The Impact of Tutoring with a Supplemental Educational Services Model on Intrinsic Motivation and Mathematical Achievement

by

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ABSTRACT

The purpose of this study was to examine the impact of individualized afterschool tutoring, under federal Supplemental Educational Services (SES), on mathematical and general academic intrinsic motivation and mathematical achievement of at-risk students. The population of this study consisted of two third graders and five fourth graders from an elementary school in the Reynolds School District in Portland, Oregon. One participant was male. The other six were female. Six of the students were Hispanic, and one student was multiethnic. Students' parents enrolled their children in free afterschool tutoring with Mobile Minds Tutoring, an SES provider in the state of Oregon. The participants were given pre- and post-assessments to measure their intrinsic motivation and achievement. The third graders took the Young Children's Academic Intrinsic Motivation Inventory (Y-CAIMI) and the fourth graders took the Children's Academic Intrinsic Motivation Inventory (CAIMI). All students took the Group Mathematics Assessment and Diagnostic Evaluation (GMADE) according to their grade level. The findings from this study are consistent with the literature review, in that individualized tutoring can help increase student motivation and achievement. Six out of the seven students who participated in this study showed an increase in mathematical achievement, and four out of the seven showed an increase in intrinsic motivation.

DEDICATION

I would like to dedicate this thesis to my husband, Matthew Ballou. He has believed in me and supported me through every avenue on my adventure to earn my masters in mathematics education.

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Chapter 1

INTRODUCTION

Researchers have studied the topic of motivation and achievement within the academic setting for many years. Students' overall academic performance and motivation in the United States and the impact of poverty on learning are foundational issues in modern education. Research across the board has shown that as students increase in age and grade level, average motivational levels and achievement decrease. This is especially prevalent in the field of mathematics and for at-risk children.

U.S. Performance in Mathematics

The trend of decreasing interest and achievement, as students grow older, is a societal problem within the United States. Researchers, from multiple theoretical perspectives, are searching to find answers for why motivation and achievement decrease. In his report for the National Center for Education Statistics, Pascal Forgione (1998) summarized the United States' overall academic achievement and compared the United States' data to international scores. American students' self-concept of mathematics achievement is among the highest in the world, but students perform below the international average in achievement on the Third International Mathematics and Science Study (TIMSS) (Lee, 2007). The data from the TIMSS indicates a relative decline in U.S. performance in mathematics and science as students progress through the grade levels. Even in advanced math and science classes, U.S. student achievement

scores in twelfth-grade were well below the international average (Forgione, 1998). In 2009, the *Program for International Student Assessment* identified U.S. students' mathematics performance as statistically significantly below the international average ("Organization for Economic Cooperation and Development," 2010). The issue of achievement and the drop in motivation must be addressed in the United States.

Poverty and At-risk Students

Many researchers are searching to discover why motivation and achievement decrease as students progress through school. Poverty is one element that profoundly impacts student learning (Manouchehri, 2004), and achievement and motivation for at-risk students is an especially challenging problem (Hock, Pulvers, Deshler, & Schumaker, 2001; Meyer, 1997; Walker, 2007). In this paper, I define at-risk students in the U.S. as students who are (a) not meeting grade level expectations on state tests, (b) English Language Learners, (c) students with special needs, or (d) students who come from low socioeconomic backgrounds (qualify for free/reduced lunch under Title I) or any combination of these factors. Some of the most promising instructional strategies for at-risk students focus on understanding mathematics at a conceptual level and applying these concepts across various content areas. Prior knowledge, student interactions, and classroom discourse are factors that can promote higher-level mathematical learning (Manouchehri, 2004). The

National Council for Teachers of Mathematics wants to develop more student-centered classrooms, where students are actively engaged in the learning process. Classrooms where students personally connect to the material, experience learning in community and participate in meaningful inquiry. Classrooms staffed with teachers willing to develop programs and implement instructional practice designed to reverse the current trend within mathematics for at-risk students. Classrooms where at-risk students receive additional support to increase motivation and make Adequate Yearly Progress (AYP).

Supplemental Educational Services: Attempting to Solve the Issues

Supplemental Educational Services was developed by the federal government to help bridge the achievements gap for at-risk students. The No Child Left Behind (NCLB) Act of 2001 mandated that SES be accessible to under- or low-performing students attending a Title I school (Ascher, 2006; Burch, Steinberg, & Donovan, 2007; Gordon, Morgan, Ponticell, & O-Malley, 2004; "Supplemental Educational Services," 2009). The program was designed for schools in their second year of improvement. The purpose of the SES program is to increase the academic achievement of students in the school ("Supplemental Educational Services," 2009). Schools that have not met AYP according to state standards for student achievement three years in a row must offer SES (Burch et al., 2007; Lee, 2007; Sunderman, 2006; "Supplemental Educational Services," 2009). Twenty percent of the Title I funds can be

used for SES. The SES program encourages schools to employ multiple independent tutoring companies, referred to as "providers," from which parents may choose. The school district acts as a liaison between the provider and the parents. Parents sign a contract to receive free tutoring (i.e., paid for with federal funds) with the individual provider they select. NCLB requires providers to utilize high quality instructional strategies that are research-based and designed to increase student achievement (Burch et al., 2007; Gordon et al., 2004; "Supplemental Educational Services," 2009). There are several different types of providers including for-profit, non-profit, religious, and school districts ("Capital to the Classroom," 2006 in Asher, 2006; "Supplemental Educational Services," 2009). While school districts are supposed to evaluate the efficacy of the SES providers in their schools, there is currently no standard methodology for doing so. Assessing providers is further complicated by the variations in parents' and students' interest and involvement (Sunderman & Kim, 2004 in Lee, 2007). A limited amount of research exists on the effects of SES (Burch et al., 2007). More research needs to be conducted in order to discover the impact of SES programs on the academic and motivational achievement of its students.

Does SES Make a Difference?

I propose that the additional academic support provided by after-school tutoring is one way to meet the needs of at-risk students. I also propose that the support systems established through tutoring can

increase self-efficacy and motivation, thereby positively impacting performance. Research has shown that higher self-efficacy beliefs positively impact performance. Self-efficacy beliefs can be better predictors of the ability to solve mathematical problems than students' gender, self-concept, and mathematical problem solving (Pajares & Miller, 1994). If educators assessed students' self-efficacy beliefs at an early age, they would be better able to identify and provide proper interventions addressing inaccurate perceptions about mathematics (Pajares & Miller, 1994). In order to enhance motivation, students need to have mastery goals that focus on effort (Ames, 1992). Providing tutoring to students at an early age can help prevent academic and motivational issues in the future (Ritter, Barnett, Denney, & Albin, 2009).

Studying the effectiveness of SES programs is important for guiding future federal mandates, improving programs in school districts, and meeting the needs of minority and poor students. A limited body of research addresses the benefits and impact of SES on at-risk students. Educators and policy makers need additional research in order to develop effective programs for students (Sunderman, 2006).

My thesis asks the questions: what is the impact on and what are the characteristics of an individualized, afterschool SES tutoring program on the intrinsic motivation and mathematical achievement of at-risk students? Specifically, I will explore: (a) patterns in intrinsic motivation related to pre- and post-assessment motivational measurements and

observed engagement in after school tutoring, and (b) patterns in mathematical achievement related to pre- and post-assessment measurements.

Chapter 2

REVIEW OF LITERATURE

Motivation and achievement are significant areas of interest in academic research. The decline in U.S. student performance and the need for intrinsic motivation is undeniable. This review focuses on factors that impact mathematical motivation and achievement as well as pedagogy, research, and strategies that can promote positive changes in those areas for students. One area of focus is tutoring. Tutoring has the potential to profoundly impact students' achievement and motivation within mathematics. Those impacts are maximized when the tutoring helps build positive self-efficacy beliefs and include goals that are created for or by students that focus on mastery and effort. I propose that developing tutoring programs that optimally combine the factors addressed in this literature review can positively impact students' motivation and achievement in mathematics.

Factors that Impact Mathematical Motivation & Achievement

The Need for Intrinsic Motivation

The causes and impact of motivation have been studied for decades. Studies comparing intrinsic versus extrinsic motivation have been foundational. Intrinsic motivation involves learning for the sake of learning. The desire to learn comes from within the individual (Benabou & Tirole, 2003; Covington, 2000; Deci, 1975; Gottfried, 1985). As it implies, extrinsic motivation is influenced by external factors generally unrelated to

the activity itself. External factors include grades, rewards, and recognition (Covington, 2000).

Middleton (1995) stresses the need to develop lifelong learners by instilling intrinsically motivating values and engaging students to learn for the sake of learning. Since intrinsic motivation varies by individual, different interests and activities will motivate different individuals. Self-efficacy, curiosity, interests, and sense of mastery influence intrinsic motivation (Kruglanski, Stein, & Riter, 1977 in Lepper, 1988; Salomon, 1983). Students who are intrinsically motivated are more likely to freely explore activities and to take risks (Condry & Chambers, 1978). Along with other research studies, Nolen's (1988) data shows that intrinsically motivated students are more likely to value and utilize deeper, more effortful, and effective study strategies (Nolen, 1988 in Lepper, 1988).

Middleton (1995) suggests that students experience intrinsic motivation if they believe the activity will, or might be, fun. A student identifies an activity as fun if she thinks it is important and that she will be successful. Middleton (1995) refers to this as "interest." Activities that involve interest are intrinsically motivating. If a student's interest in an activity is uncertain, she will consider whether the activity will provide cognitive stimulation or "arousal" as well as her level of choice or "personal control" (Middleton, 1995, p. 255-256). If both arousal and control are present, she is likely to believe the activity will be fun. The degree of interest, arousal, and control varies from student to student.

They are present in a greater degree in highly motivated students and are limited, or even absent, in less motivated students. Highly motivated students find the challenge of understanding mathematics fun. Students with lower motivation are more focused on ease, familiarity, and basic understanding. When evaluating activities, highly motivated students focus more on arousal and less on control, while students with lower motivation focus more on control and less on arousal (Middleton, 1995).

Although Lepper (1988) used different terminology, he anticipated Middleton's findings: interest, arousal, and control impact student motivation. These three elements should be implemented in all learning environments, from the classroom to individualized tutoring. Students need to believe they have a choice and are in control (Lepper, 1988). Activities should be challenging and designed to increase curiosity or "arousal" (Lepper, 1988). Lepper (1988) found that superfluous extrinsic rewards have a negative impact on interest, arousal, and control. Ideally extrinsic rewards should be related to and incorporated within learning activities. Those types of extrinsic rewards are or may be useful in engaging students, but should be withdrawn as students' abilities and self-confidence about the activity increase.

Decline in Math Motivation and Achievement

Motivation is the desire to do or participate in specific activities and to stay away from others (Hannula, 2006). Intrinsic motivation is not the same across all academic subjects, and it declines significantly as children

move from childhood to late adolescence, especially in mathematics (A. E. Gottfried, Marcoulides, A. W. Gottfried, Oliver, & Guerin, 2007).

Longitudinal research has shown that the decline in intrinsic motivation is greater in mathematics than in any other academic subject. In one study, students described a decrease in effort and persistence and identified mathematics as being less valuable at the end of both their 5th and 6th grade academic years (Pajares & Graham, 1999). The decline in math achievement has had a significant impact on the decline in intrinsic motivation is mathematics (Gottfried et al., 2007). These findings are significant because the United States recognizes the importance of math proficiency among students.

The decline in mathematics motivation in the early elementary years reveals the crucial need to develop student competence in mathematics. A longitudinal study found that a student's beginning and ending levels of achievement are directly related. Students with poor achievement in their early elementary years are likely to continue to experience a decline in achievement as well as a decline in motivation as they progress through school (Kloosterman & Gorman, 1990 in Middleton & Spanias, 1999). Students believe mathematical achievement is based on ability and that effort will not have an impact on their achievement (Kloosterman & Gorman, 1990 in Middleton & Spanias, 1999). Teachers should address academic intrinsic motivation as early as possible because it may be more difficult to influence students' motivation in adolescence

(A. E. Gottfried, Flemming, & A. W. Gottfried, 2001). One way to address intrinsic motivation is through individualized tutoring. It is clear that tutoring increases academic achievement (Bloom, 1984), and a small body of research suggests that tutoring also positively impacts academic motivation (Cohen, J. Kulik, & C. Kulik, 1982). I will discuss the impact of tutoring on academic intrinsic motivation and achievement in the next section of my thesis.

