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By

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**Building Students' Mathematics Self-Efficacy
through Student-Teacher Trust**

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**Building Students' Mathematics Self-Efficacy
through Student-Teacher Trust**

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Dedication

I dedicate this to my wonderful husband. He is an amazing teacher and a source of my inspiration. Thank you for all you do and supporting me through thick and thin.

Acknowledgements

I am grateful for all those that have mentored me and supported my academic progress. Thank you to Marie, for all of your support and advice. You helped me unlock my passion and believe in myself – for that I am eternally grateful. Finally, thank you to my family for their love and encouragement.

“Trust is a little like air – we all pay little attention to it until it is not there.”

Hoy and Tarter (2004, p. 253)

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Kristin Emilia Harvey, M.A.

The University of Texas at Austin, 2012

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A current national priority is improving secondary school mathematics performance. Middle school students' trust in their mathematics teachers can lead to better relationships and increased feelings of competence, or mathematics self-efficacy, which is consistently linked to achievement. Student trust is based on perceptions of a teacher's competence, benevolence, openness, reliability, and honesty. To determine the effect of trust in a teacher on student mathematics self-efficacy while accounting for the non-independence due to shared classroom experiences, hierarchical linear modeling will be utilized. Controlling for prior achievement, mathematics self-efficacy is expected to be higher for students who perceive their mathematics teacher meets more of the criteria for trust, with a stronger effect for low-achieving students. The implications of the outcomes of the proposed study suggest the creation of a training program to facilitate trust building between students and teachers. This report also includes an evaluation plan which details the components of the trust building program, a model for the program, and the proposed method to measure the reported outcomes.

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Introduction

President Obama's "Educate to Innovate" campaign has made improving students' abilities to think critically about STEM (science, technology, engineering and mathematics) subjects a national priority (The White House, 2011). In addition, President Obama has a goal of improving national scores in these areas in order to advance our international status in education (The White House, 2011). According to results of the 2011 National Assessment of Educational Progress in mathematics, 27% of U.S. students are performing below a basic level in eighth-grade mathematics (NCES, 2011). While the NAEP has seen a moderate increase in the scores of eighth grade students over time, approximately 1 in 4 students still are not performing adequately in mathematics (NCES, 2011).

When comparing mathematics scores of U.S. students to other nations, U.S. children perform below the world average (OCED, 2010). Despite previous reform efforts such as No Child Left Behind (NCLB) there are still only minimal advances in mathematics achievement being made each year. Even with renewed national focus on improving mathematics achievement for all, enduring inequalities in the amount of parental support, resources, and extracurricular educational opportunities available for all students complicate advancement. Therefore, in order to substantially improve mathematics scores of all students, educational approaches that can be effective within this limiting context must be sought out to reach struggling students.

Erickson (1963) stated that the first stage in a child's psychosocial development involves the struggle between basic trust and mistrust. From infancy, humans use social

interactions as a basis for their trust beliefs. A *disposition to trust* (Tschannen-Moran & Hoy, 2000) or *basic trust* as Erickson describes is assumed to be a lifelong propensity to trust developed in infancy and applied indiscriminately throughout life. More recent research (Tschannen-Moran & Hoy, 2000; Bryk & Schneider, 2002; Solomon & Flores, 2001) has found that trust is discerned and granted according to specific situational interactions between the involved parties. This proves to be an important point for teachers who, in order to provide the best education possible, must gain the trust of all their students.

Despite the external pressures of parents, principals, and legislators, students are predominantly exposed to mathematics instruction and driven to success by their mathematics teachers. Teachers must continue to navigate within the educational system's constraints to find effective ways to educate and motivate struggling students, with ever more limited financial resources. Referencing Erickson, we know that from the very beginning of life, children will attempt to discern if those that they interact with are trustworthy or not. Student trust in his or her teacher was previously found to correlate with positive impacts such as: improved classroom discipline, more student cooperation, and better attendance in that teacher's classes (Gregory & Ripski, 2008; Gregory & Weinstein, 2008). In addition, general trust of teachers has been moderately correlated with academic efficacy and accounts for a substantial amount of growth in scores on a language arts standardized test across a semester (Adams & Forsyth, 2009).

The impact of trust on student performance and attendance can best be understood through self-determination theory (SDT). SDT describes three central needs as critical components in the formation and maintenance of intrinsic motivation: *autonomy, competence, and relatedness* (Deci & Ryan, 2000). Teachers play a critical role in the process of fulfilling these psychological needs (Ryan & Deci, 2000; Deci & Ryan, 1987; Deci, Koestner, & Ryan, 1999). Autonomy-supportive classrooms foster greater intrinsic motivation which leads students to have more curiosity and desire for challenge (Ryan & Deci, 2000).

Students rely on their mathematics teachers to teach them the necessary skills required to be competent at their grade-level mathematics. The school-year interactions that occur between a student and a teacher are like the steps of a dancing couple. Only if a student trusts his or her teacher will they follow the steps the teacher leads them in. Similarly, the teacher must read the responses of the student to his or her lead and adjust the pace and movement accordingly. Students naturally desire to feel competent, but must rely on the guidance of their teachers for the steps that they should take to be successful within their classes. Students can only feel competent if they believe they have the relevant skills to succeed at the task (Ryan & Deci, 2000). I propose that when students trust their teacher's lead, they will subsequently feel more confident in their ability to be successful in their own steps.

Mathematics self-efficacy is a student's belief in their ability to perform well in mathematics (Usher & Pajares, 2008). A sense of competence or feeling of self-efficacy

can lead a student to persist more in the face of difficult challenges (Bandura, Adams, & Beyer, 1977) as well as seek out more novel tasks (Deci & Ryan, 2000). Bolstering a student's belief in his or her own abilities leads to increased persistence and resilience (Bandura, 1989). Mathematics self-efficacy has also been shown repeatedly to positively correlate with achievement (Klassen & Usher, 2010; Kitsantas, Ware, & Cheema, 2010; Usher & Pajares, 2008). Facilitating a student's desire and ability to deeply interact with mathematics will ultimately help achieve the President's call for students to become more advanced mathematics students.

As teachers struggle to find ways to motivate students, attempts to satisfy the universal need for feelings of competence provides a promising avenue for teachers to attempt to reach their struggling students. This may prove especially critical for students who have a history of negative educational encounters which have resulted in poor achievement. Gregory and Ripski (2008) found that even students with a history of behavior problems which led them to be placed in in-school suspension formed a trust in the authority of certain teachers. Teachers will be more likely to adopt strategies and employ them in their classroom if the strategies yield better academic results for students, while also reducing student disciplinary problems.

By pooling research from several areas, new approaches to this educational crisis may be found. I theorize that students' trust in their mathematics teacher will be differentiable from their perception of the general trust climate of the school. I also propose that middle school mathematics students' trust of their mathematics teacher will

positively predict the student's self-efficacy. In addition, I hypothesize that the strength of the relationship between trust and self-efficacy will be stronger for students who had lower prior mathematics achievement. However, the relationship between trust and self-efficacy for all students will be positive and significant.

Chapter One: Theoretical Framework

Self-Efficacy

Bandura (1989) proposed social cognitive theory in order to explain the way in which an individual engages cognitively with their environment. Social cognitive theory is divergent from previous theories of the self or the environment as the sole locus of control, but instead subscribes to an emergent interactive agency model. Bandura's (1989) triadic reciprocal causation model explains that there is an interplay between personal factors, behaviors, and environmental factors in which each affects all others to some degree.

From within the social cognitive theory, the personal factor that constitutes the most influential determinant of motivation and action are people's beliefs about their ability to produce desired outcomes to events in their life; a belief termed self-efficacy (Bandura, 1989). Self-efficacy beliefs shape the motivational level of a student, which translates into what specific actions a student will take. Bandura (1989) explained that one mechanism by which self-efficacy affects achievement is that higher self-efficacy beliefs lead to greater motivation and resilience which are expressed in the form of persistence. This can translate into students exerting more effort including using more strategies and self-regulation techniques in order to successfully complete a difficult homework problem (Pintrich & De Groot, 1990). A student's strong belief in their capabilities pushes them to exert greater effort in order to master the task at hand, which can lead to future successes that will further motivate the student to continue (Bandura,

1989). Usher and Pajares (2008) explain that a domain-specific analysis of self-efficacy, such as limiting the analysis to that of a specific mathematics class, has proven to have more power to predict achievement across a broad range of studies.

Although there are many factors that influence the mathematics achievement of students, Bandura (1997) proposed that self-efficacy plays a major role in student achievement. Much research has confirmed the predictive power of self-efficacy beliefs on academic achievement (Fast et al., 2010; Kitsantas et al., 2010; Multon, Brown, & Lent, 1991). In a recent study employing various statistical methods, Kitsantas, Ware, and Cheema (2010) found that using traditional regression models and more sophisticated hierarchical linear modeling techniques both yielded consistent results of the effects of mathematics self-efficacy on mathematics achievement controlling for SES, gender, and ethnicity. In fact, the authors found that for a one standard deviation increase in mathematics self-efficacy, there was a corresponding .48 standard deviation increase in mathematics achievement test scores, controlling for all other factors, and taking into account the nested nature of the data (students within classrooms, Kitsantas et al., 2010).

Sources of self-efficacy beliefs. Self-efficacy, as proposed by Bandura (1997), is impacted by four sources: physiological states, mastery experience, vicarious experience, and social persuasions. Usher and Pajares (2009) confirmed the effects of the four sources on middle school mathematics students' self-efficacy beliefs.

Physiological and affective states. The source of physiological arousal explains that students will interpret their anxiety, stress, fatigue, and mood in order to judge their

competence at a task. For example, feeling nervous during an exam may be cognitively interpreted by a student as being ill-prepared for the test, thus the student may lower their efficacy beliefs about that test (see Bandura, 1997). This source exhibits a quadratic, as opposed to linear, relationship with self-efficacy (Usher & Pajares, 2006a; Usher & Pajares, 2006b). Lower levels of anxiety are related to the highest levels of self-efficacy, but self-efficacy decreases as anxiety reaches a moderate level, and finally stabilizes as anxiety grows acute (Usher & Pajares, 2006a).

Mastery experiences. After attempting a mathematics task, students reevaluate their estimations of their ability. If a student believes that he or she was successful, self-efficacy increases (within the domain area). The definition of what constitutes a mastery experience is up to the subjective interpretation of the student. Utilizing an example proposed by Bandura (1997), if a C student receives a B on a paper, and exerted great effort to get the B, they are likely to increase their self-efficacy beliefs. Yet, if that same grade were received by a student who typically receives A's they would likely decrease their self-efficacy since the grade was contrary to their expectations (see Bandura, 1997). The self-efficacy beliefs of students are most fluid when completing a novel task (Usher & Pajares, 2008). This is perhaps why self-efficacy beliefs are more subject to change during transition years, such as during middle school, as students experience unfamiliar teachers, schools, and styles of mathematics class (Midgley, Eccles, & Feldlaufer, 1991).

Vicarious experiences. Efficacy is built through interpreting not only students' personal mastery experiences, but by the students vicariously experiencing the mastery

events of those around themselves as well. Although theory suggests that social models which are perceived to have similar abilities or attributes play a more powerful role in shaping student self-efficacy (Usher & Pajares, 2008); Bandura (1997) hypothesized that a similar source is not always a prerequisite. Interestingly, Usher (2009) found in a qualitative study that one middle school mathematics student's self-efficacy was positively influenced by his father's failures in mathematics, due to the fact the student saw himself as dissimilar to his father.

Lent, Lopez, Brown, and Gore (1996) found that high school students' vicarious experiences held distinguishable effects from peers and adults, while college students only experienced a single factor of vicarious experiences across both groups. Secondary school-aged students interpreted experiences they witnessed or were informed about from peers and adults differentially. Thus, evaluating the specific effects that a middle school teacher has on a student (as opposed to the effects of peers) will be more successful than determining the effects a professor has on a college student.

Social persuasions. Students depend on the evaluative feedback or social persuasions of those around them in order to appraise their self-efficacy. Positive words, however, may be insufficient to raise self-efficacy beliefs (Dweck, 1999; Meyer, 1982); Bandura (1997) warned that it is easier to undermine than to raise a students' self-efficacy. Students may perceive unintentionally delivered messages behind phrases and actions of their teachers; therefore, each interaction must be thoughtfully crafted to avoid unintentional harm (Purkey & Novak, 1996).

Current measures of middle-school students' sources of self-efficacy beliefs only include a single item tapping students' experiences of social persuasions from their teachers ("My mathematics teachers have told that I am good at learning mathematics," Usher & Pajares, 2009). Studies utilizing objective measures of social persuasions, such as items measuring teacher feedback about performance (Bates & Khasawneh, 2007) do not account for the subjective nature of social persuasions and often exhibit poor correlations with self-efficacy (Usher & Pajares, 2008). The subjective interpretation of persuasions can make them more influential if received from someone that the student perceives is skilled or knowledgeable in the content area (Bandura, 1997). Students also factor in the credibility of the persuader when cognitively appraising efficacy beliefs (Schunk, 1991). Although Bandura (1997) hypothesized that trust in the source of a persuasion can impact the effects of the persuasion; Usher and Pajares (2008) noted after a comprehensive literature review that "researchers have yet to include items tapping students' trust in those who try to convince them of their academic capabilities" (p. 758). This gap in understanding is what I seek to answer.

Self-efficacy effects by group. Usher and Pajares (2006b) found that while mastery experiences accounted for the greatest variance in predicting academic self-efficacy beliefs for White students, the African American students were more strongly affected by social persuasions. The authors suggest this indicates that what African American students hear from their surroundings (teachers, parents, peers, etc.) impacts the students' motivational self-beliefs more than their own successes (Usher & Pajares, 2006b). In another study, Klassen (2004) found by studying ethnic minority Indo-

Canadian students and the majority ethnic group for the region, that there was an impact of ethnicity on sources of self-efficacy beliefs; with the immigrant group attending more to social persuasions and vicarious experiences. Usher and Pajares (2006b) describe that, due to the average lower scores on achievement tests of these ethnic minority groups, there will correspondingly have been fewer mastery experiences for many students within these groups, making reliance on persuasion sources more important.

Usher and Pajares (2006b) also found that students of low reading ability credited their self-efficacy beliefs more to vicarious experiences than to mastery experiences. Low ability students came to rely on the successes of those around them to build their self-efficacy. This indicates that students can adapt to a lack of personal mastery experiences by finding alternative sources in those around them to build their own self-efficacy.

In several studies (Usher & Pajares, 2006a; Usher & Pajares, 2006b; Zeldin, Britner, & Pajares, 2008) it has also been found that girls have a stronger effect of social persuasions on self-efficacy than boys do. These authors attribute this finding to Gilligan's (1982) view that women tend to describe themselves more in terms of their connections with others than men do and to Erickson's (1968) view that girls develop their identity in terms of satisfaction in relationships. Although recent data suggests girls' mathematics achievement scores are now very similar to those of boys (Lindberg, Hyde, Petersen, & Linn, 2010), girls may be focusing more on the social messages they receive than their personal mastery experiences. This theory is further supported by Zeldin, Britnter, and Pajares (2008) who found that women in STEM careers described their

teachers' positive messages as more influential in building their competence and confidence than males with similar experiences and careers did.

Self Determination Theory

Deci and Ryan drew from the Hullian tradition (see Hull, 1943) when creating their definition for *needs*, the central drive motive in self-determination theory (SDT, Deci & Ryan, 2000). They define needs as “innate psychological nutriment that are essential for ongoing psychological growth, integrity, and well-being” (Deci & Ryan, 2000, p. 229). The three innate needs are: competence, relatedness and autonomy; SDT explains that the underlying cause of motivation to engage in behaviors is to satisfy these needs. Deci and Ryan (2000) state that conditions which facilitate need satisfaction lead to optimal development and well-being. In addition, the extent to which these needs are met can lead to *intrinsically motivated* behavior, which is defined as engagement in a behavior simply because it is inherently enjoyable (Ryan & Deci, 2000). In the absence or thwarting of these needs people may become more *extrinsically motivated*, which results in behavior being undertaken solely as a result of outside forces or pressures, such as fear of punishment.

