THE EFFECTS OF COLLECTIVE TEACHER EFFICACY ON STUDENT
ACHIEVEMENT IN URBAN PUBLIC ELEMENTARY SCHOOLS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree of Doctor of Philosophy in the Graduate
School of The Ohio State University

By

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****

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ABSTRACT

This was a multilevel study that tested two hypotheses: collective teacher efficacy is positively related to between-school differences in student achievement, and second, collective teacher efficacy attenuates the association between student socioeconomic status and student achievement. Data were collected from a random sample of 50 elementary schools at regularly scheduled faculty meetings in a large urban midwest school district. As predicted, collective teacher efficacy was related to between-school differences in student achievement; however, collective efficacy did not attenuate the relationship between SES and student achievement.

The findings support Bandura’s work by providing additional evidence that teacher beliefs about the capabilities of their faculty are systematically related to student achievement. Moreover, a reliable and valid collective teacher efficacy scale was developed based on the Tschannen-Moran, Hoy and Hoy (1998) model of teacher efficacy.

At the heart of the theoretical rationale explaining the relationship observed between collective teacher efficacy and student achievement is Bandura's theory of triadic reciprocal causation, which indicates that collective teacher efficacy beliefs...
influence the level of effort and persistence that individual teachers put forth in their
daily work. In addition, teacher's beliefs about their faculty's capability to
successfully educate students constitute a norm that influences the actions and
achievements of schools.

One way for school administrators to improve student achievement may be by
working to raise the collective efficacy beliefs of their faculties. When teachers
believe they are members of a faculty that is both competent and able to overcome
the detrimental effects of the environment, the students in their building have higher
achievement scores than students in buildings with lower levels of collective teacher
efficacy.
DEDICATION

This work is dedicated to the memories of my father, Ralph Edward Goddard, and my brother, Dr. Ralph Edward Goddard Jr. They were both a source of inspiration.
ACKNOWLEDGMENTS

The making of the scholar who writes a dissertation is probably more important than the dissertation itself. In this regard, and because this is a study of self-efficacy, I want to acknowledge those who have had an impact on my own perceptions of self-capability. It is unquestionably these beliefs, developed through the support of several important people that have made this work possible.

To my wife, Yvonne, I offer my thanks and appreciation. Without her love, patience, flexibility, and commitment, this work would have felt empty. I have been blessed with an opportunity to pursue my intellectual interests with the full support and understanding of the one I love. Yvonne has been, and continues to be, the sparkle that makes each day new. I look forward to the wonderful future we have yet to share.

I am deeply indebted to my dissertation adviser, Dr. Wayne K. Hoy. His confidence, unwavering support, and encouragement came when I needed them most. Indeed, if I have any regret about my doctoral program, it is that I did not work longer with Wayne. Wayne’s high standards for scholarship have pushed me to do my best -- to break new ground and to become the best person I can possibly
be. I will not forget our afternoons of planning research and interpreting statistics; this was fun. Wayne is theoretically grounded and uniquely capable of a parsimonious and elegant interpretation of anything complex. In addition, Wayne demonstrates openness to new ideas and he trusts unconditionally -- such qualities are rare. Through his personal strengths, Wayne has profoundly affected my development not just as a scholar but also as a person. The value of Wayne’s generous contribution to me cannot be understated. I consider him an unfailing friend.

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I must also thank my mother who has stood beside me throughout. There is no replacement for her encouragement, interest, and support. Her influence is key to my affinity for learning. I will always appreciate the sacrifices she made so that I could have this opportunity.
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For making the School of Educational Policy and Leadership a better place to be, thanks to Diane, Karmella, and Mary.

As I look forward to my new work, I would like to thank Ande Prather who has generously and unselfishly given of herself. I look forward to our successes.
VITA

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FIELD OF STUDY

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CHAPTER 1
INTRODUCTION

One of the great challenges for those who study schools is to learn how school organizations contribute to students’ academic success. Schools affect students and their achievement differentially. Depending on their characteristics, some schools are more effective and more equitable than others. Identification of school characteristics associated with differences in student achievement is, therefore, important to the development of effective schools. Bandura (1993, 1997) provides evidence that one powerful construct that varies greatly among schools and is systematically associated with student achievement is the collective efficacy of teachers in a school. As a contribution to our understanding of how school organizations affect student achievement, this study investigates the influence of collective teacher efficacy on student achievement.

Collective teacher efficacy is based on Bandura’s (1977, 1986, 1997) social cognitive theory, which is a unified theory of behavioral change that operates through self-efficacy beliefs. Self-efficacy refers to “beliefs in one’s capabilities to organize and execute a course of action required to produce a given attainment” (Bandura, 1997, p.3). As a self-referent perception of capability to execute specific behaviors, efficacy beliefs are excellent predictors of individual behavior.

Educators’ perceptions of efficacy for producing student achievement provide a framework for understanding teacher behavior. Over the last twenty years, researchers have established a strong link between teacher efficacy and teacher behaviors that foster
achievement (Allinder, 1994; Ashton & Webb, 1986; Gibson & Dembo, 1984; Meijer & Foster, 1988; Woolfolk & Hoy, 1990). Extending teacher efficacy to the organizational level, collective teacher efficacy refers to the average perception of teachers in a school that the efforts of the faculty will have a positive effect on student achievement. The collective efficacy perceptions of teachers are presumed to influence the social milieu of schools, contributing to the differential effect of schools on students’ academic success.

While there are numerous studies of teacher efficacy, collective teacher efficacy has received relatively little research attention (Bandura, 1993, 1997; Esselman & Moore, 1992; Newmann, Rutter, & Smith, 1989). Pajares (1997) suggests that studies of collective teacher efficacy are scant because of limits imposed by the intensive data collection required in the study of schools. This study responds to both the general need to understand differences among schools and specifically to our lack of knowledge about the correlates of collective teacher efficacy.

The assessment of collective teacher efficacy requires extending the measure of teacher efficacy to the organizational level. The task of extending teacher efficacy to the organizational level is, however, complicated by some confusion surrounding various approaches to the measure of teacher efficacy. Over the last twenty years, the construct of teacher efficacy has evolved out of J. B. Rotter’s (1966) locus of control theory and Albert Bandura’s (1977, 1986, 1997) social cognitive theory. Since 1977, when Bandura published his first work on self-efficacy and social cognitive theory, the meaning and measure of teacher efficacy has been the subject of considerable debate among researchers (Ashton, Olejnik, Crocker, & McAuliffe, 1982; Gibson & Dembo, 1984; Guskey, 1987; Guskey & Passaro, 1994; Pajares 1996a, 1996b, 1997; Tschannen-Moran, Hoy, & Hoy, 1998). Yet, while the definitions have differed, research has consistently indicated that teacher efficacy is positively associated with many important variables.
including student achievement, the success of educational programs, teacher orientation toward student control, teacher satisfaction with career choice, teacher stress, teacher persistence in failure situations, and teacher change (Anderson, Greene, & Loewen, 1988; Armor et al., 1976; Bandura, 1997; Berman, McLaughlin, Bass, Pauly, & Zellman, 1977; Enochs, Scharmann, & Riggs, 1995; Gibson & Dembo, 1984; Pajares, 1997; Woolfolk & Hoy, 1990).

This study reviews research on teacher efficacy and develops a theoretical framework for extending its measure to the collective, or school organizational level. Bandura (1993, 1997) has suggested that collective teacher efficacy is positively associated with student achievement and that it may mitigate the inequitable effect of socioeconomic status on student achievement. For the study of school organizations, these are intriguing and powerful assertions. The effect of collective teacher efficacy on these variables is, therefore, the focus of this study. Specifically, this study will examine the effects of collective teacher efficacy on student achievement and the relationship between student achievement and socioeconomic status.

**Problem Statement**

While some research has established a link between teachers’ perceptions of efficacy and student achievement, little research has evaluated the effect of collective teacher efficacy on student achievement (Pajares, 1997). The present study attempts to fill this void in the literature by addressing several important questions that arise when modeling the effect of collective efficacy (an organizational characteristic) on student achievement (an individual characteristic). Theoretically, the conceptual difference between collective efficacy and efficacy at the individual level depends on how tightly coupled an organization is. According to Bandura (1993, 1997), the more loosely coupled an organization and the less interdependent its work functions, the more appropriate it is
to measure collective efficacy as the aggregate of individual perceptions of
efficaciousness. However, for more tightly coupled systems with higher levels of
interdependence among jobs, it is more appropriate to assess collective efficacy as the
average of perceptions individuals hold of the collective.

This study will assess the collective efficacy of elementary school teachers in a
large urban school district. Because of the shared goals (e.g., to educate all children) and
similarity of responsibilities across teaching positions, elementary schools are generally
considered to be more tightly coupled than loosely coupled (Bandura, 1993; Clarke,
Ellett, Bateman, & Rugutt, 1996; Hoy & Miskel, 1996). For this reason, this study
employed an instrument that assesses collective teacher efficacy as the average of
perceptions that teachers hold of the faculty as a group.

One important question considered is whether collective teacher efficacy has a
significant positive effect on student achievement. The answer to this question is
complicated by the unit of analysis problem encountered when attempting to model the
effects of organizational characteristics on individual-level variables. The problem arises
because student achievement occurs at the individual level while the characteristics of
organizations occur at the group level. The typical approach to the unit of analysis
problem is to aggregate individual level variables to the group level. This analytic
strategy is, however, often compromised by aggregation bias, misestimated standard
errors, and heterogeneity of regression among groups (Bryk & Raudenbush, 1992). This
study addresses the unit of analysis problem through the use of multilevel modeling.
Multilevel modeling is intended for nested data (e.g., students nested in schools). Unlike
ordinary least squares regression, multilevel modeling accounts for the interdependence
of individual measures collected within the same organizational unit (e.g., students within
the same school). Multilevel modeling thus provides an approach to modeling differences
between schools in student achievement. Moreover, multilevel modeling allows the testing of multilevel hypotheses in the present study.

Another important research question involves Bandura’s (1993) assertion that collective efficacy has a greater effect on student achievement than does socioeconomic status. The positive effect of socioeconomic status on student achievement is well-documented and generally accepted as factual, albeit inequitable. However, the effect is not a fixed one; some schools are more equitable than others with respect to the distribution of student achievement by socioeconomic status (Bryk, Lee, & Holland, 1993; Bryk & Raudenbush, 1992). Bandura used path analysis to demonstrate that collective teacher efficacy had a greater effect on student achievement than student socioeconomic status. His analysis was, however, subject to the unit of analysis problem with student achievement and socioeconomic status aggregated to the group level. An important multilevel question is whether collective efficacy is an organizational characteristic that weakens the positive relationship typically observed between socioeconomic status and student achievement.

Research Hypotheses

This study will investigate whether teachers’ collective efficacy has a significant effect on student achievement and the distribution of achievement by socioeconomic status. The hypotheses for this study are as follows:

1. Collective teacher efficacy has a positive effect on the differences in student achievement that occur between schools.

2. Collective teacher efficacy attenuates the positive relationship between student achievement and student socioeconomic status among schools.
Definitions of Terms

This study of collective teacher efficacy draws on the special meaning of the following terms:

**Collective Efficacy** is a group characteristic “concerned with the performance capability of a social system as a whole” (Bandura, 1997, p. 469).

**Collective Teacher Efficacy** is the average perception of teachers in a school that the efforts of the faculty will have a positive effect on student achievement.

**Human Agency** refers to the capability of humans to exercise intentionality by exerting control over their thoughts, their behaviors, and their external environments.

**Self-efficacy** refers to “beliefs in one’s capabilities to organize and execute a course of action required to produce a given attainment” (Bandura, 1997, p.3).

**Social Cognitive Theory** is the set of interrelated concepts, principles, and generalities that explain reciprocal causation among human behavior, internal personal states, and the external environment, and which postulates self-efficacy as a common mechanism of behavioral change.

**Teacher Efficacy** refers to “the extent to which teachers believe their efforts will have a positive effect on student achievement” (Ross, 1994, p. 3).

Delimitations

This study is delimited to select elementary schools in a large urban school district. This delimitation was made to control for differences in efficacy that might occur between urban and non-urban districts. Additionally, because the sampled schools represented will be members of the same district, there is no possibility for uncontrolled between-district effects. Further, limiting this study to elementary schools controls for the
organizational structure of schools, thus allowing for a constant approach to the measurement of collective efficacy.

Limitations

The limitations of this study center on the type of sample employed and the timing of the data collection. Permission to survey teachers was granted by individual school principals. It is possible that the collective efficacy of teachers in the study is different from those not represented in the study. Moreover, because this study draws its data from a non-random sample of urban elementary schools, the generalizability of the research results may be affected. In addition, the self-efficacy questionnaires will be administered during February and March of 1998. It is possible that efficacy beliefs might be different at different times of the year (e.g., higher in the October and lower in May). Consequently, the research results may be affected. A key assumption in this study concerns the accuracy of the collective efficacy beliefs reported by teachers. Specifically, the perceptions of collective efficacy reported by teachers are assumed to reflect teachers’ true perceptions.
CHAPTER 2
LITERATURE REVIEW

This chapter focuses on social cognitive theory, self-efficacy, teacher efficacy, and collective teacher efficacy. Because social cognitive theory and self-efficacy theory form the basis of teacher efficacy and collective teacher efficacy, these concepts are reviewed first. Next, research on teacher efficacy, its correlates, and approaches to its measurement is reviewed. Later, a review of research on teacher efficacy at the organizational level and the issues involved in assessing this construct is presented. Finally, the chapter concludes with a rationale for the research hypotheses introduced earlier.

Social Cognitive Theory

Social cognitive theory is a unified theory of behavioral change postulating that different modes of influence (e.g., enactive experience, vicarious experience, and social persuasion) alter behavior through their effects on efficacy beliefs (Bandura, 1982). Social cognitive theory provides the theoretical framework explaining the constructs of self-efficacy, teacher efficacy, and collective teacher efficacy. The key assumptions and major components of social cognitive theory are explored in this section.

Human Agency

A major component of social cognitive theory concerns the assumption of human agency. Agency refers to the intentional pursuit of a course of action. Social cognitive theory assumes that humans are active shapers of their lives rather than passive biological organisms upon whom environmental factors act (Bandura, 1986, 1997). This view is
diametrically opposed to the position of radical behaviorists who view human behavior as
determined solely by the interaction between a human’s genetically endowed biological
composition and environmental forces. Indeed, according to Heward and Cooper (1992),
“radical behaviorists are not interested in mentalistic explanations as theoretical or
analytic tools for understanding behavior” (p. 349). Instead, radical behaviorists study the
effect of reinforcement histories on human behavior. Yet, while reinforcement histories
do exert considerable influence over human behavior, alone they are incapable of
explaining all behavior, particularly agentive actions which reflect intentionality
(Bandura, 1997).

Social cognitive theory agrees that environmental factors affect human behavior,
but it rejects the notion that reinforcement is solely deterministic of human behavior.
Social cognitive theory assumes instead that humans are agents who not only are
influenced by the environment but who also influence their environment through their
unique self-regulatory capabilities (Bandura, 1986, 1997; Maddux, 1995; Pajares, 1997).
The notion of agency in social cognitive theory implies that humans are capable of
exercising some degree of free will, that behavior is not just reactionary.

**Other Assumptions in Social Cognitive Theory**

In addition to human agency, there are several other important assumptions made
in social cognitive theory. Maddux (1995) summarized these as the capabilities for
symbolization, self-reflection, self-regulation, and the capability to learn vicariously.
Symbolizing capabilities allow people to create innovative courses of action, predict
outcomes, and communicate complex ideas and experiences to others. Through self-
reflection people reconsider events and make choices about the control they will exercise
over their internal states, behaviors and, indirectly, over their environments. Maddux
refers to the exercise of control over one’s own behavior as well as the indirect control
over one’s environments through purposive behavior as self-regulation. Finally, vicarious learning refers to the ability to learn through observation as opposed to enactive experience. These assumptions share a common feature: they highlight that social cognitive theory presumes that humans are actively engaged in analyzing, responding to, and controlling their behaviors, internal personal states, and environments.

**Triadic Reciprocal Causation in Social Cognitive Theory**

According to Bandura (1986, 1997), human agency operates through what he has labeled triadic reciprocal causation. Triadic reciprocal causation is a bi-directional causal structure linking human behavior, internal personal factors (affective, cognitive, and biological events), and the environment (see Appendix A). Thus, the environment is, in social cognitive theory, one of three separate forces acting in concert to shape human behavior. Moreover, according to social cognitive theory, the causal relationship among any two of these three elements is bi-directional.

Each element within the tripartite configuration acts on and is affected by the others (Bandura, 1997). For example, when a teacher attempts a new instructional methodology, the teacher’s new behaviors at once interact with the environment (e.g., students, other teachers, administrators, and parents) and the teachers’ own internal personal state (e.g., emotional reactions to the strategy, thoughts about improving the strategy). Thus, the cause of future behavior is assumed to be a unique blend of the teacher’s internal reactions to the environment and the new behavior, environmental influences on the teacher’s future behavior, and the influence of the teacher’s behavior on the environment. Given the bi-directional determinism postulated in triadic reciprocal causation, whether a teacher will use a new instructional technique in future lessons depends not only on environmental reinforcement but also on the teacher’s personal internal reactions to both the behavior and the environment. Social cognitive theory
assumes that through cognitive processing a teacher uniquely weighs many factors including personal desire to intentionally reach certain attainments (Bandura, 1997).

**Self-Efficacy**

Having reviewed both triadic reciprocal causation and the assumptions of social cognitive theory, this chapter now turns to a review of literature specifically related to self-efficacy.

**The Meaning of Self-Efficacy**

In terms of social cognitive theory, self-efficacy is a powerful mechanism of human agency, contributing to the decisions people make about actions they will intentionally pursue (Bandura, 1982, 1986, 1997). For example, the effort teachers expend in the face of environmental constraints such as the lack of instructional materials, high rates of student absenteeism, or deteriorating facilities depends in large measure on their perceptions of self-efficacy to overcome these obstacles and produce educational achievement. Beliefs about self-efficacy thus inform the decisions teachers make about their professional behaviors. Self-efficacy beliefs are also important to the behavior of students. In a meta-analysis of thirty-six studies, Multon, Brown, and Lent (1991) found that students’ efficacy beliefs were positively related to their academic attainment (average effect size of .38) and their persistence (average effect size of .34) in academic endeavors.

Self-efficacy beliefs are important because they are highly predictive of human behavior (Bandura, 1997; Pajares, 1997). Perceptions of efficacy affect what tasks people perform, the effort they expend, how long they persist in the face of deterrents, whether their thoughts are self-enabling or counterproductive, the level of stress they experience, and, ultimately, their level of attainment (Bandura, 1997; Pajares, 1997). The construct of self-efficacy refers to “beliefs in one’s capabilities to organize and execute the courses of
action required to produce given attainments” (Bandura, p. 3). Self-efficacy is unique among other self-regarding constructs because it is both “task- and situation-specific” (Pajares, 1996a, p. 1). Thus, an individual’s expectations for attainment depend on both perceived personal competence to execute certain behaviors and the context in which the behaviors will take place. For example, a teacher’s belief that he or she can help students master given content may vary depending on the teacher’s perceived competence in the subject as well as whether the task must be accomplished in an inner city or suburban school.

Outcome Expectancy

An important concept related to self-efficacy is that of outcome expectancy. While attainments refer to a level of performance, outcome expectancies are the physical, social, and/or self-evaluative consequences of a specific level of attainment (Bandura, 1997). For example, whether a teacher’s students all perform above the 90th percentile on a standardized test (level of attainment) is distinct from the outcomes associated with that performance such as social recognition for the students and teacher. Self-efficacy for teaching therefore reflects beliefs about one’s capability to bring about student learning, but not expectancies about the outcomes associated with that learning.

Pajares (1997) reports that the distinction between self-efficacy and outcome expectancy is an important one because one must first assess personal capability (i.e., self-efficacy) for a particular activity before one can imagine the outcomes of that performance. According to Bandura,

outcome and efficacy expectations are differentiated, because individuals can believe that a particular course of action will produce certain outcomes, but if they entertain serious doubts about whether they can perform the necessary activities such information does not influence their behavior (Bandura, 1977, p. 193).
This is not to suggest that outcome expectancies are not important. To the contrary, they play a key role in individual motivation; the anticipation of considerable social praise may indeed positively influence one’s decision to pursue a behavior. But, it is one’s perceptions of efficacy for completing that behavior that are more predictive of the level of attainment one ultimately will achieve. It is because self-efficacy is defined in terms of self-perceptions about one’s ability to produce given levels of attainment that efficacy beliefs are such powerful predictors of human behavior.

Skill Level

Self-efficacy is also distinct from one’s skill level (Bandura, 1997). Indeed, for most people there is a difference between the skills they possess and the activities they pursue. For example, novice teachers may attempt instructional strategies for which they have not yet developed the skills to execute simply because they believe they can ultimately master the requisite skills and reach a certain level of attainment. For this reason, measures of skills are limited in their utility as predictors of human behavior. For example, there are few, if any, standardized tests of skill that can account for most of the variance in people’s success in different types of work or schooling. Importantly therefore, one’s self-efficacy is conceptually distinct from one’s skill level. “Perceived self-efficacy is not a measure of the skills one has but a belief about what one can do under different sets of conditions with the skills one possesses” (Bandura, 1997, p. 37). In support of this distinction is a study of mathematics teachers in which Ernest (1989) found that two teachers possessing similar levels of knowledge might nevertheless teach in entirely differently ways. According to social cognitive theory, two teachers with identical skills might perform differently depending on, for example, their affective reactions to the teaching situation, memories of past teaching performances, and their perceptions of student ability and how these affect their beliefs.
The Specificity of Self-Efficacy Beliefs

An important question concerning efficacy is whether for each individual there are one or many efficacy perceptions (Tschanen-Moran, Hoy, & Hoy, 1998). Self-efficacy beliefs are not globalized or general; instead, perceptions of efficacy vary across domains (related sets of activities), modalities of performance (cognitive, behavioral, or affective), the qualitative characteristics of situations, and the persons toward whom behavior is directed (Bandura, 1997). However, Pajares (1996a; 1997) notes that self-efficacy research often suffers from mismeasurement arising from a lack of specificity and correspondence between measured self-efficacy and critical tasks. A common problem associated with mismeasurement is the attenuation of effects detected in empirical studies of self-efficacy. As a rule, self-efficacy assessments should reflect direct correspondence between the beliefs and the tasks assessed (Bandura, 1997; Pajares, 1997). In a study of 52 secondary teachers’ efficacy for teaching, Ross, Cousins, and Gadalla (1996) found that teachers’ efficacy varied significantly among various classes. That is, teachers’ beliefs about whether they could execute a course of actions leading to student achievement depended on the context of the task. This underscores the need for correspondence between the task of interest and the measurement of self-efficacy perceptions.

Additionally, the need for correspondence between task and efficacy assessment indicates that rather than representing one general perception, self-efficacy represents a network of complex self-referent beliefs. The effects of efficacy beliefs (e.g., task persistence, stress levels, inner thoughts) therefore vary with a host of performance-specific factors. For example, whether a teacher feels more or less efficacious about teaching may depend on, among other things, the teacher’s perceptions about: (1) students’ socioeconomic status, (2) the adequacy of instructional materials supplied by
the school, and (3) the teacher's level of comfort and expertise with the subject matter. Moreover, the relative weight given to these and other factors will vary by teacher (Bandura, 1997). Perceived self-efficacy is therefore a complex and multifaceted construct that is specific to particular tasks.

**Generalizability of Self-Efficacy Beliefs**

While efficacy beliefs do not refer to a global sense of competence, beliefs about one's self-efficacy can generalize in certain circumstances. What is required for the generalization of efficacy beliefs is that two situations share some important common features (Bandura, 1990; Maddux, 1995; Pajares, 1997). For instance, perceptions of efficacy for teaching an Algebra I course might not generalize to beliefs in one's ability to teach English literature because of the differences required, for example, in subject matter knowledge. However, efficacious beliefs about one's ability to teach an Algebra I course would more likely generalize to beliefs in one's ability to competently teach Algebra II because of the similarity required for competence in these two behaviors.

**Self-Efficacy Compared with Other Self-Referent Concepts**

Self-efficacy is sometimes confused with the psychological constructs of locus of control, self-esteem, and self-concept. However, self-efficacy is conceptually distinct from each of these (Bandura, 1997; Pajares, 1997).

**Locus of Control**

Whereas locus of control refers to whether personal actions affect outcomes, perceived self-efficacy refers to beliefs about whether one has the ability to execute such actions. Moreover, self-efficacy is a stronger predictor of behavior than locus of control (Bandura, 1977, 1997). For example, believing that a high score on a college entrance exam is a matter of ability rather than luck (internal locus of control) will not necessarily lead to a strong performance. A student who does not feel efficacious
about his capability to earn a high score (low efficacy) is not likely to enhance test performance much merely by possessing an internal locus of control with respect to academic outcomes.

