2001

A Study of the Measurement and Sources of Teachers' Self and Collective Efficacy Beliefs in Professional Learning Environments.

Amy Marie barrilleaux Dellinger
Louisiana State University and Agricultural & Mechanical College

INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

ProQuest Information and Learning
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
800-521-0600

A STUDY OF THE MEASUREMENT AND SOURCES OF TEACHERS' SELF AND COLLECTIVE EFFICACY BELIEFS IN PROFESSIONAL LEARNING ENVIRONMENTS

A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Doctor of Philosophy

in

The Department of Educational Leadership, Research and Counseling

by
Amy Marie Barrilleaux Dellinger
B.S., University of New Orleans, 1985
M.Ap.S., Louisiana State University, 1991
August, 2001

DEDICATION

In memory of

Patricia Johnson Dellinger

Your words of strength
And encouragement
Got me here and
Got me through.

ACKNOWLEDGMENTS

It is difficult to stop and prepare a final copy of something you consider to be a work in progress. This dissertation is a snapshot of my work at this point in time. Many have given of themselves in various ways to help me complete this project.

My children, Alyeska (4) and Jules (7), were a source of strength to me in this undertaking. They were understanding and supportive even at the end when I was unable to spend time with them. When I thought the task too huge to complete, their words of encouragement were like strong arms pushing me up to meet the challenge.

My husband, Jim, helped our children through these difficult times. On many occasions, he had to be both Momma and Papa to Jules and Aly. His support and love were an unwavering source of strength through it all.

On occasion (a statistically significant understatement!), Jim's sister, Nancy, filled in as the children's second mother, my friend, nursemaid, and cook, and her brother's saviour when work responsibilities pulled him out of town. Without Nancy's willingness to help in any way necessary, this project would not be finished. A mere thank you would be inadequate.

Other family members were pulled into this project as well. My sister, Kim, prepared the reference section of this document. My mom and dad pitched in to help organize the references. This was a huge undertaking, and their assistance, and encouragement through the years, meant so much to me.

Dr. Cathy Daniel, a friend and colleague, was a source of strength and support through this process. She guided and prodded me through what seemed like an

overwhelming task in the beginning. Her editing efforts, friendly advice and constant encouragement were greatly appreciated.

I would like to thank Dr. Chad D. Ellett, my major professor, for his guidance in this process, and for the "scholarly disagreements" that truly made this work better. I would also like to thank the other members of my committee, Dianne Taylor, Eugene Kennedy, Charles Teddlie, Terry Geske, Joe Kotrilik, and Joe Witt, for their participation during my general exams, proposal hearing and through the dissertation final exam. Each of these committee members, in some way, contributed positively to the quality of the work presented here.

TABLE OF CONTENTS

ABSTRACT

This study examined relationships between sources of efficacy information available in teachers' professional learning environments and teacher self-, work-group collective, and faculty collective efficacy beliefs. An argument is presented that teachers' individual and collective efficacy beliefs are vital factors that mediate linkages between professional learning and meaningful change in schools. School professional learning environments are hypothesized to provide efficacy information that may serve to enhance teachers' beliefs in their abilities to accomplish tasks that have been linked to effective teaching and learning. Social cognitive theory and triadic reciprocal causation provided a framework for this research, and self-efficacy theory, a sub-theory of social cognitive theory, and studies of the socio-psychological characteristics of learning environments provided the conceptual foundation for the study.

This study was presented in five parts. Chapter I included an overview, a brief review of pertinent literature that supports this study, a statement of the problem, purpose and significance of the study, a description of the study variables and research questions to guide the study. Chapter II consisted of an extensive review of the literature related to teacher self and collective efficacy beliefs and a review of pertinent studies of the learning environment. Chapter III included the methodology used in this study including a description of the sampling strategy, instrument development, data collection and data analysis techniques used to address research questions presented in Chapter I. Chapter 4 contained a summary of the results of the study. Chapter 5 presented a discussion of the results, implications of the study results and directions for further research.