Autonomy refers to a sense that actions emanate from oneself (Deci & Ryan, 1987), or that behaviors result from an inner causation. Intrinsically motivated behaviors can only arise from experiences of autonomy where individuals are initiators of their own behavior or have the freedom to engage in what tasks they choose (Deci & Ryan, 1987; Ryan & Deci, 2000). *Competence* refers to a need to be able to exert control over

interactions with one's environment. While perceived autonomy is necessary for motivation to be intrinsic, perceived competence is necessary for any type of motivation to exist (Deci & Ryan, 2000). Competence is facilitated by tasks of optimal challenge levels which the student believes he or she has the relevant skills to succeed at (Ryan & Deci, 2000). In SDT, competence refers to an innate desire to feel efficacious, while self-efficacy refers to a measure of one's beliefs about the present level of ability to be efficacious within the measured domain. *Relatedness* refers to a need for social connectedness (Ryan & Deci, 2000; Baumeister & Leary, 1995). Within a classroom relatedness marked by feelings of security and affective attachment are related to perceived control, engagement, and positive coping (Ryan, Stiller, & Lynch, 1994). In addition, relatedness can lead to a sense of connection as well as a willingness to internalize the classroom set of cultural norms (Ryan & Deci, 2000). Perceptions of warmth in a teacher are also related to general self-worth, perceived competence, and mastery motivation (Ryan & Grolnick, 1986).

An understanding of innate psychological needs is important in understanding classroom contexts because it helps explain why students engage in interactions with their teachers. Although in classrooms attendance is compulsory (to the extent possible), motivation is not. SDT explains that if students do not feel their needs are met within a classroom, their behaviors will tend to become more externally regulated, with the most severe possible result being *amotivation* (see model in Ryan & Deci, 2000). If a student does not have an innate desire to engage in an activity, feel connected to the teacher assigning it, or feel they have the necessary skills to complete it, they will simply not

engage in the activity. Research has shown that intrinsically motivated behaviors are more difficult to obtain with each advancing grade, due to the increasingly structured nature of secondary classroom requirements (Deci, Koestner, & Ryan, 1999; Ryan & Deci, 2000). However, it is still possible to bolster student needs in later grades, and doing so will result in students being less extrinsically motivated. Ultimately, students with their needs met will experience more internalized (intrinsic) reasons for participating in class which will foster a greater sense of competence or control over academic outcomes.

Student-Teacher Trust

History of trust literature. Erickson's (1963) psychosocial stages describe how an infant develops their first, and most basic conception of trust based on the interactions with his or her parents. As parents meet their child's physiological needs for food and safety, the child comes to have a general concept of trust in his or her environment (Erickson, 1963). However, Erickson's trust theory focused solely on infants, a period in life which, while formative, does not rely on rational thought. In addition, Erickson's (1963) conceptualization was only of *basic trust*, not determinations of trust based on individual relationships this study seeks to evaluate.

Deutsch was the first to look at the psychological phenomena of trust relationships amongst adults in 1958 in response to the fear surrounding the armaments race. Deutsch's work focused mutually on trust and suspicion and his research techniques employed game theory in a series of studies that were modeled after prisoner's dilemma

(PD) situations. Within a laboratory setting, participants were matched with another participant and presented situations which forced people to choose either to be cooperative or cheat another person. Deutsch's (1958) research found that communication and mutual concern for each other's welfare facilitated mutual trust; however, trust, according to Deutsch's PD outcomes, could be coerced in certain circumstances. The lab-manipulated experiments conducted by Deutsch did not attempt to measure the cognitive or emotional processes underlying trust decisions.

Rotter's (1967) work brought about a focus on trust as a personality trait, which he developed from social learning theory. Making a clear break from Deutsch, Rotter criticized the unnatural lab and game atmosphere which he believed would not generalize to real-life situations (Rotter, 1967). Rotter (1967) describes trust as a *generalized expectancy* which individuals hold and apply as a general rule in all social situations, similar to Erickson's (1963) conceptualization. Rotter's trust scale covered a broad range of interpersonal trust relationships (ie. parent-child, government-citizen) which he summed to create their *generalized expectancy*. Rotter's results showed many significant differences between *generalized expectancies* of individuals based on their religions, socioeconomic statuses, and birth orders. The high correlations between trust level and group membership suggest that Rotter's conceptualization of trust was not generalizable, but was measuring similarity in beliefs to the white middle-class norm group.

Beginning in the '80s, organizational research spurred a focus on trust at the group or organizational level. Much work was done by researchers analyzing the effects

of trust in business settings; as well as how to promote trust in order to get employees and consumers to invest in companies (Kramer, 1999). Coleman (1990) and Putnam's (1993) work in social capital had some similarities to other organizational research, but expanded trust into a sociological context as well. Putnam (1993) described trust as a feature of social organization and the lubricant of social life; individuals who have more trust will exchange more information (Coleman, 1990). Characterizations of trust based in an organizational or social capital perspective attempt to explain trust from a strategic or commodity-exchange perspective. However, despite the rising focus on strategic trust, Kramer (1999), a prominent organizational trust theorist, concluded that "trust is fundamentally a psychological state" (p. 571, see also the definition put forth by Rousseau, Sitkin, Burt, and Camerer, 1998).

Hoy, in the '80s, also conducted research on organizational health and climate, but began the first foray into the field of education and trust. In 1984, Hoy and Kupersmith published the first study on faculty trust. Hoy's line of trust research focused exclusively on the domains of teachers' trust and more recently principals' trust. Some of the trust relationships Hoy has investigated include: teacher trust of principal, teacher trust of colleagues, teacher trust of the school organization, teacher trust of clients (both students and parents), principal trust in parents, principal trust in students, and principal trust in teachers (Forsyth, 2008).

A second group of education researchers, Bryk and Schneider (2002), stumbled into the impact of trust relationships while conducting a 10-year evaluation of the

qualities of effective schools in the Chicago Public Schools system. The researchers became unable to explain why some schools embraced necessary changes and thrived while others continued to fail. Bryk and Schneider (2002) ultimately identified high trust as an essential predictor of a school's abilities to improve their test scores and provide a positive school environment. The researchers expressed that they were primarily interested in the individual interactions between school constituents which lead to *relational trust*.

Bryk and Schneider's (2002) research focused solely on elementary schools; as such they decided to make conjectures about student trust from the parental trust beliefs of the sample. As a result, this research conceptualized that student trust was identical to that of the trust relationships between parents and school personnel. In addition, the parent, teacher, and administrator views of trust were summed to create a measure of the trust environment within the schools. Their process of measuring trust failed to account for the individual dyadic relationships and as a result does not afford descriptive information on the effects of individual trust relationships I am seeking to explore.

A third major line of trust research in schools extended Hoy's original work. Adams and Forsyth (2009) built off Hoy's conceptualization of trust to create new measures that capture trust from the perspective of other school members. Through their line of research, a measure of parent trust and student trust were developed to look at the quality of trust relationships from outside the teacher and administrator perspective that

Hoy focused on. This marked the first scale of student trust based on the conceptualization of trust put forth by Hoy in the '80s.

Gregory and Ripski (2008) and Gregory and Weinstein (2008), in response to the issue of higher rates of defiance referrals for African American students than White students, analyzed the effects of students' trust in their teachers' authority. Here, trust was conceptualized as "students' perceptions of teachers' fair application of power and their beliefs that they should follow and respect teachers' requests" (Gregory & Ripski, 2008, p. 340). Gregory and Ripski (2008) drew their inspiration for their definition of trust from Tyler and DeGoey's (1995) research on adults' views of legitimate legal authority. Gregory and Weinstein (2008) base much of their understanding of issues of defiance on cultural mistrust (Terrell & Terrell, 1981), and their work has met with some criticism (see Stevenson, 2008).

Definition. There has not yet been a definition of trust put forth which is universally accepted and cited. Yet, among nearly all disciplines analyzing trust, the willingness to be vulnerable is an essential component of trust building (see Hoy & Tarter, 2004; Rousseau et al., 1998; Kramer, 1999). Tschannen-Moran and Hoy (2000) wrote a definition of trust in educational settings based on their multidisciplinary review of previous trust literature; Adams and Forsyth (2009) later adopted this definition in their student-teacher trust research. I will define trust as these researchers have previously: trust is a student's willingness to be vulnerable to his or her teacher based on

the student's confidence that the teacher is benevolent, reliable, competent, honest, and open (Tscannen-Moran & Hoy, 2000; Adams & Forsyth, 2009).

Bryk and Schneider's (2002) definition of trust as a complex cognitive activity process to determine the intentions of others based on a set of role expectations stemming from interpersonal relationships also supports Tscannen-Moran and Hoy's (2000) definition. This complex cognitive activity results in an individual's belief that another person meets the "criteria for discernment" or that the person offers respect, personal regard for others, competence, and integrity. Forsyth (2008) concluded that the differences between the two sets of definitions are nominal only, although they have not yet been empirically compared.

The definition of trust utilized by Gregory and Ripski (2008) and Gregory and Weinstein (2008) has some overlap with Adams and Forsyth (2008) in terms of fairness (reliability), but fails to include other key facets. Cohen and Steele (2002) wrote about the cultural barriers to the formation of trust; yet, they did not explicitly define what trust is. Here instead, the researchers focused on the increased difficulty in forming trusting relationships between teachers and students if there is a mismatch of ethnicities, genders, or cultures. Cohen and Steele's (2002) suggestions for trust creation in the face of these barriers were maintaining teacher support, high expectations, and ensuring teachers convey interest and concern. These suggestions are similar to Tschannen-Moran and Hoy's (2000) descriptions of benevolence, competence, openness and honesty.

Benevolence. Benevolence is expressed by teachers through actions that exhibit care and concern (Adams & Forsyth, 2009). Bryk and Schneider (2002) explain that *personal regard for others* encompasses any actions that one person does to reduce others' sense of vulnerability. Reducing a student's sense of vulnerability will decrease the student's anxiety and stress, leading to a more favorable affective state for improving self-efficacy. Noddings (2006) explains that caring teachers are crucial to the positive development of student motivation. She says that a teacher must read and respond to the *inferred needs* of students, which exhibits care (Noddings, 2005).

Gregory and Weinstein (2008) found that teacher characteristics such as gender and ethnicity were not associated with levels of student trust, but that a student's perception of their teacher's level of care was. Midgley, Feldlaufer, and Eccles (1989) found that teachers viewed by students as giving high support correlated with students having higher intrinsic value beliefs about mathematics as well as thinking mathematics was more important and useful. These effects were seen for both high and low achieving students, and were found regardless if the student reported low support from their previous mathematics teacher (Midgley et al., 1989). Reddy, Rhodes, and Mulhall (2003) also found that perceptions of teacher support buffered the documented negative effects of the middle school transition on students' depression and self-esteem.

Duncan-Andrade (2007), in a qualitative investigation of the characteristics of successful teachers in urban schools, classified teachers using terms found in a popular rap song: *gangstas*, *wankstas*, or *ridas*. He describes that *ridas* are like the relational

teachers who are active in their students' lives; many even chose to live in the same rough neighborhoods as their students. By being active in the students' nonacademic lives and consistently communicating with the students Duncan-Andrade (2007) found that effective trusting relationships were formed between these teachers and their students.

Reliability. Reliability refers to predictability or consistency between words and actions (Adams & Forsyth, 2009; Bryk & Schneider, 2002). This facet of trust relates back to Erikson's (1963) original definition of basic trust vs. mistrust; we make trust decisions based on the reliability of those whom we must depend on. For infants, they must rely on their mother for food and nurture in order to survive. The predictability of these needs being met (ie. being fed on a regular interval) contributes to the trusting nature of the infant (Erikson, 1963).

A crucial point that must be made here about reliability is that discernment of reliability must be mixed with other trust criteria. If an adolescent becomes aware that their teacher refuses to allow students to correct their work, even in the event of a valid excuse for poor performance (family emergency), they will perceive the teacher as predictable, but this may not add to the student's trust in the teacher. Tschannen-Moran and Hoy (2000) state that to build trust, "reliability or dependability combines a sense of predictability with benevolence" (p. 557).

Reliability is also related to a sense of fairness (Adams & Forsyth, 2009). The measure of student trust in teacher authority used by Gregory and Weinstein (2008) and Gregory and Ripski (2008) was focused on perceptions of a teacher's fair and judicious

application of power. This measure of student trust, a measure of perceptions of teacher care (similar to support), and a measure of high teacher academic expectations (similar to competence) were all highly correlated ($r=.88$ and $r=.58$ respectively, Gregory & Weinstein, 2008). These high correlations, especially between care and trust, indicate the possibility that the same construct may be being measured, which further supports why a multidimensional definition of trust is warranted.

Openness. Openness requires two facets to be fulfilled: the student must perceive the teacher is providing all important information and be physically and emotionally present in the conversations (Hoy & Tarter, 2004). As mentioned previously, social persuasions may be experienced in forms other than just the words that are uttered from a source's mouth. Henderlong and Lepper (2002) believe that studies offering conflicting findings regarding the benefits of praise to intrinsic motivation could be due to students' perceptions of the sincerity of the praise. Meyer (1982) found that students could perceive different emotional responses from teachers; pity at an unsuccessful task, accompanied by surprise at a successful task lowered students' ability beliefs. Surprise upon a student's successful completion from a teacher may indicate to the student that the teacher had a low ability estimate for the student (Meyer, 1982).

From communication literature, Richmond (1990) found that nonverbal teacher immediacy behaviors, such as standing at a close distance, making eye and physical contact with students (within normal limits), and smiling was related to student motivation in college classes. In addition, increased positive affect towards a college

class was found when nonverbal immediacy behaviors were combined with verbal immediacy (Gorham, 1988). Verbal immediacy includes addressing students by name, asking students to discuss their feelings about the content, and encouraging students to talk (Gorham, 1988). Frymier and Houser (2000) found that verbal and nonverbal immediacy was more highly correlated with females' state motivation when compared with their male counterparts, but effects were found for both genders.

If students are so keenly aware of the indirect communications that teachers may offer, it becomes clear why carefully crafted messages from teachers regarding a student's progress are so crucial to successful student-teacher relationships. Teachers must be aware that simply saying a positive comment will not guarantee that a student will become motivated; in fact, if the student misreads the praise intentions, the opposite effect may happen (see Dweck, 1999). Purkey and Novak (1996), who created an approach to teaching that focuses on teachers' direct and indirect messages called invitational teaching, said, "[Teachers] should be combatants against the subtle and not so subtle forces that negate the worth and ability of large numbers of their students" (p. 66). Both direct and indirect communications will be weighed by a student in his or her discernment process for trusting a teacher.

Competence. Competence is a student's belief that their teacher has the necessary skills to effectively educate him or her (Adams & Forsyth, 2009). As Tschannen-Moran and Hoy (2000) point out, students may believe that a new teacher wishes to help them; however, if the students also perceive that the teacher does not have the necessary skills

to aid them, the students will lack trust in the teacher. Adams and Forsyth (2009) explained that students judge a teacher's competence by the teacher's instructional practices, not the grades the student receives. This indicates that students are aware that they have a responsibility for their grades, but that they are also aware that the teacher's success as an instructor is crucial to student success.

Duncan-Andrade (2007) found that teachers who said their students trusted them believed that the trust was not based on a coddling response to student's needs, but arose from high expectations and demands of commitment from the student. A trusted teacher was thus classified by Duncan-Andrade (2007) as someone who exhibited a balance between high expectations of their students and an understanding that students will need teacher commitment to meet the expectations. Goddard (2003) found a moderate correlation between the social capital and mathematics achievement in low income elementary schools. Goddard attributed this finding in part to the social trust developed between the teachers and students which led to a strong academic emphasis and promotion of academic achievement values.

Additionally, high school students generally perceived the academic expectations (academic press) were higher in their favorite teacher's classroom as compared with the class of a teacher who wrote them a referral which put them in in-school suspension (Gregory & Weinstein, 2008). The students in the study had more trust in their favorite teacher's authority and also agreed with statements about the teacher such as "This teacher accepts nothing less than my full effort" and "When I've figured out how to do a

problem this teacher gives me more challenging problems to think about” (Gregory & Weinstein, 2008, p. 463). Interestingly, students also had better attendance in their favorite teacher’s classes, although they perceived these teachers expected more out of them than did their referring teachers. High care also significantly interacted with higher academic expectations, and, when both were high, the teacher was the most likely to be viewed as trustworthy to students (Gregory & Weinstein, 2008).

Honesty. Tschannen-Moran and Hoy (2000) relate honesty to a person’s character, integrity, or authenticity. When Duncan-Andrade (2007) asked one of the teachers in his qualitative study to explain what trust was, the teacher remarked that it wasn’t something that came as an automatic result of being a teacher. Trust, in his opinion, was something that was earned by the teacher through a persistent effort to bond with his students (Duncan-Andrade, 2007). The teacher explained, further, that trusting relationships came from a continuous stream of nuanced behaviors between the teacher and students.