Self-Concept

Self-efficacy is also distinct from self-concept in several important ways, although the two have occasionally been misused as synonyms (Pajares, 1997). One key difference among the two relates to level of specificity. For example, although self-concept may be assessed separately for different domains, it most often involves “global self-images” (Bandura, 1997, p. 11) that reflect a composite measure of ideas, feelings and attitudes about oneself (Woolfolk, 1998). And, while there is some evidence to suggest that domain-specific self-concept assessments are empirically similar to domain-specific self-efficacy assessments (Bandalos, Yates, & Thorndike-Christ, 1995), self-efficacy assessments should go beyond domain specificity to reflect task correspondence (Bandura, 1997, Pajares, 1996a). Indeed, several authors agree that when self-efficacy assessments are task specific, self-efficacy is a more powerful predictor than self-concept (Bandura, 1997; Graham & Weiner, 1995; Mone, Baker, & Jeffries, 1995; Pajares, 1997). Beyond the level of specificity, self-concept is also different from self-efficacy in terms of the type of self-belief it measures. Specifically, while self-concept is concerned with self-images, self-efficacy is concerned with perceptions about one’s capability to execute certain courses of action. These differences — in level of specificity and type of self-belief assessed — distinguish self-efficacy from self-concept.

Self-Esteem

Self-esteem is also occasionally used interchangeably with self-efficacy (Bandura, 1997). However, self-esteem refers to perceptions of self-worth while self-efficacy refers to beliefs about personal capabilities. A person may have high self-esteem yet not wish to
attempt anything difficult. Feeling good about oneself is, however, not a substitute for perceptions of personal capabilities for a specific task. Thus, self-esteem may be strong while self-efficacy for a difficult task is weak. For example, a student who never attempts a college preparatory course may, nevertheless, have high self-esteem. In this case, high self-esteem will probably not be the better predictor of attainment on a college entrance examination. The student’s self-efficacy beliefs, which incorporate beliefs about personal capabilities, would more likely be a better predictor. Consequently, as with locus of control and self-concept, self-efficacy is generally more predictive of behavior than self-esteem.

Sources of Efficacy Information

A major assumption of social-cognitive theory is that efficacy beliefs are actively constructed by each individual. According to Bandura (1977, 1986, 1997), these beliefs are constructed by individuals through cognitive processing that uniquely weighs and integrates each of four primary efficacy information sources:

- mastery experiences
- vicarious experiences
- social persuasion
- physiological and emotional states

Notably, information conveyed through each of these four sources is insufficient alone to result in perceptions of efficacy. The information “becomes instructive only through cognitive processing ... and through reflective thought” (Bandura, 1997, p. 79). In other words, a unique series of events does not necessarily hold a unique meaning; instead, events are given meaning through the cognition and reflection of agentive individuals.
Mastery Experiences

Of the four sources, enactive mastery experiences are the most powerful because they directly convey information about a person’s ability to succeed under a given set of conditions (Bandura, 1977, 1986, 1997). Mastery experiences are those in which individuals successfully complete a course of action that leads to a given attainment. Bandura (1977) showed that efficacy beliefs which were altered through mastery experience were better predictors of snake phobics’ ability to handle snakes than were the past performances of these phobics. Turning to education, a teacher may learn that it takes more than subject matter knowledge to successfully teach a particularly unmotivated group of middle school students. In this case, the teacher may learn that planning lessons that respond to the interests of these student facilitates student motivation and learning. The authentic knowledge gained through enactive mastery experience conveys powerful efficacy-forming information about personal capabilities for overcoming obstacles. Success experiences tend to raise efficacy beliefs by suggesting to individuals that they have the capabilities to succeed in similar future activities.

Conversely, failures tend to lower efficacy beliefs.

In a cross-sectional study of teachers with different levels of experience, Soodak and Podell (1997) compared the effects of teaching experience on teachers’ level of efficacy for teaching. Their findings indicated that, in the first two years of teaching, both elementary and secondary teachers typically experience a dramatic decrease in efficacy beliefs that tends to rebuild as teachers gain more experience over their years of teaching. These findings suggest that the initial difficulties often experienced by novice teachers do indeed reduce their efficacy for teaching but that as they subsequently master the work of
teaching, their self-efficacy for teaching raises. Such findings clearly suggest the power of enactive mastery experience in the formation of self-efficacy beliefs.

The importance of enactive mastery experience in the formation of efficacy beliefs underscores the strong effect that task-specific variables have on efficacy beliefs. Pajares (1996a) observes that because of this, researchers should include assessments of relevant situational factors when measuring individuals’ self-efficacy beliefs.

**Vicarious Experiences**

Vicarious experiences (i.e., models) are another source of information for efficacy beliefs. “Modeling occurs when observers pattern their behaviors, strategies, thoughts, beliefs, and affects after those of one or more models” (Schunk & Zimmerman, 1997, p.195). When behaviors are modeled by others, individuals have the opportunity for normative assessment of their own competence. The effect of vicarious influences on self-efficacy beliefs depends on one’s attending to a model, retaining information about the model, processing the information retained through some form of practice, and one’s motivation for learning a behavior and reaching a given level of attainment. Additionally, the more similar a model is to oneself, the more likely the modeled behavior is to have an impact on one’s efficacy beliefs. Vicarious successes tend to raise efficacy beliefs whereas failures tend to lower them (Bandura, 1997).

Importantly, vicarious experiences interact with the other primary sources of efficacy-forming information. Therefore, the impact of vicarious experiences on self-efficacy depends on the relative strength of other sources of efficacy information. For example, a student teacher who has yet to deliver a first lesson probably relies much more on vicarious experiences for information than a teacher who has had numerous enactive mastery experiences during a ten year teaching career. In general, the less one knows about one’s own capabilities for a certain behavior, the more weight given to self-
appraisals based on vicarious experience (Schunk 1981, 1983, 1987). Supporting this conclusion is research by Gorrell and Capron (1988) in which preservice teachers’ self-efficacy beliefs were changed through modeling that was presented as videotaped instruction. Additionally, models who express confidence, or coping ability, in the face of difficulties are more likely to raise one’s perceptions of self-efficacy (Bandura, 1997).

Social Persuasion

Social persuasion is a third source of information influencing individual assessments of personal competence. Social persuasion is often offered verbally in the form of performance feedback and it is generally not as strong as mastery experience or vicarious experiences in the formation of efficacy beliefs (Pajares, 1997; Zeldin & Pajares, 1997). According to Bandura (1993), the manner in which feedback is framed influences its effect on the recipient. For example, when a given level of performance is framed in terms of its progress toward a goal (e.g., “Good work; you’ve mastered 90 percent of the task”) efficacy beliefs tend to strengthen. Conversely, when performance feedback is consistently framed according to the portion of the task that is not yet mastered (e.g., “Keep working; You still have not learned 10 percent of the material”) efficacy beliefs are undermined. Moreover, given a situation in which an individual falls short of a goal, self-efficacy is strengthened more through constructive criticism than disparaging feedback (Bandura, 1997).

The effect of social persuasion also depends upon the credibility of the person offering advice and the disparity between an appraiser’s assessment and an individual’s self-assessment of personal capability (Bandura, 1997). The more expert knowledge and prior diagnostic success an appraiser has, the more likely the appraiser’s evaluation will have a positive persuasory effect on another person’s perceptions of efficacy. Additionally, the greater the disparity between one’s self-assessment of personal
competence and the appraisal of another, the longer the time required before mastery of the skills in question becomes a realistic expectation that raises one’s efficacy. For example, a teacher’s belief in a pre-algebra student’s ability to learn calculus during high school will have a greater efficacy-building effect if the student is in eighth grade with an entire high school math career ahead than if the student is in twelfth grade planning to graduate in six months.

**Physiological and Affective States**

A person’s physiological and affective states are the final primary source of information influencing the formation of self-efficacy beliefs. Examples of physiological and affective states influencing efficacy beliefs include anxiety, stress, arousal, and fatigue (Pajares, 1996a). Bandura (1997) notes that the range of emotions (e.g., anger, sadness, happiness, nervousness) associated with the same physiological responses (e.g., increased heart rate) means that the interpretation of internal states and their impact on efficacy are affected by cognitive processing. Thus, whether a teacher interprets tears as a sign of joy or fear elicited by a teaching moment will partly determine how efficacious that teacher feels in a similar teaching situation in the future. In addition, the level of vulnerability one tends to feel toward personal physical and emotional states partly determines the extent to which these factors influence self-efficacy beliefs. For example, some people are poor public speakers because they immediately interpret increased heart rate and perspiration as signs of impending oratory failure. Such reactions increase one’s expectation for difficulty and, consequently, lead to less overall effort and diminished persistence in the face of poor audience reactions. Others, however, may consider the same physiological reactions as natural and unavoidable thus being less susceptible to these reactions and subsequently not suffering performance impairments as a consequence.
Efficacy Beliefs in the Active Pursuit of Attainment

Efficacy beliefs are not just good predictors of behavior, they are also key mechanisms of human agency actively involved in the production of human attainment (Bandura, 1997). According to the theory of triadic reciprocal causation (Bandura 1986, 1997), not only are efficacy beliefs products of the environment and individual behavior, at the same time they also help individuals influence their environments and behavior through the regulation of internal cognitive, motivational, affective, and selective processes that affect behavior (Bandura, 1997). For example, efficacy beliefs influence thought patterns by affecting whether people dwell on their deficiencies or their competencies when they consider future events. As mediators of the relationship between sources of efficacy information and the behaviors people ultimately pursue, self-efficacy beliefs actively influence the courses of action people choose to pursue and the level of attainment they ultimately experience (Pajares, 1996a, 1997).

Changes in Efficacy Beliefs

Bandura (1997) observes that “changes in perceived efficacy result from cognitive processing of the diagnostic information that performances convey about capability rather than the performances per se” (p. 81). Thus, whether efficacy beliefs are enhanced or diminished after a given level of enactive experience is not simply an artifact of the performance; efficacy beliefs are created when individuals weigh and interpret their performance relative to other information. The same is true for all sources of efficacy information. Whether a performance, vicarious experience, verbal persuasion, or affective reaction raises or lowers efficacy beliefs depends on an individual’s cognitive processing. For example, a teacher who attends a workshop for integrating technology into classroom teaching may complete the experience with increased teaching efficacy if she decides the knowledge is useful (e.g., “Now I have activities for my students to complete in the
computer lab”), or with lowered efficacy if she reacts differently (e.g., “My students could never learn how to operate these complex computer operating systems”). Thus, while the four sources of efficacy information do influence efficacy beliefs, whether efficacy beliefs are raised or lowered, and the extent to which they change, depends on how each person processes the information.

Teacher Efficacy

Teacher efficacy refers to teachers’ perceptions about their capability to raise student achievement (Ashton & Webb, 1986; Gibson & Dembo, 1984; Ross, 1994). Several researchers have found that teacher efficacy is comprised of two distinct dimensions (e.g., Ashton & Webb, 1986; Gibson & Dembo, 1984; Woolfolk & Hoy, 1990). The first is personal efficacy which refers to a teacher’s self perceptions of personal capability to effectively teach students. The second is general teaching efficacy or a teacher’s perception regarding the extent to which teachers in general can overcome the influence of environmental factors that deter student learning.

A number of researchers have investigated the correlates of teacher efficacy adopting definitions similar to those above. However, while there are many studies of teacher efficacy, there are also many approaches to the measurement and meaning of this construct. In the interest of understanding the effects of collective teacher efficacy and developing a measure of this construct, research on the correlates and measurement of teacher efficacy is reviewed below.

Reciprocal Causality and Teacher Efficacy

Just as Hoy and Woolfolk (1993) observe that school characteristics and teacher efficacy have reciprocal effects, Ashton and Webb (1986) and Pajares (1996a) note that Bandura’s theory of triadic reciprocal causation makes it difficult to specify the direction of the relationship between efficacy and its correlates. Indeed, bi-directional causality
implies that efficacy and its correlates are mutually reinforcing or cyclic in nature. Thus, while teacher efficacy gains may lead to gains in student achievement, the opposite is also true; increases in student achievement may increase teacher efficacy.

Although the relationship between efficacy and its correlates is bi-directional, Bandura (1997) observes that self-efficacy is still a powerful predictor of human behavior. Moreover, because social cognitive theory specifies the mechanisms through which efficacy beliefs may be altered (e.g., mastery experience, vicarious learning, social persuasion, physiological and affective states), the correlates of teacher efficacy may be changeable through reform efforts aimed at systematically strengthening teachers’ efficacy. Thus, although teacher efficacy and its correlates may be mutually reinforcing, the identification of variables associated with teacher efficacy is important because of the potential to affect these variables through efficacy changing experiences. For this reason, the study of teacher efficacy offers promise for educational reform. With this potential in mind, a review of research on the correlates of teacher efficacy follows below.

Correlates of Teacher Efficacy

The efficacy of teachers is crucial to the way that teachers structure instructional activities, to teachers’ attitudes toward schooling and reform and, ultimately, to students’ achievement (Bandura, 1997). For example, teachers who believe they can help students learn, even under the most difficult circumstances, spend more time on instructional activities. Conversely, teachers with lower efficacy tend to attribute student failure to students’ lack of innate ability or educational limitations imposed by environmental factors such as students’ home life or larger community problems. Not surprisingly, low teacher efficacy is associated with increased susceptibility to environmental stressors, depersonalization of the people teachers serve, reduced instructional efforts, and ultimately, lower student achievement (Bandura, 1997).
Context and Teachers’ Efficacy Beliefs

Several teacher efficacy researchers have investigated the extent to which various contextual factors are associated with teacher efficacy. These researchers have identified several interesting patterns relating the context of teaching to teacher efficacy. For example, Guskey (1987) analyzed survey results from 114 teachers finding that student achievement (positive or negative), student ability (high or low), and whether teachers worked with individual or groups of students all influenced teacher efficacy. In addition, Moore and Esselman (1992), in a study of 1,802 teachers in midwestern elementary, middle, and high schools showed that teacher efficacy was positively associated with several context variables including school climate, lack of impediments to effective instruction, and teacher empowerment. Further, Hoy and Woolfolk’s (1993) survey of 179 teachers in 37 elementary schools indicates that teachers’ personal efficacy is influenced by the contextual variables of principal influence with superiors and the academic press of a school. Schools having a strong academic emphasis tend to set high achievable goals for students, maintain an orderly and serious learning environment, and have students that value hard work and academic success. Not surprisingly, such characteristics are associated with higher levels of teacher efficacy.

Together these studies suggest that contextual factors are important variables influencing teachers’ perceptions of efficacy. However, caution is advised in inferring causality in these relationships. Consistent with social cognitive theory, Hoy and Woolfolk (1993) note that these relationships are probably reciprocal. That is, while contextual characteristics may influence efficacy perceptions, the opposite is also probably true. Nevertheless, while the relationship is not necessarily a causal one, it is important to understand that teacher efficacy is systematically associated with a number of school contextual features.
Teacher Stress, Locus of Control, and Commitment

Parkway, Greenwood, Olejnik, and Proller (1988) and Greenwood, Olejnik, and Parkway (1990) studied the relationship between teachers' efficacy perceptions and their stress level and locus of control. Both studies found that teaching efficacy is negatively and significantly related to teacher stress and locus of control. Together, these findings indicate that as teachers' perceptions that teaching can overcome the negative effects of home environment increase, teachers experience less stress and their locus of control internalizes.

Teachers low in efficacy not only experience more occupationally-related stress and perceive less personal control over events, but also they are less committed to the profession. Coladarci (1992) surveyed 170 teachers, measuring their efficacy for teaching and asking them whether they would become a teacher again if they had it to do all over. Coladarci found that both teachers' personal and general teaching efficacy were positively and significantly related to teacher commitment to the profession. Similarly, Trentham, Silvern, and Brogdon (1985), in a survey of 155 teachers in 15 different districts, found that teacher efficacy was significantly correlated with teachers' decisions to re-enter the profession if they had it to do all over again. Trentham et al. used a 10-item instrument developed by Brogdon which they did not factor analyze into the two dimensions of personal efficacy and general teacher efficacy. Interestingly, although these studies did measure efficacy differently, they are consistent in the finding that the higher a teacher's efficacy the more likely that teacher would express a desire to re-enter the profession if they had it to do over. Trentham et al. also found a positive relationship between superintendents' rating of teacher competence and teacher efficacy.
Teacher Efficacy and Referral to Special Education

Teacher efficacy is also related to teachers’ propensity for working with children with special needs. Meijer and Foster (1988) asked 230 Dutch elementary teachers to read case studies of hypothetical students. After reading the case studies, teachers rated from 0 to 100 the degree to which: (1) it would be problematic for the student to receive an adequate education in a regular classroom and, (2) whether they would refer the student for special education assessment. Meijer and Foster found that personal teacher efficacy (PTE) was significantly related to both decisions. Specifically, the greater a teachers’ PTE, the more likely the teacher to believe a student with special needs would be adequately served in the regular education setting and the less likely the teacher would refer the student for special education services.

In a similar study using the two factor model of teacher efficacy developed by Gibson and Dembo (1984), Soodak and Podell (1993) had 192 regular and special education teachers read case studies of hypothetical students. Teacher participants then decided: (1) whether the students were appropriately placed in regular education and, (2) whether they would recommend referral to special education for those students. They found that teachers high in both personal efficacy and general teacher efficacy were significantly more likely to recommend regular class placement over special education placement for students. Moreover, they found that when student learning problems were accompanied by behavior problems (a factor increasing the difficulty of the teaching task) teachers were much more likely to refer students to special education.

In a related study, Podell and Soodak (1993) surveyed 240 teachers finding that placement judgments were significantly affected by personal efficacy. They found that the higher a teacher’s personal efficacy, the more likely the teacher was to agree with
regular education placement. Additionally, referral decisions were positively and significantly related to both personal efficacy and general teacher efficacy.

These studies demonstrate that the more efficacious a teacher, the more likely that the teacher will view students as capable and, therefore, appropriately placed in the regular education classroom. Moreover, high efficacy teachers view themselves as capable of educating students with special needs.

Teacher Behavior and Teacher Efficacy

Not only are teachers high in efficacy more likely to believe that students with some learning difficulties belong in a regular education classroom, they are more likely to teach differently. For example, Allinder (1994) found that the higher teachers’ personal efficacy, the more likely they would try multiple approaches to teaching, be organized and planful in their instructional delivery, and be confident and enthusiastic about their teaching. In a related study of 73 elementary preservice science teachers, Enochs, Scharmann, and Riggs (1995), using the Science Teaching Efficacy Belief Instrument (Riggs, 1988), found that higher personal science teaching efficacy was associated with activity-based learning (as opposed to textbook-based lecture). Additionally, in a study of student teachers, Czerniak and Schriver (1994) found that teachers high in efficacy emphasized autonomous learning and were child-centered whereas low efficacy teachers were insecure about their abilities and distracted by student misbehavior. Similarly, Gibson and Dembo (1984) found that higher efficacy teachers tended to use more probing questions, to be less critical, and to demonstrate greater persistence in failure situations than lower efficacy teachers. Emmer and Hickman (1990), in a study of 160 preservice teachers, found that the higher personal and general teaching efficacy, the more likely teachers were to use positive approaches to modifying student misbehavior. Finally,
Riggs (1995) surveyed 75 science teachers finding that those with high science teaching efficacy spent more time on instructional activities than their low efficacy counterparts.

These studies clearly suggest that, in both preservice and inservice teachers, higher efficacy is related to more student-centered, optimistic, and instructionally-focused teaching approaches.

Pupil-Control Orientation

An individual's orientation to pupil control is described by Woolfolk and Hoy (1990) as varying along a continuum with humanistic at one end and custodial at the other. The more humanistic a teacher, the more open, less controlling a teacher, and the more democratic that teacher is when interacting with students. On the other hand, more custodial teachers are more autocratic and concerned with maintaining student order. Using a revised version of the Gibson and Dembo (1984) teacher efficacy scale and the Willower, Eidell, and Hoy (1967) Pupil Control Ideology form, Woolfolk and Hoy (1990) found that the general teacher efficacy of preservice teachers was associated with a more humanistic pupil-control orientation. That is, the more that preservice teachers believed that teaching could overcome the negative effects of student homelife, the more humanistic those teachers were in their relationships with students.

In a similar study of student teachers' socialization into the profession, Hoy and Woolfolk (1990) found that, from the beginning to the end of their student teaching experiences, teachers became more custodial in their pupil-control orientation and more controlling with respect to their social problem solving. Concomitantly, student teachers' perceptions that teachers in general could overcome the difficulties imposed by students' home environments to produce learning (i.e., teachers' sense of general teaching efficacy) decreased. Student teachers' sense of personal teaching efficacy (i.e., perceptions of
personal capability to produce student learning). on the other hand, increased slightly by the end of their student teaching.

These findings suggest that the losses in general teaching efficacy experienced by novice teachers may significantly alter their approaches to pupil control. Therefore, while student teaching may strengthen perceptions of personal competence, this alone may be insufficient preparation for the reality of teaching. There is reason to design mastery experiences that provide novice teachers with experience in overcoming detrimental environmental influences; such experiences may lead to increases in general teacher efficacy. Indeed, the most effective teacher training programs of the 21st century may be those that provide novice teachers with successful experiences under adverse conditions.

Trust

In addition to pupil control orientation, teacher efficacy is also related to trust and collaboration. Da Costa and Riordan (1995) examined the implications of teacher trust and efficacy for collaboration. They performed a qualitative study of 10 teachers who worked as 5 dyads in multiple cycles of collaborative consultation during one school year. The collaborative consultation cycle was a form of clinical supervision drawn from the work of Cogan (1973) and Goldhammer (1980). Each collaborative consultation cycle consisted of a pre-observation goal setting conference, observation of teaching and data collection, and a post-observation conference with data sharing and analysis. Da Costa and Riordan considered collaboration most effective when teachers took professional risks such as experimenting with innovative pedagogical techniques and offering and being open to critical assessments of pedagogical effectiveness.

Data for the study were obtained through researcher-administered semi-structured interviews with participants, and, transcriptions of audio-taped teacher dyad conferences. Participants were provided with transcriptions and analyses of conferences for
verification. Analysis of the teacher interviews and conference data indicated varying levels of risk-taking, innovation, and critical assessment of pedagogical effectiveness. Da Costa and Riordan’s review of the extant literature indicated that teacher trust is usually considered important to the success of teacher collaboration (e.g., risk-taking, innovation, and critical assessment of pedagogy). However, in this study Da Costa and Riordan found that when trust was not high between colleagues, effective collaboration still occurred between highly efficacious teachers. They explain this finding by noting that teachers with little confidence in their capabilities avoid collaboration when there is little trust because they are not able to explain the occasional failures that come from risk-taking and innovation as sound pedagogical practice and experimentation necessary for the improvement of their own teaching. Highly efficacious teachers, on the other hand, even in the absence of trust, are less likely to avoid collaboration because their beliefs of personal capability lead them to view the lack trust as less threatening. Teacher efficacy may, therefore, be a critical variable in the development of collaborative learning communities. Furthermore, it is possible that any collaboration enabled through teacher efficacy may ultimately build trust when it is absent.

Openness to Consultation

DeForest and Hughes (1992) investigated the relationship between personal teaching efficacy and teachers desire for involvement in decisions ensuing from consultation with a school psychologist about students. Their study was guided by a concern that the consultation literature was somewhat contradictory with respect to the optimal level of teacher involvement in decision making in the context of psychological consultation. They hypothesized that the higher a teacher’s personal teaching efficacy, the more likely the teacher would prefer involvement in the decisions ensuing from psychological consultation.
DeForest and Hughes administered Gibson and Dembo’s (1984) personal teacher efficacy subscale to 102 regular education elementary teachers in two urban school districts. To facilitate a comparison of high and low efficacy teachers, DeForest and Hughes chose to study those scoring in the top and bottom thirds of the Gibson and Dembo personal teacher efficacy subscale. This yielded 68 teachers, of whom, 60 agreed to participate in the second phase of the study. In phase two of the study, teachers watched one of two 25 minute video tapes. While each video tape depicted a teacher and school psychologist discussing a student with disruptive classroom behaviors, the two differed with respect to the level of involvement the teacher had. In the high involvement tape, the teacher was engaged in problem identification, analysis and plan development whereas in the low involvement tape, the school psychologist made these decisions with little teacher input. Half of the teachers in the high PTE group (n=15) viewed the high involvement tape while the other half (n=15) viewed the low involvement tape. Similarly, half of the teachers in the low PTE group viewed one tape and the other half viewed the other tape. After viewing the tapes, teachers completed the Consultant Effectiveness Form and the Intervention Rating Profile. These instruments assess teachers’ perceptions of the effectiveness of the consultation and the appropriateness of the intervention, respectively. As hypothesized, teachers in the high PTE group perceived the consultant to be more effective and the intervention to be more appropriate than did teachers in the low PTE group. The implication here is that teachers, regardless of whether they have high or low involvement in the decisions, are more open to psychological consultation for classroom problems when they have high levels of personal teaching efficacy. If we view consultation as a form of professional collaboration, the findings of DeForest and Hughes echo those of Da Costa and Riordan (1996), namely, the higher the efficacy of teachers, the more likely is collaboration.
Teacher Change

The relationship between teachers’ ability to change their classroom practice and teacher efficacy was explored by Smylie (1987). Smylie investigated: (1) the relationship between personal teacher efficacy (PTE) and change in teacher practice, (2) the relationship between school contextual factors (e.g., principal’s goal emphasis, principal’s facilitation of teachers’ work, workgroup cooperation, warmth, and friendliness, and participative decision-making) and PTE, and (3) the relationship between classroom characteristics (e.g., class size, students’ prior achievement, and academic heterogeneity) and PTE and change in teacher practice. Smylie used path analysis to link these variables and to measure the strength of both direct (e.g., PTE on teacher change) and indirect (school context on teacher change through its effect on PTE) relationships.