CHAPTER 1: INTRODUCTION

Overview

Educational improvement and reform efforts, most consisting of politically-based policy initiatives, have been at the forefront for decades. These efforts have cycled through school systems again and again while the actual and perceived performance of schools remains largely unchanged (Cuban, 1990; Fullan, 1993). In the aftermath of the constant influx of (failed) reform initiatives and the ensuing public disapproval of educational outcomes, many public school teachers, both within their own classrooms and as members of their school's faculty, feel victimized and powerless to influence students' educational achievement and/or physical/emotional well being (Sarason, 1993). More importantly, in the nations neediest schools where poor and/or minority children attend, many teachers believe they are incapable of impacting the academic progress of their students (Bandura, 1997).

Change in schools is usually too slow and complex to predict or study adequately with snapshot methodologies, and often change efforts are entirely misdirected and initiated by the very constituents in need of transformation (Collins, 1998; Sarason, 1993, 1997). From a sociological perspective, Collins (1998) suggests that only drastic organizational structural transformation will adequately address the need for change in organizations. Present day theories and models of organizational change, which are framed within top-down functionalist organizational structure, are ineffective because they do nothing to alter the organizational power structure (Collins, 1998).

Fullan (1993, 1999) discusses the forces of change, within the current organizational structure of schooling, as being extremely complex and unpredictable. His framework of educational change, oriented as bottom-up as well as top-down, depicts the need for teachers to embrace change by respecting its complexity and the need for uncertainty, by being willing to build their knowledge, skills, and coping capacity, and by being morally committed to making a difference in their chosen career. Hence, educational change requires building a culture of learning within schools where teachers (preservice and inservice) are lifelong learners (Fullan, 1993; Sarason, 1997).

While the present emphasis in education is on accountability, standard setting and change initiated from the top-down, Eisner (1995) states:

> Perhaps one of the most important consequences of the preoccupation with national standards in education is that it distracts us from the deeper, seemingly intractable problems that beset our schools. It distracts us from paying attention to the importance of building a culture of schooling that is genuinely intellectual in character, that values questions and ideas at least as much as getting right answers. It distracts us from trying to understand how we can provide teachers the kind of professional opportunities that will afford the best among them opportunities to continue to grow through a lifetime of work (p. 764).

School cultures or organizational learning environments that value inquiry, mastery, collaboration and vision building within and beyond the organization (Fullan, 1993; Senge, 1990) should empower teachers (a previously under-utilized resource) to effect changes (including structural changes) that are needed in schools (Fullan, 1993).

Assuming school personnel recognize the complex nature of change and are armed with moral purpose, learning by educators or collectives of educators, in and of itself, may still be inadequate to effect change. Individual or collective learning in schools does not guarantee behaviors that might improve schools. In learning organizations, gaps exist between learning and action for individuals and organizations

(Cousins, 1998). The question becomes what differentiates individuals or collectives that have learned, attempt tasks, persist, and are successful from those that have learned, do not persist, and are not successful in exhibiting newly acquired knowledge/skills?

One explanation, rooted in social cognitive theory, is that individuals or collectives of individuals differ in the strength of their efficacy beliefs about their capabilities to accomplish tasks of specified quality (Bandura, 1997). In other words, individuals or collectives of individuals with similar skills and knowledge may believe differently in their capabilities under a particular context to perform a learned task/skill at the required level. Bandura states, "Unless people believe they can produce desired effects by their actions, they have little incentive to act" (p. 3). Hence, for some, lack of belief in their capabilities may mean learned behaviors are never exhibited.

Bandura (1997) posits that persons control their own behaviors. His model of human behavior and learning depicts persons as agents in a triangle consisting of personal, environmental and behavioral factors. Social cognitive theory, unlike other theories of behavior, proposes that humans are agents in making choices about behaviors they choose to exhibit, energy they put forth to perform those behaviors and additional effort expended when initial attempts result in failure. Specifically, Bandura (1977; 1997) proposes self-efficacy as a mechanism in which the self exercises control over behaviors and the environment.

The following section provides a description of self-efficacy theory, a viable sub-construct of social cognitive theory, which may elucidate discrepancies between individuals' beliefs in their capabilities.