Gregory and Ripski (2008) evaluated teachers’ approaches to discipline through teacher interviews. As a result, the authors defined relational teachers as those who attempted to learn something nonacademic about each of their students and approached each student as an individual. The teachers noted that their deliberate attempts to connect with the students by remembering personal details about each one and asking them questions about these details, better allowed the teachers to build a relationship with their students (see Gregory & Ripski, 2008). In analyzing their results, the authors found a relationship between a teacher’s relational approach to discipline with defiance (negative

correlation) and cooperation (positive correlation) which was mediated by the student's trust in that teacher's authority.

Pianta, Hamre, and Stuhlman (2003) describe relationships between teachers and students from a dynamic systems perspective. They argue that quality of information exchange and how it is exchanged affects perceptions of relationships. Students use the daily interactions with their teachers to discern the authenticity of their teachers. In the end, the degree of contingency in behavior or a tone of voice conveys a great deal more information than the actual behaviors of the teacher (Pianta, Hamre, & Stuhlman, 2003).

Measuring trust. In the Adams and Forsyth (2009) student trust scale, evaluations are made based on a student's perception of what the collective organization of students' level of trust in all teachers is. In the context of student-teacher trust, student trust is measured based on a student's beliefs about how all the students at the school feel about all teachers. In contrast, Bryk and Schneider (2002) believe trust is a result of individual beliefs stemming from encounters between dyadic relationships. In the context of a student-teacher relationship, their beliefs about trust formation would indicate that trust should be measured as a student's discernment of trust of a teacher, based on their interactions with that teacher. However, Bryk and Schneider combined their separate trust scales (faculty, administrator, and parent) to form a composite school trust factor; thus, their analysis can only generalize to organizational levels of trust within schools.

Despite the narrow definition of trust, the Gregory line of research lends critical credibility to the idea that trust should not be measured on a collective level. The trust in

teacher authority scale allowed students to answer questions separately for a teacher who wrote them disciplinary referrals and a teacher whom the students nominated as their favorite. The results of the Gregory and Weinstein (2008) study found students had significantly more trust in their nominated teachers than their referring teachers.

Reddy et al. (2003) found that when students were asked questions such as “teachers take a personal interest in *students*” (emphasis mine) as compared with “teachers at this school notice and give *me* help when *I* need them to” (emphasis mine), correlations between the resulting scale scores ranged from $r = .59$ to $r = .71$. It would be expected that if these two scales were measuring identical beliefs they would be more strongly correlated. Further, if simply by changing the reference from a general “student” reference to a personal “me” reference led to differing results, subsequent modifications to the scale to make it teacher specific would be expected to have even more strikingly different results. If levels of trust vary for students amongst their different teachers based on the quality of the interpersonal interactions, trust must be discussed and measured on the dyadic level. Thus, in my study a teacher specific trust scale will be used in order to capture a student’s beliefs about his or her mathematics teacher.

Mechanism of trust. A simple single faceted definition of trust cannot account for the complexity of the psychological response to social interactions that facilitates the formation of trust. As social-cognitive theory explains, throughout a semester, students subconsciously analyze their teachers’ words and actions. Each interaction is evaluated by students and the risk entailed in trusting their teacher is calculated. If a student

perceives that his or her teacher is meeting the criteria for trust as outlined above, the student will allow him or herself to be vulnerable and open to the teacher. Rousseau, Sitkin, Bur, and Camerer (1998) describe the process of calculating risk of vulnerability as *calculus-based trust* (similar to *cognitive-based trust*, McAllister, 1995; or *calculative trust*, Tschannen-Moran & Hoy, 2000).

Despite the initial discernment of trust appearing calculated, psychologically what will follow throughout the course of the student-teacher relationship is *relational trust* or an *affective trust* that will lead to an emotional response and attachment bond between the teacher and the student (Rousseau et al., 1998; Solomon & Flores, 2001; see model of role of trust in interpersonal relationships in McAllister, 1995). Throughout a year-long class with a teacher that a student discerns as trustworthy, the student will become attached to the teacher; thus, in interactions between the trusting student and his or her teacher, the student will be more cognitively vulnerable. This increased accessibility to the student will result in different affective and cognitive outcomes for the student than would result from similar interactions between that student and a teacher who is not perceived as meeting the trust criteria.

In high poverty elementary schools teacher trust in students predicted student trust in teachers (Adams, 2010), indicating that relational trust is a two-way street, facilitated by both parties. Teacher trust of clients (students and parents) and relational trust in schools have been linked to teacher “can do” orientation to innovation, and teacher influence on management and instructional decisions (Forsyth, 2008, Bryk & Schnieder,

2002, Tschannen-Moran, 2001). Teacher trust in students has even been linked to teacher willingness to offer protection of students from bullying (Smith & Birney, 2005). Finally, teacher trust of clients has been shown to be a more important predictor than SES of academic achievement across a variety of studies (see Forsyth, 2008). Indeed, the formation of student-teacher trust relationships provide positive impacts for the teachers and school as a whole.

Relationship between Trust and Self-Efficacy

Student-teacher interactions. Self-determination theory helps to explain why students choose to engage or not engage with their teachers. Students innately desire to feel that they can control their classroom outcomes. In order for a student to choose to engage in a task he or she must feel a sense of autonomy, competence, and relatedness (Ryan & Deci, 2000). If students feel a sense of relatedness with their teacher, they will internalize the goals of the classroom more (Ryan & Deci, 2000), including a sense of importance at doing well in the class. In addition, the student will accept the behavioral regulations as well as classroom values which can lead the student to greater success in the class. This process is evidenced in the lessening of behavioral issues for students in trusted teachers classes found in Gregory and Ripski (2008). SDT explains that students will orient themselves toward social environments that foster need satisfaction. If, in forming trust relationships with teachers, students experience a sense of relatedness, they will seek out these relationships again in the future.

Competence beliefs foster feelings of control, because students feel that they have the necessary skills to master the task at hand. Self-efficacy beliefs are a measure of a student's perception of their competence level for that class. As Ryan and Deci (2000) point out, a student with no sense of competence will be *amotivated*, or have no intention to engage with the class. It is certainly obvious if a student does not exert effort into a class, they cannot be successful in that class. If a student, on the other hand, feels a sense of competence, they will have a desire to engage in an activity out of a more autonomous, intrinsic motivation. SDT explains "that people will tend to pursue goals, domains, and relationships that allow or support their need satisfaction" (Ryan & Deci, 2000, p. 230). Thus, this theory serves as the basis for explaining the process of teachers affecting student motivation through their relationships.

The multifaceted nature of trust. While the relationship between mathematics self-efficacy and the sources of mathematics self-efficacy have been investigated; an analysis of trust as an antecedent to mathematics self-efficacy at an individual level has not been conducted. In fact, I found no published study that analyzed the relationship between a single student and his or her teacher, and this relationship's effects on self-efficacy at the middle or high school level. Other trust relationships such as those between teachers, administrators and parents have been explored in more depth, and have found links between trust in schools and achievement as well as other psychologically beneficial outcomes such as feelings of autonomy (see Forsyth, 2008 for a complete review of relevant studies).

Fast et al. (2010) in a study of fourth-, fifth-, and sixth-grade students found that self-efficacy fully mediated the relationship between students' perceptions of teacher care, teacher challenge, and teacher mastery goal orientation, and mathematics achievement, controlling for prior achievement and prior self-efficacy. The measure of care used in this study was conceptually similar to benevolence, and the measure of teacher challenge is similar to competence. Although previous year's mathematics self-efficacy significantly predicted current self-efficacy, each of the teacher variables also predicted a significant unique effect on self-efficacy. Fast et al. (2010) found that the inclusion of the three teacher variables simultaneously yielded the optimal model fit, lending further support to a multifaceted evaluation of trust.

Similarly, Levpušček and Zupančič (2009) found in a sample of eighth-grade Slovene students that a mathematics teacher's perceived academic press, teacher mastery goal approach (same measures used in Fast et al., 2010), and teacher academic support (includes aspects of teacher's willingness to help which is related to benevolence and reliability) predicted a student's mathematics self-efficacy. This effect was shown to be stronger than the effects of parental academic pressure, support, or help; elucidating the unique contribution that teachers make to students' motivation (Levpušček & Zupančič, 2009). Although a limitation of this study was that teacher academic support was not found to significantly predict self-efficacy, the overall contribution of teacher effects was strong.

Gregory and Weinstein (2008) found for ninth-grade students, using the same measure of press as above, that trust in teacher authority (similar to reliability) was significantly correlated with academic press and teacher care. Teachers with whom students had trusting relationships generally also exhibited more academic press and higher care. In addition, Adams and Forsyth (2009) found that student trust of all teachers in seventh-, eighth-, and ninth-grade students was significantly correlated with general academic efficacy ($r=.29$). Although, this correlation was only moderate, this could be because the scales measuring this correlation were both general scales. As mentioned previously, domain specific measures of self-efficacy are more reliable thus a class specific measure of trust in the teacher with self-efficacy for that class would theoretically yield higher correlations. This group of studies on adolescents, which includes a range of age groups and which had different specific aims but similar findings, indicates support for the idea that trust could be a latent factor present in these studies, and that trust (as well as individual facets of the trust criteria) can predict self-efficacy for students.

Sources of self-efficacy and trust. Perhaps the most descriptive evidence of how teacher relationships affect students comes from Usher's (2009) qualitative study about the sources of middle school students' self-efficacy. One mathematics teacher in the study noted her intentional efforts to support a student, which the student credited with abolishing her previously negative views about her mathematics capabilities. This attention from the teacher resulted in another of her students explaining how he thought that teacher was natural to talk to (Usher, 2009). Another student, Tanisha, began the year

with low-self efficacy, but due to frequent feedback from her mathematics teacher, she began to feel more confident than she did previously. In fact, Tanisha's mother noted that Tanisha was more impacted by her teacher's persuasions, than by her own family's persuasions (Usher, 2009).

In a clear example of the power of a teacher's words, one student said, "every time you tell somebody they can do it, they're going to start to believe it, and they're going to start to want to do it more and want to be better than what they are" (Usher, 2009, p. 298). Ease of communication or openness is one dimension of student trust. This openness allowed the repeated social persuasions of the teacher and the positive affective state resulting from the care (benevolence) of the teacher to help the students become more confident in their abilities and thus become more motivated.

Unfortunately Usher's (2009) study, also found negative effects of teachers' messages on students. After a teacher suggested one student move to a lower level mathematics class, the student remarked she felt that the teacher had no confidence in her, and as a result had no confidence in herself. The student perceived the teacher was unable to help her to be successful in her current class, which resulted in the student feeling that she could not trust in the teacher's competence. The student internalized the deficiency in teacher competence to be an indication of her own inability to succeed and thus lowered her self-efficacy beliefs.

Another student in Usher's (2009) study noted that although his teacher had not *said* anything negative to him, he felt negative social persuasions from her due to her

impatience when he would ask a question. The student admitted it made him “feel low about what I can do” (Usher, 2009, pp. 301). Xavier’s teacher believed that nothing she could say to him would make a difference, while Xavier just wished that the teacher took a more active role in checking for his understanding and believing in him (Usher, 2009). Usher (2009) noted that “discouraging comments seemed to be the most consequential source of Xavier’s low self-efficacy” (p. 302). The reliability and benevolence of the teacher was clearly questioned by these students, which lowered their own ability estimates for the class. Xavier clearly could perceive that the teacher had given up hope in him, and as a result of his mistrust in her he didn’t believe he could be successful in her class.

Gregory and Ripski (2008) as well as Usher (2009) found that the student-teacher relationships varied. All of the students in Usher’s study with low self-efficacy had the same teacher, and three of the students indicated that their relationship with her was not good. This is similar to what Midgley et al. (1989) found; teachers viewed as offering low support had students who correspondingly had lower motivation. However, Tanisha, although classified as having low self-efficacy felt she was building her confidence due to this same teacher’s encouragement. Although all the students had the same teacher, the messages they received from her were interpreted differently, which resulted in variance among self-efficacy belief trajectories and presumably trust.

Chapter Two: Proposed Research Study Statement of Purpose

The purpose of this study is to investigate the effects of students' trust in their mathematics teachers on their mathematics self-efficacy beliefs. Social cognitive theory highlights the power of environmental influences on peoples' notions of their abilities. Through the creation and maintenance of this trust relationship during a school year, students will feel less vulnerable and more open to their teacher; thus, students will be more willing to accept the motivating encouragements of their teacher. Research has also indicated that if students trust their teacher more, they will also likely have better attendance in the teacher's class (Gregory & Ripski, 2008), which can also lead to better educational attainment.

From qualitative studies of the sources of self-efficacy (Usher, 2009; Zeldin, Britner & Pajares, 2008; Zeldin & Pajares, 2000), it is clear that students credit their interactions with teachers as a source of their self-efficacy beliefs. Students' trust in the teacher who is providing them with social persuasions will help determine if persuasions are actualized into the students' beliefs about themselves (Bandura, 1997; Usher & Pajares, 2009). If a student views that a teacher is open, honest, reliable, benevolent, and has the skills to educate the student (competence), then the student will begin to feel more competent. This feeling of student competence is expressed through the increased self-efficacy beliefs of the student. If trust is not fostered, consequently students may feel less competent, or that they have less control over their academic outcomes; thus, they may only attend class and complete assignments in order to avoid negative consequences.

Usher (2009) found that when a student perceived lack of confidence from the teacher this translated into a lack of confidence by the student, which likely resulted in the student not trusting the teacher.

In designing this study a few key assumptions were made. I believe that teachers who are perceived as trustworthy are also providing positive persuasions to their students. Due to the fact that benevolence is a part of trust, if a teacher were making negative comments toward a student, the student would not perceive warmth or care from the teacher and thus lower their trust. I am also assuming, as Bandura (1997) originally hypothesized, that teachers who provide positive persuasions, but are not trusted will have less impact on student self-efficacy beliefs since students will not internalize the persuasions to increase their self-efficacy. Finally, it is well established that there are various sources of self-efficacy and that different people can influence an individual's beliefs. Here, I propose to document the effects on self-efficacy of a single trusting relationship between one student and one teacher.

Chapter Three: Research Questions and Methods

In synthesizing research from a diverse field of literature, three important research questions which have yet to be examined became evident to me:

- 1) Is there a difference between a student's trust in an individual teacher and his or her perception of the general trust climate within the school?
- 2) Do students who have a higher level of trust in their mathematics teacher correspondingly have higher mathematics self-efficacy?
- 3) Is the relation between trust and self-efficacy stronger for students with lower prior mathematics achievement?

Methods

Participants. Participants will include approximately 720, sixth-, seventh-, and eighth-grade, middle school students recruited from a large middle school in a mid-sized city school district in Central Texas. Twelve mathematics teachers are present at the middle school and students will be recruited from all twelve teachers' mathematics classes. Special education or resource mathematics classes will not be included in the sampling of classes in order for the sample to include a more generalizable group of students. Informed consent will be obtained from both students and parents and a letter describing the research, including possible risks will be sent home with students (see form in Appendix A). Only students with appropriate consent and assent will be included in analysis. Although it is expected that about 1440 students will be enrolled in the

school's mathematics classes, due to the difficulty in obtaining consent from minors' parents, the estimation of 720 participants included in the analysis is to account for an approximately 50% return rate on consent forms.

Measures.

Mathematics self-efficacy. Self-efficacy will be assessed using a four-item measure used by Fast et al. (2010). This scale is a subscale of the Student Motivational Questionnaire (SMQ, Karabenick & Maehar, 2004, 2007) which was developed as a part of the Mathematics-Science Partnership-Motivation Assessment Project (MSP-MAP), a nationally funded program whose goal was to provide researchers with reliable self-report instruments (Fast et al., 2010). The mathematics self-efficacy scale was adapted from the academic self-efficacy in the Patterns of Adaptive Learning Scales (PALS, Midgley et al., 2000) and from Pajares and Miller (1995). This scale measures students' beliefs about their ability to successfully learn what is taught in their mathematics class (Fast et al., 2010).

On a sample of 4th-, to 6th-grade students the mathematics self-efficacy scale obtained a Cronbach's alpha of .84. The original PALS scale, which the items remain similar to, was administered to a large population of elementary, middle, and high school students and obtained $\alpha = .78$. The reliability of this scale is expected to be better than that of the original academic self-efficacy scale due to the domain-specific nature of the revised scale. Klassen and Usher (2010) confirmed the congruence of questions such as the ones in this scale to the original theory proposed by Bandura, as opposed to other

self-efficacy measures which they ruled were inconsistent with the definition of self-efficacy. Participants will respond to items using a Likert scale of 1 to 5 scale (1 = *not at all true* and 5 = *very true*). Items on the scale are “I’m sure that I can learn everything taught in mathematics”; “I’m sure that I can do even the hardest work in my mathematics class”; “Even if a new topic in mathematics is hard, I’m sure that I can learn it”, and “I’m sure that I can figure out the answers to problems my teacher gives me in mathematics class” (Fast et al., 2010).