Smylie’s obtained data from a purposive sample consisted of 56 elementary and secondary teachers from 13 elementary, middle, and secondary schools who were voluntarily participating in the Effective Use of Time staff development program. Smylie choose this sample because previous research had shown the EUOT program was effective at increasing teacher and student time spent on learning activities. Smylie’s learned that variation in the expected changes could be explained as a function of school context. In addition, Smylie learned that school context was influenced by teacher efficacy. This provided yet another link between teacher efficacy and important teacher behaviors.

Student Achievement and Teacher Efficacy

The earliest connection between teacher efficacy and student achievement was established by Armor et al. (1976) in a study of reading gains among students in selected Los Angeles minority schools. Using reading scores obtained from the 1974 and 1975
administrations of the California Test of Basic Skills, Armor et al. found that the higher the efficacy of teachers in a special reading program, the higher the reading gain of their students. Since then, other researchers have provided additional support linking teacher efficacy and student achievement.

Using data gained from teacher interviews and questionnaire responses, Ashton and Webb (1986) studied the relationship between the efficacy of 48 teachers who taught basic skills in communications and mathematics and student achievement (student achievement was measured by the Metropolitan Achievement Test). They found significant relations between teachers’ efficacy and both communications and mathematics achievement test scores. Ashton and Webb report that “teachers with a high sense of efficacy seemed to employ a pattern of strategies that minimized negative affect, promoted an expectation of achievement, and provided a definition of the classroom situation characterized by warm interpersonal relationships and academic work” (p. 125). This interpretation by Ashton and Webb indicates that the effect of teacher efficacy on student achievement is mediated by teacher behavior.

Later, Anderson, Greene, and Loewen (1988) investigated the relationship between the efficacy of 65 teachers and the achievement of their students as measured by the Canadian Achievement Test. Anderson et al. measured teachers’ personal efficacy using the Gibson and Dembo (1984) scale. They found that teachers’ personal efficacy had a positive effect on the achievement of third and sixth grade students (although not statistically significant for sixth grade).

Further support for the association between teacher efficacy and student achievement is provided in a study by Ross (1992). Ross studied the relationship between the efficacy of 18 seventh and eighth grade history teachers and the achievement of their students. Ross measured efficacy using the 16-item instrument developed by Gibson and
Dembo (1984). Findings indicated that both personal and general teaching efficacy were significantly and positively related to mean student achievement.

The Link Between Teacher Efficacy and Student Achievement

Although many studies have investigated the direct association between teacher efficacy and student achievement, Gibson and Dembo (1984) suggest teacher efficacy "may influence certain patterns of behavior known to influence achievement gains" (p. 579). In other words, they believe that certain teacher behaviors may intervene in the relationship between teacher efficacy and student achievement. Ross (1994) agrees that student achievement is probably affected indirectly by teacher efficacy through many of its correlates. From his review of 88 teacher efficacy studies, Ross identified six ways in which the correlates of teacher efficacy may have an indirect effect on student achievement. Specifically, Ross suggested that the higher a teachers' efficacy, the more likely a teacher is to: (1) learn and implement new teaching techniques, (2) use classroom management approaches that develop autonomous learners, (3) attend to the needs of students with lower achievement, (4) enhance students' own self-perceptions as capable learners, (5) set high goals, and (6) exhibit persistence in the face of failure. Each of these behaviors, in turn, is likely to enhance student achievement.

Importantly, many of the intervening variables identified by Ross have already been identified as correlates of teacher efficacy in the preceding review. In addition to the correlates specified above by Ross, teacher efficacy may also have an indirect effect on student achievement through its positive association with trust (Da Costa & Riordan, 1996), openness to educational consultation (DeForest & Hughes, 1992), positive attitudes toward educational reform (DeMesquita & Drake, 1994; Guskey, 1988; Smylie, 1988), teacher satisfaction (Lee, Dedrick, and Smith, 1991), and increased levels of parental involvement in schooling (Hoover-Dempsey, Bassler, & Brissie, 1987, 1992).
In summary, teacher efficacy is a powerful construct affecting student achievement indirectly through its effects on many important intervening variables. The positive associations between teacher efficacy and student achievement detected in many studies may actually reflect the indirect affect of teacher efficacy on the many variables outlined above.

**Origins of the Teacher Efficacy Construct**

Although research results have consistently indicated that teacher efficacy is a powerful construct with many important correlates, several researchers differ in their operationalization of teacher efficacy. This contributes to a lack of clarity regarding how to measure teacher efficacy. With this problem in mind, the origins of teacher efficacy are examined below for the purpose of identifying a method to measure this powerful construct. This section reviews the conceptual development of several approaches to the measure of teacher efficacy, ending with a comprehensive model for the measure of teacher efficacy that synthesizes existing research.

Measures of teacher efficacy have developed from two distinct theoretical orientations to self-referent thought (Tschannen-Moran, Hoy, & Hoy, 1998): the locus of control research of J. B. Rotter (1966) and the social cognitive theory of Albert Bandura (1977, 1997). While much of teacher efficacy research is now based on Bandura’s social cognitive theory, the construct owes its origin to Rotter’s (1966) conceptualization of locus of control. Rotter described those teachers who believe that environmental forces have greater influence on student achievement than their personal teaching abilities and efforts as having an external locus of control. Conversely, teachers with an internal locus of control believe their abilities and efforts can overcome the influence of environmental forces in the determination of learning outcomes. Rotter believed that one’s locus of
control varies along a bipolar continuum. That is, we tend to believe that either internal or external forces are the dominant factor affecting significant outcomes.

A decade after Rotter’s (1966) work, researchers from Rand Corporation developed two Likert-type items based on Rotter’s locus of control (Armor et al., 1976; Berman, McLaughlin, Bass, Pauly, & Zellman, 1977). The first item was “When it comes right down to it, a teacher really can’t do much because most of a student’s motivation and performance depends on his or her home environment.” The second item stated “If I try really hard I can get through to even the most difficult or unmotivated students.” The Rand researchers labeled the sum of these items teacher efficacy. Importantly, these items reflected not only Rotter’s internal/external locus of control distinction but also their wording reflects a difference between what teachers in general can or cannot do (the first item) and what a teacher personally can do (the second item). Furthermore, the first item represents a failure or negative situation while the second represents a success or positive one. Over the next twenty years, these types of differences received considerable attention from teacher efficacy researchers attempting to clarify the construct of teacher efficacy and develop its measure.

In both Rand studies, scores on the two efficacy items above were summed to produce an overall measure of teacher efficacy. This analytic strategy reflected Rotter’s (1966) belief that locus of control varied along a single bipolar continuum. The purpose of the first Rand study was to identify factors related to reading score increases for inner city children in the Los Angeles Unified School District (Armor et al., 1976). The results indicated that teachers’ efficaciousness was significantly and positively related to reading gain for African American students. A year later, the second Rand study was released evaluating factors affecting the effectiveness and continuation of federally funded educational projects. Standard multiple regression procedures indicated that teacher
efficacy was significantly and positively related to percent of project goals achieved, teacher change, student improvement, and continuation of project methods and materials (Berman, McLaughlin, Bass, Pauly, & Zellman, 1977).

The results of these two early studies were indeed powerful. But, they left important questions about the meaning and measurement of teacher efficacy unanswered. For example, was teacher efficacy a uni-dimensional concept that varied along a continuum with internal control at one end and external control at the other? Or, did the Rand items really measure a personal and a general sense of teacher efficacy implying a multi-dimensional construct? At the same time that these questions about teacher efficacy were emerging, other researchers were asking similarly intriguing questions about Rotter’s (1966) locus of control.

Related Developments in the Measurement of Locus of Control

A few years after the Rand studies were released, Rose and Medway (1981) developed a 28-item forced-choice instrument called the Teacher Locus of Control (TLC) Scale which added a dimension to Rotter’s (1966) locus of control. Rose and Medway found that whether teachers selected an internal or external control orientation was partly dependent on whether they were considering positive outcomes (e.g., why students receive better grades) or negative outcomes (e.g., why students fail tests). Rose and Medway sampled 89 female fourth grade teachers and subjected their data to principal components factor analysis that indicated the existence of two separate subscales, one for internal responsibility for student success (I+), the other for internal responsibility for student failure (I-). Rose and Medway’s findings indicate that researchers considering teachers’ expectancies about student achievement should attempt to differentiate among positive and negative outcomes.
At the same time that Rose and Medway (1981) reported their findings for the TLC, Guskey (1981) released research on the Responsibility for Student Achievement (RSA) Questionnaire. Guskey administered a 30-item modified forced choice questionnaire to 215 elementary and secondary teachers from a large metropolitan school district. Like the TLC, Guskey’s survey questions reflected not only a choice between internal and external locus of control, but also the 30 items were evenly divided between positive and negative attainments. Not surprisingly, Guskey’s factor analysis also indicated the existence of two separate subscales, one for positive outcomes (R+) and one for negative outcomes (R-).

A year later, Guskey (1982) added further support for the theory that teachers accept responsibility for positive and negative student achievement differentially. Guskey surveyed 184 elementary and secondary teachers in two metropolitan school districts. Teachers divided 100 percentage points among four reasons for which they were particularly successful or particularly unsuccessful in a hypothetical teaching situation. Again, Guskey found that teachers tend to attribute the cause of student successes to internal factors whereas they tend to attribute the cause of student failures to stable external factors (e.g., lack of student ability or home support for schooling).

Having established that teachers do differ in the level of responsibility they accept for student achievement depending on whether the responsibility is for student success or failure, Guskey (1984) decided to investigate how teachers’ sense of responsibility changes. Guskey used the RSA scale to study the effects of student success in mastery learning on teachers’ willingness to accept responsibility for student achievement. Guskey discovered that after teachers experienced instructional success (measured by increased student class grades and test scores), they tended to accept greater responsibility for both positive and negative student achievement. This finding suggests that enactive
mastery experience, a powerful efficacy changing mechanism, also effects changes in the responsibility teachers accept for student achievement. In retrospect, the knowledge that responsibility for student achievement and efficacy beliefs have a common mechanism of change was an early indicator that teachers’ efficacy beliefs might be differentiable with respect to positive and negative student outcomes.

Later, Guskey (1987) directly considered the connection between teacher efficacy and teacher responsibility for student achievement in a study of 114 elementary and secondary teachers. In this study, teachers completed a questionnaire that included the original Rand items and a revised 20-item version of the Responsibility for Student Achievement (RSA) scale (Guskey, 1981). Guskey’s (1987) results indicated that teacher efficacy and responsibility for student achievement are significantly related. Concerning this relationship, Guskey suggests that the difference between teachers’ sense of responsibility for student achievement and their feelings of efficacy is a subtle one resting mostly on tense. According to Guskey,

  efficacy refers to projected potency in a particular situation and is generally present or future directed. It is a teacher’s belief that “I can make this happen”. Responsibility, on the other hand, is an attribution reference that is reflective and directed toward the past. It is a teacher’s belief that “I made this happen” (p.41).

Implications of Locus of Control Research for the Measurement of Teacher Efficacy

The findings of Rose and Medway (1981) and Guskey (1981, 1982, 1984, 1987) suggest that when directed at teachers’ responsibility for student learning, locus of control may be a multi-dimensional construct with one subscale for positive outcomes and another for negative ones. Furthermore, Guskey’s (1984, 1987) work shows that efficacy and responsibility for student achievement are enhanced through the common mechanism of mastery experience and that these variables are empirically related.
The finding that teachers' perceptions of responsibility for student achievement depend on whether students achieve failure or success has important implications for the measurement of teacher efficacy. For example, a review of the original Rand items indicates that one item addresses student failure while the other focuses on student success. This allows for the possibility that the weak correlations typically found between the Rand items (Armor et al., 1976; Berman et al., 1977; Guskey, 1984) might actually result from the fact that one question addresses student success while the other addresses failure, as opposed to the internal/external locus of control distinction originally intended.

Importantly, therefore, an instrument designed to assess teacher efficacy should contain sufficient items to test for the possible effect of positive and negative student achievement on teachers' self-perceptions. Taking this approach, Woolfolk and Hoy (1990) offer evidence that teacher efficacy may indeed vary according to whether students succeed or fail. They suggested teacher efficacy may be divided into subcategories based on responsibility for positive and negative student achievement. In a study of 182 preservice teachers, Woolfolk and Hoy used a 22-item scale designed to measure teacher efficacy. Factor analysis revealed that along one efficacy dimension, labeled personal teaching efficacy, two factors emerged, one corresponding to positive and the other to negative student achievement. This evidence, coupled with the connections between efficacy and responsibility for achievement established by Guskey (1984, 1987) suggests that researchers measuring teacher efficacy should consider the possibility that efficacy subscales for positive and negative student achievement do exist.

**The Effects of Bandura's Social Cognitive Theory on the Teacher Efficacy Construct**

The work of Rose and Medway (1981), Guskey (1981, 1982, 1984, 1987), and Woolfolk and Hoy (1990) demonstrates that the teacher efficacy construct has been influenced by research on locus of control and responsibility for student achievement.
However, this is not the only line of research influencing teacher efficacy research. While advances in teacher efficacy theory and research based on Rotter’s (1966) locus of control framework were occurring, teacher efficacy was also undergoing change from the influence of Bandura’s social cognitive theory. These advances are reviewed below.

At the same time that the Rand researchers conducted their studies of teacher efficacy based on Rotter’s theoretical framework, Bandura (1977) introduced his conception of self-efficacy, which he grounded in social learning theory. Bandura argued that self-efficacy was different than Rotter’s locus of control, stating that “Rotter’s (1966) conceptual scheme is primarily concerned with causal beliefs about action-outcome contingencies rather than personal efficacy” (p. 204). Bandura argued that while locus of control is a type of outcome expectancy, self-efficacy represents an expectancy about one’s capability to successfully execute a particular behavior. Outcome expectancies, he contended, were preceded in formation by beliefs of personal efficacy.

In addition, Bandura’s social learning theory postulated the four main sources of efficacy information enumerated earlier (i.e., mastery experience, vicarious learning, social persuasion, and psychological states). Bandura thus distinguished locus of control from self-efficacy not only in terms of expectancies but also in terms of the mechanisms through which personal efficacy beliefs were assumed to develop. In an experimental test of his theory, Bandura (1977) assessed the effects of mastery and vicarious experiences on efficacy beliefs. Bandura’s experiment showed two things. First, it supported the social learning theory assumption that efficacy beliefs could be altered through mastery and vicarious experience. Second, it indicated that personal efficacy was a better predictor of future behavior than was past performance. By indicating that self-efficacy was different than locus of control and providing a social cognitive explanation for the
development and predictive utility of self-efficacy, Bandura initiated an important shift in the focus of theory and research on teacher efficacy that would follow.

The Development of Teacher Efficacy Measures Grounded in Social Cognitive Theory

In an attempt to improve upon the original Rand measures, Ashton, Olejnik, Crocker, and McAuliffe (1982) investigated several approaches to the measure of teacher efficacy based on Bandura's (1977) social cognitive theory. Their work was motivated by two guiding concerns. First, they recognized that a longer instrument might prove more reliable than the sum of the two Rand items. Second, they proposed that Bandura’s social cognitive theory implied that teacher’s efficacy was comprised of two subscales.

Ashton, Olejnik, Crocker, and McAuliffe (1982) proposed that teachers’ overall efficacy for teaching be called personal teacher efficacy (e.g., “I can’t motivate these kids). To measure personal teacher efficacy, they proposed a longer questionnaire composed of two types of items: those that measured what they called personal efficacy (“I can’t motivate”) and those that measured teaching efficacy (e.g., “These kids can’t be motivated”). Ashton et al. thus argued that personal teacher efficacy was comprised of subscales for personal efficacy and teaching efficacy. These items reflected the social cognitive perspective that in addition to personal capabilities, characteristics of the task also affect one’s sense of efficacy for a given task (Bandura, 1977). Ashton et al. contended that Rand item 1 (When it comes right down to it, a teacher really can’t do much because most of a student’s motivation and performance depends on his or her home environment) was actually a measure of what they called teaching efficacy. Rand item 2 (If I try really hard I can get through to even the most difficult or unmotivated students), they proposed, was actually a measure of personal teacher efficacy. The original Rand survey, they therefore contended, failed to measure personal efficacy (i.e., assessment of the capabilities an individual brings to bear on a given task).
Ashton et al. (1982) supported their view that the two Rand items measured distinct types of efficacy with data showing that these items were not significantly correlated (p > .05) with one another. Additionally, while Rand item 1 was significantly related (r = -.30, p<.04) to the Brookover measure of Teacher Expectations and Teacher-Student Commitment to Improve (Brookover & Lezotte, 1977; Brookover et al., 1978), Rand item 2 was not (r =-.12, n.s.). The findings of Ashton et al. suggest that the two Rand items were not different aspects of the same concept suitable for summing but rather, that one was an omnibus measure (personal teacher efficacy), the other a component of the omnibus measure (teaching efficacy), and that the second component (personal efficacy) was missing. Ashton and her associates thus took a major step beyond the original Rand studies. They concluded that unlike Rotter's (1966) internal/external locus of control, teacher efficacy was a multi-dimensional construct composed of personal efficacy and teaching efficacy. Moreover, they suggested that more work was needed to develop a good measure of teacher efficacy. Ashton and her colleagues took a vital first step in the examination of teacher efficacy and its components in light of Bandura's social cognitive theory.

The next important advance in the measure of teacher efficacy came two years later when Gibson and Dembo (1984) released a validation study for a new scale to measure the construct. Their work was based on the contention of Ashton et al. (1982) that teacher efficacy could be measured using two subscales, one for personal efficacy and one for teaching efficacy. Gibson and Dembo administered a 30-item questionnaire to 208 elementary teachers in 13 schools from two adjacent school districts. Using principal components factor analysis they found that 10 items loaded (loading ≥ 0.45) on one factor and 6 on the other. The two factors accounted for a total of 28.8 percent of the variance and were weakly correlated. Gibson and Dembo called the first factor personal
teaching efficacy; this factor consisted of items representing a teacher’s perceptions of capability for producing student learning (e.g., “When I try really hard, I can get through to the most difficult students”). The second factor, called teacher efficacy, included questions about any teacher’s ability to overcome environmental influences (e.g., “If parents would do more, I could do more”). Gibson and Dembo thus moved beyond the work of Ashton et al. by providing theoretical and empirical support for the contention that teacher efficacy included both a personal dimension and an environmental, or task-related, one.

Gibson and Dembo (1984) believed that personal teaching efficacy and teacher efficacy corresponded to Bandura’s self-efficacy theory. “Bandura’s self-efficacy dimension would indicate a teacher’s rating of his or her own abilities to perform the necessary tasks to bring about positive student change and is clearly represented by the first factor” (Gibson and Dembo, 1984, p. 574). They suggested that teacher efficacy, on the other hand, is an outcome expectancy as described by Bandura: “When applied to teacher efficacy, outcome expectancy would essentially represent the degree to which students can be taught given their family background, socioeconomic status (SES), and school conditions” (p. 574). Ashton and Webb (1986) also stated that “teachers’ sense of teaching efficacy is derived, at least in part, from teachers’ more general beliefs about response-outcome contingencies” (p. 4). These assertions brought the distinction between efficacy and outcome expectation into the theoretical debate about teacher efficacy.

The notion that the measure of teacher efficacy is an outcome expectancy, as asserted by Gibson and Dembo (1984) and Ashton and Webb (1986), was challenged by Woolfolk and Hoy (1990) who observe that

for Bandura, an outcome expectation is a judgment of the likely consequences of an action, whereas an efficacy expectation is a judgment about ability to perform
an action. The question of whether teachers can override the effects of adverse background influences (Rand item 1) is an efficacy expectation, not an outcome expectation, because it involves the potential to perform (p. 82).

Thus, neither personal teaching efficacy nor teacher efficacy are outcome expectations. Rather, both are efficacy expectations. Although there is some disagreement about their description of teacher efficacy as an outcome expectation, this does not diminish the value of Ashton and Webb’s (1986) work in providing additional support that the self-efficacy beliefs of teachers are comprised of two separate dimensions.

To measure these two separate dimensions, Ashton and Webb developed two instruments: the Efficacy Vignettes and the Webb Efficacy Scale. As with Gibson and Dembo’s (1984) efficacy scale, both of the Ashton and Webb instruments were grounded in a social cognitive framework reflecting Bandura’s theoretical conceptualization of self-efficacy. The Efficacy Vignettes, designed to measure personal teaching efficacy, posed a series of descriptions of challenging teaching situations. Each vignette concluded by asking teachers to estimate how effectively they would meet the challenge by responding to a Likert-type scale ranging from extremely ineffective (1) to extremely effective (7). The Vignettes were intended to elicit greater variability in teacher response but unlike other measures of teacher efficacy, this measure was not significantly correlated with student achievement.

The Webb efficacy scale was designed to measure teacher efficacy. The Webb scale was a 7-item forced-choice instrument asking teachers to select one of two statements which expressed alternative views on a teaching situation (e.g., “A teacher should not be expected to reach every child” or “Every child is reachable”). Although Ashton and Webb (1986) found that the Webb efficacy scale correlated significantly with the original Rand item measuring teacher efficacy, the scale had two psychometric
limitations. First, the forced-choice format, which was chosen to reduce social desirability bias, had the unexpected consequence of generating a response rate of just under 90%. Second, the internal consistency for the scale was unacceptably low.

In summary, social cognitive theory led to major advances in the measurement of teacher efficacy. First, researchers developed instruments that were increasingly specific to the work of teaching. For example, instruments began to address teachers’ personal competence in given situations (Ashton et al., 1982; Ashton & Webb, 1986; Gibson & Dembo, 1984). Second, these researchers also developed the idea that teacher efficacy beliefs were comprised of two separate dimensions.

**Integrating Perspectives on Teacher Efficacy**

Several studies conducted after Gibson and Dembo (1984) developed their teacher efficacy instrument have supported the existence of two distinct and unrelated factors, one corresponding to teaching efficacy and the other corresponding to personal efficacy (Hipp & Bredeson, 1995; Hoy & Woolfolk, 1990, 1993; Woolfolk, Roscft, & Hoy, 1990). However, as explained above, Woolfolk and Hoy (1990) provided initial evidence that the social cognitive perspective and locus of control research on teacher efficacy could be integrated in a model of teacher efficacy. Specifically, they found that personal efficacy may be comprised of subscales reflecting responsibility for positive and negative student achievement. Their study represents an initial attempt at synthesizing various perspectives on teacher efficacy. Two studies responding to Woolfolk and Hoy's finding are considered below. Each offers a different interpretation of the positive and negative dimensions identified by Woolfolk and Hoy.

**Guskey and Passaro**

One interpretation was offered by Guskey and Passaro (1994) who contended that teacher efficacy, rather than representing the two dimensions reflected in much past
research, actually consists of two separate dimensions representing internal and external control. This position is consistent with the attributional focus of locus of control. However, it differs in that Guskey and Passaro propose two separate subscales internal and external control rather than a single bipolar continuing with internal at one end and external at the other as Rotter (1966) proposed for locus of control.

In their study, Guskey and Passaro sampled 342 preservice and inservice teachers in three suburban/rural school districts using a 21-item instrument drawn from the work of Gibson and Dembo (1984), Woolfolk and Hoy (1990), and the original Rand researchers. The items employed by Guskey and Passaro were reworded to reflect four separate causal attributions for a given level of student learning. The following are examples of these four causes:

- **personal-external** - “I am very limited in what I can achieve because a student’s home environment is a large influence on his/her achievement”,
- **teachers-external** - “Teachers are not a very powerful influence on student achievement when all factors are considered”,
- **personal-internal** - “When a student gets a better grade than he/she usually gets, it is usually because I found better ways of teaching that student”, and,
- **teacher-internal** - “When the grades of students improve, it is usually because their teachers found more effective teaching approaches”.

Responses to the reworded questions were analyzed using principal components factor analysis. The analysis revealed that all of the external items loaded on one factor and all of the internal items on another. According to Guskey and Passaro (1994), these factors did not reflect the negative/positive distinction observed by Woolfolk and Hoy (1990) but rather an internal/external difference. However, a careful inspection of the items reveals that Guskey and Passaro did not vary the negative/positive component of
their survey items. Without exception, every item labeled by Guskey and Passaro as internal also reflects a positive orientation and every item labeled as external is also negative. It is as possible, therefore, that the distinction they label as internal/external actually reflects the original difference detected by Guskey (1981, 1982, 1984, 1987) between teachers’ acceptance of responsibility for positive and negative student outcomes. Guskey and Passaro state that their study was intended “to bring clarity to teacher efficacy measures” (p. 630). However, their study did not effectively control for response differences associated with student achievement (i.e., success or failure). Consequently, their findings do not conclusively indicate which dimensions of teacher efficacy were actually measured.