It is imperative that educators develop strategies, pedagogy, and programs to emphasize to students early in their academic careers the importance of effort on mathematical achievement. If students develop positive, intrinsic motivation during their early elementary years, their motivation and achievement is less likely to decline during middle school, where their attitudes are refined (Eccles, Wigfield, & Reuman, 1987). Those attitudes are high predictors for mathematical achievement in high school and college (Amit, 1988; Meyer & Fennema, 1985). Instruction should be designed to help students understand that every mathematical success is significant and that success is a result of effort combined with ability.

Motivation & Achievement - Influenced by Subject Matter

Nurmi and Aunola (2005) examined motivational patterns to find associations between academic performance and self-concept. They focused specifically on task motivation. Nurmi and Aunola (2005) defined task motivation as, "… a child's interest in a particular school subject," (p.

104). Nurmi and Aunola wanted to study the impact of children's task motivation on reading, writing, and math. Results indicated that a large majority of students enjoy at least one subject, although a third have a low interest in at least one subject. Students either did not like math or did not like reading and writing. Nurmi and Aunola found that the percentage of students who enjoyed all three subjects decreased slightly over time, but the percentage of students who disliked math increased (Nurmi & Aunola, 2005).

Bong (2004) studied the effects of self-efficacy, task value, goal orientations, and ability and effort attributions, on Korean language learning, English, and mathematics. Their study showed that ability attributions resulted in the clearest distinction among subjects. Nurmi and Aunola (2005) confirmed Bong's (2004) findings: student ability attributions in one subject did not necessarily correspond to their attributional beliefs in other subjects. Bong (2004) confirmed Wigfield and Eccles (1992) study that student motivational beliefs vary across different subjects, and that motivation does not necessarily span subjects (in Wigfield & Eccles, 2000). All three studies show that a student's feelings about learning may be markedly different from one subject to the next.

Self-efficacy and Self-concept

Self-concept and self-efficacy are often used interchangeably, but they are different. Self-concept is broader than self-efficacy. Self-concept is based on one's perceived competence in relationship to her self-worth

beliefs. Self-efficacy is context-specific. It is based on perceived competence to perform a specific task in a specific situation (Pajares & Miller, 1994). Self-efficacy and self-concept relate to tutoring and all other areas of education. Tutors and other educators need to know how those elements impact student performance in order to apply effective teaching and learning strategies.

Pajares and Miller (1994) designed a study to research the relationship between self-efficacy and self-concept. As mentioned above, self-efficacy addresses context-specific questions such as, “Can you solve this specific problem,” where as self-concepts questions focus on different cognitive and affective processes such as, “Are you a good math student?” (Pajares & Miller, 1994, p. 194). Pajares and Miller investigated whether students’ mathematical self-worth beliefs while solving mathematics problems were better predictors than their capability beliefs (Pajares & Miller, 1994). They evaluated self-efficacy, perceived usefulness, anxiety, self-concept, prior experience, and performance in relation to mathematics. Pajares and Miller (1994) found that self-efficacy, when compared to all other variables, more directly affected performance (Pajares & Graham, 1999; Pajares & Miller, 1994). Similarly, Wigfield and Eccles (2000) found that children’s ability and expectancy beliefs were the greatest predictors of later mathematics performance. The results of these studies show that educators and researchers should evaluate student beliefs about their abilities in order to help guide and predict

performance (Pajares & Miller, 1994). These findings are especially significant in relation to tutoring. By focusing on students' self-efficacy and ability/expectancy perceptions in the context of tutoring, students are more likely to develop positive attributional beliefs. Positive beliefs developed during tutoring increase both mathematical achievement and motivation in the short term as well as into the future.

Tutoring

The History and Impact of Tutoring

Recently, tutoring has received significantly more attention in educational research than it has in the past. In 1982, Collins and Stevens explained that only a small amount of research had been conducted on one-to-one tutoring or individualized instruction (Colllins and Stevens, 1982 in McArthur, Stasz, & Zmuidzinas, 1990). Research has shown that one-to-one tutoring is effective (Bloom, 1984; Cohen et al. 1982; McArthur, Stasz, & Zmuidzinas, 1990). Tutoring has resulted in a more positive attitude about the subject in which the student was tutored and it has increased performance (Cohen et al., 1982). Private tutoring benefits both students and tutors at the affective and cognitive levels (Cohen et al., 1982).

One of the most influential studies about tutoring was documented by Bloom in 1982. Bloom summarized the findings of two University of Chicago doctoral students' dissertations. They divided the study sample into three groups: control, mastery learning, and one-to-one tutoring.

They found that the average student involved in one-to-one tutoring scored about two standard deviations higher (2-sigma) compared to the control group. Students involved in the mastery-learning group were about one standard deviation higher than the control group. The results were similar with time-on-task and student attitudes and interests—the highest percentages in the tutoring group. Bloom (1984) stated that, "The tutoring process demonstrates that *most* (emphasis in original) of the students do have the potential to reach this high level of learning," (p. 4). These studies demonstrate that tutoring results in increased mathematical achievement.

Tutoring often has a reciprocal relationship with general academic achievement. It can positively impact achievement, which in turn encourages students to participate in tutoring (Lee, 2007). Additionally, motivational and cognitive factors can impact the success of tutoring (Lepper & Chebay, 1985 in McArthur, Stasz, & Zmuidzinas, 1990). Tutoring can increase general and academic motivation, as well as thinking and problem-solving skills and other academic learning (Gordon et al., 2004). Tutoring has also resulted in increased achievement, increased participation during math class, positive attitude changes toward mathematics, greater levels of homework completion, and increased mathematical motivation, interest and excitement (Baker, Rieg, & Clendaniel, 2006; Cohen et al., 1982; Hock, et al., 2001; McArther, Stasz, & Zmuidzinas, 1990; Mayfield & Vollmer, 2007; Meyer, 1997; Ritter et al.,

2009; Walker, 2007). More specifically, at around the thirtieth hour of tutoring instruction, student grade level equivalency increased by six months to a year (Gordon et al., 2004). These trends continued over time even after tutoring sessions were discontinued (Gordon et al., 2004).

Tutoring Methods

There are several types of tutoring. Instructional tutoring is generally one-to-one tutoring that involves direct instruction, modeling, scaffolding, and specific, positive feedback. Assignment-assistance tutoring is typically conducted in small groups. It focuses on homework and project support. Strategic tutoring combines both elements. Students learn study strategies while completing homework projects and assignments (Hock, et al., 2001). Most SES providers offer instructional tutoring even though the ratios may be as high as one-to-ten. Superior instructional tutoring includes the following important components:

- A clearly defined program
- Tutor training, preparation, and professional development
- Consistent student attendance and long-term commitment
- Program goals and diagnostic plans for student improvement
- Track student progress
- Cognitive and constructivist philosophies
- Continuous feedback along with formal and informal assessments
- Teach study habits
- Coach parents on the learning process

- At-home tutoring
- Collaborate with classroom teachers
- A program coordinator

(Baker, 2006; Gordon et al., 2004; Hock et al., 2001).

McArthur, Stasz, and Zmuidzinas (1990) found that effective tutoring should be data driven, goal driven, strategic, and tactical. Experienced tutors have a comprehensive knowledge base of strategies for introducing, explaining, and remediating concepts (Bloom, 1982; Cohen et al., 1982; Hock et al., 2001; McArthur, Stasz, & Zmuidzinas 1990; Meyer, 1997). Tutors most successfully motivate students to learn by showing compassion, tapping into inherent curiosity, acknowledging intrinsic interests, and identifying distinct abilities (Gordon et al., 2004).

Researchers should study and educators should evaluate student capability beliefs as a means of guiding and predicting future performance (Pajares & Miller, 1994). Tutoring provides an opportunity for students to express their academic beliefs and it encourages effort.

When one-to-one tutoring is not feasible, another alternative that can positively impact affective beliefs and achievement is to make mathematics a collaborative activity or use volunteers. Peer and volunteer tutoring can be effective ways to increase achievement (Cohen et al., 1982; Mayfield & Vollmer, 2007; Ritter et al., 2009; Walker, 2007) and impact tutors and students (Annis, 1983 in Gordon et al., 2004; Mayfield & Vollmer, 2007). Peer tutoring has resulted in productive interactions and

increased achievement for underachieving African American and Latino/a high school mathematics students (Walker, 2007). Mayfield and Vollmer (2007) showed that both student tutors and their tutees that were involved in peer tutoring improved their performance in mathematics. However, they found that while peer tutoring is initially effective at improving skills, it might need additional interventions (Mayfield & Vollmer, 2007). Tutoring should meet the affective, motivational, and academic needs of all students and recognize cultural differences that impact those elements.

Researchers disagree on the educational level and training that tutors needs in order to be effective (Ascher, 2006; Gordon et al., 2004). One study found that volunteers had a positive impact on students regardless of the tutors' level of training (Ritter et al., 2009). Other researchers have found that trained peer tutors can be effective (Cohen et al., 1982; Walker, 2007). Still others have found that college students can be effective (Baker et al., 2006; Hock et al, 2001; Meyer, 1997; Ritter et al., 2009), while another study recommended that tutors have at least a college degree (Gordon et al., 2004). Whatever their educational level, tutors have the potential to profoundly impact students' lives. The tutoring experience may be the first time in a child's life where she received consistent, focused attention (Meyer, 1997). The tutor may be the most positive influence in that child's life.

Supplemental Educational Services (SES)

Students are most likely to participate in private mathematics tutoring in the United States if they highly value mathematics, if they are interested in math, if their friends posses a positive belief about mathematical achievement, or on the other hand, if they have lower math achievement (Lee, 2007). Lee (2007) found that the parents of most students who participate in private tutoring have higher levels of education. This is not the case with many students who participate in SES. They must attend a Title I school and receive free or reduced lunch in order to qualify for SES. The parents of many of those students have limited education.

In 2000, a poll in *Newsweek* revealed that 42% of American's believe children need private tutoring outside the classroom (Gordon et al., 2004). Of the $13 billion Title I funds available at the time Ascher conducted the study, 20%, or about $2.6 billion, had been allocated for supplemental tutoring services under SES (Ascher, 2006). Most districts estimate that the SES funds will provide services for only about one-fifth of all eligible students. On the other hand, urban districts estimate their SES funds only provide services for about 18% of their eligible students (Ascher, 2006). In 2006, 20% of districts that were required to participate did not have any students enrolled in an SES program. Some districts and schools do not promote SES because NCLB permits them to use Title I money for other purposes if it has not been spent by the cut-off date. In

order to best meet students' academic and motivational needs in any tutoring situation, the tutor, student, parents, and the school should communicate and collaborate (Baker et al., 2006; Meyer, 1997). Federal guidelines mandate that providers offer "research-based" instruction that focuses on achievement. The federal government, districts, providers, and parents need to work together to develop effective strategies for implementing and evaluating SES.

An Alternate Perspective on Tutoring

One of the original arguments in favor of SES was that outsourcing services would provide choices and increase competition, thereby reducing costs and improving quality (Burch, Steinberg, Donovan, 2007). SES offers significant revenue potential, and market forces rather than quality influence the pool of SES providers. Its current structure favors large firms who can spend more on start up costs. Smaller providers are unable to compete. That results in less competition and fewer choices. This occurs in part because SES is a recent mandate of NCLB, is still in the developmental stage, and evaluation frameworks such as quality, student-tutor ratio, and progress and pricing of providers have not yet been solidified (Burch, Steinberg, Donovan, 2007).

Though most research supports a positive correlation between tutoring and student academic achievement and motivation, not all studies have yielded those results (Burch, Steinberg, Donovan, 2007; Zuilke & Nelson, 2001). In each year of a three-year study of 290 students

involved in after school tutoring from up to eight schools, Zuilke and Nelson (2001) found those students did not improve in reading or math. The study focused on a non-profit community agency that partnered with an after school-tutoring program for at-risk students in grades 3-12. Zuilke and Nelson (2001) concluded that several factors impacted the agency's ability to improve student achievement: unfocused or unspecified goals/roles, a strained relationship between the personnel of the agency and the school, continuing to use activities that did not produce results, a lack of communication between the agency and the authors, absence of leadership at the agency, and the agency's lack of awareness of parental perceptions. As apparent from Zuilke's and Nelson's 2001 study, providers offering tutoring services must proactively analyze the effectiveness of their programs and be willing to institute changes that reflect best practices.

Parallels between Teachers and Tutors

Teachers are constantly in contact with students and have the time and ability to influence their motivation, beliefs, constructs, and achievement. Teachers can structure their classrooms to promote students' positive views of mathematics, thereby developing a foundation for influential conceptual structures (Cobb, Wood, Yackel, Nicholls, Wheatley, Trigatti, & Perlwitz, 1991; Cobb, Wood, Yackel, & Perlwitz, 1992). Many of the principles that help teachers positively impact their

students' mathematical motivation and achievement applies to tutors and tutoring.