Student Trust Scale. Adams and Forsyth (2009) developed the 13-item Student Trust Scale to measure students’ beliefs that teachers are benevolent, reliable, open, honest, and competent. When the scale was originally written, it was meant to assess a student’s perceptions of the peer group of students’ beliefs about the group of teachers at the school. The authors conceptualized the scale as a measure of the students’ perceptions of the social environment and attitudes toward teachers at the school. However, in writing the scale this way, it fails to capture a student’s individual beliefs about his or her teachers.

The original scale was field tested with a group of 315 seventh-, eighth-, and ninth-grade students. Factor analysis indicated that the five criteria of trust did not separate into different factors, but loaded onto one single factor of trust. This finding was similar to the patterns found with other widely used trust scales used such as the Parent Trust Scale, on which this scale was based. The Cronbach’s alpha for the scale was .90 and the general trust scale was moderately correlated with academic efficacy and was not

significantly related to ethnicity or gender. A second study with fifth-grade students used the scale as well ($\alpha=.93$, Adams, 2010).

Since this research seeks to capture the individual relationship of a single teacher and student dyad, the questions have been re-written to capture this relationship. In the place of general references to “students” within the scale, references to “me” or “mine” have been inserted. References to “teachers at this school” will be replaced by the phrase “my mathematics teacher.” For example, the item “Teachers at this school have high expectations for all students” is re-written to say “My mathematics teacher has high expectations for me.” For a full list of the original and reconceptualized questions see Appendix B. Participants respond to items on the scale using a Likert response set from 1 to 5 with 1 = *Strongly Disagree* and 5 = *Strongly Agree*.

In order to validate the revised scale a pilot study will be conducted during the first semester of the school year in which the Student Trust Scale will be administered as originally written and in a revised form to a subset of students. The 26-item, two-scale survey will be administered to a randomly selected smaller group of 75 students, prior to collecting other data. Students will receive a survey with the two scales in a random order (half with revised first and half with the original first) so as to control for bias that the prompts may cause in rating of the other scale. According to G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) in order to obtain enough power to detect a two-tailed bivariate correlation with an alpha = .05 and an expected absolute minimum correlation of $r = .40$ the necessary sample size is 75. The true range for the correlation is expected to be

between $r = .50$ and $r = .70$ as Reddy et al.'s (2003) findings found for their correlations on two similar teacher support scales. Reliabilities will be calculated at this time for both scales as well; it is expected that both scales will have similar reliabilities in the range of previous studies near an $\alpha = .90$. This a priori testing will ensure that the final results of the study are valid.

Prior achievement. In order to control for the effects of prior year's grades on self-efficacy, previous year's final mathematics grades on a scale of 0-100 will be obtained from teachers for all students participating in the study. This variable will be grand-mean centered and entered in the analysis. In addition, to test the theory that students who previously had not performed as well will have their self-efficacy more strongly affected by trust in their current teacher, a second variable of the interaction between trust and prior achievement will be calculated by multiplying the grand mean centered achievement score and trust score for each student.

Procedure. All subjects will be asked to complete the mathematics self-efficacy scale and the revised measures at the end of the first semester of the school year (see Appendix C for full survey). This time period was chosen to allow students and teachers enough time to have built relationships, but still allow students to have enough class time left that they are uncertain of what their final results in the class will be. I will administer the survey to the students and instruct them to answer all of the questions about their current mathematics teacher and mathematics class. The students will be notified that

their teacher will not see any of their responses; teachers will not be present during the survey administration in order to reduce fear or bias in responses.

Chapter Four: Proposed Analysis

Research Question 1

Is there a difference between a student's trust in an individual teacher and his or her perception of the general trust climate within the school?

Hypothesis 1. Students' perceptions of the general student trust climate of the school will be similar in some ways to their level of trust in a specific teacher due to a general disposition of basic trust. In addition, their specific feelings about their mathematics teacher will help shape their perceptions of the overall trust climate of the school. However, due to the personalization of the trust scale to force students to reflect on their individual feelings about a single teacher; there will be greater variation between students. In addition, there will be variability in students' trust in their mathematics teacher when compared with their general perceptions of the student trust climate. One example scenario could be that a student has an excellent relationship with his or her mathematics teacher and thus has high trust in that specific teacher, but the student may have had many previous negative experiences with teachers which result in a general sense of distrust in teachers.

Planned analysis 1. The analysis of this research question was explained previously in the section on the student trust scale revision. While it is expected that the originally written trust scale and my revised version will be correlated (estimated to be between $r = .5$ and $r = .7$), the correlations will be only moderately strong. Moderate correlations will indicate that although the scales are measuring the same construct, trust,

students do respond to general and specifically targeted questions differently. Higher than anticipated levels of correlation between the general trust scale and the mathematics teacher specific scale could indicate that even with the scale revision, only a general level of trust is being captured. A resulting correlation in the expected range will be accepted as a confirmation that students do experience a somewhat general level of trust in schools, but that they also have differing trust beliefs for specific teachers. The lack of perfect correlation can be attributed, thus, to variation in individual relationships between students and their mathematics teachers.

Research Question 2

Do students who have a higher level of trust in their mathematics teacher correspondingly have higher mathematics self-efficacy?

Hypothesis 2. It is expected that as students' level of trust increases in their mathematics teacher, this will lead to higher self-efficacy beliefs within that class. Prior research (Adams & Forsyth, 2009) has confirmed a correlation between general trust in teachers and academic efficacy. Other research (Usher, 2009; Usher & Pajares, 2006b; Usher & Pajares, 2009) has confirmed the effects of social persuasions on middle school students' self-efficacy beliefs. One assumption being made in this hypothesis is that due to the multifaceted definition and measurement of trust, teachers who are perceived as exhibiting only a few of the facets of trust will have students with lower trust scores and corresponding lower self-efficacy. If a teacher is perceived as competent, but rude, they

may have a higher rating on some questions, but lower on those about benevolence and openness, thus their overall trust will be lower.

Planned analysis 2.

Hierarchical linear modeling justification. Due to the nested nature of the data collected in this survey, traditional regression models cannot be employed. Since the questions in the trust survey analyze students' perceptions of the qualities and characteristics of their mathematics teacher, it is assumed that there will be non-independence of the data for students referencing the same teacher. Students within classrooms will elicit different reactions from their teacher throughout the year. It is likely that all of a teacher's students, despite what class period they are in will rate that teacher more similarly than another teacher. Interactions between a teacher and his or her students will create a specific shared bank of collective memories for that class. Students will reflect on these collective memories when considering the trust criteria.

It is important to note that although there will be general trust patterns for each teacher, this does not mean that all students in a class will have identical perceptions of a teacher. Usher (2009) found that although four students had the same mathematics teacher, three credited her with lowering their self-efficacy, while one credited her with raising it. In addition, outside class interactions – such as tutorials – will afford individual variation in students' responses, since these interactions are not shared by all students. Finally, students will also perceive classroom interactions differently according to prior experiences and to their pre-dispositions to trust as Erkison (1963) hypothesized.

The importance of this study is its ability to indicate if there are differences in outcomes for students, based on their trust in their teacher. Employing traditional regression techniques could yield results that would appear like those found in Figure 1. From this graph it appears that students who have more trust in their teacher will also have higher levels of self-efficacy. However, some researchers may draw the conclusion that this as a result of the students generalized views or some internal predisposition towards certain levels of both trust and self-efficacy. Essentially, the cause of this pattern could be interpreted as a student-level factor.

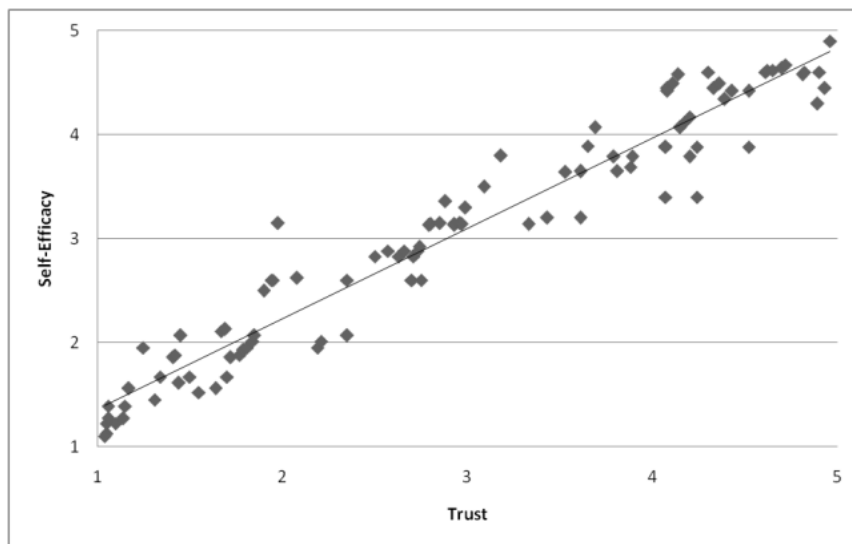


Figure 1: Graph of the hypothesized simple linear regression relationship between trust and self-efficacy not including clustering by teacher.

Through use of hierarchical linear modeling techniques, I can evaluate the distribution of trust and self-efficacy across classrooms. As a result of clustering in the student data I expect to find a pattern such as the one seen in Figure 2. This graph clearly

indicates that a future analysis of the teacher factors is warranted. Although the same overall linear trend is exhibited, one can observe that there is something markedly different about Teacher 1 and Teacher 5 classes. There still is some amount of variation within each class, but the overall clustering reveals that students' trust, and thus, self-efficacy is related to which teacher the students had. Although it is not expected that the actual results of this study will have such a neat or dramatic grouping, this extreme example indicates why HLM is necessary for this analysis.

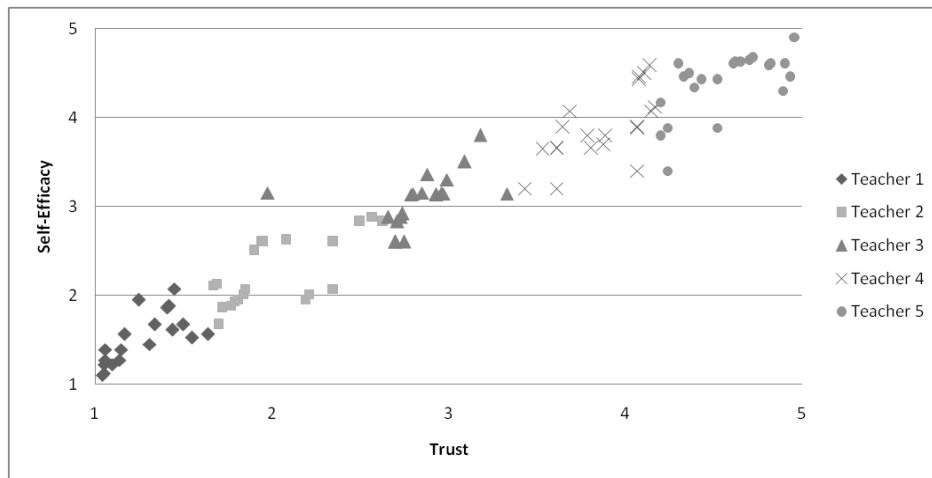


Figure 2: Graph of the hypothesized clustering by teacher found in the relationship between trust and self-efficacy.

Model structure and power. In surveying students from twelve teachers, I expect to see more variation in student trust levels than if a smaller sampling of teachers was used. The final number of level-two clusters will be 12 (teachers), which I hypothesize will afford a great amount of variation in the data. The level-one outcome for students will be their mathematics self-efficacy score. The level-one predictor will be student trust, with prior achievement, and the interaction between achievement and trust included

in subsequent analysis as well. There should be an average of 60 students per level-one group, based on average class size and estimated consent rate for the school research is being conducted in. The level-two formula will not include any predictors, but will specify which mathematics teacher the student has.

While there seems to be some disagreement about the required sample size for multilevel modeling techniques (Maas & Hox, 2005; S. N. Beretvas, personal communication, May 23, 2011), generally, by not including a level-two predictor, cluster size at level-two can be smaller (K. Pituch, personal communication, August 25, 2011). In addition, larger sample sizes at level-one, such as the 60 students in the proposed study, increase power. Although a larger number of level-two clusters would increase power further, the typical size and structure of middle schools limits the number of mathematics teachers available for this study. Increasing the number of teachers in the study would force a third cluster level to be added – school. This upper level would also have to be a large size, thus exponentially increasing sample size. Due to the fact that I expect that there will be a large effect of trust on self-efficacy as well as a strong intraclass correlation, I expect that I will have enough power to detect the effect with my chosen sample.

Unconditional model. The first step in the analysis will be to run an unconditional model of the data in which only the outcome (self-efficacy) is specified and all other effects are set to be random effects. For the purpose of all analyses the outcome of self-

efficacy is assumed to be normally distributed in the population. The unconditional model (model 1) will be specified as:

$$\text{Level one: } SE_{ij} = \beta_{0j} + r_{ij}$$

$$\text{Level two: } \beta_{0j} = \gamma_{00} + \mu_{0j}$$

In model 1, for a student i in class j , SE is the student's self efficacy, β_0 is mean class self-efficacy, and γ_{00} is the grand mean self-efficacy across all 720 students. The term r_{ij} is the difference between an individual's score (SE_{ij}) and the class mean score (β_0) and μ_{0j} is the difference between the class mean score and the grand mean score (γ_{00}) for each class. Estimation of this model allows for separating the proportion of total variation of self-efficacy that can be attributed to student and classroom factors. From this model I can calculate the intraclass correlation (ICC), which represents the proportion of variance in mathematics self-efficacy that is attributable to grouping, or class level factors (Raudenbush & Bryk, 2002). The closer the ICC is to a value of 1, the stronger the dependency of the data based on the effects of the individual classrooms (Raudenbush & Bryk, 2002) or the more clustering present.

The expected results of this analysis are that the ICC will be around .15, indicating that approximately 15% of the variance in self-efficacy is attributable to classroom conditions. For typical education research, this is considered a fairly large effect (Pituch, personal communication, August 30, 2011). In addition, the variance component of the intercept, τ_{00} , would be significant indicating that there is variation

between classes. Finally, the variance for level one (σ^2) is expected to be large since there are no predictors in the model to account for the variation in student level outcomes.

Model 2. In order to determine if self-efficacy beliefs are partially attributable to trust, model two will include trust (grand-mean centered for interpretability) as a student level predictor. Model two will be specified as:

$$\text{Level one: } SE_{ij} = \beta_{0j} + \beta_{1j}Trust_{ij} + r_{ij}$$

$$\text{Level two: } \beta_{0j} = \gamma_{00} + \mu_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

In this model the student predictor $Trust_{ij}$ is added grand-mean centered (for reasoning see, Enders & Tofighi, 2007), denoting the trust score of student i in classroom j . The term β_{1j} is the slope coefficient which represents the relationship between trust and self-efficacy. Its value represents the difference in self-efficacy scores for two students who differ by one unit in trust. By not specifying an error term for the slope (μ_{1j}), I am making the assumption that the effect of trust on self-efficacy will not vary across classrooms. However, since the error term remains for the intercept (μ_{0j}), I am allowing that different classrooms will have different self-efficacy means, and this variability between classes is a function of μ_{0j} . Since the slope is fixed, while the intercept can have random effects, this specification will only result in convergence if there truly is variance from the level two (classroom) effects.

The expected results of this analysis are that *Trust* would be a significant predictor, in that the p-value for the coefficient would be less than .05. In addition, it is assumed that there will still be significant random effects for τ_{00} , since all predictors are not included in the model. The random effects for level 1, σ^2 , will be greatly reduced due to the significant effect of trust. It is assumed that the random effects for level-one may still be large, since this is not the final model.

Research Question 3

Is the relationship between trust and self-efficacy stronger for students with lower prior mathematics achievement?