Soodak and Podell

A second interpretation of the negative and positive personal teacher efficacy dimensions identified by Woolfolk and Hoy (1990) is offered by Soodak and Podell (1996). According to Woolfolk and Hoy, the item “If a student in my class becomes disruptive and noisy, I feel assured that I know some techniques to redirect him/her quickly” represents the negative dimension of personal teaching efficacy. However, Soodak and Podell contend that this item actually taps teachers’ efficacy expectations. Additionally, Soodak and Podell contend that the items identified as positive by Woolfolk and Hoy (e.g., “When a student gets a better grade than he/she usually gets, it is because I found better ways of teaching that student”) actually represent outcome expectancies. The distinction, according to Soodak and Podell, is that the first item refers to teachers’ efficacy to execute given behaviors (e.g., to use a behavior management technique), while the second item refers to teachers’ efficacy to produce given outcomes (e.g., student grades).
The primary difficulty with the interpretation offered by Soodak and Podell (1996) is that it contradicts social cognitive theory. In the language of social cognitive theory, the phrase “outcome efficacy” is a contradiction in terms. As noted earlier, efficacy expectations are different than outcome expectations (Bandura, 1997; Woolfolk and Hoy, 1990). While efficacy expectations reflect a self-perception of capability to execute a course of actions that will lead to a given attainment, outcome expectations refer to the outcomes of a given attainment.

An Integrated Model

Expressing concern about the measure of teacher efficacy, Ross (1994) observes that existing approaches overlap with locus of control, confuse efficacy with outcome expectancy, are susceptible to response bias (particularly in the general teaching efficacy scale which contains only a single negatively worded item), and are too general to meet Bandura’s definition of self-efficacy as a situation specific construct (p.5).

Ross provides a fairly comprehensive set of concerns for the measure of teacher efficacy. In response to the confusion surrounding the meaning and measurement of teachers’ efficacy expectations, Tschannen-Moran, Hoy, and Hoy (1998) proposed an integrated model that situates teacher efficacy within a comprehensive theoretical framework accounting for the influence of social cognitive theory and developments in the measure of locus of control and responsibility for student achievement. First, grounded in social cognitive theory, their model acknowledges the influence of the efficacy changing mechanisms specified by Bandura (i.e., mastery experience, vicarious experience, verbal persuasion, and physiological arousal). Second, their model proposes that efficacy beliefs are uniquely affected by teachers’ perceptions of both their personal competence and an analysis of the teaching task they face. Therefore, they suggest that teacher efficacy is
comprised of dimensions for personal competence and an analysis of the teaching task. Third, their model observes that teachers’ responsibility for positive and negative student achievement is related to teachers’ efficacy beliefs. That is, teachers may have a tendency to accept responsibility for student success and to blame environmental factors for student failure. Consequently, they suggest that the personal competence and task analysis dimensions of teacher efficacy may each be comprised of subscales reflecting positive and negative student achievements.

Collective Teacher Efficacy

In this study, the construct of teacher efficacy is extended to the school level. Accordingly, having reviewed the theoretical underpinnings of teacher efficacy and its correlates, this chapter now turns to the conceptualization and measurement of organizational level perceptions of efficacy held by teachers.

Organizational Level Efficacy Perceptions

Teachers are members of school organizations. Their shared beliefs influence the social milieu of schools (Hoy & Miskel, 1996). Within an organization, perceived collective efficacy represents the shared perceptions of group members concerning “the performance capability of a social system as a whole” (Bandura, 1997, p. 469). Analogous to self-efficacy, collective efficacy is associated with the tasks, level of effort, persistence, shared thoughts, stress levels, and achievement of groups.

According to Bandura (1993, 1997), the collective efficacy perceptions of teachers in a given school are important school organizational features. One reason for this conclusion is the link between teacher efficacy and student achievement reviewed earlier (Anderson, Greene, & Loewen, 1988; Armor et al., 1976; Ashton & Webb, 1986; Ross, 1992, 1994). Just as individual teacher efficacy may partially explain the effect of teachers on student achievement, from an organizational perspective, collective teacher
efficacy may help to explain the differential effect that schools have on student achievement. Collective teacher efficacy, therefore, has the potential to contribute to our understanding of how schools differ in the attainment of their most important objective -- the education of students.

Bandura (1997) observes that because schools present teachers with a host of unique challenges involving such things as public accountability, shared responsibility for student outcomes, and minimal control over work environments, the task of developing high levels of collective teacher efficacy is a difficult one indeed. Yet, although the challenge for schools to develop the efficacy of teachers in the face of numerous environmental stressors is considerable, the situation is not at all bleak. This is because there is reason to believe that teacher efficacy, once developed, will thrive. Putnam (1993) provides some insight into why this is so. At the collective level, efficacy beliefs are social perceptions. Putnam (1993) refers to such social features as moral resources -- ones that are strengthened rather than depleted through their use. The potential for efficacy to grow rather than deplete through use is also indicated by the cyclic nature of efficacy implied by reciprocal causality. That is, if collective efficacy gains enhance organizational performance, reciprocal causality suggests that resulting performance improvements may, in turn, strengthen collective organizational efficacy. Thus, to the extent collective teacher efficacy is positively associated with student achievement, there is strong reason to lead schools in a direction that will systematically develop teacher efficacy; such efforts may indeed be rewarded with growth in not only collective teacher efficacy but also student achievement.

Social Cognitive Theory and Efficacy Beliefs at the Organizational Level

Bandura (1993, 1997) suggests that, when aggregated, teachers' efficacy perceptions represent an emergent organizational characteristic called collective efficacy.
Collective efficacy thus extends social cognitive theory to the organizational level. The application of theories that explain individual behavior to organizations is not new in the social sciences. For example, theories of organizational learning are grounded in principles of individual human learning. Simon (1996) explains this noting that “all learning takes place inside individual human heads; an organization learns in only two ways: (a) by the learning of its members, or (b) by ingesting new members who have knowledge the organization didn’t previously have” (p. 176). Similarly, Garvin (1993) explains organizational learning in terms of the knowledge, listening, action and reflection of individual organizational members. Collective efficacy may be conceptualized analogously. That is, just as individual learning theory provides a framework for organizational learning, individual efficacy perceptions provide the theoretical and empirical foundation for collective efficacy.

One way to extend self-efficacy theory to the collective level is to consider the assumptions of social cognitive theory at the organizational level. As examined earlier, a fundamental assumption of social cognitive theory concerns human agency. Extended to the school level, the parallel concept is organizational agency. Since agency refers to the intentional pursuit of a course of action, we may begin to understand school organizations as agentive when we consider that schools act purposefully in pursuit of their educational goals. For example, one school may be working to raise student achievement scores while another works to increase the rate and quality of parental involvement. If we consider that such differences are purposeful, we may view them as evidence of organizational agency. The purposive actions schools take as they strive to meet their goals thus reflect organizational intentionality, or agency. Of course, organizational agency results from the agentive actions of individuals.
In addition to human agency, organizational functioning also depends on the knowledge, vicarious learning, self-reflection and self-regulation of individual members. For example, a school that responds to declining achievement scores by implementing a curricular reform that was effective in a neighboring district is engaged in a self-regulatory process that is informed by the vicarious learning of its members. Such examples make clear that the assumptions of social cognitive theory also apply to organizations, though we must recognize that it is through individuals that organizations act.

Summary of the Theoretical Underpinnings of Collective Efficacy

The preceding discussion provides a foundation for conceiving of social cognitive theory at the organizational level. Organizations, through the actions of individual members, are actively engaged in analyzing, responding to, and controlling their behaviors and environments. Furthermore, as with self-efficacy, collective efficacy may be highly predictive of organizational effectiveness. In the interest of knowing more about collective efficacy and its association with organizational effectiveness, this section now turns to the findings of research on collective efficacy.

Research on Collective Efficacy

Collective teacher efficacy is important, among other reasons, because of the association between teacher efficacy and students’ academic success. Yet, despite the potential of this powerful construct, the collective efficacy of teachers has received little research attention. One explanation offered by Pajares (1997) is that the extensive data gathering typically required in studies in which schools are the unit of analysis has prevented researchers from engaging in studies of collective efficacy, but the need and the challenge are there to tap greater insights from this potentially critical construct (p. 37).
Another reason for the lack of research on teacher collective efficacy is that the concept is relatively new.

Although studies of collective teacher efficacy are in short supply, there have been a few. Several relevant studies of collective efficacy and collective teacher efficacy are reviewed below.

**Hoover-Dempsey, Bassler, and Brissie**

One early study in which teacher efficacy was conceived as a characteristic of organizations was conducted by Hoover-Dempsey, Bassler, and Brissie (1987). Although these researchers did not use the term “collective teacher efficacy,” their methodology involved the aggregation of teachers’ individual efficacy perceptions to the school level. Informed by earlier investigations of the correlates of teacher efficacy, they reasoned that teachers’ efficacy influenced the “setting” of a school through its influence on multiple teacher behaviors. Accordingly, they chose to conceive of teacher efficacy as an organizational characteristic.

Hoover-Dempsey and her colleagues hypothesized that the level of teacher efficacy in a school was positively related to various types of parental involvement. To test this hypothesis, they surveyed teachers in 66 urban, suburban, and rural elementary schools. The average rate of teacher participation within schools was 69%. The researchers measured teacher efficacy with an 11-item instrument containing items similar to those in the 1984 Gibson and Dembo instrument. Although these researchers did not distinguish between general and personal teacher efficacy, they did find a significant positive effect for their omnibus teacher efficacy measure. (Significant effects for omnibus teacher efficacy measures date back to the original Rand studies in which teacher responses to two survey items were summed to form a single measure of teacher efficacy.) Using stepwise regression, they found that the average level of teacher efficacy
in a school was positively related to parent participation in parent-teacher conferences, parent volunteer work at school, parent home tutoring, and parent support (of the teacher’s work). Notably, Hoover-Dempsey and colleagues reported that teacher efficacy was more strongly related to both parent home tutoring and parent support than was SES. These results provided initial support for Bandura’s (1993, 1997) eventual assertion that collective teacher efficacy is more strongly associated with important school outcomes than is SES. The effect of teacher efficacy and SES were about the same for parent participation in parent-teacher conferences and parent volunteer work at school.

Importantly, the measure of parental involvement used in the Hoover-Dempsey study was obtained through teachers’ reports of their perceptions of parental involvement rather than parent reports. It is possible, therefore, that the positive association between teachers’ perceptions of efficacy and parent home tutoring results from a tendency of highly efficacious teachers to overstate rates of parent home tutoring.

However, despite the lack of parent reports of involvement, the Hoover-Dempsey et al. study was an important early effort toward conceptualizing and measuring collective teacher efficacy that is consistent with the approach taken in the current study. Specifically, Hoover-Dempsey et al. conceived of teacher efficacy as an organizational characteristic measured by the mean efficacy score of teachers in a school. Furthermore, the Hoover-Dempsey et al. study provides reason for additional investigation into the relationship between teacher efficacy and parent-reports of their involvement in schooling.

Newmann, Rutter, and Smith

Like the Hoover-Dempsey et al. study, Newmann, Rutter, and Smith (1989) treated schools as the unit of analysis by aggregating individual teacher’s efficacy perceptions to the school level although they did not use the term “collective teacher
efficacy.” Using data obtained from the 1984 High School and Beyond Teacher/Administrator Survey, they investigated the correlates of teacher efficacy at the school level. Results of multiple regression procedures indicated that collective teacher efficacy was significantly associated with students’ prior ability, school orderliness, teacher innovation, and teacher knowledge of other teachers’ courses. Even though Newmann et al. did not investigate the relationship between student achievement and collective teacher efficacy, it is likely that, as with teacher efficacy, variables such as school orderliness and teacher innovation mediate the effect of collective teacher efficacy on student achievement.

An important topic considered in the Newmann et al. (1989) study was the influence of group consensus about efficacy perceptions. Newmann et al. observed that in each school “teachers have different experiences and often disparate perceptions of common experiences that can produce within-school variance on teachers’ attitudes. This variance may be considered a measure of school consensus” (p. 225). Newmann and his colleagues were concerned that the effects of collective teacher efficacy might differ depending on the variance in school mean scores for collective efficacy.

This reasoning led Newmann and colleagues to treat the variance in efficacy perceptions for each school as a separate organizational variable which they referred to as group efficacy consensus. When included in a multiple regression with all of the significant covariates indicated above, group efficacy consensus had the strongest effect on collective teacher efficacy while the effect sizes of the other covariates changed slightly but remained statistically significant. Newmann et al. offer the following interpretation of this finding:

It is possible that when teachers within a school vary considerably in their sense of efficacy, these disparities create divisiveness that may have the negative impact
of reducing efficacy in the school as a whole. Whereas if teachers tend to perceive similar levels of efficacy, this perception may reinforce a sense of community that tends to boost the overall sense of efficacy (p. 234).

In this early study of collective teacher efficacy, Newmann et al. not only identified several important correlates of collective teacher efficacy, but also their treatment of variance in efficacy perceptions among schools suggests that group consensus is an important collective efficacy-building mechanism.

Esselman and Moore

Esselman and Moore (1992) also investigated the relationship among several organizational level variables and aggregate measures of personal and teaching efficacy. Their results were obtained from an analysis of survey data collected from 1,802 teachers. They found a negative association between teaching efficacy and a school’s level of suspensions and between personal efficacy and a school’s level of suspensions and dropout rate. Because these correlates reflect dimensions of the teaching task, it is not surprising that they are related to teachers’ sense of efficacy. Esselman and Moore’s results indicate that collective teacher efficacy is an important organizational variable.

Bandura

More recently, Bandura (1993) used path analysis to show that collective teacher efficacy influences aggregate student achievement and that collective teacher efficacy has a greater direct effect on student achievement than student SES. Bandura’s results also indicate that SES has a negative direct effect on collective teacher efficacy. Bandura explains this finding as follows:

Adverse characteristics of student body populations reflecting largely socioeconomic disadvantage erode schools’ sense of instructional efficacy. Thus, the higher the proportion of students from low socioeconomic levels and the
higher the student turnover and absenteeism, the weaker the staff’s beliefs in their efficacy to achieve academic progress and the poorer the schools fare academically (p. 142).

Bandura’s study suggests that collective teacher efficacy does indeed have a positive effect on student achievement. Additionally, the results suggest that student socioeconomic status, a key factor affecting the educational task teachers face, is associated with collective teacher efficacy.

More recently, Bandura (1997) concluded, from a review of research on teacher efficacy, that the relationship between collective teacher efficacy and student academic success is mediated by several factors. For example, Bandura suggests that schools with higher levels of collective teacher efficacy tend to have higher achievement because they have strong parental involvement and administrators with high expectations for achievement. Conversely, according to Bandura, schools with low levels of collective teacher efficacy are often characterized by comparatively less parental involvement and administrators who do not actively seek to improve instruction. As explained earlier in the review of teacher efficacy research, many correlates of teacher efficacy tend to enhance student achievement; Bandura’s interpretation of the influence of collective teacher efficacy is consistent with that finding.

Sampson, Raudenbush, and Earls

Although not a study of teacher efficacy, Sampson, Raudenbush and Earls (1997) performed an important study of the relationship between collective neighborhood efficacy and violent crime. Sampson and colleagues measured collective neighborhood efficacy in terms of social cohesion and trust, and residents’ willingness to intervene on behalf of the common good. Although these measures do not clearly reflect perceptions of individual or group capabilities to successfully execute a given course of action, their
aggregates were treated as the collective efficacy of 343 neighborhood clusters in Chicago. Although the efficacy measures employed by Sampson et al. are not theoretically precise from a social-cognitive perspective, their results do indicate the existence of an efficacy-like neighborhood attribute and the power of this measure of a predictor. Using hierarchical linear modeling, Sampson et al. showed that collective efficacy was associated with reduced levels of neighborhood violence, violent victimization, and homicide.

Measuring Collective Teacher Efficacy

As this review has demonstrated, although there is considerable research investigating the measure of teacher efficacy, there are relatively few studies devoted to the measure of collective teacher efficacy. This section is devoted to the conceptual issues that arise when attempting to measure the collective teacher efficacy of elementary schools.

Specificity

Pajares (1996b) observes that the level of generality is a major factor influencing the predictive utility of self-efficacy assessments. Pajares warns that omnibus measures that assess a general sense of one’s confidence lack correspondence with critical tasks. An alternative to an omnibus measure is a domain-specific assessment of self-efficacy. For example, a domain-specific measure of teacher efficacy might assess the extent to which a teacher feels confident that she can effectively teach students. However, a domain-specific measure of teacher self-efficacy forces teachers to aggregate varied capabilities to form a one-dimensional assessment of personal capability for teaching. While such a measure may be an improvement over an omnibus measure of general confidence, Pajares argues that it is still probably not as appropriate as precise judgments about one’s capability to successfully execute particular types of behavior. For example, a
teacher may have different personal capabilities in the areas of subject matter knowledge, classroom management skills, and teaching methodology. A teacher might, for example, be able to maintain a well-ordered classroom but produce little student learning because of a lack of content knowledge. Assessments of both teacher efficacy and collective teacher efficacy should, therefore, reflect these and other task specific variables (i.e., subject matter knowledge, classroom management skills, and pedagogical knowledge).

**Who is the Object of Collective Teacher Efficacy Assessments?**

Collective teacher efficacy is a construct measuring teachers’ beliefs about the collective (not individual) capability of a faculty to influence student achievement. Collective teacher efficacy refers to the average perception of teachers in a school that the efforts of the faculty will have a positive effect on student achievement. One must consider, however, whether an assessment of collective teacher efficacy should ask teachers about their perceptions of themselves, or the faculty as a whole. The difference between these two alternatives is represented in the following sample items on teacher competence:

1) Individual orientation: “I am able to get through to the most difficult students”

2) Group orientation: “Teachers in this school can get through to the most difficult students”

Which alternative is appropriate to the measure of collective teacher efficacy in elementary schools is guided by two concerns. First, Bandura (1993, 1997) states that when a researcher is attempting to measure collective efficacy, it is important that the orientation (individual or group) reflect the degree of coupling (loose to tight) present in an organization. According to Bandura, the more loosely coupled an organization and the less interdependent its work functions, the more appropriate it is to measure collective efficacy as the aggregate of each individual’s perceptions of his or her efficaciousness.
However, for more tightly coupled systems with higher levels of interdependence among jobs, it is more appropriate to assess collective efficacy as the average of perceptions individuals hold of the collective. Because of the shared goals (e.g., to educate all children) and similarity of responsibilities across teaching positions, elementary schools are generally considered to be more tightly coupled than loosely coupled (Bandura, 1993; Clarke, Ellett, Bateman, & Rugutt, 1996; Hoy & Miskel, 1996). Thus, Bandura’s strategy suggests that questions about collective teacher efficacy in elementary schools should be written to reflect a group orientation.

A second consideration in the orientation of questions used to describe group processes is presented by Porter (1992). Porter notes that when organizational-level aggregates are constructed from individual-level responses, the individual responses are not independent, but rather they are subject to the influences of group membership. Porter therefore suggests that if questions reflect a group orientation (as in example 2 above), group level influences are more accurately reflected in the group mean.

A Model for Collective Teacher Efficacy

The integrated model of teacher efficacy proposed by Tschanen-Moran, Hoy, and Hoy (1998) coupled with the advice of Bandura (1993, 1997) and Porter (1992) noted above regarding the orientation of efficacy assessments serves as the basis of a measure of collective teacher efficacy. First, Tschanen-Moran, Hoy, and Hoy (1998) propose that teacher efficacy is comprised of both an assessment of personal teaching competence and an analysis of the teaching task. Additionally, consistent with research on teacher efficacy by Woolfolk and Hoy (1990), there is reason for teacher efficacy items to reflect both positive and negative student attainments. Finally, because of the tighter coupling of elementary schools (Bandura, 1993, 1997) and the relevance of group influence for a collective measure (Porter, 1992), collective teacher efficacy items should reflect a group
rather than individual orientation. With a conceptual adjustment to reflecting a group rather than individual orientation, Tschannen-Moran, Hoy, and Hoy’s teacher efficacy model offers two dimensions for an assessment of collective teacher efficacy, teachers’ perceptions of group competence and the task.

Rationale for Hypotheses

This section synthesizes the theoretical and empirical work pertaining to social cognitive theory to explain the hypotheses for the present study.

Previous Research Findings

The preceding literature review demonstrates that teacher efficacy is a powerful variable related indirectly to student achievement through its effects on many teacher behaviors and characteristics. Of particular relevance are several school level studies indicating that aggregated teacher efficacy is associated with increased rates of parental involvement (Hoover-Dempsey, Bassler, and Brissie, 1987), students’ prior ability, school orderliness, teacher innovation, and teacher knowledge of other teachers’ courses (Newmann, Rutter, and Smith, 1989), suspensions and dropout rate (Esselman and Moore, 1992), and aggregate student achievement (Bandura, 1993). These findings suggest that collective teacher efficacy may foster school success.

Theoretical Framework

This discussion outlines the theoretical foundation upon which the hypotheses for the present study are built. The applications of both triadic reciprocal causation and the assumptions of social cognitive theory to organizations are central to explaining the causal link between collective teacher efficacy and student academic achievement. The discussion concludes with a description of the normative mechanism through which collective teacher efficacy influences student achievement.
There is a unique reciprocal relationship between an organization, its environment, and its members. One way to view this relationship is through Bandura’s (1993, 1997) theory of triadic reciprocal causation. As enumerated earlier, triadic reciprocal causation specifies reciprocal causality among a person’s environment (E), behavior (B), and internal personal influences (P) (see Appendix A).

The hypotheses for the present study extend reciprocal causality to the organizational level. We may conceive of communication among organizational members, both formal and informal, as the organizational parallel to what Bandura calls internal personal influences (P). The collective efficacy beliefs of organizational members influence these communications and, therefore, an organization’s behavior and external environment. The behavioral (B) dimension of triadic reciprocal causation is represented by the actions (e.g., setting and enforcing rules, planning and implementing educational activities) that organizations take. The final element of triadic reciprocal causation is the environment (E). Examples of factors external to schools that both influence schools through their actions and respond to the actions of schools include the media that reports about education, governmental agencies that fund and regulate education, and businesses in the education marketplace.

The preceding examples demonstrate a fit between the theory of reciprocal causation and organizations. This fit suggests that the causal mechanisms specified by reciprocal causality apply to organizations, and schools in particular. In addition to triadic reciprocal causation, the assumptions of social cognitive theory also seem to hold for schools. For example, in a school with a high level of collective teacher efficacy, it is more likely that teachers, and thus the school, will act purposefully to enhance student learning. Such purposeful actions result from organizational agency that influences a school to intentionally pursue its goals. Schools are also capable of self-regulation.
Effective self-regulation assists schools in the identification, selection, and monitoring of educational efforts (e.g., curriculum alignment, block scheduling, team teaching, technological innovation, authentic instruction and assessment, or new teaching methods) that are likely to meet the unique needs of their students.

Given that social cognitive theory may be applied to explain collective teacher efficacy as shown above, we may demonstrate how collective efficacy beliefs influence student achievement. To understand the influence of collective teacher efficacy on a school it is necessary to understand that teachers’ shared beliefs shape the normative environment of schools. Collective teacher efficacy is a way of conceptualizing the normative environment of a school and its influence on both personal and organizational behavior. That is, teacher’s beliefs about their faculty’s capability to successfully educate students constitute a norm that influences the actions and achievements of schools.

Given that collective teacher efficacy shapes the normative environment of a school, understanding how collective teacher efficacy influences student achievement requires that we consider the influence of social norms on the behavior of group members. Because social cognitive theory specifies that teachers’ perceptions of self and group capability influence their actions, it follows that these actions will be judged by the group relative to group norms such as those set by collective efficacy beliefs. According to Coleman (1985, 1987), norms develop to permit group members some control over the actions of others when those actions have consequences for the group. When a teacher’s actions are incongruent with the shared beliefs of the group, the teacher’s actions will be sanctioned by group members; in fact, Coleman argues that the severity of the social sanctions delivered to those who break norms will be equal in magnitude to the effect of norm-breaking on the collective. Thus, if most teachers in a school are highly efficacious, the normative environment will press teachers to persist in their educational efforts.
Moreover, the press to perform will be accompanied by social sanctions for those who do not. Such sanctions might take the form of verbal persuasion. For example, group members might attempt, through informal dialogue, to persuade ineffectual teachers to change their views, to believe in themselves and their students, and to persist in their educational efforts. It is no coincidence that social persuasion is one of the four efficacy-building mechanisms outlined by Bandura (1997); indeed, in a school with a high level of collective efficacy, the social persuasion experienced by teachers who break norms of persistence and belief in group capability should be a powerful efficacy changing force.