Teachers have different ways of instructing, interacting with, and motivating students. Research has shown that teachers are often not informed about or good at predicting the foundation and focus of their students' intrinsic motivation (Middleton, 1995). The amount of planning a teacher invests in his students' motivation significantly relates to his ability to anticipate his students' motivational characteristics. In one study, students whose teachers more accurately predicted the students' motivational constructs generally had a higher level of motivation when compared to students whose teachers' were not as accurate (Middleton, 1995). The ability of a teacher or tutor to accurately identify and employ the intrinsic motivation of a student has the potential to profoundly impact that child's learning experiences.

Teachers need to evaluate their student's motivational constructs, as well as understand how instruction impacts motivation. What has worked well in a classroom setting should be incorporated into tutoring. Several names have been used to describe teachers' instructional approaches, such as inquiry-oriented versus traditional and autonomy-supportive versus controlling (Manouchehri, 2004; Stipek, Givvin, Salmon, & MacGyvers, 2001). In this thesis, the terms inquiry-oriented versus traditional will be used. Inquiry-oriented instruction has been proven in the classroom to be more effective for student learning than traditional

instruction, and this type of instruction can be implemented into the tutoring setting. Inquiry-oriented teachers tend to support students' interests, encourage creative thinking, risk taking and problem solving, and initiate classroom discussions. Traditional teachers tend to focus on procedures, rules, assignment completion, responsibility, and the elimination of undesirable behaviors. Manouchehri (2004) found that inquiry-oriented teachers, when compared to traditional teachers, spent more time listening and less time talking, encouraged students to ask more questions, had a greater number of directive statements, and focused less on students following specific procedures. In order to create the most effective learning environment, inquiry-oriented instructional strategies such as these should be implemented in tutoring.

The small group atmosphere is a significant advantage in tutoring. One-to-one or small group tutoring enables tutors to provide additional time and immediate feedback, as well as adjusting lessons to the remediation or enrichment needs of the individual student. Since inquiry-oriented instruction has proven successful in the classroom, it should also be implemented in tutoring.

Productive Learning Environments

Teachers and classroom environments that are sensitive to the needs of young adolescent students often result in positive student achievement (Midgley & Feldlaufer, 1987; Midgley, Feldlaufer, & Eccles, 1989). The learning environment of any educational setting is significant.

It is important to understand the environments in which students most effectively learn and apply best practices to tutoring. A student's confidence, self-regulated learning, and disruptive behavior, in relation to the teacher, are impacted by her perceived support in the classroom environment (Ryan & Patrick, 2001). Ryan and Patrick (2001) found that a teacher that was available and tried to understand his students' perspectives resulted in less disruptive and off-task behavior in the classroom. A classroom environment where students felt encouraged and supported to take risks and openly share their ideas were the most important elements in predicting changes in self-regulation of school work and academic efficacy in the social environment (Ryan & Patrick, 2001). Students reported more disruptive behavior and less confidence in relating to their teacher when they felt they were being directly compared to others (Ryan & Patrick, 2001). Research suggests that tutors should be encouraging, responsive, available, open and respectful to the thought processes of students (Ryan & Patrick, 2001). They should also interact with each student on an individual basis by recognizing specific strengths and weaknesses without comparing one student to another.

The Impact of Tutoring on Mathematical Motivation & Achievement

Tutoring has a significant, positive impact on student motivation and achievement. It helps students develop a greater understanding of material, increase problem-solving skills and increase interest, motivation, and affect (Baker et al., 2006; Cohen et al., 1982; Hock et al., 2001;

McArther et al., 1990; Mayfield & Vollmer, 2007; Meyer, 1997; Ritter et al., 2009; Walker, 2007). SES was developed by the federal government in an effort to bridge the gap in achievement for at-risk students. It provides the educational benefits of tutoring to students who would not normally receive these services. SES has been projected to increase the motivation and achievement of at-risk students.

Goals Impacting Motivation and Achievement

Goals have become a focal point in research on academic motivation and achievement. Researchers have focused on a variety of learning goals, the process of developing goals, and the impact of goals on student motivation and achievement. As early as second grade, students form consistent, internal beliefs and academic goals that are connected to mathematical success (Nicholls, Wood, Yackel, & Patashnick, 1990). Goals have been proven to influence students' learning; therefore, goals should be incorporated into student instruction (McNeil & Alibali, 2000). As mandated by NCLB, SES providers must create at least one individualized academic goal for every student that receives services. It is essential that providers understand why goals are created, and which types of goals result in the greatest increase in motivation and achievement. Though the focus of the goal may be an increase in achievement, research has shown that goals can also positively impact motivation (Ames, 1992; McNeil & Alibali, 2000; Nicholls et al., 1990; Schweinle, Meyer, & Turner, 2006).

Mastery versus Performance Goals

Individualized goals are one component of SES outlined by NCLB. NCLB requires providers to analyze student performance (pre- and post-assessments) and most school districts require providers to use those measurements to create individualized goals. Research has shown that goals are one way to help improve mathematical motivation and achievement (Ames, 1992; McNeil & Alibali, 2000; Nicholls et al.,1990; Schweinle & Meyer, 2006). Since SES providers are required to create goals, it is important that tutoring goals be created in alignment with current research. Goals have taken on many forms and researchers have referred to two common types of goals by various names: mastery versus performance, task orientation versus ego orientation, learning versus performance, and intrinsic versus extrinsic. For the purpose of this comparison, the two versions will be referred to as mastery versus performance. Mastery goals and performance goals result in qualitatively different motivational patterns due to various environmental and instructional pressures (Ames, 1992). Mastery goals have a foundation of intrinsic motivation and the focus is on effort and understanding. Effort will lead to success and ultimately to mastery. Mastery goals support a motivational framework for high-quality, long-term learning and positive achievement (Ames, 1992). Central to a performance-orientated goal is an individual's sense of self worth and ability. The focus is on outperforming one's peers and gaining public recognition. In one study,

students that believed that interest, effort, cooperation, and attempts to comprehend mathematics are connected to success did not believe that success relies on competiveness (Nicholls et al., 1990). One way for SES providers to develop intrinsic motivation, effort, understanding, and a personal sense of success in students is to create mastery goals or goals focused on mastery.

Learning a procedure does not necessarily transfer to conceptual understanding. Children must go deeper than an instructed procedure in order to gain conceptual knowledge and transfer that knowledge to practical problems. McNeil and Alibali (2000) examined the influence of externally imposed goals on students' ability to gain conceptual knowledge and transfer learned procedures to new situations. Their study focused on mastery and performance goals. Mastery goals resulted in persistence and the desire for challenge, whereas performance goals resulted in a lack of persistence and an increase in disruptive behavior (McNeil & Alibali, 2000). Children who received goals solved more problems correctly and demonstrated a higher level of conceptual understanding and transfer (McNeil & Alibali, 2000). In order for a student's motivation to change, she must either create a mastery goal or understand and support an externally imposed goal focused on mastery (Hannula, 2006). Educators need to understand students' motives in order to understand their behavior (Hannula, 2006). The implementation of mastery goals or externally imposed goals focused on mastery into SES programs could

help encourage student understanding, develop intrinsic motivation, and increase academic achievement.

Setting Challenging Goals

Research has suggested that affect was mostly an outcome of motivation. Schweinle, Meyer & Turner (2006) found that affect and motivation are collectively experienced. They found a strong correlation between affective and motivational factors, indicating that learning is influenced at the emotional as well as cognitive level (Schweinle, Meyer, & Turner 2006). Results indicate that challenge is indirectly linked to affect, through value. Finding a balance between challenge and perceived skills are critical components of motivation and classroom instruction. Schweinle, Meyer & Turner (2006) listed the following components as collectively having a positive impact on affect and motivation: "…demonstrating enjoyment of math, alleviating frustration, providing positive substantive feedback, encouraging cooperation rather than competition, and encouraging persistence…learning and understanding rather than memorizing, treating mistakes as learning opportunities, supporting autonomy, and stressing the importance of mathematics…" (p. 289). Along with creating mastery goals, SES providers should also make sure goals are challenging while still attainable. This combination will help maximize student focus during tutoring while taking into account affect, effort, ability, and motivation.

Nicholls, Wood, Yackel, and Patashnick (1990) also designed a study examining mastery versus performance goals. A constructivist approach in the classroom produced students with higher scores relating to mastery goals and they placed a higher value on collaboration and effort to understand material. Their performance goal scores were lower; they were less likely to view themselves as superior to their peers and were less likely to engage in work avoidance behaviors. Research suggests that a student's mastery and performance beliefs about the causes of success are generally self-sustaining and stable over time (Nicholls et al., 1990). This can play a significant role in the educational progress of students. Therefore, tutoring should not only focus on mastery goals, but also a constructivist learning approach which support those created, established, or externally imposed mastery goals.

Goals & Assessment

The format of student evaluation is one of the most significant factors that can influence student motivation. A negative motivational environment can develop when students perceive evaluations as being normative, comparative to their peers, or a threat to their sense of control (Ames, 1992). These elements are often present with performance goals. Ames (1992) found that, "The impact of social comparison on children when they compare unfavorably can be seen in their evaluations of their ability, avoidance of risk taking, use of less effective or superficial learning strategies, and negative affect directed toward the self," (p. 264).

Classroom structures centered around mastery goals should focus students on effort instead of ability, help develop intrinsic interest in learning, and utilize effective learning strategies.

Goals & Tutoring

Placing value on goals that focus on mastery is critical for students and should incorporate meaningful learning, self-evaluation opportunities, and the chance for self-directed learning (Ames, 1992). Goals focused on mastery help guide students who are involved in tutoring. One way to help create goals that focus on mastery is to understand the motivational and academic level of every student. The Children's Academic Intrinsic Motivation Inventory (CAIMI) is one way to evaluate students' motivational perspectives on specific subject matter and general motivation towards academics (Gottfried, 1990). This enables instructors, teachers and tutors to create meaningful goals that align with students' motivational levels and that focus on mastery. When a student's current motivation and achievement are used to develop goals, she is more likely to relate, support, and connect with her goals and strive to develop mastery. Educational structures should center around goals and mastery that focus students on effort, intrinsic interest in learning, and effective learning strategies.

Chapter 3

HYPOTHESIS

Research Questions

I hypothesize that individualized, afterschool (SES) tutoring for at-risk students enrolled in a Title 1 school will increase mathematical achievement and intrinsic motivation through the mechanisms of individualized instruction, personalized learning plans, favorable tutor to student ratios, and specific and individualized goals designed to develop mastery.

The research questions for this study were:

a.) In what ways does individualized afterschool tutoring increase mathematical and general academic intrinsic motivation in students?

b.) In what ways does individualized afterschool tutoring increase mathematical achievement in students?

Limitations

The following limitations directed the results, conclusions, and suggestions for future research:

a.) The sample was limited to an elementary, public school in an urban neighborhood in Portland, OR.

b.) The sample was limited to the number of students whose parents chose to sign up with Mobile Minds Tutoring services.

c.) The sample was limited to parents who signed “Parental Consent Forms” and students who signed a “Child Assent Form.”

d.) Small sample size

e.) No control group

As a result of these limitations, this current study provides descriptive statistics on a very small scale. The study sheds light on the disposition of mathematics, motivation, and achievement in tutoring and on the impact of the SES model on at-risk students. The descriptive statistics apply to a very small sample size. More research will need to be completed in order to test whether the findings of this study are consistent with the general population.

Chapter 4

METHODS

Mobile Minds Tutoring

Individualized tutoring through independently contracted companies is mandated by the state of Oregon for schools that have not met Adequate Yearly Progress (AYP) goals for three years in a row. The program is through Supplemental Educational Services (SES) as mandated by NCLB. Schools are expected to use twenty percent of their Title 1 funds to outsource tutoring services through independent companies. Parents whose children are receiving free or reduced lunch under Title 1 funding are eligible to choose an independent provider and receive tutoring services (free for parents and children).

I conducted my research through Mobile Minds Tutoring (MMT), an approved SES provider for the state of Oregon. MMT granted me permission to access and use student data (Appendix C). The tutor-to-student ratio for MMT is 1:5 or less. Students receive up to thirty hours of tutoring within the SES program, or a specified amount agreed upon in the contract between the district and MMT. Students are given a pre- and post-assessment to evaluate growth. They are also given a pre- and post-motivational measurement to determine students' overall academic and mathematical motivation. MMT, the district and parents agree on a specific goal for each student in order to develop mastery and focus

instruction throughout the SES process. Tutors create individualized lessons for each student in alignment with her specific goal.