Hypothesis 3. Here I am hypothesizing that students who have higher prior achievement will also likely have higher self-efficacy. There has been a strong correlation consistently found between self-efficacy and achievement in mathematics (Kitsantas et al., 2010). Therefore, students who have lower self-efficacy will likely also have lower prior achievement. However, I expect that the effects of high trust in a current mathematics teacher will have a greater impact on the lower achieving students than previously higher achieving students. This is because without a previous year's mastery experiences to boost their self-efficacy, students will rely more heavily on the current teacher's social persuasions to make judgments about their ability to succeed in the class. Thus, in the presence of a trusting relationship with positive persuasions, students with previously low achievement will experience high self-efficacy. However, the converse will be seen as well. Students who already may have had low self-efficacy in

mathematics due in part to low prior achievement will lower their expectations of success for the current year further if they do not trust the teacher. In essence, students who are lower achieving will have a stronger effect of trust on their self-efficacy than higher achieving students whose self-efficacy may be more robust due to prior mastery experiences.

Proposed analysis 3. The final model specified is the full model (model 3) which includes the effects of prior achievement to test whether the effects of trust are significant controlling for prior achievement. In addition, the interaction term between trust and prior achievement will be added to the equation. Model three equations are:

$$\text{Level one: } SE_{ij} = \beta_{0j} + \beta_{1j}Trust_{ij} + \beta_{2j}Ach_{ij} + \beta_{3j}Trust * Ach_{ij} + r_{ij}$$

$$\text{Level two: } \beta_{0j} = \gamma_{00} + \mu_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20} + \mu_{2j}$$

$$\beta_{3j} = \gamma_{30}$$

Here I have added *Ach* as the measure of student prior mathematics achievement and *Trust*Ach* as the interaction between prior achievement and trust. Trust and achievement have both been grand-mean centered to aid in interpretation and the interaction term was computed by multiplying the grand-mean centered results for each student. The term β_0 is the intercept; since trust and achievement predictors have been grand-mean centered, β_0 represents the average level of self-efficacy for a student who

has average trust and average achievement. The coefficient, β_1 , represents the relation between trust and self-efficacy for a student at the mean of achievement; β_1 is the expected change in self-efficacy for a one unit change in trust for students with scores equal to the mean achievement (since the mean here is zero). The term β_2 represents the change in self-efficacy for a one unit change in prior achievement for students with trust scores equal to the mean. The variable β_3 represents the effect of the interaction between trust and prior achievement. I predict that for students with lower prior achievement, trust will have a stronger effect on their current mathematics self-efficacy than for students with higher prior achievement. Further investigation of the interaction term will follow the HLM analysis.

This model has a combination of fixed and random effects estimated based on the supporting theory and to increase the likelihood of convergence when the model is run. There will be no random effects for *Trust* or *Trust*Ach*, but that there will still be random effects on the intercept μ_{0j} and for *Ach* (μ_{2j}). This result would indicate that while classrooms differ overall on mathematics self-efficacy scores of students and that the effects of prior achievement on self-efficacy differs for students within classes, the overall effect of trust and the interaction between trust and achievement will not differ for individual students in classes.

It is also predicted that the coefficient for *Trust* and *Trust*Ach* will be significant. Due to the fact that the achievement variable and self-efficacy are evaluated for separate class years, the effect of trust for the current year is expected to be stronger than the

effect of previous achievement. However, it is assumed that for low performing students their self-efficacy will be increased more by trust and thus, this interaction is expected to be significant. The two predictors which include current year classroom evaluations of trust will have the largest impact on student self-efficacy outcomes. There should again be a reduction in the level-1 variance due to the addition of more significant predictors. This model should also have the best reliability.

Follow up analysis on the interaction term. It is expected that trust will be a significant predictor of self-efficacy while controlling for prior achievement, but that the effect of trust will be stronger for students with lower prior achievement. The interaction will likely be more clearly visible by first estimating a traditional regression equation using the level 1 equation from model 3. Then utilizing the estimated coefficients and standard deviations, I will trichotomize the predictors *Ach* and *Trust* into high, medium, and low levels and plotting -1, 0, and 1 times the standard deviations for each of the 9 possible combinations. This analysis will not be used to make any type of significance statements about the predictors, merely to visually represent the interaction. An example interaction is given in Figure 3. In this graphical depiction of the interaction between trust and achievement, it is clearly visible that with high trust, previously low achieving students can obtain the high level of self-efficacy that high achieving students can reach.

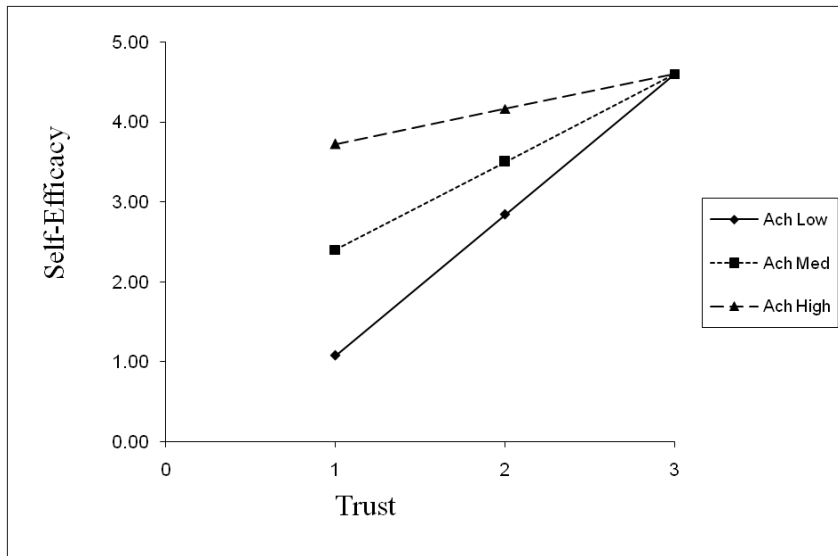


Figure 3: Graph of the hypothesized interaction between trust and prior achievement and its relationship to self-efficacy. Adapted from “2pred&int_trich.XLS [dataset]” by S. N. Beretvas, Fall 2010, Correlation and Regression course online supplemental materials.

Chapter Five: Discussion

Summary

Self-efficacy is defined as students' perceived capabilities to attain what they desire; thus, the more control students feel over their academic outcomes, the stronger their beliefs about their capabilities will be. This is perhaps why mastery experiences so frequently account for the most variance in self-efficacy beliefs. The best indicator of control is the amount of control you previously attained. However, as students enter middle school and beyond they are exposed to an entirely new style of teaching from their elementary years. The decreases in motivation and valuing of mathematics as students transition into middle school are documented (Midgley, Eccles, & Feldlaufer, 1991), and these trends could possibly continue into high school and can lead to an increased risk of dropping out of high school.

Through students forming trust in their teacher based on beliefs of reliability, competence, openness, honesty and benevolence about the teacher, it is easy to see why a student's self-efficacy would be impacted. Self-determination theory (Ryan & Deci, 2000) explains that students have a universal need to feel competent, autonomous and related. Throughout the course of a school year a student seeks out the fulfillment of these needs, and can have these needs fulfilled in part through a teacher's actions. The desire to feel competent in mathematics presses students to engage with their teacher initially. If a teacher is not perceived to be trustworthy by the student, the student may in

turn disengage from the interactions with the teacher and begin to feel that he or she cannot succeed in the teacher's class.

If the student feels their teacher is reliable and fair, the student will feel more strongly that they can predict how they will do in the class based on how they have done so far. If a teacher is unpredictable or unfair students will be unsure of how their effort put in to the class will relate to their outcomes. Trust in a teacher signals a belief from students that if a student exerts the amount of effort the teacher demands from each individual student (this may vary between students), then the outcomes the teacher outlined in exchange for the work can be expected. If a student can reliably predict what their efforts will bring, and those predictions meet the students' success criteria, then the student will have higher self-efficacy. In addition, if students believe a teacher is benevolent, they will have a sense that even if they do make a mistake, such as forgetting to do an assignment, the teacher will work with them to find ways to help the student succeed nonetheless.

While a teacher must have high expectations as mentioned earlier, these must be realistic expectations as well. Students will inevitably encounter an academic misstep at some point during the year, if they are aware that the teacher will work with them and nurture them through the difficulty and help them to learn from their mistakes, they will feel they have more control over their outcomes for the class. They will understand that even if they aren't completely reliable, their teacher will help them to achieve the outcome that they desire. In this way they will be confident, not only in their ability to

control their outcomes, but also to feel confident in their desired outcomes when they can't control something academically.

Limitations and Future Directions

Since the link between trust and mathematics self-efficacy has yet to be analyzed at an individual level, there are limitations to what could be analyzed. Future research should investigate the beneficial impacts of trust on achievement, which I propose will be indirect effects, with the direct effect of trust on self-efficacy mediating the relationship. This is supported by Lee (2007) who evaluated the effects of student-teacher trust relationships on achievement in South Korea, but measured trust using a scale that referenced the student's feelings about all teachers. Lee (2007) found that the trust relationship was a significant predictor of school adjustment and academic motivation which both predicted academic performance. From this Lee (2007) was able to conclude that trust in teachers did have an indirect effect on achievement, through boosts in motivation and school adjustment. Adams and Forsyth (2009) found that students' perception of student trust in their teachers explained a significant amount of language arts achievement growth during the school year; even when controlling for gender and ethnicity.

Future research directions can be formed based on the outcome of this study. If clustering effects are found, as assumed, then future studies attempting to find which teacher variables predict the clustering of trust would be warranted. Adams (2010) found that teacher trust in students predicted students' trust in teachers. Due to the dyadic

conceptualization of the trust relationship, a study which investigates teacher trust and student trust in dyadic analysis structure could also illuminate the nature and mechanism of student trust. A further study to analyze what specific teacher behaviors predict student trust could ultimately help teachers by providing more specific trust facilitating behaviors. If, however, clustering is not found, student variables which predict where they lie on the trust scale should be researched. This initial study will provide the basis for future hypotheses and evaluations.

The current scale used to measure trust is a limitation to this study. Although trust is conceptualized as a five-faceted belief, the current scale only loads onto a single factor – trust. Thus, it is not possible to fully explore which of the facets may be more or less important to bolstering self-efficacy. Future scale expansion, including more items which will allow for a scale of trust that can be distinguished into its five separate components (benevolence, reliability, competence, openness, and honesty) will allow for a deeper understanding of the nature of trust and how it interacts with student motivation.

The interactions of trust with gender, ethnicity, and culture and the effects of matches or mismatches in demographics between students and teachers should also be further explored. Although this initial study seeks only to establish the relationship between trust and self-efficacy, further research should be conducted to see if this relationship is constant for all students. Some research has indicated that female students (Usher & Pajares, 2006a; Usher & Pajares, 2006b; Zeldin, Britner, & Pajares, 2008) and minority students (Usher & Pajares, 2006b; Klassen, 2004) rely more heavily on social

persuasions than do their counterparts. Future studies should include demographic predictors in order to examine if these patterns affect trust and self-efficacy relations as well.

The individual experience of student trust is a relatively unexplored area of research, as expectations of student success continue to rise; new directions for increasing student success in mathematics must be explored. Efforts to improve the quality of a students education through strengthening relationships between teachers and students is perhaps one of the most ideal mechanisms possible. Further research in this field could lead to critical discoveries that positively impact not only students' classroom experiences, but teachers' as well.

Chapter Six: Creation of Teacher Training Program

In the final chapters of this report I will outline and detail the creation of a teacher training program based on the research presented in the prior chapters. In light of the predicted and documented benefits of student trust in a teacher, I have subsequently designed for teachers a training program that is grounded in the theoretical ideas about trust discussed previously. This chapter will include a detailed description of the program based on the Decomposition Model by Borich and Jamelka (1982).

The Student-Trust Building (STB) professional development will begin with teachers attending a one-day training session during the summer. For the development phase of the program, teachers will be randomly selected for the STB program by administrators; however, the intention is that ultimately all teachers within a school will receive the training. For the first year of implementation of the program, only half of the teachers (likely 20 or more teachers per campus) at any given school will be selected in order to have a control group with which to compare data. The following year, the other half of the teachers at the given school will receive this training.

Stake (1967) defines antecedents as prior existing conditions which may affect the outcome of the program. Antecedents are any prior experiences, interests, or aptitudes of the participants entering a program which are assumed to exist (Stake, 1967). The antecedents to this program are teachers' desire to do their best and the fact that no teacher could currently utilize every possible strategy for trust building.

The intended transactions of a program are the encounters within the program which are expected to facilitate the intended outcomes (Stake, 1967). During the STB training the critical intended transactions are those which help the teachers reconnect to positive experiences of trust from their own educational experiences in order to help teachers develop new strategies to build trust with their own students. During the STB training, teachers will hear about current research on trust and will also be encouraged to be reflective about their own experiences of trust. The theoretical foundation for the STB program is the definition of trust as put forth by Tschannen-Moran and Hoy (2000). Here, trust is defined as a student's willingness to be vulnerable to a teacher based on their belief that the teacher is competent, benevolent, open, honest, and reliable. Trainers will explain each of the five components in detail and present relevant research about each component that sheds light on the importance of trust in student-teacher relationships.

The intended outcomes are the expected results of the program. An enabling outcome is one which is a prerequisite all subsequent outcomes. One key enabling outcome of the STB program, which will be measured, is that teachers come to believe that trust is an important part of educational experiences for them and for their students. Pajares (1992) stated that teacher beliefs are relatively stable and hard to change and these beliefs have the power to influence teachers' perception of new information and to alter behaviors. Gregoire (2003) explains that in order to facilitate teacher belief change, teachers should feel efficacious about their ability to implement changes, which can happen as a result of having an opportunity to practice reform initiatives in a classroom context. If teachers come to believe that a new belief system is accurate through student

success examples, they are more likely to adopt the beliefs than if teachers are taught the ideas without experiencing accompanying student success (Leatham, 2006).

Since encouraging student trust in teachers is the ultimate goal of the program, it is essential to have teachers focus on the ways that they experienced trust as students. There is an assumption that teachers already do some trust building strategies in their classes, but not every possible strategy. By forcing teachers to consider the aspects of trust from a student perspective, this training will be distinctive from many other teacher-student relationship trainings which focus on relationship building solely from a teacher's perspective. Thus, it is hoped that even the best trust-building teachers will benefit from the training by learning new methods for building trust with their students from these reflective practices.

Following the summer training, teachers will be asked to revisit these trust concepts five times throughout the school year. Teachers will be encouraged to focus on one aspect of trust throughout each six-week period and then reflect on their experiences in the classroom at the end of it. For the first six-weeks, for example, teachers will focus on benevolence again. They will receive an email at the beginning each six weeks reminding them of some of the tactics that were listed in the training and then will encourage teachers to be cognizant of their attempts to show students each aspect. At the end of every six-week period throughout the school year, teachers will be asked to get together with the group that attended the training and meet for one hour. The teachers will meet and discuss how they felt their attempts to implement the trust-fostering strategies

fared and if any methods worked better or worse than others. Following each meeting, participants will receive an email with the next component and similarly will be expected to focus on this next component of trust during that six weeks. This process will repeat through the fifth six-week period of the year. For the final six weeks they will receive an email encouraging them to focus on combining all five components and will summarize the tips that came out of the year-long follow-up meetings.

While it is critical that teachers believe that trust is important in student teacher-relationships, if this belief change is not accompanied by a change in practice, it is not expected that positive outcomes will be found for students. The purpose of the year-long follow up meetings is to hold teachers accountable for making changes in their practice and also to foster the encouragement and creativity that results from working in a group. This will encourage teachers to try new methods that brought other teachers success and to offer a support system that will encourage the teachers to continue applying the training to their teaching. Without a continued support system, the teacher intervention may fail.

Outcomes are the expected benefits of a program and should be realistic expectations of the program; first order outcomes are those which are the primary indicators of program effectiveness (Hao & McGee, 2003). One first order outcome for the STB program is that the students will perceive their teachers are more benevolent, competent, honest, open, and reliable. These are all documented in the literature to be the factors which when combined result in trust relationships. This perception of these

components theoretically implies the second first-order outcome, that students have more trust in their teachers. Second and third order outcomes are broader and indicate the intended directions of the program stemming from the first order outcomes (Hao & McGee, 2003). The intended second-order outcome is a result of the first order outcomes; students will be more accepting of a teacher's positive persuasions due to their trust in that teacher. The third order outcome is that by trusting teachers and accepting teacher persuasions more readily students will subsequently exhibit higher self-efficacy.

Modeling Student-Teacher Trust Program Design

Using the Decompositional Model (Borich & Jemlka, 1982) to diagram the program, the first-level diagram of the program can be seen in *Figure 4*. Inputs of a program are dichotomous variables which are requirements of the program (Budgen, 1987). For this program, the first input to the program is a group of teachers who will attend the program. Teachers are the drivers of change in this program; their implementation of the program within their schools is expected to be the cause of student change. If teachers do not attend the program no changes are expected. A second input is teacher attendance to the summer program and the five meetings throughout the school year. If teachers do not attend all of these components, it is likely the program will lose some of its potency. Students are the third critical input. If teachers fail to use the trust-building strategies of the program within their student-teacher relationships, the proposed effects of the program are negated. The emails sent to teachers with follow-up ideas and reminders are a fourth input. The final input to the program is the continued contact between the teachers who attend the program together. If teachers receive support from

other teachers for continuing to implement the trust strategies in their classes, they will be more likely to maintain their commitment to the program than if they were working in isolation and not held accountable by other teachers.