It is because collective teacher efficacy beliefs shape the normative environment of a school that they have a strong influence over teacher behavior and, consequently, student achievement. When collective efficacy is high, teachers in a school believe they can reach their students and that they can overcome the influence of negative environmental influences. Given these beliefs, teachers are more persistent in their efforts; they plan more; they accept responsibility for student achievement; and, they are not discouraged by temporary setbacks or failures. And, while these behaviors are also effects of teacher efficacy, it is the normative environment that is shaped by collective teacher efficacy beliefs that maintains these beliefs of efficacy. Thus, strong collective efficacy perceptions not only enhance individual teacher performance, but also influence the pattern of shared beliefs held by organizational members. Given the influence of group norms, a teacher with average personal efficacy beliefs may tend to exert even more effort upon joining a faculty with high levels of collective teacher efficacy. Such behavioral changes simply reflect the normative effect of a school’s collective efficacy on its individual members.

Although triadic reciprocal causation, the assumptions of social cognitive theory, and the influence of social norms explain the effect of collective teacher efficacy beliefs
on student achievement, one must remember that the relationship is reciprocal. Thus, any discussion of the association between student achievement and collective teacher efficacy must acknowledge bi-directional causality. However, in the interest of advancing educational practice to facilitate student achievement, it is important to identify alterable correlates of student achievement. If a relationship between collective teacher efficacy and student achievement is observed, any effective effort to strengthen collective teacher efficacy may be expected to have a positive effect on student achievement.

Need for the Present Study

Although there is both theoretical and empirical evidence to suggest that collective teacher efficacy may explain differences in school effectiveness, there have been relatively few studies that have investigated this possibility. In fact, if we look for studies of collective teacher efficacy that focus on student achievement, we find only one, published by Bandura (1993). In this groundbreaking study of collective teacher efficacy and student achievement, Bandura reached two important conclusions: (1) student achievement (aggregated to the school level) is significantly and positively related to collective efficacy, and (2) collective efficacy has a greater effect on student achievement than does student socioeconomic status (aggregated to the school level).

Bandura’s conclusions are powerful ones that offer great hope to schools struggling to increase student achievement and close the socioeconomic status achievement gap. However, to date, there have been no comparable studies examining socioeconomic status, student achievement, and collective teacher efficacy. The aim of the present study is to answer the need for more evidence about collective teacher efficacy and its relationship with student achievement and student SES.
Multilevel Hypotheses

The present study is strongly influenced by Bandura’s (1993) study; however, it is not an exact replication of Bandura’s study. While this study does focus on the variables investigated by Bandura (i.e., collective teacher efficacy, student achievement, and student socioeconomic status), there is an important methodological difference. Unlike Bandura and the authors of other prior studies of aggregated teacher efficacy (Newmann, Rutter, and Smith, 1989; Esselman and Moore, 1992), this researcher will not aggregate student achievement or socioeconomic status to the school level. This analytic decision preserves the considerable variance in student characteristics that occurs within schools and avoids the bias that results when student characteristics are aggregated to the school level. Instead of aggregating student characteristics to the school level, this study of collective teacher efficacy will be conducted using multilevel modeling thereby allowing the investigator to analyze only the portion of variance in student characteristics that occurs between schools. By permitting the simultaneous analysis of student and school level data, multilevel modeling enables the testing of multilevel hypotheses.

Conceptualizing the Multilevel Effects of Collective Teacher Efficacy

Collective teacher efficacy is conceived as an emergent characteristic of schools, one that gains its meaning from collective perceptions and is, therefore, not reducible to the individual measures from which group level aggregates are constructed. Yet, collective teacher efficacy, along with many organizational features such as school size and climate, is experienced individually by each organizational member. From a methodological perspective, this reality is a multilevel phenomenon. For example, while an individual teacher may be highly inefficacious, that teacher might perform differently depending on whether the majority of teacher colleagues in a school share strong
perceptions of personal efficacy. Shared perceptions form a normative environment that exerts pressure experienced by individual organizational members to perform in given ways. Thus, in a school having many efficacious teachers, even low efficacy teachers may tend to expend more effort in the face of obstacles or failures because of the collective effect of efficaciousness on teacher behavior. In other words, the effect of an individual teacher’s efficaciousness may be either attenuated or enhanced depending on the level of collective efficacy in a school.

Not only do schools differ in terms of their collective efficacy, but also in other ways commonly known to affect student achievement. Foremost among these is the effect of student socioeconomic status (SES) on student achievement. At least since the Coleman Report (1966), many educational researchers have accepted that student SES has a positive, although inequitable, effect on student achievement. However, this effect is not a fixed one. Bryk, Lee, & Holland (1993) and Bryk & Raudenbush (1992) have shown that the effect of SES on student achievement varies with certain school organizational features. Such organizational features, when alterable, become powerful mechanisms through which the distribution of student achievement may become more equitable.

Hypothesis I

The theory and research reviewed earlier suggests that collective teacher efficacy may positively affect numerous teacher behaviors that tend to increase student achievement. Accordingly, the first multilevel hypothesis for this study is as follows:

H₁: Collective teacher efficacy is positively associated with between school variance in student-level achievement.
Hypothesis II

Given Bandura’s (1993) assertion that collective teacher efficacy has a stronger effect on student achievement than does SES, and the fact that SES-achievement slopes vary among schools, the second multilevel hypothesis for this study is as follows:

H₂: Collective teacher efficacy attenuates the positive relationship between student achievement and student socioeconomic status among schools.
CHAPTER 3
METHODOLOGY

The type of research used to investigate the effects of collective teacher efficacy on student achievement was a correlational study with teacher data collected through researcher-administered surveys and student achievement data collected through school-administered standardized achievement tests. Student demographic data were provided by the school district. This chapter describes the development of the collective teacher efficacy instrument including reliability and validity information obtained through a pilot study, the population and sample for the present study, data collection procedures, a description of all variables employed, and the analytic plan.

Development of the Collective Teacher Efficacy Measure

The earlier review of literature is important to the measurement of collective teacher efficacy. In particular, the review demonstrates that the measure of teacher efficacy has been under development for two decades. During these two decades, various approaches to the measure of teacher efficacy have addressed the implications of social cognitive theory, locus of control, efficacy and outcome expectations, and responsibility for student achievement (Pajares, 1996a; Ross, 1994). The measure of collective teacher efficacy employed is guided by a theoretical model that reflects each of these developments. Specifically, the measure of collective teacher efficacy used is based on the comprehensive model of teacher efficacy suggested by Tschannen-Moran, Hoy, and Hoy (1998), outlined in the preceding review of literature.
The collective teacher efficacy instrument used in the present study was developed by adapting the Gibson and Dembo (1984) instrument to adhere to the theoretical model developed by Tschannen-Moran, Hoy, and Hoy (1998). One key difference between the Gibson and Dembo teacher efficacy instrument and the collective teacher efficacy instrument used in the present study relates to the difference between individual and group oriented survey items (Bandura 1993, 1997; Porter, 1992). For example, a teacher efficacy item such as “I can reach a difficult student,” should be restated to assess collective efficacy as follows, “Teachers in this school can reach a difficult student.” In addition, the two dimensions of collective teacher efficacy, group competence and task analysis, adhere to the theoretical rationale offered by Tschannen-Moran, Hoy, and Hoy (1998). This approach led to the identification of four possible ways to word items that assess collective efficacy beliefs. These are: group competence/positive (GC+), group competence/negative (GC-), task analysis/positive (TA+), and task analysis/negative (TA-). The sample items below demonstrate the differences.

- Teachers in this school are well-prepared to teach the subjects they are assigned to teach (GC+),
- Teachers here don’t have the skills needed to produce meaningful student learning (GC-),
- The opportunities in this community help ensure that these students will learn (TA+).
- The lack of instructional materials and supplies in this school makes teaching very difficult (TA-).

In order to develop a collective teacher efficacy instrument that contained all of the wordings outlined above, this researcher began by analyzing the original Gibson and Dembo instrument. An important finding of this analysis was that the 16 items on the
original Gibson and Dembo instrument contained only GC+ and TA- items. The instrument contained no items reflecting GC- or TA+. In response, this researcher added several items assessing the PC- and TA+ dimensions of collective teacher efficacy. To test the content validity of this initial modification, the collective teacher efficacy instrument was reviewed by a panel of experts.

Preliminary Review

A preliminary step taken to insures that the items selected for inclusion in the survey adequately represent the content of collective teacher efficacy was a review by a panel of three experts from The Ohio State University (a professor of educational psychology, a professor of educational administration, and a teacher efficacy researcher). Each reviewer received copies of the collective teacher efficacy instrument and was asked to judge whether the items adequately represented the four dimensions of collective teacher efficacy outlined above. The experts noted that in addition to influences from outside the school such as home support and student readiness, the teaching task also included influences from within the school such as the availability of a wide range of materials and supplies used in teaching. In response, items reflecting the availability of teaching materials and supplies were added to the collective teacher efficacy instrument in an attempt to more comprehensively reflect the teaching task faced by elementary school teachers. One panel member also made several helpful comments regarding the wording of the items. Changes in response to the panel members’ concerns were made. The revised collective teacher efficacy instrument is displayed in Table 3.1. Next, the revised instrument displayed in Table 3.1 was submitted to a field test.
<table>
<thead>
<tr>
<th>NO.</th>
<th>ITEM</th>
<th>GC+</th>
<th>GC-</th>
<th>TA+</th>
<th>TA-</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Teacher in this school have what it takes to get the children to learn.</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Teachers in this school know how to get through to difficult students.</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>If a child doesn’t learn something the first time teachers will try another way.</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Teachers here are confident they will be able to motivate their students.</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Teachers in this school truly believe every child can learn.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>6</td>
<td>If a child doesn’t want to learn teachers here give up.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>Teachers here need more training to know how to deal with these students.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>8</td>
<td>Teachers in this school think there are some students that no one can reach.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>9</td>
<td>Teachers here don’t have the skills needed to produce meaningful student learning.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>10</td>
<td>Teachers here don’t have the skills needed to reach all of the students.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>11</td>
<td>Teachers here fail to reach some students because of poor teaching methods.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>12</td>
<td>These students come to school ready to learn.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>13</td>
<td>The students here come in with so many advantages they are bound to learn.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>14</td>
<td>The lack of instructional materials and supplies makes teaching very difficult.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>15</td>
<td>Teacher don’t have the materials and supplies they need to teach.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Table 3.1: Collective teacher efficacy instrument developed through feedback from a panel of experts.
Field Test

After revisions based on feedback from the panel of experts, the instrument displayed in Table 3.1 was subjected to a field test. In the field test, six teachers were asked to give feedback regarding the clarity of instructions, length of the instrument, appropriateness of the questions, and any other responses they had to the instrument. The feedback of these teachers was intended to provide another opportunity to revise the survey instrument before conducting the pilot study. The teachers who participated in the field test noted no difficulties or concerns with the instrument.

Pilot Study

After the field test, the revised collective teacher efficacy instrument displayed in Table 3.1 was administered to teachers in schools identified through the method of known groups (Rokeach, 1960); selected schools were known to be either high in conflict or low in conflict. Schools’ conflict levels were ascertained from education professionals (e.g., teachers, principals, central office administrators, and education professors) in a position to have an opinion about the schools’ level of conflict. One teacher from each of 50 schools was solicited to respond to the revised collective teacher efficacy instrument; none of the 50 pilot study schools were included in the final study sample.

Results of the Pilot Study

Teacher responses to the fifteen collective teacher efficacy items ranged from 1 (Strongly Disagree) to 6 (Strongly Agree). Teacher responses were submitted to a principal components factor analysis with a varimax rotation to determine how the items would relate. Two factors emerged. The rotated factor loadings for each item in the collective teacher efficacy instrument are displayed in Table 3.2.
<table>
<thead>
<tr>
<th>NO.</th>
<th>ITEM</th>
<th>Factor One</th>
<th>Factor Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>If a child doesn’t learn something the first time teachers will try another way.</td>
<td>.85</td>
<td>.18</td>
</tr>
<tr>
<td>5</td>
<td>Teachers in this school truly believe every child can learn.</td>
<td>.83</td>
<td>.16</td>
</tr>
<tr>
<td>2</td>
<td>Teachers in this school know how to get through to difficult students.</td>
<td>.80</td>
<td>.32</td>
</tr>
<tr>
<td>11</td>
<td>Teachers here fail to reach some students because of poor teaching methods.</td>
<td>.78</td>
<td>.20</td>
</tr>
<tr>
<td>1</td>
<td>Teacher in this school have what it takes to get the children to learn.</td>
<td>.75</td>
<td>.44</td>
</tr>
<tr>
<td>8</td>
<td>Teachers in this school think there are some students that no one can reach.</td>
<td>.73</td>
<td>.19</td>
</tr>
<tr>
<td>6</td>
<td>If a child doesn’t want to learn teachers here give up.</td>
<td>.72</td>
<td>-.21</td>
</tr>
<tr>
<td>4</td>
<td>Teachers here are confident they will be able to motivate their students.</td>
<td>.64</td>
<td>.41</td>
</tr>
<tr>
<td>7</td>
<td>Teachers here need more training to know how to deal with these students.</td>
<td>.59</td>
<td>.53</td>
</tr>
<tr>
<td>9</td>
<td>Teachers here don’t have the skills needed to produce meaningful student learning.</td>
<td>.59</td>
<td>.45</td>
</tr>
<tr>
<td>14</td>
<td>The lack of instructional materials and supplies makes teaching very difficult.</td>
<td>.10</td>
<td>.87</td>
</tr>
<tr>
<td>15</td>
<td>Teacher don’t have the materials and supplies they need to teach.</td>
<td>.02</td>
<td>.84</td>
</tr>
<tr>
<td>12</td>
<td>These students come to school ready to learn.</td>
<td>.41</td>
<td>.66</td>
</tr>
<tr>
<td>13</td>
<td>The students here come in with so many advantages they are bound to learn.</td>
<td>.13</td>
<td>.60</td>
</tr>
<tr>
<td>10</td>
<td>Teachers here don’t have the skills needed to reach all of the students.</td>
<td>.49</td>
<td>.54</td>
</tr>
</tbody>
</table>

Table 3.2: Pilot study rotated factor loadings for collective teacher efficacy instrument.

The initial factor analysis in Table 3.2 shows that two factors emerged from the collective efficacy items. These factors have eigenvalues of 7.53 and 1.96 and explained a total of 63.2 percent of the variance in the collective teacher efficacy items. Close inspection of the factor loadings in Table 3.2 reveals that with one exception, the items
loading on factors one and two reflect the group competence and task analysis
dimensions of collective efficacy, respectively.

The only item that did not load higher on the factor expected, was item 10.
Although item 10 was written to assess teachers’ perceptions of group competence, it
loads slightly higher on the task analysis factor. Indeed, although item 10 is the only item
that did not load higher on the factor expected, there are five other items loading .40 or
higher on both factors (item 1, item 4, item 7, item 9, and item 12). These dual loadings
may reflect that teachers have difficulty separating their perceptions of the collective
capabilities of a faculty the constraints from their perceptions they have of the teaching
task.

The dual loadings observed in Table 3.2 may indicate that, rather being comprised
of two separate and unrelated dimensions, collective teacher efficacy is, in fact, a single
construct that is based on the relationship between teachers’ perceptions of group
competence and the task. A single collective efficacy construct is consistent with the
model of teacher efficacy developed by Tschannen-Moran, Hoy, and Hoy (1998) who
argue that efficacy perceptions reflect perceptions of competence judged relative to a
particular task. That is, teachers have difficulty separating their perceptions of group
competence from perceptions of the teaching task. This view is shared by Pajares (1996b)
who argues that efficacy perceptions are specific to a given task.

Given the conceptual association between perceptions of competence and the task,
and the dual loading of many of the items in the initial factor analysis, this researcher
investigated whether all of the collective teacher items would load on a single factor. The
results of this factor analysis are reported in Table 3.3. The factor reported in Table 3.3
has an eigenvalue of 7.57 and explains 50.5 percent of the variance in the collective
efficacy items. The loadings for the items on this factor range from .47 to .87 with all but
four items loading .71 or above. These results provide evidence that collective teacher efficacy is a single construct uniting the concepts of group competence and task analysis. Accordingly, a single collective teacher efficacy scale was constructed for each of the pilot study schools. The scale was calculated as the mean score of all items in the collective teacher efficacy survey.

<table>
<thead>
<tr>
<th>NO.</th>
<th>ITEM</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Teacher in this school have what it takes to get the children to learn.</td>
<td>.87</td>
</tr>
<tr>
<td>2</td>
<td>Teachers in this school know how to get through to difficult students.</td>
<td>.84</td>
</tr>
<tr>
<td>3</td>
<td>If a child doesn’t learn something the first time teachers will try another way.</td>
<td>.80</td>
</tr>
<tr>
<td>7</td>
<td>Teachers here need more training to know how to deal with these students.</td>
<td>.78</td>
</tr>
<tr>
<td>5</td>
<td>Teachers in this school truly believe every child can learn.</td>
<td>.78</td>
</tr>
<tr>
<td>4</td>
<td>Teachers here are confident they will be able to motivate their students.</td>
<td>.77</td>
</tr>
<tr>
<td>11</td>
<td>Teachers here fail to reach some students because of poor teaching methods.</td>
<td>.76</td>
</tr>
<tr>
<td>9</td>
<td>Teachers here don’t have the skills needed to produce meaningful student learning.</td>
<td>.74</td>
</tr>
<tr>
<td>8</td>
<td>Teachers in this school think there are some students that no one can reach.</td>
<td>.71</td>
</tr>
<tr>
<td>10</td>
<td>Teachers here don’t have the skills needed to reach all of the students.</td>
<td>.71</td>
</tr>
<tr>
<td>12</td>
<td>These students come to school ready to learn.</td>
<td>.71</td>
</tr>
<tr>
<td>14</td>
<td>The lack of instructional materials and supplies makes teaching very difficult.</td>
<td>.57</td>
</tr>
<tr>
<td>13</td>
<td>The students here come in with so many advantages they are bound to learn.</td>
<td>.52</td>
</tr>
<tr>
<td>15</td>
<td>Teacher don’t have the materials and supplies they need to teach.</td>
<td>.48</td>
</tr>
<tr>
<td>6</td>
<td>If a child doesn’t want to learn teachers here give up.</td>
<td>.47</td>
</tr>
</tbody>
</table>

Table 3.3: Pilot study factor loadings for a single collective teacher efficacy factor.
Toward Establishing Criterion-Related Validity

This section reports the results of four tests performed to test the collective teacher efficacy measure for criterion-related validity. In addition to collective teacher efficacy, the pilot study also measured teacher powerlessness (Zielinski & Hoy, 1983), trust in colleagues (Hoy & Kupersmith, 1985; Hoy & Sabo, 1998) and teacher efficacy using a measure developed by Bandura (Pajares, personal communication). Furthermore, the schools represented in the pilot study were selected according to the method of known groups described earlier; this procedure identified 22 high conflict schools and 24 low conflict schools.

The four hypothesized relationships tested were as follows:

1. Collective teacher efficacy is significantly higher in low conflict schools than high conflict schools,
2. Collective teacher efficacy is negatively related to teacher powerlessness,
3. Collective teacher efficacy is positively related to trust in colleagues,
4. Collective teacher efficacy is positively related to teacher efficacy.

The conceptual rationales for these hypotheses are described below. The observed relationships between the criterion variables and collective teacher efficacy were statistically tested for significance. The results reported below provide some evidence of criterion-related validity for the collective teacher efficacy instrument.

Conflict. The first test criterion was the level of conflict existing in a school. It was expected that low conflict schools would have a significantly higher level of collective teacher efficacy than their high conflict counterparts. As discussed earlier, it is
through the actions of agentive individuals that organizational functioning occurs. A school that is known to be high in conflict is, therefore, likely to have some teachers engaged in conflictual relationships. The existence of such conflictual relationships may undermine teachers' perceptions of group competence. A teacher might wonder, for example, how colleagues who cannot maintain good working relationships can manage the social relationships that develop in an elementary school classroom. The existence of conflict in a school might also complicate the task of teaching by adding to the difficulty of the teaching task. For example, teachers in a conflictual school may perceive that less collegial and professional support is available to the faculty. For these reasons, it was expected that the collective teacher efficacy observed in a low conflict school would be greater than that in a high conflict school.

Table 3.4 reports the results of a t-test performed to test the proposition that collective teacher efficacy is higher in low conflict schools. As reported in Table 3.4, the mean collective teacher efficacy score for low conflict schools (4.27) is significantly higher (t=5.08, p<.001) than the score for high conflict schools (3.17). This provides some initial evidence of criterion-related validity for the collective teacher efficacy instrument.

<table>
<thead>
<tr>
<th>Variable</th>
<th>School conflict</th>
<th>n</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>t</th>
<th>df</th>
<th>1-tail prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collective efficacy</td>
<td>Low 24</td>
<td>4.27</td>
<td>0.65</td>
<td>5.08</td>
<td>45</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High 22</td>
<td>3.17</td>
<td>0.82</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.4: T-test
Teacher powerlessness. The validity of the collective teacher efficacy instrument was also tested by examining the observed relationship between the collective teacher efficacy measure and a measure of teacher powerlessness (Zielinski & Hoy, 1983). Zielinski and Hoy’s previous research with the construct of teacher powerlessness yielded a high internal consistency (alpha = 0.96). The internal consistency of the powerlessness scale for the pilot study, reported in Table 3.5, was 0.83.

Teacher powerlessness serves as a criterion expected to be negatively related to collective teacher efficacy for several reasons. In a school where teachers feel powerless, it is likely that organizational agency, a key mechanism of collective teacher efficacy, would be weakened. This is because teachers who feel powerless in their work seem less likely to attempt to exercise control on their own behalf or on behalf of their school. Similarly, such teachers are less capable of self-regulation because of their own sense of powerlessness. As predicted, Table 3.5 reports a correlation of -0.51 (p<.001) between collective teacher efficacy and teacher powerlessness.

Trust in colleagues. Trust among colleagues (Hoy & Kupersmith, 1985; Hoy & Sabo, 1998) serves as a criterion expected to be positively related to collective teacher efficacy. Reliabilities for trust in colleagues found in previous research include 0.97 (Hoy & Kupersmith, 1985) and 0.91 (Hoy & Sabo, 1998). As reported in Table 3.5, the reliability for the trust in colleagues scale obtained in the pilot study was 0.95.

A positive relationship between trust in colleagues and collective teacher efficacy is expected for several reasons. Schools with highly trusting teachers may offer enhanced levels of collegiality and, therefore, more opportunities for vicarious learning than found in schools where teachers perceive less trust. Increased exposure to efficacy building vicarious learning likely leads to higher collective efficacy. In addition, trust provides social support that may reduce the level of difficulty perceived by teachers when they
consider the teaching task. For these reasons, trust in colleagues was predicted to be positively and significantly related to collective teacher efficacy. Operationally, it was expected that this conceptual relationship would be observed as a positive correlation between collective teacher efficacy and teacher powerlessness. Table 3.5 displays a correlation of 0.67 (p<.01).

**Teacher efficacy.** The validity of the collective teacher efficacy scale was also tested using a ten item measure of teacher efficacy developed by Bandura (Pajares, personal communication). Cronbach’s alpha for the Bandura teacher efficacy measure was 0.87. It was expected that collective teacher efficacy and teacher efficacy would be moderately and positively correlated because of their shared theoretical underpinnings, a prediction that was confirmed. Table 3.5 displays a correlation of 0.41 (p<.001) between teacher efficacy and collective teacher efficacy.

<table>
<thead>
<tr>
<th>Variable</th>
<th>CTE</th>
<th>TP</th>
<th>TT</th>
<th>TE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collective teacher efficacy CTE</td>
<td>.92*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher powerlessness (TP)</td>
<td>-.51**</td>
<td>.83*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trust in teachers (TT)</td>
<td>.67**</td>
<td>-.33*</td>
<td>.95*</td>
<td></td>
</tr>
<tr>
<td>Teacher efficacy (TE)</td>
<td>.41**</td>
<td>-.55**</td>
<td>.30*</td>
<td>.87*</td>
</tr>
</tbody>
</table>

** Correlation significant at the 0.01 level.

*Scale reliabilities along diagonal.

Table 3.5: Reliabilities and correlations for pilot study variables.

**Revised Collective Teacher Efficacy Instrument**

Instrument development, including a review by a panel of experts and tests of criterion-related validity and internal consistency in the pilot study, provided evidence of
the reliability and validity of the collective teacher efficacy instrument. However, before surveying teachers for the actual study, the pilot study instrument was revised to address a few weaknesses that were detected in the pilot study.

One weakness of the collective teacher efficacy instrument identified in the pilot study relates to item redundancy. In particular, item 10 and item 7 were similar in the way that they unite perceptions of task and competence. In the interest of parsimony, this researcher decided to retain only one of the two items in the final survey. Because item 7 loaded higher in the factor analysis reported in Table 3.3, it was retained. Of the 14 remaining items, four related to task analysis. Of these four task analysis items, items 14 and 15 were both specific to materials and supplies. Given this duplication, this researcher decided to delete item 15 because of its lower loading.