Participants & Setting

In this study, MMT offered SES to a kindergarten-fifth grade elementary school in the Reynolds School District in Portland, Oregon. Students enrolled in SES in the Reynolds School District received 26 hours of tutoring. The school has a total of 515 students, with 15 enrolled in the MMT program. Forty-five percent of the school's population receives special education services, forty-seven percent are English Language Learners (ELL), and ninety-one percent receive free or reduced lunch as determined by Title 1 funding. Table 1 describes the overall demographics in the school.

Table 1 - School Population Demographics for Ethnicity

Ethnicity	Percent of School Population (n=515)
Latino	52%
Caucasian	26%
African American	9%
Multiethnic	7%
NA	2%
Pacific Islander	1%

The students enrolled in the MMT program were first through fourth graders. Of those 15 students, two third graders and five fourth graders had a goal that focused on mastery in mathematics. Tutors utilize information provided by the school or district, student and parent requests and feedback, and program pre-assessments to develop a personalized goal for each student. A goal of mastery in mathematics was chosen,

because those specific students scored higher in reading than mathematics on their pre-assessment. The grades, age, gender, and ethnicity of the students that participated in the study are listed in Table 2. All participants in the study received free or reduced lunch. Participants are identified by letters to protect their identity. None of the students received special education or ELL services through the school. All of the participants signed a child's assent form (Appendix B) and their parent/guardian signed a parental permission agreement (Appendix A).

Table 2 – Study Participants Demographics for Ethnicity

Student ID	Grade	Age	Gender	Ethnicity
A	3	9	F	Hispanic
B	3	8	F	Hispanic
C	4	10	F	Hispanic
D	4	10	M	Hispanic
E	4	9	F	Multiethnic
F	4	9	F	Hispanic
G	4	10	F	Hispanic

Students were tutored for two hours per day, two times per week (Monday and Wednesday or Tuesday and Thursday), which was the schedule set up by the school's after-school program director. Once school was dismissed, students went to the cafeteria to receive a meal. After the meal, each tutoring company would take their students to their assigned room. Mobile Minds Tutoring was assigned one room where all students were tutored. Students were assigned a tutor that worked with them throughout the program. The tutor to student ratio for all participants was one to four. Though the tutor worked with four students throughout each tutoring session, each student had an individualized lesson plan and

received one-to-one instruction at different times throughout each tutoring session. The same tutor tutored all participants in the study.

Measures & Procedures

Intrinsic motivation.

Students were given a pre- and post-motivational assessment to test the overall change in intrinsic motivation due to individualized after-school tutoring. Adele Eskeles Gottfied created the motivational instruments, the Young Children's Academic Intrinsic Motivation Inventory (Y-CAIMI) for primary-level students and the Children's Academic Intrinsic Motivation Inventory (CAIMI) for 4^{th}-8^{th} graders in 1988. Both instruments used the same definition for intrinsic motivation created by Adele Gottfried, "Academic intrinsic motivation involves enjoyment of school learning characterized by a mastery orientation, curiosity, persistence, task-endogeny, and the learning of challenging, difficult, and novel tasks," (Gottfried, 1985, p. 317).

The Y-CAIMI was created to be more appropriate for younger children and is a simplified version of the CAIMI. The number of items was reduced and the response format was simplified. Instead of using a five-point Likert scale like the CAIMI, the Y-CAIMI uses a three-point Likert scale. The Y-CAIMI is characterized by high reliability and validity. The coefficient alphas were .82 (Reading), .84 (Math), .82 (General), .87 (Difficult) and .91 (Total). It was found to have high inter-item consistency and strong short-term stability. The Y-CAIMI also was found to have high

test-retest correlations (two months between tests): .73 (Reading), .73 (Math), .74 (General), .80 (Difficult) and .88 (Total) where $p<.001$ (Gottfried, 1990). Pilot testing revealed that the administrative procedures and format were clear and appropriate, as well as having high internal consistency among the subscales, resulting in high validity (Gottfried, 1990). The responses were developed to minimize acquiescence, biases, and social desirability. For example, the answer "*Very True"* for some statements indicated high academic intrinsic motivation, where as for other statements, "*Very True"* indicated low academic intrinsic motivation. Results from multiple studies showed that *Very True* and *Not True* item totals were consistently, positively, and significantly correlated with the other (*r*'s were from .37-.79; *dfs*=96-104; $p<.001$). No consistent patterns or correlations were found between social desirability items and the Y-CAIMI (Gottfried, 1990).

The Y-CAIMI was given orally to the two third graders enrolled with MMT. The students were given the option to point at cards and choose between "Very True", "True", and "Not True" or to answer verbally using one of the three previous words/phrases. Both students went back-and-forth between pointing to the cards and offering an auditory answer. Questions on the Y-CAIMI addressed student mathematics intrinsic motivation, "I feel good inside when I learn something new in math", and general academic intrinsic motivation, "I do not like learning." Students

were asked thirteen questions in each category ("*Young Children's Academic Intrinsic Motivation Inventory,"* 1990).

The CAIMI has very extensive reliability in both the internal consistency and test-retest reliability ranging from .66 to .75 (Gottfried, 1986). Both convergent and discriminant validity were established through positive and negative correlations (Gottfried, 1986). The CAIMI has also proven to be a unique and independent measure of intrinsic motivation based on partial correlations (Gottfried, 1986). The original version of the CAIMI has five categories: reading, math, social studies, science, and general academics. I received permission from the publishing company to use only the items in the mathematics and general academic categories (Appendix D). The directions and administration of the measurement followed the same guidelines as the original.

The CAIMI was administered in groups of two or three students. The students were read the directions aloud and then completed all of the questions on their own. They were encouraged to ask questions if they were confused. The CAIMI used a five-point Likert scale: strongly agree, agree, don't agree or disagree, disagree, and strongly disagree. Students answered a total of 44 questions: 26 focused on intrinsic motivation in mathematics and 18 focused on intrinsic motivation in general academics. Questions for mathematics modeled, "I give up easily when I don't understand an assignment in mathematics," ("*Children's Academic Intrinsic Motivation Inventory*," 1986). Questions in the general category

were similar to, “I like to review work I already know,” (“*Children's Academic Intrinsic Motivation Inventory*,” 1986).

Achievement.

To test the impact of after-school tutoring on students’ overall achievement, students were given a pre- and post-achievement assessment. Specifically, I used the Group Mathematics Assessment and Diagnostic Evaluation (GMADE). The GMADE is based on the National Council of Teachers of Mathematics standards document, *Principles and Standards for School Mathematics,* and is a result of a yearlong research study conducted by Pearson Publishing Company to evaluate state standards, research on best practices, curriculum benchmarks, and textbooks’ scope and sequence (“GMADE The Complete Solution,” 2010). Alternate form and test-retest reliability coefficients for the GMADE were within the .90 range. Multiple standardized mathematics assessments were used to evaluate the concurrent and predictive validity of the GMADE (*Terra Nova, Iowa Test of Educational Development, Texas Assessment of Knowledge and Skills,* to list a few). The standardized sample consisted of 26,000 students nationwide that were representative of socioeconomic status, race/ethnicity, gender, region, enrollment, and type of community based on participation for free/reduced lunch (“GMADE The Complete Solution”, 2010). The curriculum used throughout the tutoring session was *Head for Success* by Pearson Publishing, which was developed to go hand-in-hand with the GMADE.

Chapter 5

RESULTS

The purpose of the following study was to examine the impact of an individualized after-school tutoring program, structured under SES, on the mathematical and general academic intrinsic motivation and mathematical achievement of at-risk students. SES is a new program mandated by NCLB and very limited research exists that shows the positive or negative impact of SES on student motivation and achievement.

Intrinsic Motivation

The instruments used to measure intrinsic motivation were the Y-CAIMI (n=2) and the CAIMI (n=5). The highest possible raw score for intrinsic motivation on the Y-CAIMI is 78 (36 for math, 36 for general, and 6 for difficult). The highest possible total raw score, indicating the highest rating for intrinsic motivation, for the CAIMI is 214: mathematics=124 and general=90.

Y-CAIMI.

The results of the quantitative analysis for the Y-CAIMI were not consistent with my hypothesis. The combined results of the two students who took the pre- and post-motivational measurements did not show growth in motivation. The total pre-test range was four, indicating that one student received four points higher on the motivational measurement than the other student. When the actual measurement was analyzed, though, the only difference in the pre-test scores was in the “difficulty” category.

Student A received one point for each of the two questions in that category, indicating that she does not enjoy being challenged in mathematics. Student B received the maximum amount of points (three for each question) in the difficulty category, indicating she enjoys challenging mathematical problems. The overall pre-measurement mean was 76 with a standard deviation of 2.83. Both students received high motivational scores in the mathematics and the general categories. Student A received a total score of 74 points – 36 in math, 36 in general, and 2 in difficult. She received the maximum number of possible points in both the mathematical and general categories. However, she received the least amount of points in the difficulty category. Student B also received the maximum points possible in the mathematical and general categories. Her total score was six points in the difficulty category. Student B's pre-measurement score of 78 is the highest possible motivational score on the Y-CAIMI. Table 3 shows the descriptive statistics and Table 4 shows the individual student scores.

Overall, the post-measurement scores indicated a decrease in motivation. The range increased to 8, the mean decreased to 74, and the standard deviation increased to 5.66. Student B's scores remained identical to her pre-measurement score. Since she received the highest score on the pre-measurement, her post-measurement score indicates that she did not lose motivation. However, it does not indicate whether or not she had an increase in motivation. Student A's post-measurement

results indicated a decrease in motivation. She lost two points in both the mathematical and general sections on her post-measurement, lowering her total pre-measurement score of 74 to 70. In the mathematics section, she answered, “Very true” to the statement “I like to do hard math work,” in her pre-measurement, but she answered, “not true” in her post-measurement. In the general section, she answered “very true” to the statement, “I like to do hard work in school,” on her pre-measurement, but she answered, “not true” on her post-measurement. These questions both address the same idea in different academic domains, indicating that student A’s enjoyment of “hard work” in academics decreased. This evidence suggests that student A’s experience in tutoring may have influenced her enjoyment of “hard work” in general academics and in mathematics. The tutoring program focuses on mastery. Students do not generally move on to a new concept until they have mastered the current mathematical concept. Elapsed time was one of the main concepts that Student A had a difficult time mastering and a significant amount of time during tutoring was spent on developing mastery of that concept. Focusing on the challenging areas of mathematics may have impacted Student A’s view of hard work. She demonstrated throughout tutoring that she would prefer to work on concepts she grasped more easily and did not enjoy focusing on the more challenging concepts. Overall, both students received high scores on their pre- and post-Y-CAIMI, indicating they have high levels of motivation in mathematical and general academics.

Table 3 - Descriptive Statistics for Sub-Domains of Y-CAIMI
n=2

Y-CAIMI Category	Pre-test Range	Pre-test Mean	Pre-test SD	Post-test Range	Post-test Mean	Post-test SD
Mathematics	0	36	0	2	35	1.41
General	0	36	0	2	35	1.41
Difficult	4	4	2.83	4	4	2.83
Total	4	76	2.83	8	74	5.66

(SD=Standard Deviation)

Table 4 – Descriptive Statistics of Individual Student Results of Y-CAIMI

Student ID	Pre-Math	Pre-General	Pre-Difficult	Pre-Raw Score	Post-Math	Post-General	Post-Difficult	Post-Raw Score
A	36	36	2	74	34	34	2	70
B	36	36	6	78	36	36	6	78

CAIMI.

The results of the quantitative analysis for the CAIMI were consistent with my hypothesis: individualized tutoring is an effective strategy for increasing motivation for at-risk students. Five students were administered the pre- and post-CAIMI. A review of the descriptive statistics can be found on Table 5. The pre-CAIMI range for mathematics was 18, the mean was 94, the percentile rank based on the mean was 31 and the standard deviation was 7.31. The post-CAIMI range for mathematics was 21, the mean was 96.6, the percentile rank based on the mean was 37 and the standard deviation was 8.53. The mathematics range increased by 3 from the pre- to post-CAIMI. The mean increased by 2.6, the percentile rank increased by 7, and the standard deviation increased by 1.22. The pre-CAIMI range for general academics was 17, the mean was 67.6, the percentile rank based on the mean was 37, and

the standard deviation was 7.54. The post-CAIMI range for general academics was 16, the mean was 72.2, the percentile rank based on the mean was 53 and the standard deviation was 6.06. The general academics range decreased by 1 from the pre- to post-CAIMI. The mean increased by 4.6, the percentile rank increased by 16, and the standard deviation decreased by 1.48. The pre-CAIMI range for the total (mathematics and general scores combined) was 29, the mean was 161.2, and the standard deviation was 13.05. A percentile rank for the combined mathematics and general scores is not listed in the data tables developed for evaluating the results of the CAIMI. The post-CAIMI range for the total was 37, the mean was 168.8, and the standard deviation was 13.55. The range increased by 8 from the pre- to post-CAIMI. The mean increased by 7.6, and the standard deviation increased by 0.05.