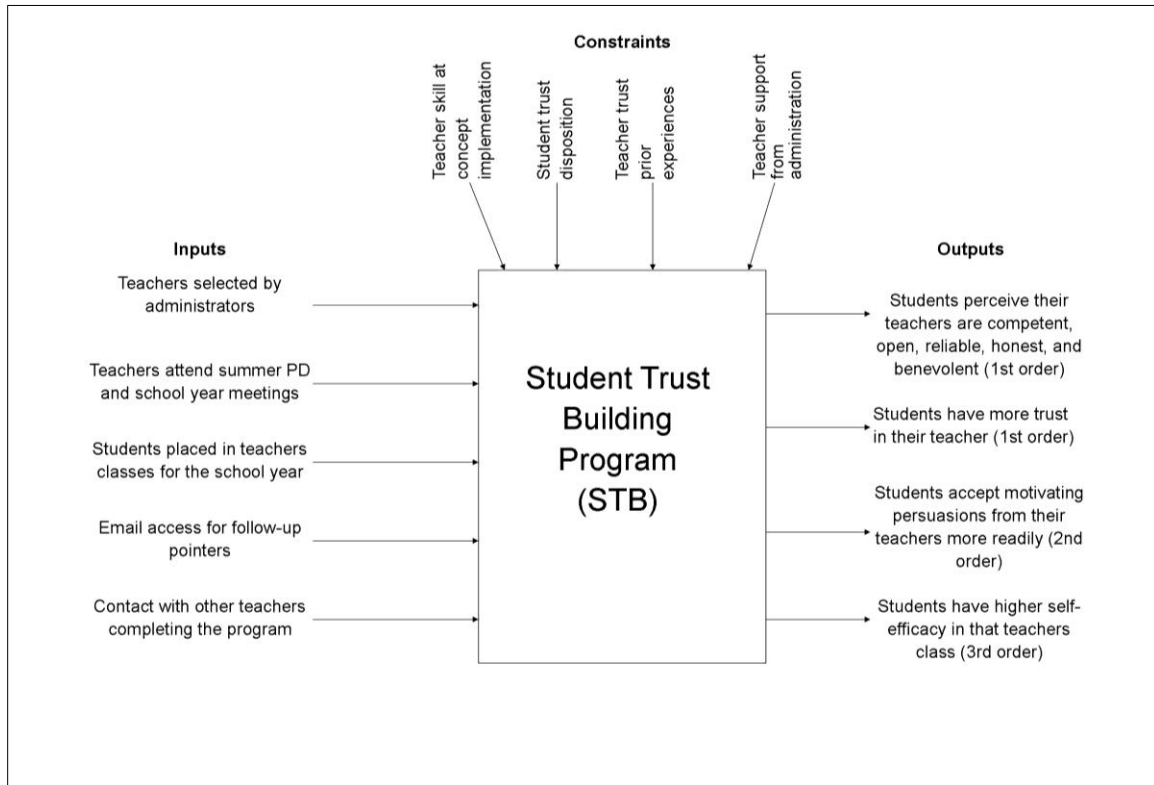


Figure 4: Model of the overall design of the Student Trust-Building Program

Acting upon these inputs are constraints that can mediate the strength of the relation between the inputs and the expected outcomes of the program (Budgen, 1987). The first of these constraints is the group of teachers' skill at implementing the strategies intended to increase student trust. The strategies developed in the program should result in positive results as they were generated by teachers based on their own memorable experiences of trust. However, if teachers are unable to implement the strategies as they

were intended, similar results can no longer be expected. Next, the students' trust dispositions can also be a hindrance to successful outcomes. For example, if a student is resistant to trusting teachers—or people in general—it may be a barrier to building trust in a teacher despite a teacher's best effort. Finally, due to the fact that teachers are guided to rely heavily on their own experiences of trust as students, a constraint on the program would be if a teacher never had positive trust experiences with their own teachers during their schooling. A teacher with this lack of trust history will not likely be able to participate effectively in the training and will not likely view this as important as would a teacher who did have positive experiences.

Finally, the last constraint is support from each teacher's school administration. If teachers do not have adequate time to attend the summer training or the subsequent meetings, the program will likely not be effective. Since administrators largely have control of scheduling summer training and meetings throughout the school day for teachers, providing time for teachers to attend the training and to meet once every 6 weeks is important. In addition, if administrators are not supportive of the trust strategies, they will likely not encourage or allow teachers to continue to use the strategies in their classrooms. Since principals frequently complete assessments of teachers by attending their classes and leaving them feedback, if the principals see the trust strategies as negative, they will likely instruct teachers not to continue the strategy use. This will likely press teachers not to use the strategies in order to please their administrators who are responsible for offering or denying their teaching contracts.

The intended outcomes of the program are as mentioned before. The first order outcome is that the students perceive teachers are more benevolent, competent, honest, open, and reliable and that students consequently have more trust in their teachers. The second order outcome is that students will be more accepting of a teacher's positive persuasions due to their trust in that teacher. Finally, the third order outcome is that students will exhibit higher self-efficacy in the participating teachers' classes.

Figure 5 shows the second level of the Decomposition Model which details the program activities or transactions that will lead to the expected outcomes (Hao & McGee, 2003). Working under the same constraints and inputs as in the first diagram, the first transaction of the program (1.0) is the activity which has teachers reflect on their experiences as students. After hearing an explanation of the components of trust, teachers will be broken up into small groups of four to six. Within these groups teachers will be asked to discuss each one of the five components of trust sequentially. For the component of benevolence, for example, teachers will be asked to speak with each other about educational experiences in which their teachers treated them with care, support, and concern.

During group time, teachers will be asked solely to focus on their experiences as students – not as teachers. This is to ensure that the teachers reflect on what actions mattered to them as students first, before considering how trust may be manipulated. After a time for discussion about ways that teachers from their past exhibited benevolence, the current teachers will rejoin as a group and generally discuss ways they

experienced benevolence. Then, a presenter will share current research on the positive effects of this component for students and ask teachers to brainstorm as a group some methods they could use to show benevolence based on ways they experienced it. This process will be repeated for the other four components of trust.

The enabling outcome resulting from transaction 1.0 is that if teachers come to believe that trust is a positive aspect of the student-teacher relationship, they will be more likely to utilize the strategies from the training and meetings. The second transaction (2.0) for teachers is to focus on one of the trust components during their daily encounters with students for each of the specified six-week periods. As teachers focus on using trust building strategies in their classes, they should correspondingly begin to see positive benefits to their relationships with their students. Witnessing these positive results will lead teachers to believe that the trust building strategies are working; this enabling outcome will help fuel the third and fourth transaction.

The third transaction (3.0) involves the follow-up meetings in which teachers participate five times throughout the year. During these meetings the teachers will discuss their attempts from the prior six weeks to integrate the trust building strategies in their teaching. These meetings will encourage teachers to continue in their efforts to focus on student trust building and offer teachers additional examples of positive strategies that they may not have attempted to use yet. Transactions 2.0 and 3.0 feed into the fourth transaction.

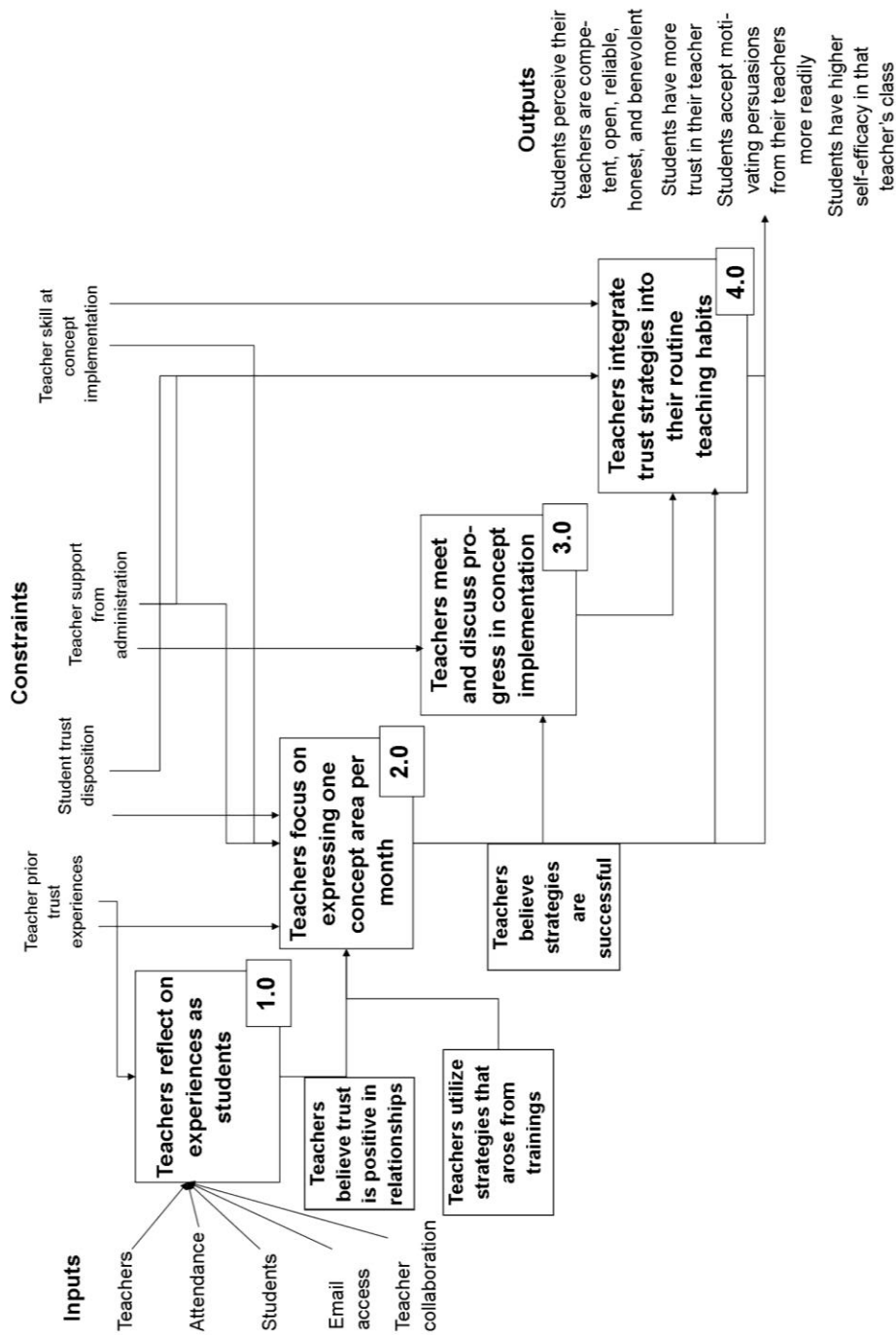


Figure 5: Model of the intended transactions of the Student Trust-Building Program

Successful implementation of the trust-building strategies as well as witnessing success in other teachers' classes will lead all teachers to integrate trust strategies into their routine teaching habits for the future (4.0). The second and fourth transactions will lead to the desired outputs for the program as these are the points where teachers learning and experiences from the program translate into behaviors in the classroom.

In *Figure 6* the third and final level of program decomposition further explains the first transaction. The process of teachers reflecting on their experiences of trust will begin with teachers first learning what research indicates are the five components of trust (1.1). Presenters at the professional development training will describe the components of trust and describe how they interact to psychologically facilitate the experience of trust. Once teachers understand what the antecedents to trust are they will be able to discuss specific examples of each component that they experienced while students (1.2). When teachers come to believe that during their educational experience they trusted a teacher, they will be able to call on these experiences in order to discuss the specific behaviors they believe may have led them to have trust in a teacher (1.3). From this activity, teachers will come to believe that there are specific ways to build trust which will allow them to brainstorm methods for trust building that they could implement within their own classrooms (1.4). This method allows teachers to come up with their own strategies based on personal experiences, instead of receiving a pre-designed list of strategies from the program presenters. Since the teachers will have had a stake in creating the strategies they will become more confident that they can implement the strategies successfully in their

classes. This will lead to the output that teachers use the trust building strategies which were discussed in the training within their own classrooms.

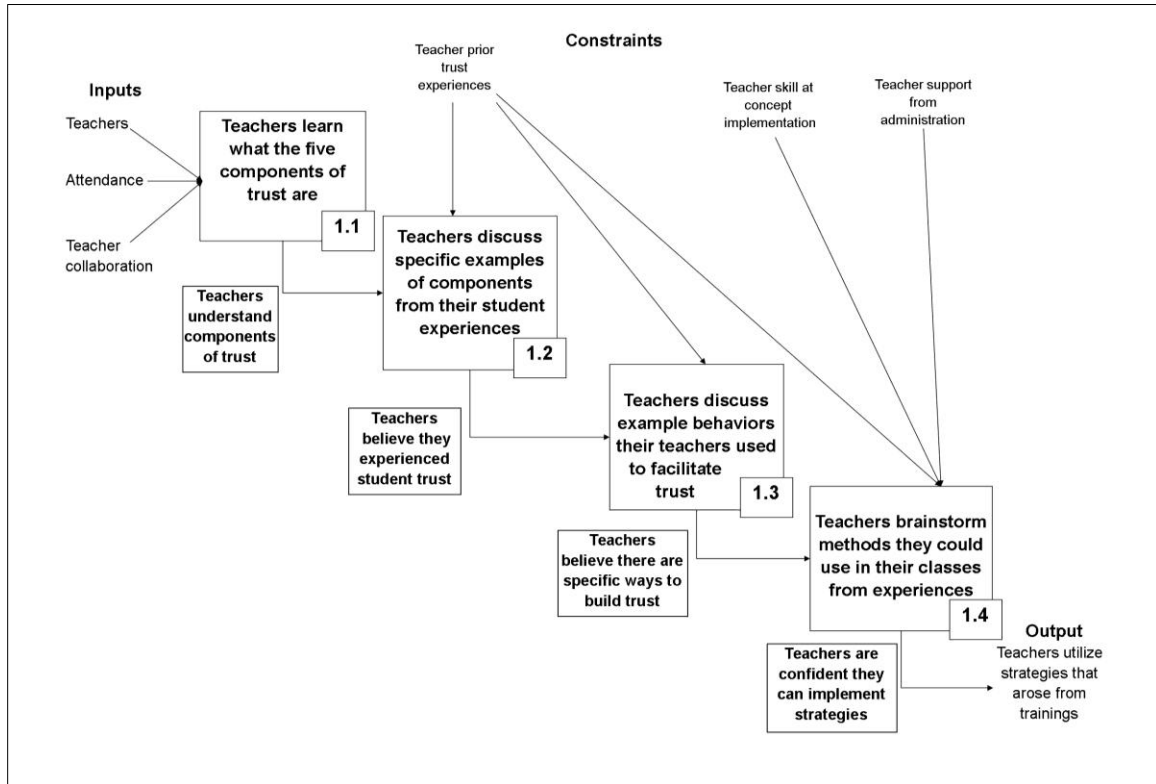


Figure 6: Model of the second order transactions for intended transaction 1.0 for the Student Trust-Building Program.

Chapter Seven: Natural Language Questions and Data Analysis Procedures

Program stakeholders are those people who are most interested and invested in a program (Royse, Thyer, & Padgett, 2010). For this student trust-building program there are three stakeholders: teachers, students, and school administrators. Each of these stakeholders is critical to the success or failure of the program and will also benefit directly from the anticipated outcomes of the program. The following chapter describes each of the stakeholders and then poses some specific, natural language questions which they are likely to ask, as well as the data analysis procedures proposed to answer these questions.

Stakeholder #1: Teachers

As evidenced by the models in the previous section, teachers are a crucial part of the program. If teachers cannot be recruited to attend the training program, then it cannot exist. In addition, teachers must have some level of buy-in to the program in order to use the strategies they develop within their classes. The following questions posed in natural language—which might be asked by teachers—focus on why they would want to agree to attend the program from a cost-benefit perspective.

Why should I agree to participate in the STB training?