This pilot analysis also led to an expanded conception of factors that influence perceptions of group competence and task difficulty; hence, three additional group competence items reflecting teachers’ perceptions of the subject matter knowledge (CE10), pedagogical skills (CE11), and classroom management skills (CE21) of their colleagues were developed. The task analysis dimension was enhanced by additional items reflecting the influence of student safety concerns (CE18), drug and alcohol abuse (CE19), school facilities (CE2), and community support (CE3). All of the items in the final collective teacher efficacy instrument are summarized in Table 3.6.
<table>
<thead>
<tr>
<th>Study No.</th>
<th>Pilot No.</th>
<th>ITEM</th>
<th>GC+</th>
<th>GC-</th>
<th>TA+</th>
<th>TA-</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE9</td>
<td>1</td>
<td>Teachers in this school have what it takes to get the children to learn.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE8</td>
<td>2</td>
<td>Teachers in this school are able to get through to difficult students.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CE6</td>
<td>3</td>
<td>If a child doesn’t learn something the first time teachers will try another way.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE5</td>
<td>4</td>
<td>Teachers here are confident they will be able to motivate their students.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CE4</td>
<td>5</td>
<td>Teachers in this school truly believe every child can learn.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE15</td>
<td>6</td>
<td>If a child doesn’t want to learn teachers here give up.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE13</td>
<td>7</td>
<td>Teachers here need more training to know how to deal with these students.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE14</td>
<td>8</td>
<td>Teachers in this school think there are some students that no one can reach.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE12</td>
<td>9</td>
<td>Teachers here don’t have the skills needed to produce meaningful student learning.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE20</td>
<td>11</td>
<td>Teachers here fail to reach some students because of poor teaching methods.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE16</td>
<td>12</td>
<td>These students come to school ready to learn.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CE17</td>
<td>13</td>
<td>The students here come in with so many advantages they are bound to learn.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE7</td>
<td>14</td>
<td>The lack of instructional materials and supplies makes teaching very difficult.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE1</td>
<td></td>
<td>Students here just aren’t motivated to learn.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE2</td>
<td></td>
<td>The quality of school facilities here really facilitates the teaching and learning process.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE3</td>
<td></td>
<td>The opportunities in this community help ensure that these students will learn.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE10</td>
<td></td>
<td>Teachers here are well-prepared to teach the subjects they are assigned to teach.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE11</td>
<td></td>
<td>Teachers in this school are skilled in various methods of teaching.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE18</td>
<td></td>
<td>Learning is more difficult at this school because students are worried about their safety.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE19</td>
<td></td>
<td>Drugs and alcohol abuse in the community make learning difficult for students here.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>CE21</td>
<td></td>
<td>Teachers in this school do not have the skills to deal with student disciplinary problems.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Table 3.6 Revised collective teacher efficacy instrument.
Power Analysis

Initially, 50 schools were randomly selected for possible inclusion in the study. However, in the planning phase of the study, a concern for the sensitivity of study led to the decision to conduct a power analysis to determine a minimally acceptable sample size.

The first step in the power analysis was to estimate the proportion of variance in student achievement explained by collective teacher efficacy in previous research. Keppel refers to this estimate as omega squared ($\omega^2$). When omega squared estimates are not reported in prior studies, Keppel notes that multiple correlation coefficients ($R^2$) may be used, although shrunken R-squared estimates, if available, are closer to omega squared.

Three of the studies reviewed in Chapter 2 provide estimates that are useful in developing an estimate for omega squared in the present study. First, in his study of the relationship between collective teacher efficacy and student academic achievement, Bandura (1993) reports a path coefficient of 0.34 between collective efficacy and student achievement. In a different study, Ross (1992) examined the relationship between student achievement and aggregate personal teacher efficacy. Ross reported an adjusted $R^2$ of 0.57. In an earlier study of teacher efficacy and student achievement, Ashton and Webb (1986) showed that 24% of the variance in student’s Metropolitan Achievement Test Math scores was explained by aggregate teacher efficacy. This estimate reflects the increase in $R^2$ that occurred after teacher efficacy was added to a linear regression model containing students’ prior year scores on the same test.

The three studies described above provide a range of estimates for the proportion of variance explained in student achievement by collective teacher efficacy. As a guide for interpreting the magnitude of omega squared, Keppel suggests that researchers follow
Cohen’s (1977) recommendations. Cohen advises that, based on its magnitude, omega squared may be judged as a small effect (0.01), a medium effect (0.06), or a large effect (0.15 or larger). Given the comparably large proportions of variance explained in previous research, collective teacher efficacy appears to have a large “effect” on student achievement. However, in the interest of producing a conservative estimate for the minimum sample size required for the present study, a medium size effect of 0.06 was used in this power analysis.

The sensitivity of an experiment is determined by the interaction of four factors: alpha ($\alpha$), power ($\beta$), effect size ($\omega^2$), and sample size ($n$). Assuming a medium effect size of 0.06 and conventional values of 0.05 and 0.80 for alpha and power, respectively, the required sample size may be estimated through an iterative process using power charts and the following formula (Keppel, 1991):

$$\phi^2 = \frac{n \cdot \omega^2}{1 - \omega^2}$$

This iterative procedure yields a required sample size of 44. Given a minimum sample size of 44, this researcher decided to solicit participation from each of the 50 randomly selected schools and to randomly select additional schools only if more than six schools refused to participate.

**Sample**

The principal of each of the 50 randomly selected schools was solicited via phone by a researcher to schedule a time for the administration of surveys to school faculty. One principal declined to participate. Of the 49 participating schools, there were two in which four or fewer faculty members agreed to complete the questionnaires. This yielded a response rate of 94 percent for the schools randomly selected for inclusion. Because this number exceeded the minimally acceptable sample size for this study, the study was deemed to have adequate sensitivity.
In addition to its size, it is important to consider the population from which the sample was drawn. An urban district was selected to hold constant differences in teacher efficacy that might occur between urban and non-urban districts. Additionally, because this study focuses on schools in just one district, there is no possibility for uncontrolled between-district effects. Further, limiting this study to elementary schools controls for the organizational structure (i.e., elementary, middle, secondary) of the schools, thus allowing for a constant approach to the measurement of collective efficacy. The population for this study was, therefore, all elementary schools in the urban district studied.

**Data Collection Setting**

Data were obtained from teachers and students in these 47 elementary schools in a large urban midwestern school district. Student achievement and demographic data for all schools in the final sample were obtained from the central administrative office of the district. Teacher surveys, on the other hand, were researcher-administered. To the greatest extent possible, the researcher controlled the location, time, and conditions under which these surveys were administered to teachers. Surveys were administered by a researcher to faculty groups in the afternoons, during faculty meetings. During these meetings, other data beyond the scope of the present study were also collected from teachers. For this reason, half of the teachers in the room received a survey containing questions assessing collective efficacy. The other half received another survey with different questions. Distribution occurred so that every other teacher received a collective efficacy survey; teachers sitting next to one another had different surveys. Elementary school faculties in the selected district ranged in size from approximately 10 to 30. Thus, for any given school, faculty perceptions of the collective are represented by the responses of half the faculty (approximately 5 to 20 teachers, depending on school size).
Prior to distributing the surveys, the researcher read a statement describing the purpose of the research project, asking teachers for their frank perceptions, and explaining that teachers need not answer any question that made them feel uncomfortable (See Appendix C for the script). Teacher surveys were administered during February and March, 1998, while student achievement tests were administered during March, 1998.

**Variables**

The dependent variables for this study were student achievement in mathematics and reading. The decision to investigate the relationship between these dependent variables and collective teacher efficacy was made in light of the relationships observed between teacher efficacy and student achievement in prior studies. The dependent variables in previous studies of teacher efficacy include reasoning in language as measured by the New Jersey Test of Reasoning Skills (Anderson, Greene, & Loewen, 1988), reading achievement (Armor et al., 1976), and mathematics, language, and reading as measured by the Metropolitan Achievement Test (Ashton & Webb, 1986).

Additionally, in his study of collective efficacy, Bandura (1993) observed a relationship between collective efficacy and mathematics and reading achievement. Because this study is guided by Bandura’s study and because there is additional evidence to support the conjecture that efficacy perceptions are associated with student achievement in mathematics and reading, these were selected as the dependent variables for the present study.

The mathematics and reading achievement of second, third, and fifth grade students was measured by the seventh edition of the Metropolitan Achievement Test (MAT7). In a review of MAT7, Nitko (1994) reports that KR-20 reliability scores for ranged from .80 to .89. In addition, separate reviews by Nitko (1994) and Rogers (1994) indicate that while the MAT7 appears to be well-matched to typical elementary school
curricula, its validity is specific to a school districts’ own curricular objective’s. Conversation with the Director of Testing and Assessment for the district sampled indicated that the district administers the MAT7 to elementary school students specifically because of the congruence between the content of the MAT7 and the district’s curriculum. For these reasons, the MAT7 was judged to be a valid and reliable achievement test for students in the district sampled.

Student test scores, gender, race/ethnicity, free and reduced-price lunch status (a proxy for SES) and school size were provided by the school district.

The independent variable, collective teacher efficacy, was assessed by the researcher through the survey of faculty in participating schools. The survey items are displayed in Table 3.5. Factor analytic techniques were used to analyze the content of the collective teacher efficacy instrument (Kerlinger, 1973). Items loading 0.40 or above were retained for use in the construction of a collective teacher efficacy scale. Internal consistency for the collective teacher efficacy scale was assessed with Cronbach’s alpha. The variance in collective teacher efficacy was calculated and recorded separately for each school. This variable was designed to measure a school’s collective teacher efficacy consensus (Newman, Rutter, & Smith, 1989).

In addition, the survey instrument included measures of personal teaching efficacy developed by Woolfolk and Hoy (1993) and trust in colleagues (Hoy & Kupersmith, 1985; Hoy & Sabo, 1998), both of which served as a criteria expected to be moderately positively related to collective teacher efficacy. Finally, environmental press (Hoy & Sabo, 1998) was included as a measure expected to be unrelated to collective teacher efficacy.

Student demographics for race/ethnicity, gender, and socioeconomic status were included as controls. Additionally, to account for the possibility that between school
differences in student achievement is affected by elementary school size, this variable was also considered.

**Data Analysis**

Univariate statistics for this study included Pearson product-moment correlations among all the independent and dependent variables. The effects of collective teacher efficacy, efficacy consensus, and school size on student achievement were investigated in the multilevel analysis. Importantly, although Bandura’s (1997) theory of triadic reciprocal causation indicates that collective teacher efficacy and student achievement are mutually reinforcing, for the purpose of these analyses, collective teacher efficacy was treated as the independent variable and student achievement as the dependent variable.

Collective teacher efficacy is an organizational-level variable associated with a student-level outcomes. When attempting to model the effects of organizational characteristics on individual level variables, researchers typically encounter the unit of analysis problem. The problem arises in the current study because student achievement occurs at the student level while collective teacher efficacy exists at the school level. The typical approach to the unit of analysis problem is to aggregate individual level variables to the group level. Unfortunately, this analytic strategy is often compromised by aggregation bias, misestimated standard errors, and heterogeneity of regression among groups (Bryk & Raudenbush, 1992).

This study addresses the unit of analysis problem through the use of hierarchical linear modeling (HLM). HLM is a multilevel modeling technique intended for nested data (e.g., students nested in schools). Unlike ordinary least squares regression (OLS), HLM accounts for the interdependence of individual measures collected within the same organizational unit (e.g., students within the same school).
Because the data structure involved in the measurement of collective teacher efficacy and student achievement involves students nested within schools, a 2-level HLM was employed for this study. A two-level HLM includes both level-1 (within-school) and level-2 (between-school) structural equations. The within-school structural equation is similar in form to an ordinary least squares (OLS) equation, with all variables at the student level. However, unlike OLS regression, HLM produces separate regression estimates for each school. This permits HLM to partition variance in the level-1 outcome variable into its within- and between-school components. As a result, significant variations between schools in average outcomes (level-1 intercept) and the average effects of student-level predictors (level-1 slopes) may be modeled as functions of level-2 variables (e.g., school characteristics such as collective efficacy). Level-1 and Level-2 models for this study are described below.

**Within-School Model**

The level-1 structural equation estimates the effects of the student demographic variables of SES, race/ethnicity, and gender on student achievement as follows:

\[
Y_{ij} = \beta_0 + \beta_{iSES}X_{iSES} + \beta_{iAFAM}X_{iAFAM} + \beta_{iFEMALE}X_{iFEMALE} + \tau_{ij},
\]

assuming \(\tau_{ij} \sim N(0, \sigma^2)\), where,

- \(Y_{ij}\) is the achievement of student \(i\) in school \(j\),
- \(X_{iSES}\) is the socioeconomic status of student \(i\) in school \(j\), coded 1 for free or reduced price lunch, 0 otherwise for student \(i\) in school \(j\),
- \(X_{iAFAM}\) is dummy variable coded 1 for African American, 0 otherwise for student \(i\) in school \(j\),
- \(X_{iFEMALE}\) is dummy variable for gender, coded 1 for female, 0 for male for student \(i\) in school \(j\).
As in OLS regression, the coefficients, $B_{jk}$, in a level-1 HLM as depicted above represent the change in the value of the outcome, $Y_{ij}$, associated with a one-unit increase in a given predictor, while controlling for the effect of the others. For example, in the level equation above, $B_{\text{FEMALE}/j}$ represents the mean difference in achievement between females and males in school $j$ while controlling variance associated with SES and AFAM.

However, unlike ordinary least squares regression, HLM estimates a separate regression for each school $j$. This permits differences among schools in the regression coefficients, $B_{jk}$, to be modeled as functions of level-2 variables. In the present study, collective teacher efficacy, efficacy consensus, and school size were the level-2 independent variables. Specifically, these variables were employed to explain the following two types of differences between schools: (1) the difference in average achievement, and (2) the difference in the average effect of SES on student achievement.

**Between-School Model**

The hypotheses proposed for this study suggest that the collective teacher efficacy can explain differences among schools in their level-1 intercept ($B_{j0}$) and the level-1 SES-achievement slope ($B_{j\text{SES}}$). Specifically, collective teacher efficacy is hypothesized to have a positive effect on a school’s mean student achievement ($B_{j0}$) and a positive effect on a school’s SES-achievement slope ($B_{j\text{SES}}$). The effect of collective teacher efficacy on mean student achievement is a question of school effectiveness. In contrast, the effect of collective teacher efficacy on the SES-achievement slope is a question of school equity. While these questions are fundamentally different, the level-2 modeling approach for both is similar.

First, the effect of collective teacher efficacy on between-school differences in student achievement is modeled as follows:

$$B_{j0} = \gamma_{00} + \gamma_{0\text{CE}} W_{j\text{CE}} + \mu_{0j},$$
where,

\[ W_{jCE} \] is the collective teacher efficacy for school \( j \),

\[ \gamma_{00} \] is the average student achievement found in a school with a value of 0 for collective teacher efficacy,

\[ \gamma_{0CE} \] is the mean achievement difference associated with a one-unit increase in collective teacher efficacy,

\[ \mu_{0i} \] is the unique effect of school \( j \) on mean student achievement, holding constant the effect of collective teacher efficacy.

Between-school differences in SES slopes are modeled similarly:

\[ B_{jSES} = \gamma_{10} + \gamma_{1CE} W_{jCE} + \mu_{1i}. \]

where,

\[ W_{jCE} \] is the collective teacher efficacy for school \( j \),

\[ \gamma_{10} \] is the average SES-achievement slope found in a school with a value of 0 for collective teacher efficacy,

\[ \gamma_{1CE} \] is the mean SES slope difference associated with a one-unit increase in collective teacher efficacy,

\[ \mu_{1i} \] is the unique effect of school \( j \) on the SES slope, holding constant the effect of collective teacher efficacy.

In summary, the level-1 model allows for the use of student demographics as predictors of achievement. At level 2, between-school differences in mean student achievement and the SES-achievement slope are modeled as a function of differences in collective teacher efficacy.

**Partitioning Variance in Achievement Between Schools**

Before developing a full two-level HLM as described above, the multilevel modeling began with an estimation of the proportion of variance in the dependent
variable that occurs within and between schools (Bryk & Raudenbush, 1992). This estimate was useful in later assessing the proportion of between-school variance in mathematics and reading achievement explained by the various dimensions of collective teacher efficacy modeled at level 2. The first step in partitioning the variance in an outcome variable into its within and between school components was a fully unconditional HLM (one-way ANOVA) with random effects. In the fully unconditional ANOVA, their are no individual-level ($X_{ij}$s) or school-level ($W_{ij}$s) predictors. The fully unconditional model is as follows:

Level 1: \[ Y_{ij} = B_{j0} + r_{ij} \]

Level-2: \[ B_{j0} = \gamma_{00} + \mu_{0j} \]

Because there are no level-1 predictors, all slopes, $B_{jks}$ are effectively set to zero and consequently there are no level-2 structural equations with slopes as outcomes.

In the fully unconditional two level model, the estimates of variance for $r_{ij}$ and $\mu_{0j}$ produced by HLM thus represent the variance in the outcome occurring at level 1 and level 2, respectively. The level-1 and level-2 variance estimates produced by HLM are, respectively, $R$ and $U_0$. Given $R$ and $U_0$, the proportion of variance in the outcome variable (student achievement) occurring between schools ($\rho$) is estimated as follows:

$$\rho = U_0(R + U_0^{-1})$$.

Using the estimated intraclass correlation, $\rho$, obtained from the unconditional ANOVA, this researcher estimated the proportion of between-school variance explained by the collective teacher efficacy in the full 2-level HLM.
CHAPTER 4

RESULTS

This chapter reports the results of the study. Student, teacher, and school sample sizes are described along with the results of the statistical analyses conducted on these samples. Statistical analyses reported include factor analysis and reliability for collective teacher efficacy, correlations among the independent and dependent variables, and the results of the hierarchical linear modeling performed to test the relationship between collective teacher efficacy and student achievement. In addition, the reliabilities of scales measuring trust in colleagues and environmental press are shown as well as the correlations between these variables and collective teacher efficacy.

Sample Size

This section reports the size of the sample obtained for the final study. Because this was a multilevel study, the school and student-level samples are described separately.

School-Level Sample

Within the 47 elementary schools surveyed, there were 452 teachers who returned usable surveys. This represents a response rate of over 99 percent among the teachers surveyed. Table 4.1 describes the number of teachers surveyed in the 47 sampled schools. The average number of teacher responses per school was 9.62. The minimum number of teachers surveyed in any sampled school was 5, the maximum was 15. Teacher responses
were aggregated to the school level to construct operational measures of collective teacher efficacy and several other criterion variables.

<table>
<thead>
<tr>
<th>Teacher n</th>
<th>Mean number of teachers per school</th>
<th>Standard Deviation</th>
<th>Minimum number of teachers per school</th>
<th>Maximum number of teachers per school</th>
</tr>
</thead>
<tbody>
<tr>
<td>452</td>
<td>9.62</td>
<td>2.58</td>
<td>5</td>
<td>15</td>
</tr>
</tbody>
</table>

Table 4.1: Number of teachers.

**Student-level Sample**

The dependent variables were students’ mathematics and reading achievement. Student achievement was operationalized as students’ scores on the Seventh Edition of the Metropolitan Achievement Test (MAT7). Within the district from which the sample is drawn, MAT7 is administered to second, third, and fifth grade students. Students with individualized education plans were excluded from the district’s standardized testing. Table 4.2 shows that the mean number of second, third, and fifth grade students per school was 149. The minimum number of students tested in any school was 56 and the maximum was 264.

<table>
<thead>
<tr>
<th>Student n</th>
<th>Mean number of students per school</th>
<th>Standard deviation</th>
<th>Minimum number of students per school</th>
<th>Maximum number of students per school</th>
</tr>
</thead>
<tbody>
<tr>
<td>7016</td>
<td>149</td>
<td>47</td>
<td>56</td>
<td>264</td>
</tr>
</tbody>
</table>

Table 4.2: Number of students sampled.

Table 4.3 displays the distribution of sampled students across grades two, three and five. There were 2520 students in grade two, 2438 in grade three, and 2058 in grade five, for a total of 7016 students in the final sample.
<table>
<thead>
<tr>
<th>Grade</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Two</td>
<td>2520</td>
</tr>
<tr>
<td>Grade Three</td>
<td>2438</td>
</tr>
<tr>
<td>Grade Five</td>
<td>2058</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7016</strong></td>
</tr>
</tbody>
</table>

Table 4.3: Grade level distribution of student sample.

Collective Teacher Efficacy: Factor Analyses

Teacher responses to the 21-item collective teacher efficacy instrument were aggregated to the school level. At the school level, the aggregated responses to the 21 items were submitted to a factor analysis. Given that the model for collective teacher efficacy is based on perceptions of group competence and the task, this initial factor analysis was set to extract two factors with a varimax rotation. The rotated factor loadings are reported in Table 4.4. The eigenvalues for these factors were 12.40 and 2.29 with the two explaining a cumulative total of 70 percent of the variance.

Consistent with the results of the pilot study, 7 of the 21 items in this two factor solution loaded .40 or greater on both factors. The data, therefore, appeared to fit the theoretical model for collective teacher efficacy that specifies a strong relationship between teachers’ perceptions of group competence and the task. Consequently, teacher responses to the collective teacher efficacy instrument were also submitted to a factor analysis in which a single factor was extracted. The factor loadings from this analysis are reported in Table 4.5. Inspection of the loadings for this one factor solution reveal that no item loads less than .63; in fact, only 4 of the 21 items load less than .71. Based on the factor loadings in Table 4.5, all of the collective teacher efficacy items were retained to form a single collective teacher efficacy scale.
<table>
<thead>
<tr>
<th>Item No.</th>
<th>ITEM</th>
<th>Factor One</th>
<th>Factor Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE6</td>
<td>If a child doesn’t learn something the first time teachers will try another way.</td>
<td>.83</td>
<td>.16</td>
</tr>
<tr>
<td>CE11</td>
<td>Teachers in this school are skilled in various methods of teaching.</td>
<td>.83</td>
<td>.06</td>
</tr>
<tr>
<td>CE10</td>
<td>Teachers here are well-prepared to teach the subjects they are assigned to teach.</td>
<td>.83</td>
<td>.18</td>
</tr>
<tr>
<td>CE4</td>
<td>Teachers in this school truly believe every child can learn.</td>
<td>.82</td>
<td>.34</td>
</tr>
<tr>
<td>CE15</td>
<td>If a child doesn’t want to learn teachers here give up.</td>
<td>.78</td>
<td>.30</td>
</tr>
<tr>
<td>CE20</td>
<td>Teachers here fail to reach some students because of poor teaching methods.</td>
<td>.74</td>
<td>.33</td>
</tr>
<tr>
<td>CE12</td>
<td>Teachers here don’t have the skills needed to produce meaningful student learning.</td>
<td>.70</td>
<td>.41</td>
</tr>
<tr>
<td>CE9</td>
<td>Teachers in this school have what it takes to get the children to learn.</td>
<td>.68</td>
<td>.51</td>
</tr>
<tr>
<td>CE8</td>
<td>Teachers in this school are able to get through to difficult students.</td>
<td>.67</td>
<td>.50</td>
</tr>
<tr>
<td>CE5</td>
<td>Teachers here are confident they will be able to motivate their students.</td>
<td>.57</td>
<td>.64</td>
</tr>
<tr>
<td>CE7</td>
<td>The lack of instructional materials and supplies makes teaching very difficult.</td>
<td>.66</td>
<td>.22</td>
</tr>
<tr>
<td>CE21</td>
<td>Teachers in this school do not have the skills to deal with student disciplinary problems.</td>
<td>.63</td>
<td>.48</td>
</tr>
<tr>
<td>CE14</td>
<td>Teachers in this school think there are some students that no one can reach.</td>
<td>.61</td>
<td>.39</td>
</tr>
<tr>
<td>CE2</td>
<td>The quality of school facilities here really facilitates the teaching and learning process.</td>
<td>.58</td>
<td>.29</td>
</tr>
<tr>
<td>CE17</td>
<td>The students here come in with so many advantages they are bound to learn.</td>
<td>.07</td>
<td>.93</td>
</tr>
<tr>
<td>CE16</td>
<td>These students come to school ready to learn.</td>
<td>.33</td>
<td>.89</td>
</tr>
<tr>
<td>CE19</td>
<td>Drugs and alcohol abuse in the community make learning difficult for students here.</td>
<td>.22</td>
<td>.87</td>
</tr>
<tr>
<td>CE3</td>
<td>The opportunities in this community help ensure that these students will learn.</td>
<td>.26</td>
<td>.82</td>
</tr>
<tr>
<td>CE1</td>
<td>Students here just aren’t motivated to learn.</td>
<td>.36</td>
<td>.80</td>
</tr>
<tr>
<td>CE18</td>
<td>Learning is more difficult at this school because students are worried about their safety.</td>
<td>.47</td>
<td>.74</td>
</tr>
<tr>
<td>CE13</td>
<td>Teachers here need more training to know how to deal with these students.</td>
<td>.46</td>
<td>.62</td>
</tr>
</tbody>
</table>

Table 4.4: Rotated factor loadings for a two factor solution.
<table>
<thead>
<tr>
<th>Item No.</th>
<th>ITEM</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE5</td>
<td>Teachers here are confident they will be able to motivate their students.</td>
<td>.92</td>
</tr>
<tr>
<td>CE9</td>
<td>Teachers in this school have what it takes to get the children to learn.</td>
<td>.85</td>
</tr>
<tr>
<td>CE4</td>
<td>Teachers in this school truly believe every child can learn.</td>
<td>.84</td>
</tr>
<tr>
<td>CE8</td>
<td>Teachers in this school are able to get through to difficult students.</td>
<td>.84</td>
</tr>
<tr>
<td>CE16</td>
<td>These students come to school ready to learn.</td>
<td>.83</td>
</tr>
<tr>
<td>CE18</td>
<td>Learning is more difficult at this school because students are worried about their safety.</td>
<td>.81</td>
</tr>
<tr>
<td>CE12</td>
<td>Teachers here don't have the skills needed to produce meaningful student learning.</td>
<td>.80</td>
</tr>
<tr>
<td>CE1</td>
<td>Students here just aren't motivated to learn.</td>
<td>.80</td>
</tr>
<tr>
<td>CE21</td>
<td>Teachers in this school do not have the skills to deal with student disciplinary problems.</td>
<td>.79</td>
</tr>
<tr>
<td>CE15</td>
<td>If a child doesn't want to learn teachers here give up.</td>
<td>.78</td>
</tr>
<tr>
<td>CE20</td>
<td>Teachers here fail to reach some students because of poor teaching methods.</td>
<td>.78</td>
</tr>
<tr>
<td>CE13</td>
<td>Teachers here need more training to know how to deal with these students.</td>
<td>.75</td>
</tr>
<tr>
<td>CE3</td>
<td>The opportunities in this community help ensure that these students will learn.</td>
<td>.74</td>
</tr>
<tr>
<td>CE10</td>
<td>Teachers here are well-prepared to teach the subjects they are assigned to teach.</td>
<td>.74</td>
</tr>
<tr>
<td>CE19</td>
<td>Drugs and alcohol abuse in the community make learning difficult for students here.</td>
<td>.74</td>
</tr>
<tr>
<td>CE6</td>
<td>If a child doesn't learn something the first time teachers will try another way.</td>
<td>.73</td>
</tr>
<tr>
<td>CE14</td>
<td>Teachers in this school think there are some students that no one can reach.</td>
<td>.71</td>
</tr>
<tr>
<td>CE17</td>
<td>The students here come in with so many advantages they are bound to learn.</td>
<td>.67</td>
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<tr>
<td>CE11</td>
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<tr>
<td>CE7</td>
<td>The lack of instructional materials and supplies makes teaching very difficult.</td>
<td>.65</td>
</tr>
<tr>
<td>CE2</td>
<td>The quality of school facilities here really facilitates the teaching and learning process.</td>
<td>.63</td>
</tr>
</tbody>
</table>

Table 4.5: Factor loadings for a one factor solution.
Validity and Reliability of Collective Teacher Efficacy

This section reports the results of the criterion-related validity and internal consistency tests that were conducted on the collective teacher efficacy scale. The criterion-related related validity of the collective efficacy scale was tested by correlating the collective teacher efficacy scale with a variety of existing measures in both the pilot and final studies. The internal consistency of the collective teacher efficacy scale was tested with Cronbach’s alpha.