Table 5 - Descriptive Statistics for Sub-Domains of CAIMI
n=5

CAIMI Category	Pre-Range	Pre-Mean	Pre-%ile	Pre-SD	Post-Range	Post-Mean	Pre-%ile	Post-SD
Mathematics	18	94	31	7.31	21	96.6	37	8.53
General	17	67.6	37	7.54	16	72.2	53	6.06
Total	29	161.6	n/a	13.05	37	168.8	n/a	13.55

(SD=Standard Deviation, %ile=Percentile)

An individual comparison of student data from the CAIMI reveals some differences (refer to Table 6). In the mathematics section of the CAIMI, Student C increased her raw score by 12 points and her percentile by 16. Student D and E both increased their raw scores by 7 and their percentiles by 39 and 14 respectively. Students F and G showed a decrease in mathematical motivation based on their CAIMI results.

Student F had a raw score and a percentile decrease of 5. Student G had a raw score decrease of 8 and a percentile decrease of 17. Both student F's and G's results were surprising. They both demonstrated motivation in mathematics and enjoyment during tutoring. Neither student drastically changed their answers on their post-assessment. Rather, their score decreased because they answered questions with "Agree" instead of "Strongly Agree." These small changes may have been influenced by the excitement at the beginning of tutoring, pressure from taking assessments, a change in mood influenced by outside factors, or an actual difference in motivation. A more detailed comparison of student F's and student G's behavior during tutoring and their CAIMI results are addressed in Chapter 6.

Table 6
Descriptive Statistics of Individual Student Results of Mathematics CAIMI

Student ID	Pre-Math RS	Pre-Math %ile	Pre-Math T-score	Post-Math RS	Post-Math %ile	Post-Math T-score
C	84	15	40	96	36	46
D	98	39	47	105	78	58
E	97	37	47	104	51	50
F	89	22	42	84	17	40
G	102	48	49	94	31	45

(RS=Raw Score; %ile=Percentile)

In the general section of the CAIMI, Student C increased her raw score by 9 points and her percentile by 40. Student D and E both increased their raw scores by 4 and 11, and their percentiles by 15 and 37 respectively. The general results for students F and G were not as substantial as the mathematics section. Student G had the same pre- and

post-CAIMI scores. Student F only decreased her raw score by 1 point, which resulted in a percentile decrease of 3. Refer to Table 7 for descriptive statistics.

Table 7
Descriptive Statistics of Individual Student Results of General (G) CAIMI

Student ID	Pre-G raw score	Pre-G %ile	Pre-G T-score	Post-G raw score	Post-G %ile	Post-G T-score
C	65	23	43	74	63	54
D	75	67	54	79	82	59
E	59	8	36	70	45	49
F	63	17	40	63	17	40
G	76	70	55	75	67	54

(%ile=Percentile; GE=Grade Equivalent)

This evidence supports the findings of multiple researchers, which suggest that students' intrinsic motivation does not necessarily span different domains in academics (Bong, 2004; Nurmi & Aunola, 2005; Wigfield & Eccles, 1992). A student may have a high level of general academic motivation, while having a lower level of motivation in one or more specific subjects (reading, mathematics, etc.). The results from this study could be due to random variation or they could be reflective of the many negative connotations connected with mathematics. Overall, the results for the general academics appear to be the same, where as the intrinsic mathematical motivation dropped for two students, indicating those students liked mathematics less. It is important to identify that intrinsic motivation towards school and intrinsic motivation towards mathematics are two separate elements.

As demonstrated by Table 5, on average, tutoring resulted in an increase in mathematics and general academic motivation for fourth

graders. Using T-scores and the standard error of measurement based on the coefficient alpha reliability (96% confidence limits), students C and D showed a significant motivational increase within mathematics on the CAIMI. Students C and E showed a significant motivational increase in general academics on the CAIMI ($p<.04$). Student E showed an overall increase in mathematics and student D showed an overall increase in general academics, but the confidence intervals for the pre- and post-measurements overlapped. I cannot be certain the increases were significant for students D and E, since they did not fall outside of the confidence intervals.

Achievement

The instruments used to measure academic achievement were the third (n=2) and fourth (n=5) grade GMADE (Group Mathematics Assessment and Diagnostic Evaluation). The total raw score for both measurements is 80, which is split into three sections: Concepts and Communication has a total raw score of 28, Operations and Computation has a total raw score of 24, and Process and Application has a total raw score of 28. Students were given the pre-GMADE on the first day of tutoring and the post-GMADE during the last two sessions of tutoring. Students received a total of 26 hours of tutoring, which included the pre-/post-assessments. Overall, student data shows an increase in mathematical achievement for students in 3rd and 4th grade (refer to Table 8).

Table 8 – GMADE Descriptive Statistics								
Grade	Pre-Range	Pre-Mean	Pre-%ile	Pre-SD	Post-Range	Post-Mean	Post - %ile	Post-SD
3rd (n=2)	8	43	12.5	5.66	6	50	30	4.24
4th (n=5)	5	46	30.2	2.12	12	49.2	51.8	4.66

3rd Grade GMADE.

The results of the quantitative analysis for the third grade GMADE were consistent with my hypothesis: individualized tutoring is an effective strategy for increasing mathematical achievement for at-risk students. The pre-GMADE range was 8, the mean was 43, the percentile based on the mean was 12.5 and the standard deviation was 5.66. The post-GMADE had a range of 9, a mean of 50, a percentile of 30 and a standard deviation of 4.24. The range decreased by 6, the mean increased by 7, the percentile increased by 17.5 and the standard deviation decreased by 1.42. Refer to Table 8 for the descriptive statistics for the 3rd GMADE data. Both students, A and B, in the study increased their overall mathematical achievement. Student A had a pre-GMADE total raw score of 39 and a post-GMADE score of 47. She had a pre-GMADE standard score of 68 and a post-score of 89. She had pre-/post-percentiles of 2 and 23, and pre-/post-grade equivalents of 1.6 and 2.2 respectively. Student A increased her overall score by 8 points, her standard score by 21, her percentile by 21, and her grade equivalent by 0.6 or 6 months. Student B had a pre-GMADE total raw score of 47 and a post-GMADE raw score of 53. Her pre- and post-GMADE standard scores were 89 and

95, her percentiles were 23 and 37, and her grade equivalents were 2.2 and 2.6 respectively. She increased her total raw score and standard scores by 6, her percentile by 14, and her grade equivalent by 0.4 or 4 months. Table 9 summarizes the results listed above.

Table 9 – Pre-/Post Assessment GMADE 3rd Comparison

Student ID	Pre-total	Post-Total	Pre-SS	Post-SS	Pre-%ile	Post-%ile	Pre-GE	Post-GE
A	39	47	68	89	2	23	1.6	2.2
B	47	53	89	95	23	37	2.2	2.6

(SS=Standard Score; %ile=Percentile; GE=Grade Equivalent)

Though both students increased their overall scores, it is also beneficial to look at each individual section in the GMADE. Tables 10 and 11 summarize the individual data for students A and B in each subcategory of the third grade GMADE. Refer to Figure 1 for a graphical representation of that data. Student A increased her scores in all three sections of the GMADE. From pre- to post-GMADE, she increased her Concepts and Communications score by three points, her Operations and Computation score by four points and her Process and Application score by one point. Student B increased her scores in two out of the three sections. She increased her score by three points in the Concepts and Communications and Process and Application sections. Her score remained the same, 16 points, in the Operations and Computation section.

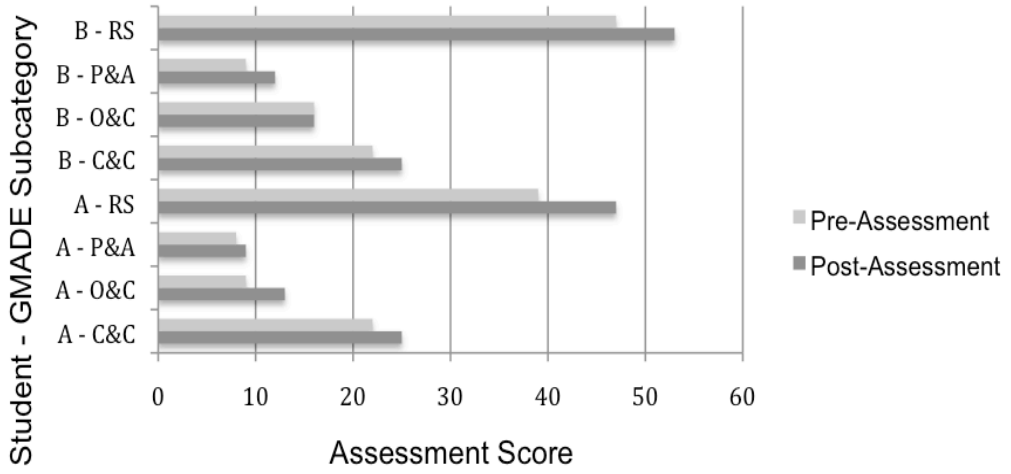
Table 10 – Pre-Assessment Results GMADE 3rd						
Student ID	Pre-C&C	Pre-O&C	Pre-P&A	Pre-total RS	Pre-%ile	Pre-GE
A	22	9	8	39	2	1.6
B	22	16	9	47	23	2.2

(Concepts & Communication=C&C; Operations & Computation=O&C; Process & Application = P&A; Raw Score = RS; %ile=Percentile; GE=Grade Equivalent)

Table 11 – Post-Assessment Results GMADE 3rd						
Student ID	Post-C&C	Post-O&C	Post-P&A	Post-total RS	Post-%ile	Post-GE
A	25	13	9	47	23	2.2
B	25	16	12	53	37	2.6

(Concepts & Communication=C&C; Operations & Computation=O&C; Process & Application = P&A; Raw Score = RS; %ile=Percentile; GE=Grade Equivalent)

Figure 1 - 3rd GMADE Pre- & Post-Assessment Data by Subcategory



4th Grade GMADE.

The results for the quantitative analysis of the fourth grade GMADE supported my hypothesis and revealed similar results to the third grade GMADE. Overall, fourth grade students' GMADE mathematical achievement scores increased from their pre- to post-assessments. The

pre-GMADE range was 5, the mean was 46, the percentile based on the mean was 30.2, and the standard deviation was 2.12. The post-GMADE range was 12, the mean was 49.2, the percentile was 51.8, and the standard deviation was 4.66. A pre-/post-assessment comparison shows the range increased by 7, the mean increased by 3.2, the percentile increased by 21.6, and the standard deviation increased by 2.12. Refer to Table 8 for descriptive statistics. Four out of five of the fourth grade students demonstrated progress in the program based on GMADE achievement scores. Students C, E, F, and G increased their total raw score from pre- to post-assessment. Student D's total raw score decreased on his post-assessment. Student C had a pre-GMADE total raw score of 44, a standard score of 90, a percentile of 25, and a grade equivalent of 3. She increased her total raw score by 8 points, her standard score by 10, her percentile by 25, and her grade equivalent by 1.1 or 1 year and 1 month. Student E increased her total raw score by 9 points, her standard score by 14, her percentile by 33, and her grade equivalent by 1.5 or 1 year and 5 months. Student F increased her total raw score by 6 points, her standard score by 7, her percentile by 17, and her grade equivalent by 0.8 or 8 months. Student G increased her total raw score by 6 points, her standard score by 8, her percentile by 22, and her grade equivalent by 0.7 or 7 months. Student D was the only student that did not show progress on his post-assessment. His total raw score decreased by 2 points, his standard score by 2, his percentile by 5, and

his grade equivalent decreased by 0.2 or 2 months. Refer to Table 12 for detailed data.

Table 12 – Pre-/Post Assessment GMADE 4th Comparison

Student ID	Pre-total	Post-Total	Pre-SS	Post-SS	Pre-%ile	Post-%ile	Pre-GE	Post-GE
C	44	52	90	100	25	50	3	4.1
D	47	45	93	91	32	27	3.5	3.3
E	46	57	92	106	30	66	3.5	5.0
F	44	50	90	97	25	42	3	3.8
G	49	55	96	104	39	61	3.8	4.5

(SS=Standard Score; %ile=Percentile; GE=Grade Equivalent)

Reviewing the individual categories of the students' pre-/post-assessments reveals their areas of strength and weakness as well as what was focused on during the tutoring sessions. Most students had a fairly high pre-GMADE score in the Concepts and Communications category. All students' scores, with the exception of student G, increased in that category. All students, with the exception of student D, increased their scores in the Operations and Computation section of the GMADE. Student D's Operation and Computation score decreased from 13 to 7 on the pre-/post-assessments. The reasoning behind this decrease will be addressed in detail in Chapter 6. The Process and Application section had very different results for each student. Students D, E, and G all increased their scores in this section. Student D, whose overall score decreased, had a 4-point increase in the Process and Application section. Student E increased her score by 1 point and student G increased her score by 6 points. The scores for students C and F remained the same – 12 and 8 respectively. Refer to Tables 13 and 14 for the specific GMADE

results split by assessment subcategory and Figure 2 for a graphical representation. Overall, the pre-/post-GMADE results for fourth grade indicate that individualized after-school tutoring results in increased mathematical achievement.