Teachers who participate in the program will have an opportunity to learn about the latest educational research about student trust, as well as have an opportunity to reflect on their own educational experiences. This program is unique in that it allows

teachers to have an opportunity to be part of the creative process of developing strategies for use in their classroom from their own experiences in conjunction with learning the theoretical underpinnings of trust from the psychology literature. In this way the strategies are flexible and thus more practical and easier to implement.

The design of the program allows teachers time and space to create the trust strategies during their training that they will use in their classes. Strategies created during the session will be documented and serve as part of the email reminder system. Since this is a natural part of the training process, no analysis is necessary to answer this question.

How will this help my relationships with students during the school year?

By using the trust building strategies within classes, students are predicted to have stronger beliefs that the teacher is competent, open, honest, reliable, and benevolent. The discernment of these trust criteria by students leads to student trust in teachers. As students come to trust their teacher more, positive benefits have been seen. Trust has been related to improved classroom discipline, attendance, participation in class, and increased motivation. When students begin to trust a teacher more they are more willing to be vulnerable to the teacher and will interact with them correspondingly.

To measure student trust, surveys including the 13-item trust scale based on the original scale developed by Adams and Forsyth (2009) will be administered to students at the beginning of the school year and at the end of the fifth six weeks of the school year. All teachers in the school will be asked to hand out the survey and ask students to answer

the questions during their first period class. Since about half of the teachers in the schools should have completed the training, there will be approximately equal groups of teachers who received the training program (treatment) as well as those who did not (control). Teachers who do not have a class first period and those who teach non-academic classes (for example, band, choir, athletics) will be omitted from the study due to the differing nature of their relationships with students and the differing goals of these classes. Students will be instructed to answer the survey questions about their first period teacher; some example items from the scale are “My teacher is always ready to help me” and “I am well cared for by this teacher.”

A three-way repeated-measures analysis of variance (RM ANOVA) with two between- and one within-subjects factor design will be used to analyze the data. Here I will examine the difference in pre-post scores on trust, comparing response patterns across the school year. I will include whether the teacher responded about in the survey was attended the training or not as an independent variable in the analysis as well as what core subject the teacher teaches (math, English, social studies, or science), and the interaction between them. I will look to first see if there is a three-way interaction between teacher attending the program, subject, and time in order to attempt to detect if these two between-subjects variables had an effect on the strength of trust at the post-survey. I expect that the three-way interaction will not be significant, but will follow up with a two-way interaction between time and attending the program. I will expect to see that students will have significant growth in trust in those whose teacher attended the

program, and will have greater trust on the post-survey than students in teachers classes who did not attend the program.

How does this program affect my students' motivation?

Student trust in a teacher is predicted to lead to increases in self-efficacy for that class. As students come to trust a teacher more they are more likely to accept the verbal persuasions the teacher offers them which will bolster their self competence beliefs. Self-efficacy is well documented to predict achievement and correspond with other benefits such as increased self-regulation and persistence.

In order to measure student self-efficacy, surveys using the self-efficacy subscale of the Student Motivational Questionnaire (SMQ, Karabenick & Maehar, 2004, 2007) will be administered to students at the same time using the same procedure as the trust survey described above. Students again will be directed to think of their first period class as they answer items. Some example items from the self-efficacy scale are “I'm certain I can master the skills taught in class this year” and “I'm certain I can figure out how to do the most difficult class work.”

This data will be analyzed using a three-way RM MANOVA in the same way as the trust variable. However, it is likely that there will be a three-way interaction. It is expected that there may be differences in self-efficacy change across the year for students in subjects typically perceived as more difficult (math, science). If the three-way interaction is significant I will run 4 separate two-way RM MANOVAs—one for each subject—with time as a within factor and teacher program attendance as a between factor.

Additionally, I will look to see if trust predicts self-efficacy. Here I will utilize a hierarchical linear modeling technique. Post-test self-efficacy will be the dependent variable and students will be grouped by who their first-period teacher is. Post-test trust will be included as a level 1 predictor. Teacher attendance in the program will be added as a level 2 predictor. It is expected that trust will be a predictor of self-efficacy and that teacher attendance in the program will be related to self-efficacy.

Stakeholder #2: Students

Students are the second major group of stakeholders for the student trust-building program. Student lack of success in mathematics was the impetus for the initial look at the relationship between trust and self-efficacy, and students' increased trust in their teachers is the expected output of the program. There are clear hurdles to getting students to trust their teachers more. These natural language questions are those that students might pose about the effects of the program on them.

Are my teachers just trying to trick me?

Students who become aware of the program may be concerned that teachers are simply trying to manipulate or trick them. Teachers who attended the program can address these concerns by explaining to students that one of the critical components of trust is honesty. By addressing student concerns directly and explaining to students that the purpose of the training is to help teachers be more effective, rather than trying to manipulate students, students' fears should be eased. In addition, the strengthened

relationships between students and teachers should allow these types of honest conversations to be more approachable.

Why should I trust my teachers?

Students with a history of negative experiences in school may be reluctant to trust their teachers. Through utilizing the trust strategies within their classes, teachers will have a variety of different methods through which they can connect with students. By opening teachers up to new methods of connecting with their students, there is a better chance that a teacher will have a method work with a difficult student. Students will likely be unaware of the multiple strategies that teachers are using in their classes, but they will likely notice that they do feel more trust in certain teachers. Prior research analysis comparing the results of students in a teacher's class who attended the program versus a teacher who did not attend the program will reveal if the additional strategies were successful at gaining a higher level of student trust across all students. In addition, the analysis connecting trust to self-efficacy indicates that there are positive effects for students who are willing to trust their teacher—mainly through increased feelings of competence.

Stakeholders #3: School Administrators

The final group of stakeholders is the school administrators who must fund the purchase of the STB program, as well as make available their schools during the summer for the teachers' training and allow time for follow-up meetings. If school administrators

don't agree to fund the STB program, teachers and students will not be able to benefit from the positive outcomes of the program. In essence, convincing administrators of the value of the program may be the most important obstacle, for without them, the program would not exist in schools.

How does this program affect teacher beliefs?

Through the training program teachers will come to believe that both trust and quality student-teacher relationships are crucial to effective classrooms. The benefits of student trust are documented, and having teachers internalize these beliefs will likely lead to teachers more actively seeking out trust relationships with students. This will not only improve the quality of individual student-teacher relationships, but the overall quality of the school as students begin to feel more connected to their teachers.

In order to analyze the effects of the program on teacher beliefs, I will develop a pre-post survey which will be administered to teachers who attend the training program. The first survey will be administered at the start of the professional development training, then teachers will be asked to complete the brief survey during each of the follow-up meetings. Example items on the survey are "I believe it is important for my students to trust me," "I can use strategies to help my students trust me more," and "I use strategies from the STB program in my classroom."

The purpose of this data is to determine if teachers' views of trust and their ability to affect trust change throughout the course of the programs' first year of implementation.

To effectively analyze the data, hierarchical linear modeling will be used since there will be a large sample of teachers (20 or more) with 6 surveys from each. Time will be the level one factor and the separate time points for the survey will be nested within each teacher. Growth modeling will help indicate the trajectory of belief changes and reveal if teacher beliefs about the importance of trust increase, decline, or maintain throughout the school year. Teacher gender and years of experience will be included as a Level 2 predictor to see if these effect the relation between attending the program and belief change.

How much time and resources will this take to implement?

Administrators will want to know exactly what the necessary elements of the program are for success. Before the program is enacted at a school, campus administrators will receive an implementation guide which outlines the crucial elements of the program as well as inputs, outputs, constraints and enabling outcomes, as discussed above in the models of the program. No analysis will be conducted by evaluators beyond the creation of the model of the program that was created above. Administrators will have to evaluate the possible constraints and inputs in order to determine if they can provide an environment that will maximize inputs and limit constraints.

What are the benefits of the program for my school?

I will evaluate the benefits of the program utilizing two approaches: the decision-oriented approach and the applied research approach. Through the decision-oriented

approach to evaluation (see Borich & Jemelka, 1981), I will be forced to evaluate if the program is meeting the stated objectives and goals. The way in which I will measure the decision-oriented approach is through the teacher pre-post beliefs survey assessing teachers' views of the importance of trust in student-teacher relationships. In addition, the student trust and self-efficacy surveys to be conducted pre-post school year will assess student trust in the teacher who attended the program and self-efficacy for their class. Since increased student trust and self-efficacy are the primary intended outcomes of the program, if these increase, then it can be concluded that the program is successfully meeting its stated objectives.

Greater power to detect and describe the effects of the program will be afforded through the use of the applied research approach (for a comparison of multiple evaluation designs, see Borich & Jemelka, 1981). This approach will allow me to answer the question: are changes detected in students a result of the program or are they natural shifts for all students? Better control in detecting outcomes is afforded by using two groups of students—those with a teacher who attended the program (treatment) and those with a teacher who did not attend the program (control)—and a repeated measures approach. By comparing students whose teachers attended the program to a control group whose teachers' did not attend, it can be inferred whether increase in trust and self-efficacy were due to teacher attendance in the program or through natural shifts that may be detected for all students.

The results of the all analyses conducted will be reported to the school administrators. This will help administrators see the benefits of the program in relation to the time and expenses the program requires. In addition, it will serve as a justification for the implementation of the program with future groups of teachers. Presenting administrators with analysis that both confirms that the program is meeting is stated objectives and indicates that these objectives were met because teachers attended the program will help justify the costs of the program.

Appendix A
The University of Texas at Austin
Student and Parent Consent to Participate in Research

I am Kristin Harvey, Doctoral Student in the department of Educational Psychology at The University of Texas at Austin. I am directing a study about the effects of student trust in their teachers on motivation. I am asking your child to take part in this study, which will help me learn more about the nature of trust between teachers and students in mathematics classes. All students in your child's school are being invited to participate in this research.

Please talk this over with your child before you decide whether to participate. I will also ask your child to give his or her assent to take part in this study. Your child's participation is voluntary. If you permit your child to participate in the study, you are free to withdraw that participation at any time. If your child does *not* participate in the study, your child will not be penalized in any way.

If you agree for your child to be in this study, I will ask your child to do the following things:

- Answer a confidential survey about his or her beliefs about student attitudes about the teachers in the school.
- Answer a confidential survey about his or her attitudes toward his/her current mathematics teacher.
- Answer a confidential survey about his or her beliefs about how they will do in the mathematics class.
- Allow his or her mathematics teacher to release prior year mathematics grades with ID numbers, names will **not** be attached.

The amount of time it will take to participate in the study is estimated to be less than one hour, beginning in September 2012 and ending in June 2013. Students will not do anything that would disrupt their involvement in school. There are minimal or no discernable risks to your child, other than discomfort from answering questions about the student's teacher. The teacher will not have access to whether or not your child participated, nor to their individual responses. The teacher will not be present in the room during the survey administration, so as to minimize discomfort.

There will be no costs for participating in this study. Only I will have access to the data during data collection. I will protect the confidentiality of those records to the extent permitted by law. Throughout the study, I will notify you of new information that may become available and that might affect your decision to remain in the study.

The forms of raw data (survey responses and achievement data) will be stored in locked file cabinets or in computer databases that are password protected. Only I will have the password or keys. All of the raw data will be destroyed three years after the end of the study. Data with identifying information (only student IDs) will not be made available to anyone else. When data are received, I will only have access to ID numbers without student names. These IDs will be used to match the students' information, and then will be removed from the database. Summaries of research data will be available for sharing with participating teachers and their school administrators. Data will be aggregated and all identifying information will be removed prior to sharing any data.

Contacts and Questions:

Kristin Harvey, Doctoral Student, Kristin.harvey@austin.utexas.edu, 512-876-2921

This plan of study has been reviewed and approved by The University of Texas at Austin Institutional Review Board. If you have questions about the study, want additional information, or wish to withdraw your child's participation, please contact Kristin Harvey, whose contact information is listed above.

If you have questions about your child's rights as a research participant, or if you have complaints, concerns, or questions about the research, please contact Jody L. Jensen, Ph.D., Chair, The University of Texas at Austin Institutional Review Board for the Protection of Human Subjects at (512) 232-2685 or the Office of Research Support at (512) 471-8871, or email orsc@uts.cc.utexas.edu.

You may keep a copy of this consent form.

PARENT CONSENT

You are making a decision about allowing your son or daughter to participate in this study. Please check whether or not your child will participate and complete the information below.

- Yes, I agree to have my child participate in the research activities as described above.
- No, I do not give my permission for my child to participate in any of the research activities of the project.

Signature of Parent/Guardian: _____ Date _____

Printed Name of Parent/Guardian: _____

Full Name of Student: _____
(Please print.)

STUDENT ASSENT FORM

I have read the description of the study that is printed above, and I understand what the procedures are and what will happen to me in the study. I have received permission from my parent(s) to participate in the study, and I agree to participate in it. I know that I can quit the study at any time.

Please check whether or not you will participate and complete the information below.

- Yes, I agree to participate in the research activities as described above.
- No, I do not agree to participate in any of the research activities of the project.

Printed Name of Student

Signature of Student

Student's Current Math Teacher

Date

Appendix B

Original Student Trust Scale

Directions: Please indicate how much you agree or disagree with each of the following statements. Please choose the answer that is closest to how you feel or what you think.

1. Teachers are always ready to help at this school.
2. Teachers at this school are easy to talk to.
3. Students are well cared for at this school.
4. Teachers at this school always do what they are supposed to.
5. Teachers at this school really listen to students.
6. Teachers at this school are always honest with me.
7. Teachers at this school do a terrific job.
8. Teachers at this school are good at teaching.
9. Teachers at this school have high expectations for all students.
10. Teachers at this school DO NOT care about students.
11. Students at this school can believe what teachers tell them.
12. Students learn a lot from teachers at this school.
13. Students at this school can depend on teachers for help.

Reconceptualized Trust in Mathematics Teacher Scale

Directions: Think of your current mathematics teacher. Please indicate how much you agree or disagree with each of the following statements about this teacher.

1. My mathematics teacher is always ready to help me.
2. My mathematics teacher is easy to talk to.
3. I am well cared for by this mathematics teacher.
4. My mathematics teacher does what he/she is supposed to.
5. My mathematics teacher really listens to me.
6. My mathematics teacher is always honest with me.
7. My mathematics teacher does a terrific job.
8. My mathematics teacher is good at teaching.
9. My mathematics teacher has high expectations for me.
10. My mathematics teacher DOES NOT care about me.
11. I can believe what my mathematics teacher tells me.
12. I learn a lot from my mathematics teacher.
13. I can depend on my mathematics teacher for help.

Appendix C Student Beliefs Survey

Please mark your answers on this paper. The purpose of this survey is to determine your attitudes and beliefs about mathematics and learning. All responses are anonymous and will be kept completely confidential. Identifying information is requested only so that this can be matched to information previously requested from your teachers.