Self-Efficacy: Mediating Knowledge and Action

In social cognitive theory, Bandura (1986, 1997) describes a causal model of interactions between self and society (triadic reciprocal causation) that maps behavior, internal personal factors (cognitive, affective and biological events), and the external environment as reciprocating factors (See Figure 1). Before (during and after) actions by individuals can be (are) made to accomplish desired goals, individuals, with their own internal personal factors, interact with the external environment. Self-efficacy is a dynamic personal factor said to mediate relationships between knowledge and behavior while interacting within the environmental context. Self-efficacy theory proposes information about self-capabilities situated in environmental contexts is cognitively processed before behaviors are displayed.

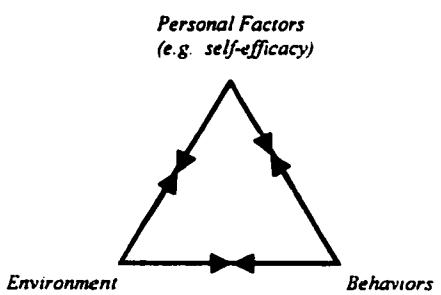

Figure 1: Model of Triadic Reciprocal Causation (adapted from Bandura, 1997)

Personal efficacy beliefs are crucial to human agency (Bandura, 1997). In other words, action manifested in choice of behaviors, effort expended, and persistence in the face of failure, are all mediated by a person's belief in their ability to perform specific tasks in specific contexts. The generation of efficacy beliefs is an important aspect of reciprocal causation because of the impact these beliefs have on human agency. Bandura (1997) defines perceived *self-efficacy* as "beliefs in one's capabilities to

organize and execute the courses of action required to produce given attainments" (p. 3). Efficacy is personal belief that one is able to do what it takes (plan, act) to accomplish a task or goal at a particular level of quality. Within Bandura's theory, self-efficacy beliefs determine a person's choice of task, motivation, resilience, and effort subsequent to failure.

Because efficacy beliefs are task *and* situation specific, efficacy beliefs are not believed to be a trait of an individual (Bandura, 1997; Maddux, 1999), but rather an active and *learned* system of beliefs held in context. As a result, efficacy beliefs vary in strength, level and generality. *Strength* refers to the intensity of a person's belief in their ability to do a certain task. Efficacy beliefs may vary by *level* or by the perceived degree of difficulty of tasks. *Generality* is the degree to which efficacy beliefs about one task may generalize across a range of similar activities in the same or other domains of functioning. For example, a teacher who possesses high levels of efficacy toward teaching honor students how to solve linear equations may not hold high efficacy beliefs about teaching this same topic to students in a regular classroom indicating variation in efficacy beliefs due to variation in the perceived difficulty or level of the task. Two teachers who are equally capable of leading a school committee may differ in the strength of their efficacy beliefs whereas one believes he/she is capable while the other believes he/she is not. Efficacious beliefs about teaching fractions to fourth grade students may generalize to a situation where a teacher is asked to teach a similar skill, such as recipe reduction, to adults or to a similar context, such as teaching a summer camp craft session to fourth grade students.

Bandura (1977; 1993; 1997) has been specific about how self-efficacy beliefs differ from other constructs. One area of confusion involves how to differentiate between outcome expectancy and self-efficacy beliefs or expectations. Bandura distinguishes between these constructs based on the chronology of occurrence of each expectation such that self-efficacy beliefs function between the person and a situation-specific task, while outcome expectancy functions between performance of the task and the outcome generated by task performance. In self-efficacy expectation one asks, "Do I have the capabilities to perform this task in this context at the specified level of quality?" In outcome expectation one asks, "If I perform at the specified level of quality, what will accrue to me?" Bandura (1997) contends that both self-efficacy beliefs and outcome expectations are useful in predicting behaviors, and that efficacy beliefs are more useful.