Table 13 – Pre-Assessment Results GMADE 4th

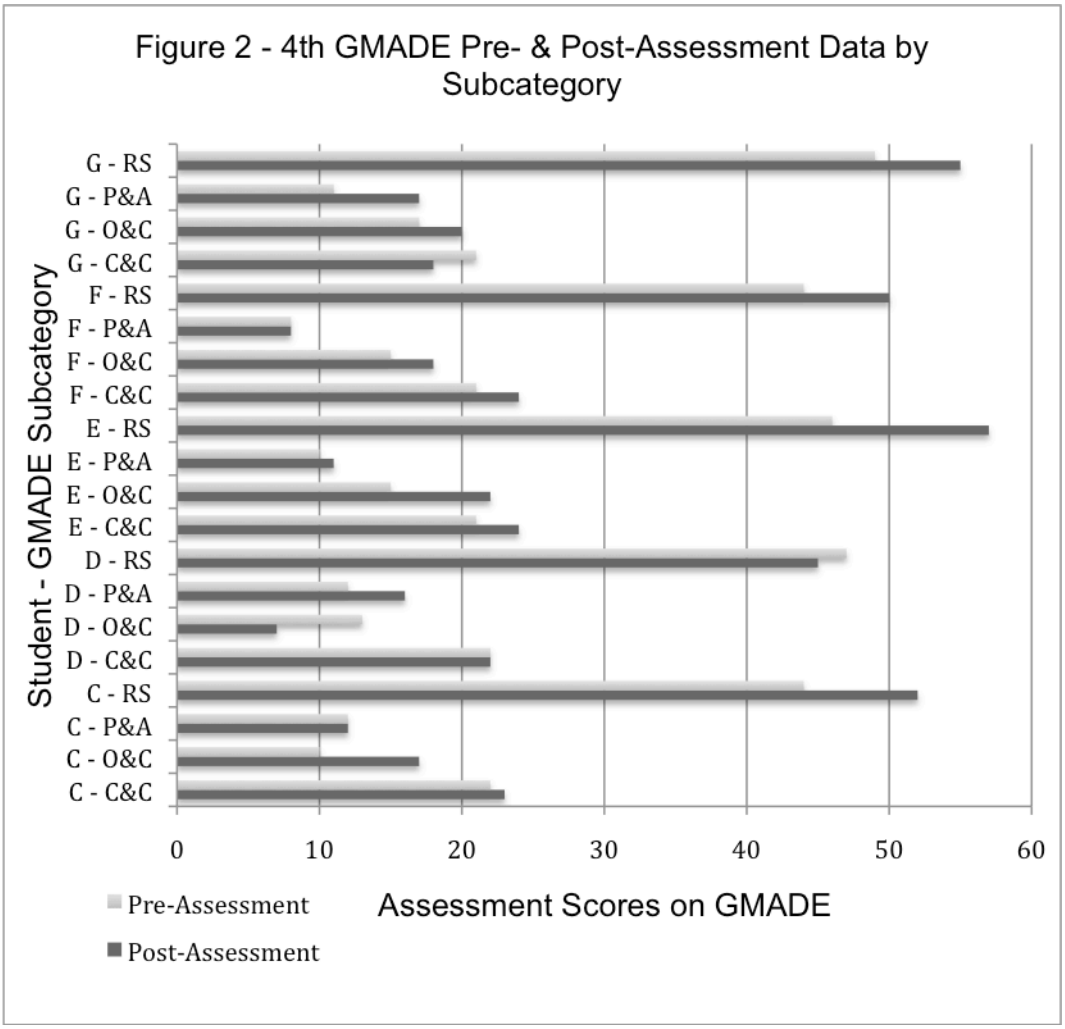
Student ID	Pre-C&C	Pre-O&C	Pre-P&A	Pre-total RS	Pre-%ile	Pre-GE
C	22	10	12	44	25	3
D	22	13	12	47	32	3.5
E	21	15	10	46	30	3.5
F	21	15	8	44	25	3
G	21	17	11	49	39	3.8

(Concepts & Communication=C&C; Operations & Computation=O&C; Process & Application = P&A; Raw Score = RS; %ile=Percentile; GE=Grade Equivalent)

Table 14 – Post-Assessment GMADE 4th

Student ID	Post-C&C	Post-O&C	Post-P&A	Post-total RS	Post-%ile	Post-GE
C	23	17	12	52	50	4.1
D	22	7	16	45	27	3.3
E	24	22	11	57	66	5.0
F	24	18	8	50	97	3.8
G	18	20	17	55	61	4.5

(Concepts & Communication=C&C; Operations & Computation=O&C; Process & Application = P&A; Raw Score = RS; %ile=Percentile; GE=Grade Equivalent)



Comparison Between Motivation and Achievement

A comparison of the pre- and post-measurement means for the Y-CAIMI, CAIMI, and GMADE indicate an overall increase in motivation and achievement. An additional area of interest is the relationship between motivation and achievement. Table 15 shows the positive and negative gains for each student on each measurement (Y-CAIMI and CAIMI are divided by category – mathematics or general). All students, with the exception of student D, showed a positive gain on the GMADE. However, the Y-CAIMI and CAIMI results showed substantial variation. Students A,

F, and G did not show a positive gain in motivation, though their achievement increased. Student D did not show a positive gain in achievement, though his motivation increased. Student B did not show a gain, because she scored the highest possible score on the pre- and post-Y-CAIMI. The data indicates a positive correlation between motivation and achievement for students B (The Y-CAIMI was not able to indicate whether motivation remained the same or increased for student B.), C, and E. For those students, an increase in motivation resulted in an increase in achievement. However, students A, F, and G show that when motivation decreases, it is still possible for achievement to increase, which indicates a negative correlation. Further research with a much larger sample size is needed in order to more accurately determine the correlation between motivation and achievement.

Table 15
Gain Comparison for Intrinsic Motivation and Mathematical Achievement

Student ID	Gains in Y-CAIMI/CAIMI Math	Gains in Y-CAIMI/CAIMI General	Gains in GMADE
A	-	-	+
B	0	0	+
C	+	+	+
D	+	+	-
E	+	+	+
F	-	0	+
G	-	-	+

+ indicates positive gain; - indicates negative gain; 0 indicates no change

Chapter 6

DISCUSSION

The purpose of this study was to examine the impact of individualized afterschool tutoring in the realm of Supplemental Educational Services on intrinsic motivation and achievement. Specifically, I sought to investigate if SES tutoring increases mathematical and general intrinsic motivation and mathematical achievement through the mechanisms of individualized instruction, personalized learning plans, favorable tutor to student ratios, and specific and individualized goals designed to develop mastery.

The population of this study consisted of two third graders and five fourth graders from an elementary school in the Reynolds School District in Portland, Oregon. Only one out of the seven participants was male; all other participants were female. The majority of the students in this study are Hispanic, with the exception of one student who was identified as multiethnic.

The data were collected during the first and last tutoring sessions within 26 hours of tutoring, as agreed upon by Mobile Minds Tutoring and Reynolds School District. All parents signed a parental consent form and the students signed a child assent form, indicating they were aware that their pre-/post-data would be used for written research. All student information has been kept confidential and students are identified by letters in this research.

The objective of the study was to measure the increase or decrease in mathematical and general intrinsic motivation and mathematical achievement as a result of SES tutoring. In general, the results of the study support the hypothesis that SES is one strategy that increases at-risk students' intrinsic motivation and achievement. However, the number of participants in this study (n=7) was so few, that another similar study with a greater sample to represent the population is necessary to confirm these results.

Intrinsic Motivation

The overall results for the Y-CAIMI and the CAIMI suggest that tutoring can help increase at-risk students' general and mathematical intrinsic motivation. The Y-CAIMI and CAIMI data cannot be combined for comparison, though, since they are separate measurements. For this reason, the seven participants in the study were split by grade level, which have separate motivational and academic measurements. Table 16 shows the percentage of increase from the pre- to post-measurements for the Y-CAIMI and CAIMI. The data shows that scores ranged from a decrease of -7.74 percent to an increase of 18.64 percent. Students C and D showed a very similar increase on their mathematical and general intrinsic motivation. However, students E, F, and G showed a greater range between the CAIMI math and the CAIMI general percentages of increase. These data indicate that the tutoring program impacted these seven students in different ways. More data are needed in order to

indicate a strong positive or negative pattern for the impact of SES tutoring on motivation.

Table 16 – Percentage of Increase on Y-CAIMI and CAIMI

Student ID	Percentage Increase on Y-CAIMI	Percentage Increase on CAIMI Math	Percentage Increase on CAIMI General
A	-5.41		
B	0		
C		14.29	13.85
D		7.14	5.33
E		7.22	18.64
F		-5.62	0
G		-7.84	-1.32

Y-CAIMI.

The mean of the Y-CAIMI decreased from the pre- to post-measurement, suggesting there was a decrease in motivation. The sample only represents two students. One student, student B, received the highest possible motivational score on the Y-CAIMI and maintained that score from pre- to post-measurement. Student B demonstrated this high level of motivation throughout her tutoring sessions. She attended every tutoring session, was enthusiastic and responsive towards the tutor, and engaged in the majority of the lessons. She had a few sessions where she became frustrated with the material. On her motivational measurement, she suggested that she enjoys challenging problems and trying something new; however, she often asked to switch topics when she was having a difficult time grasping the material. Elapsed time was the most challenging topic for Student B. She developed a positive

relationship with her tutor and said she was sad when her last tutoring session ended.

Student A, received a high motivational score on her pre-measurement, but her score decreased by four on her post-measurement. She answered two questions differently on her pre- and post-measurement, both of which addressed enjoying hard work in mathematics or in academics. Student A appeared ecstatic on the first day of tutoring and was excited to participate and interact with the tutors. However, she had a significant number of absences from school, which impacted her ability to consistently attend tutoring. She completed her program at least a week and a half after the other students. During her last four tutoring sessions, she often appeared distracted, tired, and less motivated. She had a hard time remaining focused and using problem solving skills when she met challenging, difficult, and multi-step problems. This relates to her decrease in motivation in the area of “hard work” that was identified on the pre-/post-measurements.

CAIMI.

The CAIMI had a slightly higher sample size (n=5) compared with the Y-CAIMI, and the mean showed an overall increase in motivation. In the mathematics and general academics sections, students C, D, and E showed an increase in their intrinsic motivation. Student C’s and student E’s results are consistent with their behavior throughout tutoring. They were attentive, responsive, respectful, and interactive. They maintained

regular attendance and developed a positive relationship with their tutor. However, student D's scores are not reflective of his behavior throughout tutoring. He was responsive and excited during the first several sessions of tutoring. Once he was required to use his skills with basic addition, subtraction, multiplication, and division facts, though, he became frustrated, distracted, and sometimes disrespectful towards the tutor. Once he slowed down, focused, and thought through his answers, he was generally successful. However, he needed a significant amount of support with his basic facts, which made the conceptual understanding of fourth grade mathematics skills extremely challenging. It was surprising that he had an increased level of intrinsic motivation on the post-CAIMI, since his outward behavior expressed that he did not enjoy learning or practicing mathematics during most tutoring sessions.

Student G showed a decrease in both sections, while student F showed a decrease in mathematics, but remained the same in general academics. Student F had fewer points on her post-measurement, because she answered several questions with "Agree" instead of "Strongly Agree." Her answers were not that different, but those few points made a noticeable difference in her overall score. She demonstrated a moderate level of motivation throughout the tutoring sessions. She was generally responsive and respectful towards the tutor. Student F did have a difficult time with challenging and multi-step problems. If she did not see the answer immediately, she would want to move on or have the tutor provide

the answer. The intense opportunity for challenging problems throughout tutoring may have resulted in her answering “Agree” instead of “Strongly Agree” for several answers.