1. **What grade are you in?**
 A. 6th grade
 B. 7th grade
 C. 8th grade

2. **Who is your current primary mathematics teacher?** _____

3. **What is your student ID number?** _____

Think of your current mathematics teacher. Please indicate how much you agree or disagree with each of the following statements about this teacher. Mark only one choice per item.	A= Very True	B= Somewhat True	C= Neither True or False	D= Somewhat Not True	E= Not at all True
4. My mathematics teacher is always ready to help me.	A	B	C	D	E
5. My mathematics teacher is easy to talk to.	A	B	C	D	E
6. I am well cared for by my mathematics teacher.	A	B	C	D	E
7. My mathematics teacher does what he/she is supposed to.	A	B	C	D	E
8. My mathematics teacher really listens to me.	A	B	C	D	E
9. My mathematics teacher is always honest with me.	A	B	C	D	E
10. My mathematics teacher does a terrific job.	A	B	C	D	E
11. My mathematics teacher is good at teaching.	A	B	C	D	E
12. My mathematics teacher has high expectations for me.	A	B	C	D	E
13. My mathematics teacher DOES NOT care about me.	A	B	C	D	E

Think of your current mathematics teacher. Please indicate how much you agree or disagree with each of the following statements about this teacher. Mark only one choice per item.	A= Very True	B= Somewhat True	C= Neither True or False	D= Somewhat Not True	E= Not at all True
14. I can believe what my mathematics teacher tells me.	A	B	C	D	E
15. I learn a lot from my mathematics teacher.	A	B	C	D	E
16. I can depend on my mathematics teacher for help.	A	B	C	D	E

Consider this year's mathematics class. Please rate your level of agreement with each statement. Mark only one choice per item.	A= Very True	B= Somewhat True	C= Neither True or False	D= Somewhat Not True	E= Not at all True
17. I'm sure that I can learn everything taught in mathematics.	A	B	C	D	E
18. I'm sure that I can do even the hardest work in my mathematics class.	A	B	C	D	E
19. Even if a new topic in mathematics is hard, I'm sure that I can learn it.	A	B	C	D	E
20. I'm sure that I can figure out the answers to problems my teacher gives me in mathematics class.	A	B	C	D	E

21. **Please choose the ethnicity with which you primarily identify yourself.**

- A. Asian/Pacific Islander
- B. Black/African American
- C. Hispanic/Latino/Chicano/Mexican American
- D. Native American/Alaskan Native
- E. White
- F. Multi-Ethnic

22. **What is your gender?**

- A. Male
- B. Female

References

- Adams, C. M. (2010). Social determinants of student trust in high poverty elementary schools. In Wayne Hoy and Michael DiPaola (Eds). *Analyzing School Contexts: Influences of Principals and Teachers in the Service of Students*, Charlotte, NC: Information Age Publishing.
- Adams, C. & Forsyth, P. (2009). Conceptualizing and validating a measure of student trust. In W. K. Hoy & M. DiPaola (eds.), *Studies in school improvement*. Charlotte, NC: Information Age Publishing.
- Bandura, A. (1989). Human agency in social cognitive theory. *American Psychologist*, 44(9), 1175-1184. doi:10.1037/0003-066X.44.9.1175
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Bandura, A., Adams, N. E., & Beyer, J. (1977). Cognitive processes mediating behavioral change. *Journal of Personality and Social Psychology*, 35(3), 125-139. doi:10.1037/0022-3514.35.3.125
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497-529. doi:10.1037/0033-2909.117.3.497
- Bates, R., & Khasawneh, S. (2007). Self-efficacy and college students' perceptions and use of online learning systems. *Computers in Human Behavior*, 23(1), 175-191. doi:10.1016/j.chb.2004.04.004

- Borich, G., & Jemelka, R. (1981). Definitions of program evaluation and their relation to instructional design. *Educational Technology*, 21(8), 31-38.
- Borich, G., & Jemelka, R. (1982). A modeling approach to program evaluation. In G. Borich & R. Jemelka (Eds.). *Programs and systems: An evaluation perspective* (pp. 173-197). New York: Academic Press.
- Bryk, A. S., & Schneider, B. (2002). *Trust in schools: A core resource for improvement*. New York: Russell Sage Foundation.
- Budgen, C. (1987). Modeling a method for program development. *Journal of Nursing*, 17, 19-26.
- Cohen, G. L., & Steele, C. M. (2002). A barrier of mistrust: How negative stereotypes affect cross-race mentoring. In J. Aronson (Ed.), *Improving academic achievement: Impact of psychological factors on education* (pp. 303-327). San Diego, CA: Academic.
- Coleman, J. (1990). *Foundations of social theory*. Cambridge, MA: Harvard University Press.
- Deci, E. L., & Ryan, R. M. (1987). The support of autonomy and the control of behavior. *Journal of Personality and Social Psychology*, 53(6), 1024-1037.
doi:10.1037/0022-3514.53.6.1024
- Deci, E. L., & Ryan, R. M. (2000). The 'what' and 'why' of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227-268.
doi:10.1207/S15327965PLI1104_01

- Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, 125(6), 627-668. doi:10.1037/0033-2909.125.6.627
- Deutsch, M. (1958). Trust and suspicion. *Journal of Conflict Resolution*, 2, 265-279.
- Duncan-Andrade, J. (2007). Gangstas, Wankstas, and Ridas: defining, developing, and supporting effective teachers in urban schools. *International Journal of Qualitative Studies in Education (QSE)*, 20(6), 617-638.
doi:10.1080/09518390701630767
- Dweck, C. S. (1999). Caution—Praise can be dangerous. *American Educator*, 23(1), 4-9.
- Enders, C. K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods*, 12(2), 121-138. doi:10.1037/1082-989X.12.2.121
- Erikson, E. H. (1963). *Childhood and society* (2nd ed.). New York, NY: Norton.
- Fast, L. A., Lewis, J. L., Bryant, M. J., Bocian, K. A., Cardullo, R. A., Rettig, M., & Hammond, K. A. (2010). Does mathematics self-efficacy mediate the effect of the perceived classroom environment on standardized mathematics test performance? *Journal of Educational Psychology*, 102(3), 729-740. doi:10.1037/a0018863
- Forsyth, P. B. (2008). The empirical consequences of school trust. In W. K. Hoy & M. DiPaola (eds.), *Improving schools: Studies in leadership and culture*. Charlotte, NC: Information Age Publishing.

- Frymier, A., & Houser, M. L. (2000). The Teacher-Student Relationship as an Interpersonal Relationship. *Communication Education*, 49(3), 207-219.
- Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39, 175-191.
- Gilligan, C. (1982). *In a different voice: Psychological theory and women's development*. Cambridge, MA: Harvard University Press.
- Goddard, R. D. (2003). Relational networks, social trust, and norms: A social capital perspective on students' chances of academic success. *Educational Evaluation and Policy Analysis*, 25(1), 59-74.
- Gorham, J. (1988). The relationship between teacher immediacy behaviors and student learning. *Communication Education*, 37(1), 40-53.
- Gregoire, M. (2003). Is it a challenge or a threat? A dual-process model of teachers' cognition and appraisal processes during conceptual change. *Educational Psychology Review*, 15(2), 147-179. doi:10.1023/A:1023477131081
- Gregory, A., & Ripski, M. B. (2008). Adolescent trust in teachers: Implications for behavior in the high school classroom. *School Psychology Review*, 37(3), 337-353.
- Gregory, A. A., & Weinstein, R. S. (2008). The discipline gap and African Americans: Defiance or cooperation in the high school classroom. *Journal of School Psychology*, 46(4), 455-475. Retrieved from EBSCOhost.

- Hao, Y., & McGee, P. (2003). *Demystifying the structures of online teaching through decomposition model: Exploration of online teaching effectiveness*. Paper presented at the World Conference on Educational Multimedia, Hypermedia and Telecommunications 2003. Retrieved from <http://www.editlib.org/p/14157>
- Henderlong, J., & Lepper, M. R. (2002). The effects of praise on children's intrinsic motivation: A review and synthesis. *Psychological Bulletin*, 128(5), 774-795. doi:10.1037/0033-2909.128.5.774
- Hoy, W. K., & Kupersmith, W. (1984). Principal Authenticity and Faculty Trust: Key Elements in Organizational Behavior. *Planning and Changing*, 15(2), 80-88.
- Hoy, W., & Tarter, J. (2004). Organizational justice in schools: No justice without trust. *International Journal of Educational Management*, 18(4), 250-259.
- Hull, C. L. (1943). *Principles of behavior: An introduction to behavior theory*. New York: Appleton-Century-Crofts.
- Karabenick, S. A., & Maehr, M. L. (2004). MSP—Motivation Assessment Program: First-year report to the National Science Foundation. Retrieved from <http://mspmap.org/wp-content/uploads/2009/12/mspmapr1.pdf>
- Karabenick, S. A., & Maehr, M. L. (2007). MSP—Motivation Assessment Program: Final report to the National Science Foundation. Retrieved from http://ma.mspnet.org/media/data/MSP-MAP_Final_Report.pdf?media_000000006004.pdf

- Kitsantas, A., Ware, H. W., & Cheema, J. (2010). Predicting mathematics achievement from mathematics efficacy: Does analytical method make a difference? *The International Journal of Educational and Psychological Assessment*, 5, 25-44.
- Klassen, R. M. (2004). A cross-cultural investigation of the efficacy beliefs of south asian immigrant and anglo canadian nonimmigrant early adolescents. *Journal of Educational Psychology*, 96(4), 731-742. doi:10.1037/0022-0663.96.4.731
- Klassen, R. M., & Usher, E. L. (2010). Self-efficacy in educational settings: Recent research and emerging directions. In T. Urdan & S. Karabenick (Eds.), *Advances in motivation and achievement, Volume 16A* (pp. 1–33). Greenwich, CT: JAI.
- Kramer, R. M. (1999). Trust and distrust in organizations: Emerging perspectives, enduring questions. *Annual Review of Psychology*, 50, 569–98.
doi:10.1146/annurev.psych.50.1.569
- Leatham, K. (2006). Viewing mathematics teachers beliefs as sensible systems. *Journal of Mathematics Teacher Education*, 9(1), 91-102.
- Lee, S.J. (2007). The relations between the student-teacher trust relationship and school success in the case of Korean middle schools. *Educational Studies*, 33(2), 209-216.
- Lent, R. W., Lopez, F. G., Brown, S. D., & Gore, P. A. (1996). Latent structure of the sources of mathematics self-efficacy. *Journal of Vocational Behavior*, 49(3), 292-308. doi: 10.1006/jvbe.1996.0045

- Levpušček, M. P., & Zupančič, M. (2009). Mathematics achievement in early adolescence: The role of parental involvement, teachers' behavior, and students' motivational beliefs about mathematics. *The Journal of Early Adolescence*, 29(4), 541-570.
- Lindberg, S. M., Hyde, J., Petersen, J. L., & Linn, M. C. (2010). New trends in gender and mathematics performance: A meta-analysis. *Psychological Bulletin*, 136(6), 1123-1135. doi:10.1037/a0021276
- Maas, C. M., & Hox, J. J. (2005). Sufficient Sample Sizes for Multilevel Modeling. *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences*, 1(3), 86-92. doi:10.1027/1614-2241.1.3.86
- McAllister, D. J. (1995). Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations. *Academy of Management Journal*, 38(1), 24-59. doi:10.2307/256727
- Meyer, W. (1982). Indirect communications about perceived ability estimates. *Journal of Educational Psychology*, 74(6), 888-897. doi:10.1037/0022-0663.74.6.888
- Midgley, C., Eccles, J. S., & Feldlaufer, H. (1991). Classroom environment and the transition to junior high school. In B. J. Fraser & H. J. Walberg (Eds.), *Educational environments: Evaluation, antecedents and consequences*. (pp. 113-139). Elmsford, NY US: Pergamon Press.
- Midgley, C., Feldlaufer, H., & Eccles, J. S. (1989). Student/teacher relations and attitudes toward mathematics before and after the transition to junior high school. *Child Development*, 60(4), 981-992. doi:10.2307/1131038

- Midgley, C., Maehr, M., Hruda, L., Anderman, E., Anderman, L., Freeman, K., Gheen, M., Kaplan, A., Kumar, R., Middleton, M., Nelson, J., Roeser, R., and Urdan, T. (2000). *Manual for the Patterns of Adaptive Learning Scales (PALS)*. Ann Arbor, MI: University of Michigan.
- Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Journal of Counseling Psychology*, 38(1), 30-38. doi:10.1037/0022-0167.38.1.30
- National Center for Education Statistics (2011). *The nation's report card: Mathematics 2011*. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education, Washington, D.C.
- Noddings, N. (2005). Identifying and responding to needs in education. *Cambridge Journal of Education*, 35(2), 147-159. doi:10.1080/03057640500146757
- Noddings, N. (2006). Educational leaders as caring teachers. *School Leadership & Management*, 26(4), 339-345. doi:10.1080/13632430600886848
- OECD (2010). *PISA 2009 Results: Executive Summary*. Paris: OCED.
- Pajares, F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62(3), 307-32.
- Pajares, F., & Miller, M. D. (1995). Mathematics self-efficacy and mathematic outcomes: The need for specificity of assessment. *Journal of Counseling Psychology*, 42, 190-198. doi: 10.1037/0022-0167.42.2.190
- Pianta, R. C., Hamre, B., & Stuhlman, M. (2003). Relationships between teachers and children. In W. M. Reynolds, G. E. Miller, W. M. Reynolds, G. E. Miller (Eds.) ,

- Handbook of psychology: Educational psychology, Vol. 7* (pp. 199-234).
Hoboken, NJ US: John Wiley & Sons Inc.
- Pintrich, P. R., & de Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82*(1), 33-40. doi:10.1037/0022-0663.82.1.33
- Purkey, W. W., & Novak, J. M. (1996). *Inviting school success : a self-concept approach to teaching, learning, and democratic practice*. Belmont, Calif.: Wadsworth Pub. Co.
- Putnam, R. D. (1993). The prosperous community: Social capital and public life. *The American Prospect, 13*, 35-42.
- Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage Publications, Inc.
- Reddy, R., Rhodes, J. E., & Mulhall, P. (2003). The influence of teacher support on student adjustment in the middle school years: A latent growth curve study. *Development and Psychopathology, 15*(1), 119-138.
doi:10.1017/S0954579403000075
- Richmond, V. P. (1990). Communication in the Classroom: Power and Motivation. *Communication Education, 39*(3), 181-95.
- Rotter, J. J. (1967). A new scale for the measurement of interpersonal trust. *Journal of Personality, 35*(4), 651-665. doi:10.1111/j.1467-6494.1967.tb01454.x

- Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of Management Review*, 23(3), 393-404. doi:10.5465/AMR.1998.926617
- Royse, D., Thyer, B., & Padgett, D. (2010). *Program Evaluation* (5th ed.). Belmont, CA: Wadsworth.
- Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25(1), 54-67. doi:10.1006/ceps.1999.1020
- Ryan, R. M., & Grolnick, W. S. (1986). Origins and pawns in the classroom: Self-report and projective assessments of individual differences in children's perceptions. *Journal of Personality and Social Psychology*, 50(3), 550-558. doi:10.1037/0022-3514.50.3.550
- Ryan, R. M., Stiller, J. D., & Lynch, J. H. (1994). Representations of relationships to teachers, parents, and friends as predictors of academic motivation and self-esteem. *The Journal of Early Adolescence*, 14(2), 226-249. doi:10.1177/027243169401400207
- Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational Psychologist*, 26(3-4), 207-231. doi:10.1207/s15326985ep2603&4_2
- Smith, P. A., & Birney, L. L. (2005). The organizational trust of elementary schools and dimensions of student bullying. *International Journal of Educational Management*, 19(6), 469-485.

- Solomon, R. C., & Flores, F. (2001). *Building trust: In business, politics, relationships, and life*. New York, NY: Oxford University Press.
- Stake, R.E. (1967). The countenance of educational evaluation. *Teachers College Record*, 68, 523–540.
- Stevenson, H. C. (2008). Fluttering around the racial tension of trust: Proximal approaches to suspended black student-teacher relationships. *School Psychology Review*, 37(3), 354-358.
- Terrell, F., & Terrell, S. (1981). An Inventory to Measure Cultural Mistrust among Blacks. *Western Journal of Black Studies*, 5(3), 180-85.
- Tschannen-Moran, M. (2001). Collaboration and the need for trust. *Journal of Educational Administration*, 39(4), 308-331.
- Tschannen-Moran, M., & Hoy, W. K. (2000). A multidisciplinary analysis of the nature, meaning, and measurement of trust. *Review of Educational Research*, 70, 547-593. doi: 10.3102/00346543070004547
- Tyler, T. R., & DeGoey, P. (1995). Collective restraint in social dilemmas: Procedural justice and social identification effects on support for authorities. *Journal of Personality and Social Psychology*, 69(3), 482-497. doi:10.1037/0022-3514.69.3.482
- Usher, E. L. (2009). Sources of middle school students' self-efficacy in mathematics: A qualitative investigation. *American Educational Research Journal*, 46(1), 275-314. doi:10.3102/0002831208324517

- Usher, E. L., & Pajares, F. (2006a). Inviting confidence in school: Invitations as a critical source of the academic self-efficacy beliefs of entering middle school students. *Journal of Invitational Theory and Practice, 12*, 7-16.
- Usher, E. L., & Pajares, F. (2006b). Sources of academic and self-regulatory efficacy beliefs of entering middle school students. *Contemporary Educational Psychology, 31*(2), 125-141.
- Usher, E. L., & Pajares, F. (2008). Sources of self-efficacy in school: Critical review of the literature and future directions. *Review of Educational Research, 78*(4), 751-796. doi:10.3102/0034654308321456
- Usher, E. L., & Pajares, F. (2009). Sources of self-efficacy in mathematics: A validation study. *Contemporary Educational Psychology, 34*(1), 89-101. .
- The White House (2011). *Educate to innovate*. Retrieved from <http://www.whitehouse.gov/issues/education/educate-innovate>
- Zeldin, A.L., & Pajares, F. (2000). Against the odds: Self-efficacy beliefs of women in mathematical, scientific, and technological careers. *American Educational Research Journal, 37*, 215–246.
- Zeldin, A. L., Britner, S. L., & Pajares, F. (2008). A comparative study of the self-efficacy beliefs of successful men and women in mathematics, science, and technology careers. *Journal of Research in Science Teaching, 45*(9), 1036-1058. doi:10.1002/tea.20195