Others (Kirsch, 1995) delineate between two types of outcome expectancies that work in concert with self-efficacy expectations to produce behavior. Kirsch's model of behavior puts outcome expectancy and self-efficacy as influencing personal outcome expectancy, or the expectation that behaviors that one is capable of producing will result in the relevant outcome, which then predicts behaviors. These relationships are also mediated by whether outcomes are perceived to be under personal control or control of external entities. If outcomes are dictated by external others or due to chance, persons' judgments of capabilities to produce behaviors may have little bearing on predicting performance. On the other hand, if outcomes are tied closely to successful performance of behaviors, then self-efficacy beliefs are more useful than outcome expectations in predicting behaviors (Maddux, 1999).

Conceptualizations and operationalizations of self-efficacy and outcome expectancy constructs have compounded confusion regarding the distinction between self-efficacy and outcome expectancy (Maddux, 1995; Kirsch, 1995; Bandura, 1995c). These problems are manifested in how self-efficacy beliefs have been measured. Particularly, whether self-efficacy beliefs are assessed in terms of performance of a situation-specific task or behavior at a stated level of quality or assessed in terms of attainment of an outcome from performance of a set of situation-specific tasks or behaviors. Depending on how self-efficacy beliefs are assessed, outcome expectations may be confounded with judgments of environmentally situated capabilities to accomplish tasks. Maddux (1999) and Kirsch (1995) argue that inconsistencies exist in self-efficacy theory because Bandura (1977; 1993; 1997) uses both in his definitions of self-efficacy.

Bandura (1995c) argued that performance accomplishments can be indicated by delineating levels of attainment. For example, Bandura (1995c) states that getting an A grade in a course is an indication of performance attainment and not an outcome. However, it can be argued that the behavior or performance in this example is a certain level of quality of work produced (multiple tasks), and that the outcome of performance of those quality behaviors is possibly an A grade assigned by the instructor of the course. Bandura (1995c) warns researchers of the problems that are introduced when performance attainments are considered outcomes, and he is certainly right. When performance attainments are considered to be outcomes, then outcomes are thus composed of sub-tasks which themselves may be outcomes of nested sub-tasks, and so on. Or as Biddle (1999) points out, "This takes self-efficacy beyond the narrow

conception of agent-means efficacy expectations and suggests that agent-ends connections are present, too, and hence control beliefs. However, this may be taking self-efficacy beyond its originally intended scope." Although Bandura's admonitions are well founded, they appear arbitrary when the only reason one chooses not to call a performance attainment an outcome is because it is messy. Others (e.g., Kirsch, 1995; Maddux, 1999) have noted this issue as a major flaw in the conceptual foundation of self-efficacy theory and in research on self-efficacy and outcome expectancy. And, as will be demonstrated later, this very issue has created confusion in the conceptualization and measurement of efficacy beliefs of teachers.

Generation of Efficacy Beliefs

Because efficacy beliefs are part of the triangle of reciprocal causation, the combination of the external environment and behavioral events impact, and are impacted by, efficacy beliefs. The relationship between environmental and behavioral factors and efficacy beliefs provides opportunities for changing efficacy beliefs and consequent behaviors. In his most recent work, Bandura (1997) describes four sources of efficacy information within the triadic reciprocal causation framework: *enactive mastery experiences* (most influential), *vicarious experiences*, *social persuasion*, and *physiological and emotional states*. *Enactive mastery experiences* are actual participative events in which evidence of capability (success or failure) is gained. *Vicarious experiences* also provide evidence of capability through observation of others or though mental imagery of self or others performing tasks. *Social persuasion* is meaningful verbal or non-verbal communication that provides evidence of capability. *Physiological and emotional states* can enhance or diminish beliefs of efficacy through

physical or affective responses such as anxiety, excitement, elevated blood pressure, etc.

Teachers, for example, can become more efficacious about particular behaviors when they experience successful attempts at displaying these or similar behaviors, observe successfully modeled behaviors, either internally generated or externally provided by others, receive meaningful verbal feedback or persuasion about their abilities, and experience satisfying emotional and physical responses from performing the behaviors successfully. In the context of school professional learning environments for teachers, if the environment and behaviors of the self and others in a school provide these sources of efficacy information, it may be possible to change efficacy beliefs of teachers.