Student G’s results are also very surprising. She demonstrated the most enthusiastic and motivated behavior of all the students throughout the tutoring sessions. She wrote “I love tutoring!” on the sign-in sheet during every tutoring session and she created tutoring certificates of appreciation for the tutors. Student G would run up to the tutors every day with a big smile on her face and give them a hug. When reviewing her individual data results from the CAIMI, the main difference again was answering questions with “Agree” instead of “Strongly Agree.” On her pre-measurement, most of her answers were “Strongly Agree.” However, most of those “Strongly Agree” questions were answered with “Agree” on her post-measurement. Though her scores indicate a decrease in motivation, her outward behavior suggested just the opposite.

Students C and D showed a significant motivational increase in mathematics on the CAIMI based on a 96% confidence level ($p<.04$). Students C and E showed a significant motivational increase in general academics on the CAIMI. Student E showed an overall increase in mathematics and student D showed an overall increase in general academics, but the confidence intervals in the pre- and post-measurements overlapped. The intrinsic motivation increased overall with this student sample; however, only two out of the five participants had

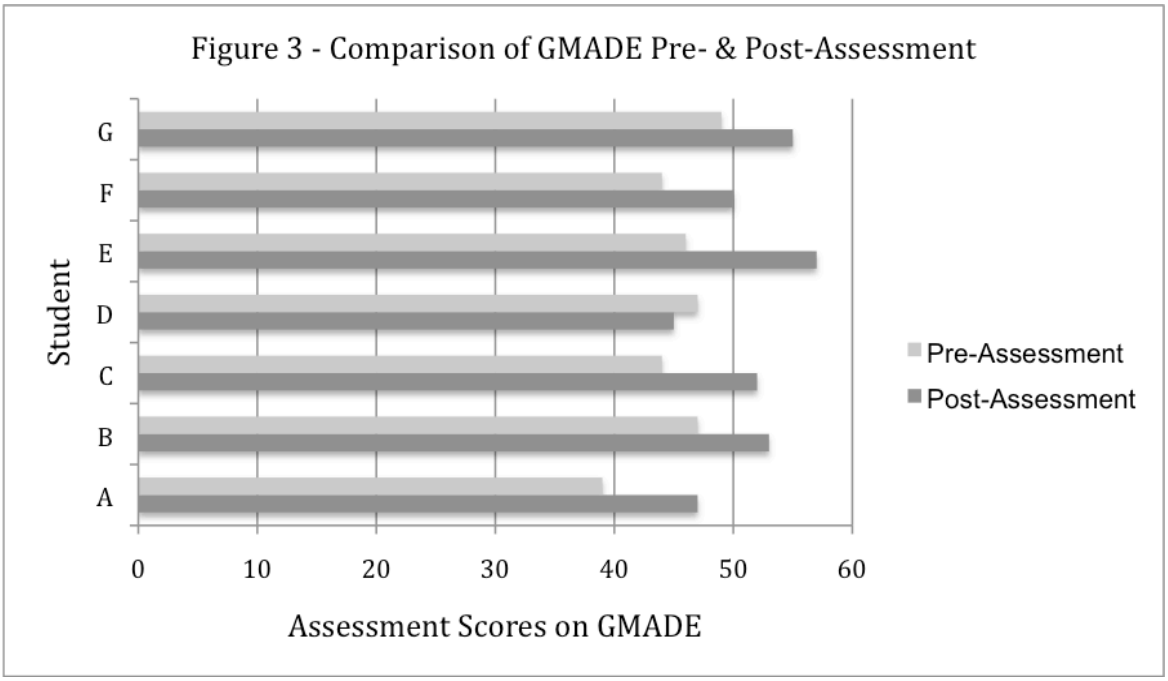
statistically significant increases in motivation in all areas (p<.04). Two other participants had statistically significant increases in one out of the two areas (either mathematics or general academics).

Achievement

The quantitative analysis of this study indicates that SES can increase the mathematical achievement of at-risk students. Six out of the seven participants in the study made progress; increasing their total raw score by at least ten percent from pre- to post-assessment (Table 17). Students A, B, C, E, F, and G increased their scores by 20.51%, 12.77%, 18.18%, 23.91%, 13.64%, and 12.24% respectively. Student D is the only student that showed a decrease in his raw score (4.25%).

Table 17 – Percentage of Increase on GMADE

Student ID	Pre-Raw Score	Post-Raw Score	Percentage Increase
A	39	47	20.51
B	47	53	12.77
C	44	52	18.18
D	47	45	-4.25
E	46	57	23.91
F	44	50	13.64
G	49	55	12.24



3rd Grade GMADE.

Students A and B both increased their GMADE achievement scores from pre- to post-assessment. Overall, the two 3rd graders increased their pre-assessment mean of 43 to a mean of 50 on their post-assessment, resulting in an overall increase in percentile from 12.5 to 30 and a decrease in their standard deviation from 5.66 to 4.24. The decrease in standard deviation indicates that both students' scores were closer together on the post-assessment then they were on the pre-assessment. This is also reflected in the range, which went from 8 in the pre-assessment to 6 in the post-assessment. The pre- and post-assessment data indicates that individualized tutoring increases students' mathematical achievement.

4th GMADE.

Overall, the 4th grade students increased their mathematical achievement from pre- to post-assessments. The mean increased from 46 on the pre-assessment to 49.2 on the post-assessment. The percentile and standard deviation from pre- to post-assessment increased from 30.2 to 51.8 and 2.12 to 4.66 respectively, on the pre- and post-assessments. The increase in the standard deviation indicates that students' overall raw scores were more spread-out on the post-assessment than the pre-assessment. The range increase from 5 on the pre-assessment to 12 on the post-assessment confirms these results. This also reflects the decrease in Student D's achievement scores from pre- to post-assessment. The fourth grade data aligns with the findings of the third grade data: individualized tutoring increases students' mathematical achievement.

Student D showed a decrease in overall mathematical achievement in the Operations and Computation section of the post-assessment. The tutor progress reports on student D indicated constant frustration with mathematical operations due to his limited grasp of basic addition, subtraction, multiplication, and division facts. The mathematics curriculum used throughout tutoring, *Head for Success*, touches on developing basic multiplication and division facts; however, most of the lessons focus on applying those facts to fourth grade state standards such as multi-digit multiplication and long division. Implementing additional remediation

activities to increase student D's automaticity recall with his mathematics facts may have been necessary to develop those skills. During the post-assessment, he demonstrated a negative attitude and it was clear through observation that he guessed on the majority of problems in the Operations and Computation section. This is also evident by the fact that his score increased in the Process and Application section, which incorporates operations and computation in word problems. The Process and Application section requires a higher level of conceptual understanding. An increase in this area indicates that he actually took the time to complete the problems and was able to apply new knowledge on the post-assessment. As stated in the intrinsic motivation section, it is surprising that Student D increased his motivational score, since he displayed the type of behavior previously listed and showed a decrease in achievement.

Students C, E, F, and G all showed an increase on their post-assessment GMADE results. As addressed in the intrinsic motivation section, students C and E also increased their intrinsic motivation. However, students' F and G's post-measurement indicated a decrease in intrinsic motivation. Overall, four out of the five fourth grade students increased their achievement scores, which means that 80% of the fourth grade sample showed an increase in achievement during tutoring.

Comparison Between Motivation and Achievement.

The objective of this study was to investigate the impact of afterschool, individualized, SES tutoring on the intrinsic motivation and

mathematical achievement of at-risk students. The overall means for intrinsic motivation increased for fourth grade, and achievement scores increased across both third and fourth grade. A comparison between gains in motivation and achievement (Table 15) indicate that students had an overall increase in achievement and three out of the seven had an increase in motivation. However the limited sample size in this study does not provide sufficient evidence to indicate if there is a correlation between motivation and achievement. The data indicates a positive correlation between motivation and achievement for students B, C, and E. An increase in motivation resulted in an increase in achievement for those students. However, students A, F, and G show that when motivation decreases, it is still possible for achievement to increase, which indicates a negative relationship. The overall findings of this study support my hypothesis: tutoring has a positive impact on the intrinsic motivation and achievement of at-risk students. In addition, some of the findings support that there is a positive relationship between motivation and achievement. However, additional research with a larger sample size must be conducted in order to confirm those findings.

Limitations

Several limitations may have had an impact on the results, conclusions, and suggestions in this research study. First, the sample was limited to one elementary public school in an urban neighborhood in Portland, Oregon. Studying various schools, neighborhoods, and regions

could have impacted the results differently. Also, this study was limited to the number of parents that signed up with Mobile Minds Tutoring during a second sign-up period in the school year. Additionally, the study was limited to parents who were willing to sign the "Parental Consent Form" (Appendix A) and to students who were willing to sign the "Child Assent Form" (Appendix B). Conducting the research with all students participating in SES at a particular school or all students participating in SES with Mobile Minds Tutoring would have provided a much bigger and more diverse study. Six out of the seven students in this study were Hispanic and six out of the seven were female. More diversity that is reflective of the school's, district's, or region's population is necessary, and should also take into account ethnicity, gender, and the predominant language spoken in the student's home. Also, this study did not have a control group, which is one of the common issues when conducting research on SES. It is difficult to not have bias in the selection process. Parents and children who choose to participate in SES are already creating a bias group, which is often indicative of students' prior motivation and parents' level of education (Asher, 2006). Finally, the study had a very small sample size of seven. Though the data from this study indicates interesting conclusions to guide future research and the SES system, it does not offer statistically significant information.

Future Research

SES is a very new field in education. It is still in the development stage; states, districts, providers, and parents are in the process of learning how to perfect this mandate. Future research needs to focus on large sample sizes and longitudinal studies. Researchers must figure out how to effectively create control groups and analyze data across different states, districts, and providers. They also need to discover the most effective SES tutoring strategies and resources, as well as effective support strategies by districts and implementation strategies by providers. For many people in the field of education, the question of whether or not SES is the most effective strategy for at-risk, poverty students is still uncertain. Researchers must gather more substantial evidence in order to evaluate SES.

Further research should be conducted comparing the diverse strategies of SES providers and evaluating the most effective strategies for increasing student performance. Some providers offer more traditional tutoring services. Other providers offer in-home tutoring, off-site tutoring, online, and extrinsic rewards for students to either sign-up or complete the tutoring program. According to the Educational Industry Association, 60% of for-profit and 50% of non-profit SES providers offer incentives including T-shirts, gift certificates, backpacks, iPads, computers, and basketball tickets (Ascher, 2006, p. 140). A question for future research is how do SES programs that offer the extrinsic rewards (computer, iPad, etc.)

compare with SES programs that do not incorporate extrinsic rewards but focus on intrinsic motivation and learning for the sake of learning? The Mobile Minds Tutoring philosophy is to create mentorship relationships and help develop intrinsic, lifelong learning beliefs in students. The participants in this study did not receive any extrinsic rewards for signing up with Mobile Minds Tutoring or for completing the program. Research has shown that, "In the classroom, extrinsic rewards are often given with good intentions, but they can have paradoxical and detrimental effects when they are applied to an entire group of students with varying abilities and levels of interest," (Ames, 1992: from Lepper and Hodel, 1989; p. 265). It would be of interest to discover if this research is supported in individualized, afterschool tutoring programs.

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Measurements

Children's Academic Intrinsic Motivation Inventory (CAIMI). -- Published by Psychological Assessment Resources, 1986. For ordering information, please call 1-800-331-TEST or www.parinc.com. Described in the Test Manual available from the publisher, and also all CAIMI related articles referenced above. Measures academic intrinsic motivation across four subject areas (reading, math, social studies, science) and for school in general for children in grades 4 - 8.

Young Children's Academic Intrinsic Motivation Inventory. (Y-CAIMI). This is a downward extension of the CAIMI for younger children (1990). Available from the author. Described in A. E. Gottfried (1990) (see reference above). Measures academic intrinsic motivation in reading, math, and for school in general for children in grades 1 - 3.

APPENDIX A

PARENTAL LETTER OF PERMISSION

Dear Parent:

I am a graduate student under the direction of Professor James Middleton professor in the College of Engineering at Arizona State University. I am conducting a research study to examine the change in math motivation and achievement within an individualized, afterschool tutoring program (Mobile Minds Tutoring).

I am inviting your child's participation, which will not involve anything beyond what is already a part of the Student Educational Services program through Mobile Minds Tutoring. I am asking for permission for your child's assessments to be used for research purposes. Your child's participation in this study is voluntary and does not involve any additional time or activities/assessments. If you choose not to have your child participate or to withdraw your child from the study at any time, there will be no penalty. It will not affect your child's ability to remain enrolled in the tutoring program. Likewise, if your child chooses not to participate or to withdraw from the study at any time, there will be no penalty.

Although there may be no direct benefit to your child, the possible benefit of your child's participation is a deeper understanding of motivation and achievement within mathematics in the field of education. There are no foreseeable risks or discomforts to your child's participation.