Correlations with Criterion Variables

The data for this study of collective teacher efficacy were gathered with other data intended for other studies of social processes in schools. These additional data provided the opportunity to perform tests of criterion-related validity for the collective teacher efficacy scale using other variables that measure school characteristics.

The criterion variables examined were personal teaching efficacy (Woolfolk & Hoy, 1993), trust in colleagues (Hoy & Kupersmith, 1985), and environmental press (Hoy & Sabo, 1998). Woolfolk and Hoy’s measure of personal teaching efficacy was adapted from the Gibson and Dembo (1984) teacher efficacy instrument. Personal teaching efficacy is a measure of a teacher’s self-perceptions of capability to successfully educate students. It was predicted that when aggregated to the school level, teachers’ perceptions of personal competence would be moderately positively related to collective teacher efficacy; however, a high correlation was not expected because personal and
collective teacher efficacy have different referents (self versus group). Moreover, the collective teacher efficacy measure directly assesses perceptions of the task whereas the personal teacher efficacy measure does not. As predicted, Table 4.6 displays a moderate and positive ($r=.54$, $p<.01$) correlation between personal teacher efficacy and collective teacher efficacy.

The next criterion variable was trust in colleagues. A positive relationship between trust in colleagues and collective teacher efficacy was expected for several reasons. Schools with highly trusting teachers may offer enhanced levels of collegiality and, therefore, more opportunities for vicarious learning than found in schools where teachers perceive less trust. Increased exposure to efficacy building vicarious learning likely leads to higher collective efficacy. In addition, trust provides social support that may reduce the level of difficulty perceived by teachers when they consider the teaching task. For these reasons, trust in colleagues was predicted to be positively and significantly related to collective teacher efficacy. Consistent with the results of the pilot study, Table 4.6 displays a moderate positive correlation ($r=.62$, $p<.01$) between collective teacher efficacy and trust in colleagues.

Another variable measured when the collective teacher efficacy data were gathered was environmental press (Hoy and Sabo, 1998). Environmental press refers to the extent to which teachers are subject to "unreasonable community demands" (Hoy & Sabo, 1998, p. 57). Environmental press thus represents schools’ failure to manage critical pressure exerted by parents and other community members toward the school. It
was predicted that environmental press would not be related to collective teacher efficacy because there is no a priori reason to expect that teacher’s perceptions of group capability should be associated with external demands from which they are shielded. As predicted, the observed relationship between collective teacher efficacy and environmental press is not statistically significant (r=.05, n.s.).

**Reliabilities**

As reported in Table 4.6, the collective teacher efficacy scale demonstrates high internal consistency with a reliability of .96. In addition, Table 4.6 reports the reliabilities for the measures teacher efficacy, trust in colleagues, and environmental press.

<table>
<thead>
<tr>
<th>Variable</th>
<th>CTE</th>
<th>PTE</th>
<th>TC</th>
<th>II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collective teacher efficacy (CTE)</td>
<td>.96*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal teaching efficacy (PTE)</td>
<td>.54**</td>
<td></td>
<td>.79*</td>
<td></td>
</tr>
<tr>
<td>Trust in colleagues (TC)</td>
<td>.62**</td>
<td>.23</td>
<td></td>
<td>.92*</td>
</tr>
<tr>
<td>Environmental Press (II)</td>
<td>.05</td>
<td>-.01</td>
<td>-.05</td>
<td>.66*</td>
</tr>
</tbody>
</table>

**Correlation significant at the 0.01 level.**

*Scale reliabilities along diagonal.

Table 4.6: Reliabilities and correlations for collective teacher efficacy, personal teaching efficacy, trust in colleagues, and environmental press.

**Summary**

According to Kerlinger (1986), the construct validity of an operational measure may be established with correlational evidence that shows a given construct is positively related, negatively related, and not related to other constructs, as expected. The results
reported in Table 4.6 and those reported earlier in the pilot study show that, as predicted, the measure of collective teacher efficacy is (1) positively related to aggregated teacher efficacy, aggregated personal teacher efficacy, and trust in colleagues, (2) negatively related to teacher powerlessness, and (3) not related to environmental press. This provides evidence that the measure of collective teacher efficacy employed in this study is valid. In addition, the collective teacher efficacy and criterion variable measures used in the validity tests demonstrate adequate internal consistency as measured by Cronbach’s alpha.

Independent and Dependent Variables

This section reports descriptive statistics and correlations for the independent and dependent variables of the study. Because the data were analyzed with multilevel statistical procedures, student variables are not aggregated to the school level. Therefore, results are reported separately for student and school level variables. The relationship between student and school level variables is tested in the following section, which reports the results of the multilevel analyses.

Student-level Variables

Within each school, this study models the variance in student mathematics and reading achievement associated with demographic variables representing socioeconomic status, African American status, and gender. Socioeconomic status is operationalized as a dichotomous variable reflecting a student’s free or reduced price lunch status. Students receiving a free or reduced price lunch are coded ‘1’ while all others are coded ‘0’ for the
variable SES. Similarly, African American students are coded ‘1’ for AFAM and, female students are coded ‘1’ for FEMALE. Descriptive statistics for the achievement and demographic variables are reported in Table 4.7. Approximately two-thirds of the students in the sample received a free or reduced price lunch, half were female, and slightly more than half were African American. The correlations among student achievement scores, free and reduced price lunch status, race, and gender are reported in Table 4.8.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>44.90</td>
<td>20.42</td>
<td>6.70</td>
<td>99.00</td>
</tr>
<tr>
<td>Reading</td>
<td>46.23</td>
<td>19.86</td>
<td>6.70</td>
<td>99.00</td>
</tr>
<tr>
<td>SES</td>
<td>.66</td>
<td>.47</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>AFAM</td>
<td>.57</td>
<td>.50</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>FEMALE</td>
<td>.50</td>
<td>.50</td>
<td>0.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Table 4.7: Descriptive statistics for student-level variables.
<table>
<thead>
<tr>
<th>Variable</th>
<th>MATH</th>
<th>READING</th>
<th>SES</th>
<th>AFAM</th>
<th>FEMALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>READING</td>
<td>.66**</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SES</td>
<td>-.27**</td>
<td>-.29**</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AFAM</td>
<td>-.23**</td>
<td>-.22**</td>
<td>.26**</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>FEMALE</td>
<td>.00</td>
<td>.10**</td>
<td>.01</td>
<td>.01</td>
<td>1.0</td>
</tr>
</tbody>
</table>

** Significant at the 0.01 level.

Table 4.8: Correlations among student-level variables.

**School-Level Variables**

A collective teacher efficacy scale score was constructed for each school as the mean score of all teacher responses to the collective teacher efficacy items. Within each school, a collective teacher efficacy scale score was also constructed for each teacher; variance among teacher’s collective efficacy responses within a school was calculated and recorded as a measure of efficacy consensus (Newman, Rutter, & Smith, 1989). Student enrollment for each school at the time teacher surveys were administered was obtained from the district. Descriptive statistics for these school level variables are displayed in Table 4.9. The correlations among a school’s collective teacher efficacy (CE), efficacy consensus (CONSENSUS), and student enrollment (SIZE) are reported in Table 4.10.
### Table 4.9: Descriptive statistics for school level variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE</td>
<td>4.31</td>
<td>0.48</td>
<td>3.50</td>
<td>5.42</td>
</tr>
<tr>
<td>CONSENSUS</td>
<td>0.28</td>
<td>0.18</td>
<td>0.07</td>
<td>1.04</td>
</tr>
<tr>
<td>SIZE</td>
<td>401.19</td>
<td>107.51</td>
<td>229</td>
<td>710</td>
</tr>
</tbody>
</table>

### Table 4.10: Correlations among school level variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>CE</th>
<th>CONSENSUS</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONSENSUS</td>
<td>-.21 (p=.163)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>-.28 (p=.059)</td>
<td>.14 (p=.343)</td>
<td>1</td>
</tr>
</tbody>
</table>

### Results of Multilevel Analyses

This section reports the results of the multilevel analyses. The section begins with the results of the fully unconditional models for mathematics and reading achievement; unconditional variance estimates were used to calculate the proportion of variance in student achievement occurring between schools. Next, the results of the within-school analysis and the full model with collective teacher efficacy as a predictor of between school differences in both student achievement and the socioeconomic status-achievement slope are reported. The chapter concludes with an estimate of the proportion
of between-school variance in student achievement that was explained by collective teacher efficacy.

**Unconditional Model**

The multilevel analyses began with an estimation of the proportion of variance in the dependent variables that occurs between schools. This estimate provided a basis for later assessing the proportion of variance explained by collective teacher efficacy in the full multilevel model. The dependent variables for this study were students’ achievement scores in mathematics and reading; hence two separate unconditional analyses were conducted. The unconditional level 1 and level 2 structural equations for both of these analyses took the following form:

**Level 1:** \[ Y_{ij} = B_{j0} + r_{ij} \]

**Level-2:** \[ B_{j0} = \gamma_{00} + \mu_{0j} \]

The final estimation of variance components produced by HLM for both the mathematics and reading achievement scores are displayed in tables 4.11 and 4.12, respectively. The bottom rows of tables 4.11 and 4.12 report the proportion of variance in student achievement that was observed between schools for the 7016 students in the study sample.
<table>
<thead>
<tr>
<th>Random Effect</th>
<th>Standard Deviation</th>
<th>Variance Component</th>
<th>df</th>
<th>Chi-square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (Boj)</td>
<td>$U_0$</td>
<td>9.06</td>
<td>82.01</td>
<td>46</td>
<td>1414.96</td>
</tr>
<tr>
<td>Level 1</td>
<td>R</td>
<td>18.68</td>
<td>349.02</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Between school variance $\rho = U_0/(R + U_0) = .1903$

Table 4.11: Unconditional model variance components for mathematics achievement.

<table>
<thead>
<tr>
<th>Random Effect</th>
<th>Standard Deviation</th>
<th>Variance Component</th>
<th>df</th>
<th>Chi-square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (Boj)</td>
<td>$U_0$</td>
<td>7.87</td>
<td>61.90</td>
<td>46</td>
<td>1145.80</td>
</tr>
<tr>
<td>Level 1</td>
<td>R</td>
<td>18.68</td>
<td>340.83</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Between school variance $\rho = U_0/(R + U_0) = .1537$

Table 4.12: Unconditional model variance components for reading achievement.

The Chi-square statistic shown in tables 4.11 and 4.12 tests the null hypotheses that the variance between schools in mean student achievement ($\mu_{ij}$) is zero. As displayed in tables 4.11 and 4.12, the between-school variance for both mathematics (19.0%) and reading (15.4%) is statistically nonzero at the .0001 level. These results indicate that there is sufficient variance between schools in mean student achievement to proceed with multilevel modeling. The proceeding sections report the results of the within-school and full multilevel analyses that were performed to test for the effects of collective teacher efficacy.
The Within-School Model

This section reports the results of the level 1 analyses. Within each school, the level 1 equation models the linear association between student achievement for mathematics and reading and demographic variables for socioeconomic status (SES), race (AFAM), and gender (FEMALE). The structural equation representing this model is as follows:

\[ Y_{ij} = B_{j0} + B_{jSES} X_{ijSES} + B_{jAFAM} X_{ijAFAM} + B_{jFEMALE} X_{ijFEMALE} + r_{ij}, \]

assuming \( r_{ij} \sim N(0, \sigma^2) \).

Tables 4.13 and 4.14 report the results of the within-school models for mathematics and reading achievement, respectively. Notably, both SES and AFAM were significant predictors of within school variation in student achievement in mathematics and reading. The third level 1 demographic variable, FEMALE, was a significant predictor of reading but not mathematics.

Tables 4.15 and 4.16 report the corresponding final estimates of variance components for each of the within-school models. The Chi-square statistics reported in Tables 4.11 and 4.12 indicate significant between-school variance (U1) in the SES slope for both mathematics and reading achievement; the full model reported later explored the possibility that collective teacher efficacy is associated with this variation.
### Table 4.13: Within-school model for mathematics achievement.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std Error</th>
<th>T-ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>52.44</td>
<td>1.36</td>
<td>38.68</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SES</td>
<td>-5.43</td>
<td>.69</td>
<td>-7.85</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>AFAM</td>
<td>-6.95</td>
<td>.53</td>
<td>-13.17</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>FEMALE</td>
<td>-.02</td>
<td>.44</td>
<td>-.05</td>
<td>n.s</td>
</tr>
</tbody>
</table>

### Table 4.14: Within-school model for reading achievement.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std Error</th>
<th>T-ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>51.42</td>
<td>1.23</td>
<td>41.73</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SES</td>
<td>-6.38</td>
<td>.71</td>
<td>-8.92</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>AFAM</td>
<td>-5.72</td>
<td>.51</td>
<td>-11.10</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>FEMALE</td>
<td>4.15</td>
<td>.43</td>
<td>9.67</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

### Table 4.15: Variance components for the within school model for mathematics achievement.

<table>
<thead>
<tr>
<th>Random Effect</th>
<th>Standard Deviation</th>
<th>Variance Component</th>
<th>df</th>
<th>Chi-square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (Boj) U₀</td>
<td>8.48</td>
<td>71.85</td>
<td>46</td>
<td>538.30</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>SES slope (B̄₁SES) U₁</td>
<td>2.83</td>
<td>8.20</td>
<td>46</td>
<td>68.51</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Level 1       R</td>
<td>18.21</td>
<td>331.47</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Random Effect</th>
<th>Standard Deviation</th>
<th>Variance Component</th>
<th>df</th>
<th>Chi-square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (Boj)</td>
<td>$U_0$</td>
<td>7.56</td>
<td>57.18</td>
<td>46</td>
<td>465.51</td>
</tr>
<tr>
<td>SES slope ($B_{j SES}$)</td>
<td>$U_1$</td>
<td>3.20</td>
<td>10.25</td>
<td>46</td>
<td>79.22</td>
</tr>
<tr>
<td>Level 1</td>
<td>R</td>
<td>17.88</td>
<td>319.66</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.16: Variance components for the within-school model for reading achievement.

**Full Model**

The hypotheses for the present study frame between-school variance in the level 1 intercepts ($B_{j0}$) and between-school variance in the socioeconomic status slopes ($B_{j SES}$) as the school-level dependent variables. At level 1, the intercepts for each of the 47 sampled schools are the operational measure of between-school differences in student achievement. Similarly, the socioeconomic status slopes for the 47 sampled schools represent an operational measure for the equitable distribution of achievement.

The Chi-square statistics reported in tables 4.11 and 4.12 above indicate that the variance between schools in student achievement is nonzero. In addition, tables 4.15 and 4.16 show that the between-school variation in the SES slopes is significantly different from zero. These statistics provide evidence that parameters of interest for this study -- the intercepts and the SES slopes -- do indeed vary significantly between schools. This section reports the results of full HLM analyses with between-school variation in the level 1 intercepts ($B_{j0}$) and level 1 slopes ($B_{j SES}$) as outcomes.
The full HLM was developed in two stages. First, in a model containing all of the level 1 demographic variables, collective teacher efficacy was modeled as the only independent variable at level 2. This analytic strategy provides an estimate of the effects of collective teacher efficacy before the effects of school size (SIZE) and efficacy consensus (CONSENSUS) are entered into the regression. For this first stage, the corresponding structural equations for both mathematics and reading achievement were as follows:

Level 1: \[ Y_{ij} = B_{j0} + B_{jSES} X_{iSES} + B_{jAFAM} X_{iAFAM} + B_{jFEMALE} X_{iFEMALE} + r_{ij}, \]

Level-2: \[ B_{j0} = \gamma_{00} + \gamma_{0CE} W_{jCE} \mu_{\theta j}, \]
\[ B_{jSES} = \gamma_{10} + \gamma_{1CE} W_{jCE} \mu_{\theta j}. \]

The results of these analyses are shown in tables 4.17 and 4.18.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std Error</th>
<th>T-ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>52.04</td>
<td>1.14</td>
<td>45.47</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>CE</td>
<td>11.19</td>
<td>2.33</td>
<td>4.79</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SES Slope</td>
<td>-5.07</td>
<td>.67</td>
<td>-7.61</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>CE</td>
<td>-3.68</td>
<td>1.47</td>
<td>-2.51</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>AFAM Slope</td>
<td>-6.87</td>
<td>.53</td>
<td>-13.03</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>FEMALE Slope</td>
<td>-.14</td>
<td>.44</td>
<td>-.09</td>
<td>n.s</td>
</tr>
</tbody>
</table>

Table 4.17: Collective efficacy as a predictor of variation in slopes and intercepts for mathematics achievement.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std Error</th>
<th>T-ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>51.14</td>
<td>1.00</td>
<td>51.25</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>CE</td>
<td>11.13</td>
<td>2.03</td>
<td>5.49</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SES Slope</td>
<td>-6.17</td>
<td>.70</td>
<td>-8.78</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>CE</td>
<td>-3.82</td>
<td>1.55</td>
<td>-2.47</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>AFAM Slope</td>
<td>-5.56</td>
<td>.51</td>
<td>-10.87</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>FEMALE Slope</td>
<td>4.14</td>
<td>.43</td>
<td>9.65</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Table 4.18: Collective efficacy as a predictor of variation in slopes and intercepts for reading achievement.

Tables 4.17 and 4.18 show that collective teacher efficacy is a significant predictor of between-school variation in achievement and the SES slope for both mathematics and reading achievement. However, these results were obtained before introducing statistical controls for the size of a school (SIZE) and the degree of agreement among a school’s faculty regarding the capability of the group (CONSENSUS). Hence, the second stage of the full multilevel analyses added these school level variables as predictors. At level 1, this full HLM contains the social demographic variables and, at level 2, efficacy consensus (CONSENSUS), school size (SIZE), and collective teacher efficacy (CE) are entered as predictors of between school variation in the intercepts and SES slopes. The corresponding structural equations are as follows:

Level 1: \[ Y_{ij} = B_{0j} + B_{i\text{SES}} X_{ij\text{SES}} + B_{i\text{AFAM}} X_{ij\text{AFAM}} + B_{i\text{FEMALE}} X_{ij\text{FEMALE}} + r_{ij}, \]
Level-2: \[ B_{j0} = \gamma_{00} + \gamma_0 \text{CONSENSUS} W_{j \text{CONSENSUS}} + \gamma_{0 \text{SIZE}} W_{j \text{SIZE}} + \gamma_{0 \text{CE}} W_{j \text{CE}} + \mu_{0j}. \]

\[ B_{j\text{SES}} = \gamma_{10} + \gamma_1 \text{CONSENSUS} W_{j \text{CONSENSUS}} + \gamma_{1 \text{SIZE}} W_{j \text{SIZE}} + \gamma_{1 \text{CE}} W_{j \text{CE}} + \mu_{1j}. \]

The results of these HLM analyses are reported in Tables 4.19 and 4.20.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std Error</th>
<th>T-ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>52.26</td>
<td>1.14</td>
<td>45.68</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SIZE</td>
<td>-.02</td>
<td>.01</td>
<td>-1.60</td>
<td>n.s</td>
</tr>
<tr>
<td>CONSENSUS</td>
<td>1.41</td>
<td>6.19</td>
<td>.23</td>
<td>n.s</td>
</tr>
<tr>
<td>CE</td>
<td>9.72</td>
<td>2.54</td>
<td>3.83</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SES Slope</td>
<td>-5.31</td>
<td>.69</td>
<td>-7.74</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SIZE</td>
<td>.01</td>
<td>.01</td>
<td>1.24</td>
<td>n.s</td>
</tr>
<tr>
<td>CONSENSUS</td>
<td>3.00</td>
<td>3.68</td>
<td>.82</td>
<td>n.s</td>
</tr>
<tr>
<td>CE</td>
<td>-2.45</td>
<td>1.69</td>
<td>-1.45</td>
<td>n.s</td>
</tr>
<tr>
<td>AFAM Slope</td>
<td>-6.86</td>
<td>.53</td>
<td>-13.00</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>FEMALE Slope</td>
<td>-.04</td>
<td>.44</td>
<td>-.08</td>
<td>n.s</td>
</tr>
</tbody>
</table>

Table 4.19: HLM results with CONSENSUS, SIZE, and CE as predictors of between-school variation in mathematics achievement.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std Error</th>
<th>T-ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>51.33</td>
<td>.99</td>
<td>51.89</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SIZE</td>
<td>-.02</td>
<td>.01</td>
<td>-1.65</td>
<td>n.s</td>
</tr>
<tr>
<td>CONSENSUS</td>
<td>-4.09</td>
<td>5.21</td>
<td>-.78</td>
<td>n.s</td>
</tr>
<tr>
<td>CE</td>
<td>9.45</td>
<td>2.22</td>
<td>4.26</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SES Slope</td>
<td>-6.34</td>
<td>.72</td>
<td>-8.77</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>SIZE</td>
<td>.01</td>
<td>.01</td>
<td>1.13</td>
<td>n.s</td>
</tr>
<tr>
<td>CONSENSUS</td>
<td>2.39</td>
<td>3.91</td>
<td>.61</td>
<td>n.s</td>
</tr>
<tr>
<td>CE</td>
<td>-2.74</td>
<td>1.78</td>
<td>-1.54</td>
<td>n.s</td>
</tr>
<tr>
<td>AFAM Slope</td>
<td>-5.58</td>
<td>.51</td>
<td>-10.87</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>FEMALE Slope</td>
<td>4.13</td>
<td>.43</td>
<td>9.64</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Table 4.20: HLM results with CONSENSUS, SIZE, and CE as predictors of between-school variation in reading achievement.
As reported in Table 4.19 and 4.20, even with the addition of CONSENSUS and SIZE, collective teacher efficacy continues to be significantly and positively associated with between-school variation in student achievement. For mathematics achievement, a one unit increase in collective teacher efficacy is associated with a change from 52.26 to 61.98 in mean school math score. Similarly, a one unit increase in collective teacher efficacy is associated with a change from 51.33 to 60.78 in mean school reading score. The effect of collective teacher efficacy on between-school differences in the SES slope is different. Tables 4.17 and 4.18 show that, before SIZE and CONSENSUS were added to the full HLM, CE was significantly and positively associated with variation in the SES achievement slopes. However, as displayed in Tables 4.19 and 4.20, with the addition of SIZE and CONSENSUS, CE is no longer significantly associated with variance in the SES slopes.