The confidentiality of your child will be maintained by using alternate identification numbers for data representation. The results of this study may be used in reports, presentations, or publications but your child's name will not be used.

If you have any questions concerning the research study or your child's participation in this study, please call me at (602) 361-0253.

Sincerely,

Cherise Ballou

By signing below, you are giving consent for your child _____ (Child's name) to participate in the above study by having assessments used for research purposes

_____ _____ _____

Signature Printed Name Date

If you have any questions about you or your child's rights as a subject/participant in this research, or if you feel you or your child have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the Office of Research Integrity and Assurance, at (480) 965-6788.

APPENDIX B

CHILD ASSENT FORM

Math Motivation and Achievement

I have been told that my parents (mom or dad) have given permission (said it's okay) for me to take part in a project about math motivation and achievement for afterschool tutoring.

I will not be asked to do anything extra. By signing below I am agreeing to have the assessments that I will do as part of the project used for research purposes.

I am taking part because I want to. I know that I can stop at any time if I want to and it will be okay if I want to stop.

_____ _____

Sign Your Name Here Print Your Name Here

_____

Date

APPENDIX C

MOBILE MINDS TUTORING PERMISSION LETTER

Office of Research Integrity and Assurance

IRB - Arizona State University

PO Box 87 - 6111

Tempe, AZ 85287

Attention: Alice Garnet

Dear Ms. Garnett:

This letter confirms that Mobile Minds Tutoring grants Cherise Ballou permission to: (a) access and use student data for thesis research under the supervision of Dr. James Middleton at Arizona State University; and (b) use the data from the Pearson Group Math Assessment and Diagnostic Evaluation or any other assessment and diagnostic measure used in connection with her work for Mobile Minds Tutoring; and (c) to administer and use data from the Children's Academic Intrinsic Motivation Inventory (CAIMI) or similar motivational assessment.

Students' names and personal information will not be included in her thesis or any publications related to her thesis.

Sincerely,

_____

Charles Purdom, CEO
Mobile Minds Tutoring

APPENDIX D

CAIMI COPYRIGHT PERMISSION LETTER

January 5, 2011
Cherise Ballou
Arizona State University

Dear Ms. Ballou:

In response to your recent request, permission is hereby granted to you to reproduce up to a total of 60 copies of the 62 items in the Math and General subscales of the Children's Academic Intrinsic Motivation Inventory (CAIMI) Test Booklet for use in your research titled, *The Impact of After---school tutoring on mathematics motivation and achievement for at---risk students*. If additional copies are needed, it will be necessary to write to PAR for further permission. This Agreement is subject to the following restrictions:

(1) The following credit line will be placed at the bottom of the verso title or similar front page on any and all material used: "Reproduced by special permission of the Publisher, Psychological Assessment Resources, Inc., 16204 North Florida Avenue, Lutz, Children's Academic Intrinsic Motivation Inventory (CAIMI) Inventory by Adele E. Gottfied, Ph.D., Copyright 1986. Further reproduction is prohibited without permission of PAR."
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(3) An accurate count of the total number of copies created will be kept. (4) Payment of a royalty/license fee of $46.20 ($0.77 per copy for 60
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CAIMI Ballou 62 items --- 1---5---2011.doc

TWO COPIES of this Permission Agreement should be signed and returned to me, along with your payment for $46.20 USD to cover the royalty/license fee, to indicate your agreement with the above restrictions. I will then sign it for PAR and return a fully executed copy to you for your records.

Sincerely,
Vicki M. McFadden
Permissions Specialist vmark@parinc.com
1-800-331-8378 (phone)
1-800-727-9329 (fax)

APPENDIX E

PERMISSION FORM SUBMITTED TO INSTITUTIONAL REVIEW BOARD

Arizona State University
Office of Research Integrity and Assurance
P.O. Box 871103
Tempe, AZ 85287-1103
Phone: 480-965-6788
Fax: (480) 965-7772

For Office Use Only:
Date Received:

HS Number:

ARIZONA STATE UNIVERSITY
APPLICATION FOR EXEMPT RESEARCH

PROTOCOL TITLE: The Impact of Tutoring with a Student Educational Services Model on Intrinsic Motivation and Mathematical Achievement		**DATE OF REQUEST:** December 6, 2010
PRINCIPAL INVESTIGATOR: **Dr. James Middleton**	**DEPARTMENT/CENTER:** Sch Engr Matter Trnsprt Energy	**UNIVERSITY AFFILIATION:** ☒ Professor ☐ Associate Professor ☐ Assistant Professor ☐ Instructor ☐ Other: **Please specify**. ("Other" categories may require prior approval. Students **can not** serve as the Principal Investigator)
CAMPUS ADDRESS: (include campus mail code)	**PHONE:** **602-361-0253**	
	E-MAIL: james.middleton@asu.edu	
List all co-investigators. (Attach an extra sheet, if necessary.) A co-investigator is anyone who has responsibility for the project's design, implementation, data collection, data analysis, or who has contact with study participants.		
CO-INVESTIGATOR: **Cherise Ballou**	**DEPARTMENT/CENTER:**	**UNIVERSITY AFFILIATION:** ☐ Professor ☐ Associate Professor ☐ Assistant Professor ☐ Instructor ☒ Other: **Please specify**. **Graduate Student – MA in Mathematics Education**
CAMPUS ADDRESS: (include campus mail code) **0211**	**PHONE:** **602-361-0253**	
	EMAIL: **receballou@yahoo.com**	

STUDY OVERVIEW

1. Provide a **brief** description of the **background, purpose, and design** of your research. Avoid using technical terms and jargon. Be sure to list all of the **means you**

will use to collect data (e.g. tests, surveys, interviews, observations, existing data). Provide a short description of the tests, instruments, or measures and **attach copies of all instruments and cover letters for review.** *If you need more than a few paragraphs, please attach additional sheets.* **FOR ALL OF THE QUESTIONS, WRITE YOUR ANSWERS ON THE APPLICATION RATHER THAN JUST SAYING SEE ATTACHED.**

I currently work as a manager for Mobile Minds Tutoring. Mobile Minds Tutoring is an approved Students Educational Services (SES) provider for the state of Oregon. Individualized tutoring through independently contracted companies is mandated by the state for schools that have not met Annual Yearly Performance (AYP) goals for the state of Oregon for at least two years in a row. The program is through Student Education Services as mandated by No Child Left Behind (NCLB). Schools must use twenty percent of their Title 1 funds to outsource tutoring services through independent companies. Parents whose children are receiving free or reduced lunch under Title 1 funding are eligible to choose an independent provider and receive tutoring services (free for parents/children).

I will be researching students within the Reynolds School District in the Portland, Oregon area. Parents have chosen to sign their child(ren) up for free tutoring with Mobile Minds Tutoring. The tutor to student ratio for Mobile Minds tutoring is 1:5. Students receive thirty hours of tutoring within the SES program. The students are given a pre- and post-assessment, Group Mathematics Assessment and Diagnostic Evaluation (GMADE) by Pearson Publishing Company to evaluate mathematical growth (see attachments). The assessment takes approximately one tutoring session. Students will also take a pre- and post-motivational survey, Children's Academic Intrinsic Motivation Survey (CAIMI), to assess their mathematical and general academic motivation. I will be collecting data on students in grades third through sixth. The third graders will use the CAIMI for younger students (see attachment). Students in grades fourth through sixth will take the comparable age appropriate CAIMI. I am still waiting on the numbers from Reynolds School District, so I have not attached the CAIMI for older students. However, the questions within the older CAIMI mirror the questions within the attached, CAIMI for younger students (Y-CAIMI). The following web address gives a basic overview of the CAIMI for older students (http://www4.parinc.com/Products/Product.aspx?Productid=CAIMI).

MMT, the district and parents agree on a specific goal for the student based on assessment results in order to focus instruction throughout the SES process. Tutors create individualized lessons for each student in alignment with his/her specific goal(s). I will use the pre- and post-assessment/survey results to examine the change in motivation and achievement of at-risk students over thirty hours of individualized,

afterschool tutoring. Results will be used to help align tutoring to student needs.

RECRUITMENT

2. Describe how you will recruit participants (attach a copy of recruitment materials). I will be using data from participants who have already chosen to be a part of the Mobile Minds Tutoring services. All enrolled students and their parents will be informed about the survey, how results will be used to improve the motivational value of the program, and asked for their participation. Participants will not be penalized in any way for non-participation. In addition, students who decide, for whatever reason, to drop out of the study will not be penalized in any way.

PROJECT FUNDING

3. How is the research project funded? (A copy of the grant application(s) must be provided prior to IRB approval. For funded projects, researchers also need to submit a copy of their human subjects training certification: http://researchintegrity.asu.edu/irb/training/)

☒ Research is **not funded** (Go to question 4)
☐ Funding decision is pending
☐ Research is **funded**

a) What is the source of funding or potential funding? (Check all that apply)

☐ Federal ☐ Private Foundation ☐ Department Funds
☐ Subcontract ☐ Fellowship ☐ Other

b) Please list the name(s) of the sponsor(s):

c) What is the Project grant number and title (for example NIH grant number)?

d) What is the ASU account number/project number?

e) Identify the institution(s) administering the grant(s):

STUDY POPULATION- If you are doing data analysis only, please write DA.

4.Indicate the **total number of participants** that you plan to include or enroll in your study. about 30		Indicate the **age range** of the participants that you plan to enroll in your study	3rd grade to 6th grade

SUPPLEMENTAL MATERIALS

5. Attach a copy of the following items as applicable to your study (Please check the ones that are attached):

☐ Research Methods (Research design, Data Source, Sampling strategy, etc)
☐ Any Letters (cover letters or information letters), Recruitment Materials, Questionnaires, etc. which will be distributed to participants
☐ If the research is conducted off-site, provide a permission letter where applicable
☐ If the research is part of a proposal submitted for external funding, submit a copy of the FULL proposal

Note: The information should be in sufficient detail so IRB can determine if the study can be classified as EXEMPT under Federal Regulations 45CFR46.101(b).

DATA USE

6. How will the data be used? (Check all that apply)

☐ Dissertation ☐ Publication/journal article

☒ Thesis ☐ Undergraduate honors project

☐ Results released to participants/parents ☐ Results released to employer or school

☒ Results released to agency or organization ☐ Conferences/presentations

☐ Other *(please describe):*

EXEMPT STATUS

7. Identify which of the 6 federal exemption categories below applies to your research proposal and explain

why the proposed research meets the category. Federal law 45 CFR 46.101(b) identifies the following EXEMPT categories. Check all that apply to your research and provide comments as to how your research falls into the category.

SPECIAL NOTE: The exemptions at 45 CFR 46.101(b) do not apply to research involving prisoners. The exemption at 45 CFR 46.101(b)(2), for research involving survey or interview procedures or observation of public behavior, does not apply to research with children, except for research involving observations of public behavior when the investigator(s) do not participate in the activities being observed.

☒ (7.1) Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

Please provide an explanation as to how your research falls into this category: Mobile Minds regularly assesses student achievement. We are adding mathematics motivation to this assessment to provide additional information regarding the effectiveness of the tutoring programs. This is all within the regular methods of assessment for Mobile Minds.

☒ (7.2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) Information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; AND (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Please provide an explanation as to how your research falls into this category: Students are already enrolled within the SES Mobile Minds Tutoring program. The pre- and post-assessments and surveys are already a part of the Mobile Minds Tutoring program. Students are being evaluated at the school site and will not receive any additional evaluations. The data used within this research is already being collected by the tutoring company.

The information collected in this research will be blinded so that there will be no means of identifying any participant individually.

TRTRAINING

8. The research team must document completion of human subjects training within the last 3 years. (Attach a copy of the human subjects training for the PI and all Co-Investigators: http://researchintegrity.asu.edu/humans.)

Please provide the date that the PI and co-investigators completed the training.
Attached

PPRINCIPAL INVESTIGATOR

In making this application, I certify that I have read and understand the ASU Procedures for the Review of Human Subjects Research and that I intend to comply with the letter and spirit of the University Policy. I may begin research when the Institutional Review Board gives notice of its approval. I must inform the IRB of ANY changes in method or procedure that may conceivably alter the exempt status of the project. **I also agree and understand that records of the participants will be kept for at least three (3) years after the completion of the research**
Name (first, middle initial, last):
James A. Middleton

Signature: James A. Middleton Date: 12/14/10

APPENDIX F

NIH CERTIFICATE: CHERISE BALLOU

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that Cherise Ballou successfully completed the NIH Web-based training course “Protecting Human Research Participants”.

Date of completion: 09/07/2010

Certification Number: 508395