Proportion of Between-School Variance Explained

The section reports the proportion of between-school variance in achievement explained by the full models reported in tables 4.19 and 4.20. The estimates of variance components corresponding to the full HLM models in tables 4.19 and 4.20 are displayed in Tables 4.21 and 4.22.
<table>
<thead>
<tr>
<th>Random Effect</th>
<th>Standard Deviation</th>
<th>Variance Component</th>
<th>df</th>
<th>Chi-square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (Boj) U0</td>
<td>6.66</td>
<td>44.36</td>
<td>43</td>
<td>286.56</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>SES (B_{jSES}) U1</td>
<td>2.33</td>
<td>5.46</td>
<td>43</td>
<td>56.97</td>
<td>n.s</td>
</tr>
<tr>
<td>Level 1 R</td>
<td>18.21</td>
<td>331.50</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.21: Variance components for the within-school model for mathematics achievement.

<table>
<thead>
<tr>
<th>Random Effect</th>
<th>Standard Deviation</th>
<th>Variance Component</th>
<th>df</th>
<th>Chi-square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (Boj) U0</td>
<td>5.39</td>
<td>29.06</td>
<td>43</td>
<td>234.42</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>SES (B_{jSES}) U1</td>
<td>2.84</td>
<td>8.17</td>
<td>43</td>
<td>70.06</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Level 1 R</td>
<td>17.88</td>
<td>319.64</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.22: Variance components for the full model for reading achievement.

The proportion of between-school variance in student achievement explained by collective teacher efficacy was calculated as the reduction in the unconditional between-school variance reported in tables 4.11 and 4.12. Specifically, the extent to which between-school variance was reduced by the full model is calculated as follows:

\[
\frac{(U_{0\text{Unconditional}} - U_{0\text{Full}})}{U_{0\text{Unconditional}}}
\]

Mathematics: \((82.01 - 44.36)/82.01 = .459\)

Reading: \((61.90 - 29.06)/61.90 = .531\)
As these calculations show, the full model with collective teacher efficacy as the only significant predictor explained 45.9% and 53.1% of the between-school variance in mathematics and reading, respectively. This suggests that collective teacher efficacy explains roughly half of the variance between schools in student achievement. However, it is important to note that in both tables 4.21 and 4.22, the Chi-square statistic for U0 is significant at the .001 level, indicating the unexplained variance is nonzero. This suggests the possibility that other school characteristics may help to explain those between-school differences in student achievement not associated with collective teacher efficacy.
CHAPTER 5

DISCUSSION

In this chapter, the results of the study are discussed beginning with a brief summary of the major findings. After this summary, the findings of the research are explored in greater depth in the sections that follow. In the first section following the summary, the measure of collective teacher efficacy is developed. Next, the results and implications of the multilevel analyses are examined, as well as the statistical tests for significant variation in intercepts and slopes between schools, the control variables employed in the within-school model, and the hypotheses tested in the full model. After discussing the multilevel analyses, this chapter turns to the theoretical and practical significance of the study. Finally, the chapter concludes with a discussion of the implications of this research for future studies of collective teacher efficacy.

Summary of Findings

This study of collective teacher efficacy led to several important findings that are summarized below and will be described in greater detail in the sections that follow.

1. As predicted, collective teacher efficacy has a positive effect on the differences in student achievement that occur between schools.
2. Collective teacher efficacy does not explain all of the between-school variance in student achievement, which suggests that other organizational characteristics may also play important roles in explaining between-school differences in student achievement.

3. The study does not support the hypothesis that collective teacher efficacy attenuates the negative relationship between socioeconomic status and student achievement. Instead, the results suggest the need for further study of the relationship between collective teacher efficacy and the equitable distribution of student achievement.

4. The theoretical elements of collective teacher efficacy, group competence and task analysis, are highly interrelated and therefore should not be separated to form subscales for each dimension. Factor analyses of both pilot study and final study data support that a single measure of collective teacher efficacy combining both dimensions is appropriate.

5. The theoretical conceptualization of collective teacher efficacy is grounded in social cognitive theory. The analysis extends the assumptions (e.g., agency, vicarious learning, and self-regulation) of social cognitive theory as well as triadic reciprocal causation to the organizational level and validates the rationale for the influence of collective teacher efficacy on between-school differences in student achievement.

6. The collective teacher efficacy scale developed in this research was reliable (.96) and had substantial validity evidence.
7. The findings provide additional evidence that schools differ significantly in terms of their effectiveness and the equitable distribution of student achievement.

8. Collective teacher efficacy explains approximately half of the between-school variance in mathematics and reading achievement.

The next sections provide more detailed discussions of several of the findings described above.

Measuring Collective Teacher Efficacy

In order to conduct this research, it was necessary to develop a valid and reliable measure of collective teacher efficacy. The collective teacher efficacy construct was based on the model of teacher efficacy developed by Tschannen-Moran, Hoy, and Hoy (1998). Because their model is specific to the efficacy of individual teachers, it was necessary to modify their task/competence framework to reflect a group orientation.

The collective teacher efficacy scale developed in this research differs from measures of teacher efficacy found in previous research in that this study employed one measure of efficacy rather than separate subscales for general teacher efficacy and personal teaching efficacy (Ashton & Webb, 1986; Gibson & Dembo, 1984; Hoy & Woolfolk, 1993). Data analysis in both the pilot and full studies confirmed that, when measuring collective teacher efficacy, perceptions of group competence should not be separated from perceptions of the task. Specifically, factor analyses of both pilot and full study data demonstrated that collective efficacy perceptions simultaneously integrate perceptions of both competence and the task. To illustrate the perceptual process,
consider how a teacher might assess a faculty’s capability for educating a given group of students. A teacher who perceives that her fellow faculty members are highly capable must, nevertheless, know something about the students and the supporting environment (e.g., parents, community, etc.) before deciding whether the competence possessed by the faculty is sufficient to overcome any difficulties inherent in the task.

After establishing the theoretical framework for collective teacher efficacy, an operational problem remained. Guskey (1981, 1982) had suggested that distinctions between personal and general teaching may actually reflect teachers’ preference for accepting responsibility for student success over student failure. Given these concerns and the group competence/task analysis framework, the collective teacher efficacy items in the present study were written to associate teacher capability with both positive and negative student achievement and, likewise, to associate elements of the task with both positive and negative student achievement. The results of the collective teacher efficacy factor analyses suggest that collective teacher efficacy is neither comprised of two subscales nor a proxy for teachers’ sense of responsibility for student achievement. Rather, both the theoretical model on which the collective teacher efficacy instrument was based and the empirical findings of the present study suggest that collective teacher efficacy should not be separated into two perceptions, one of competence and one of task. Instead, the study provides evidence that teachers weigh characteristics of both group competence and the task when they form perceptions of collective efficacy.
Discussion of the Multilevel Results

The multilevel analyses began with tests for between-school variance in the intercepts and SES slopes of the sample schools. Between-school variance in the intercepts was tested in the unconditional model while variance in the SES slopes was tested in the within-school model. Additionally, the effect of student-level control variables was tested in the within-school model. The results of these models (unconditional and within school) are examined in the first two subsections below. The hypotheses for this study, which involved the effect of collective teacher efficacy on the intercepts and SES slopes, were tested in the full model, which is explored in the final subsection below.

The Unconditional Model: Between-School Variance in Achievement

A fundamental assumption of this research was that differences between schools in student-level achievement could be measured. In a multilevel analysis, these differences are operationalized as the variance among schools in their average achievement (level one intercepts). The unconditional hierarchical linear models reported in tables 4.11 and 4.12 tested for significant variation among the intercepts of the sample schools. As shown in those tables, the chi-square statistic indicates that, for both mathematics and reading, the variation between schools in student achievement was nonzero. This means that a significant proportion of the variance in the dependent variables was associated with differences among schools.
For the study sample, approximately 19% of the variance in student mathematics achievement occurred between schools while approximately 15% of student reading achievement occurred between schools. These results are consistent with prior school effectiveness studies in which student achievement was a dependent variable (Bryk & Raudenbush, 1992). The fact that the data collected for this research are consistent with variance patterns reported by other researchers suggests that, contrary to some earlier notions (Coleman, 1966), schools can make a difference on student achievement. Specifically, Coleman’s conclusion that SES is a powerful factor associated with student achievement must be qualified by the fact that the strength of the relationship between SES and achievement varies systematically with certain school characteristics. More generally, the consistency of these findings is also important to organizational theory because it indicates that important individual-level outcomes vary significantly as a function of organizational characteristics.

**The Within-School Model**

The within-school model reported in Chapter Four served two purposes. First, it allowed for statistical control of the relationships between student achievement and certain student demographic variables. Second, in preparation for a test of the second hypothesis for this study, the within-school model tested for significant variance between schools in the relationship between student socioeconomic status and student achievement (i.e., the level one SES slopes). The paragraphs below discuss each of these topics.
The demographic variables employed control for student race, gender, and socioeconomic status. As reported in Tables 4.13 and 4.14, both SES (estimated by free or reduced price lunch status) and AFAM (African American) were significantly associated with declines in students’ mathematics and reading achievement. However, the results for the variable FEMALE were mixed. Although females had significantly higher reading achievement than did males, gender was not significantly related to student mathematics achievement. This is an interesting finding, but the relationship between gender and the mathematics achievement of urban elementary students was not the focus of this study. Consequently, no explanation for this finding is offered here. This finding does suggest, however, that a study of gender equity in mathematics achievement, perhaps in urban elementary schools, could prove a fruitful area of inquiry given the emphasis mathematics education researchers and scholars have devoted to this topic (Leder, 1992).

Although every school in the sample has a slope for each of the demographic control variables above, it was the SES slope that was of particular interest for this study. The second hypothesis predicts that SES will have a weaker association with student achievement the higher a schools’ collective teacher efficacy. Before this hypothesis could be tested, however, it was necessary to first test whether there was significant variation between schools in the SES slopes. Although Bryk and Raudenbush (1992) have shown that SES often varies significantly between schools, the question was particularly important for this study because of the nature of the SES measure employed
and the population under study. Specifically, because students’ free or reduced price status was used as a dichotomous proxy for a more complex measure of socioeconomic status, there was concern that there would not be sufficient variability to detect any relationship between collective teacher efficacy and SES slopes that might exist in the population. Moreover, because the population consisted of urban elementary schools, there was additional concern that the range of variation in school level SES might be restricted.

The results of the statistical tests of between-school variance in SES slopes are reported in Tables 4.15 and 4.16. As shown, the chi-square statistic indicates that for both mathematics and reading achievement, schools do vary in terms of the equitable distribution of student achievement (i.e., the SES slopes). It is important to note that, while significant, the variance component for the SES slopes comprised only approximately 2% of the total variance in the dependent variables of reading and mathematics achievement.

The Full Model

This study was concerned with how schools can act to become more effective (hypothesis I) and equitable (hypotheses II) places for the children they serve. The hypotheses for the study were tested in the full model. The first hypothesis was whether collective teacher efficacy has a positive effect on the differences in student achievement that occur between schools. The second hypothesis was whether collective teacher
efficacy attenuates the positive relationship between student achievement and student socioeconomic status among schools.

In addition to the independent variable (collective teacher efficacy), school size and efficacy were included as school-level variables in the full model. School size was included as a statistical control because of evidence that school effectiveness varies systematically with size (Lee & Smith, 1997). Efficacy consensus was included because of the research by Newmann, Rutter, and Smith (1989) that suggests the effect of aggregated teacher efficacy may be enhanced as the degree of consensus among teachers increases in a given school.

The full model results reported in Chapter Four indicate that, as predicted, a school's collective teacher efficacy is significantly and positively related to student achievement. Moreover, collective teacher efficacy has a significant and positive relationship with between school differences in student achievement with or without school size and efficacy consensus in the model. However, because of the a priori rationale for including these variables, they were retained in the final model.

The first hypothesis of this study was supported; collective teacher efficacy is positively associated with between-school variance in both mathematics and reading achievement. The analysis demonstrates that a one unit increase in a school's collective teacher efficacy score is associated with a 9.72 point average gain in student mathematics achievement and a 9.45 point average gain in reading achievement. In terms of standard deviation comparisons, a one standard deviation increase in collective teacher efficacy is associated with an increase of approximately one half of a standard deviation in student
achievement. These results are consistent with Bandura’s (1993) study which indicates that collective efficacy was significantly and positively associated with school level student achievement. Collective teacher efficacy perceptions are predictive of student achievement.

The findings are also consistent with the theoretical argument that collective teacher efficacy promotes student achievement. Likewise, Bandura’s reciprocal causality is supported at the organizational level. In a school with a high level of collective teacher efficacy, teachers are more likely to act purposefully to enhance student learning. Such purposeful actions result from organizational agency that influences a school to intentionally pursue its goals. Schools are capable of self-regulation and self-regulation helps in the identification, selection, and monitoring of educational efforts that are likely to meet the unique needs of students. To understand the influence of collective teacher efficacy in schools, it is necessary to understand that teachers’ shared beliefs shape the normative environment of schools. Collective teacher efficacy is a way of conceptualizing the normative environment of a school and its influence on both personal and organizational behavior. That is, teachers’ beliefs about their faculty’s capability to educate students constitute a norm that influences the actions and achievements of schools.

The second hypothesis of this study was not supported; collective teacher efficacy did not attenuate the positive relationship between student achievement and SES among schools. In the full model, with school size and efficacy consensus as controls, the effect of collective teacher efficacy on the SES slope is not significant. Therefore, the distribution of student achievement by socioeconomic status is unaffected by collective teacher efficacy.
There are several possible reasons why a significant effect for collective teacher efficacy on the SES slopes was not detected in the full HLM. One reason may be related to the operational measure of socioeconomic status employed. Socioeconomic status was operationalized as a dichotomous variable reflecting a student’s free or reduced-price lunch status. This measure was, however, somewhat compromised because it did not directly account for parental education, income, or social status.

Another reason that a significant effect was not detected may be related to the magnitude of the variance in the SES slopes. Because this study sampled only urban elementary schools in one city by design, the range of variation among schools in student SES was restricted. The proportion of total variation in the mathematics and reading achievement that was systematically associated with SES slopes was approximately 2%. The relatively small proportion of variance among schools in student SES may have contributed to the lack of statistical significance for the effect of collective teacher efficacy in the full model.

While the second hypothesis for the study was not supported and the null was accepted, there is a question about whether this was an adequate test of the hypothesis given the measure of SES employed and the lack of variance in the SES slopes. A more appropriate test would include a better measure of SES in a sample with more variation of SES slopes.

In addition to testing the two main hypotheses, the full model also provided some interesting results related to efficacy consensus that do not agree with those found by Newmann, Rutter, and Smith (1989). Specifically, efficacy consensus was not a significant predictor of variance among schools in student achievement or SES slopes. The differences between this result and those obtained by Newmann et al. could be related to methodology. That is, while the present study is a multilevel one, Newmann et
al.’s was a school level study. It may be, therefore, that efficacy consensus is predictive of variance in aggregated student achievement but not of between school differences in student-level achievement. Conceptually, such differences may arise because the process of aggregation changes the meaning of individual level variables as in the case of the difference between individual and collective efficacy.

Implications for Future Research on Collective Teacher Efficacy

Collective teacher efficacy was shown to be predictive of differences in student achievement among schools. This finding is, however, only a beginning. Because collective teacher efficacy emerged only recently (Bandura, 1993) as a theoretical construct subject to scholarly inquiry, there are many other important questions about its effects that remain unanswered. Anticipating the explanatory potential of collective teacher efficacy, Pajares (1997) suggested several questions that researchers might investigate. His suggestions include:

- What is the effect of individual teacher efficacy on collective efficacy?
- What is the effect of students’ personal efficacy for learning on collective efficacy?
- How does a school’s collective efficacy affect the development of novice teachers’ sense of teacher efficacy?
- How does the collective efficacy of a school affect the efficacy for learning of students who are new to the school?
- Does collective efficacy undermine or enhance students’ or teachers’ sense of efficacy?

The questions suggested by Pajares examine the relationship between collective teacher efficacy and students’ and teachers’ own sense of efficacy. In addition to these, there are several other interesting questions that future studies of collective teacher efficacy might investigate.
One unanswered question about collective teacher efficacy pertains to its measure across school levels. The measure of collective teacher efficacy developed was used with elementary teachers who share common schedules and routinely teach the same core academic subjects. In secondary schools, however, departmentalization is the norm. Given that an assessment of efficacy must be pertinent to a specific task, academic specialization in secondary schools raises the question of whether the measurement of collective teacher efficacy should differ by school level or academic area in middle and high schools.

Just as we should consider school level when asking questions about collective teacher efficacy, we should also account for school type. Collective teacher efficacy is predictive of student achievement in urban schools. But, might the effect of collective teacher efficacy be different in non-urban schools? If so, how? For example, is the effect of collective teacher efficacy on student achievement stronger or weaker in suburban and rural schools?

Other intriguing questions relate to the possible relationships among collective teacher efficacy, administrator efficacy, and leadership. Before answering some of these questions it will be necessary to develop a measure of administrator efficacy. Perhaps existing measures of teacher efficacy and collective teacher efficacy could be modified to measure administrator efficacy. Such a measure should assess an administrators’ perceptions of the leadership task at hand as well as self-perceptions of personal competence as a leader. The following questions might be asked in studies of school leadership and collective or administrative efficacy:

- Is administrative efficacy predictive of leader success?
- Do efficacious administrators make more effective decisions?
- Do efficacious administrators more often employ shared decision making strategies?
Can highly efficacious school leaders improve the collective efficacy of a debilitated faculty?

Does the collective teacher efficacy already present in a school influence the efficacy perceptions of new school leaders?

Do highly efficacious leaders communicate more effectively than their lower efficacy counterparts?

What can leadership training programs do to strengthen the efficacy of those preparing to be school leaders?

Another interesting question about collective teacher efficacy is raised by Bandura (1997) who advances the hypothesis that the higher the collective efficacy of a school, the higher the rate of parental involvement. Bandura does indicate that, given reciprocal causality, it may be challenging to determine which comes first, the parental involvement or the collective efficacy. As such, a test of the relationship between parental involvement and collective efficacy among schools and a conceptual analysis of that relationship would be an important contribution.

Broadening the scope beyond parental involvement, one could also ask whether collective teacher efficacy is related to a school’s social capital. Social capital is comprised of the norms, social trust, and relational networks that connect parents, students, and educators. According to Coleman (1985, 1987), social capital fosters school success by providing necessary social support for children. If collective teacher efficacy fosters parental involvement, social capital and collective teacher efficacy may be mutually reinforcing social features that work together to improve student achievement.

Other fruitful areas of inquiry include the relationship between collective teacher efficacy and trust (Tschannen-Moran, 1998), collaboration (Tschannen-Moran, 1998),
school climate (Hoy & Sabo, 1998), and pupil control ideology (Willower, Eidell, & Hoy, 1967).

- When collective teacher efficacy is high, do teachers tend have greater trust in their clients (parents and students), principal, and colleagues?
- Do teachers collaborate more when collective teacher efficacy is high?
- Is the climate more open than closed in high collective teacher efficacy schools?
- Are teachers more humanistic than custodial in their pupil control orientation in schools’ with high levels of collective teacher efficacy?

Significance of the Research

This research has both theoretical and practical significance. First, this research extends social cognitive theory to the organizational level. Maddux (1995) states that the assumptions of social cognitive theory include agency, the capability for self-regulation, and the capability to learn vicariously. As goal-directed entities, schools are agentive; they monitor their activities and make adjustments to their schedules, policies, and procedures to facilitate goal attainment. Such activities are evidence of both organizational agency and organizational self-regulation. In addition, schools often learn from one another. Whether the issue is block scheduling, curricular reform, or instructional improvement, schools commonly share their experiences and approaches; such communication facilitates vicarious learning.

In addition to the assumptions of social cognitive theory, the primary mechanism of social cognitive theory, triadic reciprocal causation, also extends to organizations. Triadic reciprocal causation is the causal mechanism specifying that an individual’s behavior, internal personal states, and the external environment simultaneously influence one another, although the relative weight of these factors varies across situations. For an
organization, internal personal states are represented by the actions and cognitive processing of individual members, including internal formal and informal communication. The collective efficacy perceptions of members are an important part of the internal state of an organization. Organizational behavior is comprised of the formal and informal communications that organizations have with non-members. Finally, an organization's environment includes those individuals and organizations who exist outside of the organization. Collective teacher efficacy beliefs influence the internal state of a school and consequently its behaviors and environment.

Additionally, this research provides evidence that collective teacher can be validly and reliably measured. Moreover, the analysis of both pilot and full study data indicate that collective teacher efficacy is a construct that simultaneously integrates perceptions of the task and group competence. The measure of collective teacher efficacy developed here may be applied as an operational measure in future studies of collective teacher efficacy such as those suggested earlier.

Finally, this research indicates that collective teacher efficacy is predictive of schools' differential success in educating students; in general, the higher a school's collective teacher efficacy, the greater the average achievement of that school's students. The practical significance of this research is related to the finding that collective teacher efficacy is predictive of student achievement in urban elementary schools. Given that most schools have the goal of raising student achievement, this finding is of great practical significance. Because we know that efficacy perceptions may be altered through mastery and vicarious experiences, this suggests strategies for school leaders who are attempting to improve student achievement. Collective efficacy may be strengthened, for example, through mastery and vicarious experiences that focus on both developing competence and overcoming difficulties in the teaching task. Thus, inservice education
need not focus on only instructional competence; an equally important topic relates to how faculties can act to overcome difficulties inherent in the teaching task.

Conclusion

This research constitutes a useful beginning for theorists, researchers, and school administrators alike who are interested in teacher efficacy, schools as unique organizations, and student achievement. The literature contains few investigations of collective teacher efficacy and fewer yet examine the relationship between collective efficacy and student achievement. This research supports Bandura’s (1993) study by providing additional evidence that teacher beliefs about the capabilities of their faculty are systematically related to student achievement. Moreover, the findings confirm that the concepts and assumptions of social cognitive theory may be used to explain organizational behavior.

The collective teacher efficacy scale developed in this research is also a useful beginning. Grounded in the Tschannen-Moran, Hoy and Hoy (1998) model of teacher efficacy, the collective teacher efficacy scale has many untapped uses. It may, for example, be used to replicate this study, or modified to conduct similar studies of secondary schools, or studies of teacher efficacy.

At the heart of the theoretical rational explaining the relationship observed between collective teacher efficacy and student achievement is Bandura’s theory of triadic reciprocal causation. Triadic reciprocal causation indicates that collective teacher efficacy beliefs influence the level of effort and persistence that individual teachers put
forth in their daily work. Therefore, one way for school administrators to improve student achievement is by working to raise the collective efficacy beliefs of their faculties. While mastery experiences are the most powerful efficacy changing forces, they may be the most difficult to deliver to a faculty with low collective efficacy. Thoughtfully designed staff development activities are, however, one way school administrators might provide efficacy-building mastery experiences. School administrators should also take opportunities to provide vicarious learning experiences and social persuasion to build the collective efficacy of their faculty. Additionally, administrators should be attentive to both the competence and task dimensions of efficacy. It is not enough to hire and retain the brightest teachers – they must also believe they can successfully meet the challenges of the task at hand. When teachers believe they are members of a faculty that is both competent and able to overcome the detrimental effects of the environment, the students in their building have higher achievement scores than students in buildings with lower levels of collective teacher efficacy. Collective teacher efficacy is, however, not a panacea. There are other reasons that schools have different effects on student achievement. This study offers only initial evidence supporting a strong relationship between collective teacher efficacy and student achievement.
REFERENCES


APPENDIX A

Graphical Representation of The Theory of Triadic Reciprocal Causation

![Graphical representation of the theory of triadic reciprocal causation]

APPENDIX B

Sample Items Assessing Four Dimensions of Collective Teacher Efficacy

PERSONAL COMPETENCE

Positive

Teachers in this school are well-prepared to teach the subjects they are assigned to teach.

Negative

Teachers here don’t have the skills needed to produce meaningful student learning.

TASK ANALYSIS

Positive

The opportunities in this community help ensure that these students will learn.

Negative

The lack of instructional materials and supplies in this school makes teaching very difficult.
APPENDIX C

Script for the Administration of Surveys.

This survey is part of the dissertation research of two graduate students at The Ohio State University. The purpose of this research is to gather information regarding the perceptions of educators about their schools. There are no correct or incorrect answers. The researchers conducting this study are interested only in your frank opinion.

Two separate questionnaires have been distributed; about half the faculty has one, and the other half has the other. Each teacher needs to complete only one or the other, not both.

This research has been approved by the research committee of the district, including a representative from the union. Data gathered about the school will be completely confidential. Strict procedures to insure the confidentiality of all participants has been approved by the Human Subjects Review Board at the university. All teachers' responses are anonymous. Data will be compiled at the school level and will be used for a statistical analysis of the relationships between the variables. No individual school scores will be reported. You may skip any item that you feel uncomfortable answering.

Your time, insights, and perceptions are valuable resources. Thank you for sharing them with us.