However, Bandura (1997) postulates that providing sources of efficacy information is not sufficient to effect change in efficacy beliefs. According to Bandura (1997), there are four mediating processes (cognitive, motivational, affective, and selective) through which efficacy beliefs are formed. For example, two different teachers provided with the same sources of efficacy information and who are equally knowledgeable and capable of teaching sentence structure to eighth grade students may hold differing efficacy beliefs in their capabilities to teach sentence structure to these students because of differential processing of efficacy information through the four mediating processes. Whether sources of efficacy information are attended to and are interpreted as meaningful determines whether these same sources are viable in developing self-efficacy beliefs.

Bandura (1997) proposes that efficacy beliefs are malleable and can be influenced by environmental elements. In the context of education, school learning environments influence and are influenced by behaviors and personal factors of school personnel. For teachers, a school culture that supports an environment that provides sources of efficacy information from which teachers' efficacy beliefs may be generated could be beneficial in strengthening teachers' beliefs in their individual capabilities to effect educational improvements (Bandura, 1997; Raudenbush, Rowan & Cheong, 1992). On the other hand, even strong efficacy beliefs can be inhibited by environmental constraints. In school learning environments, whether teachers, individually and as a group, feel that they can do what needs to be done is important to affecting educational outcomes such as student achievement (Bandura, 1986, 1993, 1995a, 1997; Fullan, 1993).

Collective Efficacy Beliefs

Bandura (1993; 1997) extends self-efficacy theory to encompass shared beliefs about capabilities to accomplish given attainments. He refers to *collective efficacy* as a group's shared belief in its capabilities to accomplish goals of a certain quality. This definition frames discussions of teacher work-group and faculty collective efficacy beliefs in this study. Collective efficacy is generally seen as an extension of self-efficacy theory with similar antecedents and consequences and applications to various areas of group functioning; however, Zaccaro and colleagues (1995) indicated that collective efficacy may have unique antecedents and consequences.

Teachers in a school function within a group or collective of individuals, share some amount of interdependence and must work together to influence outcomes in

schools; therefore, it is important that teachers individually and collectively believe that they possess the capability to accomplish valued objectives. The school is a social organization (Hoy & Miskel, 1982; Lipham, 1988) in which teachers must function. Teachers may work individually in their classrooms, but often they are required to work as groups of teachers or as a faculty to accomplish group and/or school-level goals.

As with individuals, knowledge alone does not guarantee that collectives of individuals can effectively use skills they may possess or acquire. Without strong efficacy beliefs or beliefs in abilities to organize resources to accomplish tasks in certain situations it is unlikely that collectives of persons would attempt such tasks, expend effort to accomplish these tasks or persist when it looks like the group will fail (Bandura, 1993). In schools, individual teachers and collectives of teachers may possess knowledge and/or abilities to accomplish tasks necessary to fulfill their responsibilities. However, these teachers or groups of teacher may not believe that they can overcome obstacles and persist to accomplish the requisite task.

Brief Review of Literature Related to Teachers' Self-Efficacy Beliefs

This section provides a brief introduction to literature related to self and collective efficacy beliefs of teachers. A thorough review of the literature in this area is included in Chapter 2.

This study will distinguish between *teacher efficacy* and *teachers' self-efficacy beliefs*. *Teachers' self-efficacy beliefs* are defined as teachers' situation-specific beliefs in their abilities to perform specific teaching-related tasks at specified levels of quality. *Teacher efficacy* has been defined as a teacher's belief in their ability to affect student performance. Figure 2 provides a model that demonstrates the difference between these

related constructs. In examining teacher efficacy, one may arbitrarily consider *affecting student performance* to be a performance attainment. However, as affecting student performance is a possible (valued) outcome of teaching that may result from performance of effective teaching behaviors then beliefs about capabilities to affect student learning would confound self-efficacy beliefs about performing behaviors required to affect student performance *and* outcome expectations about the contingent relationship between those behaviors and student performance. Few have recognized this distinction (Ross, 1995). Neither interpretation is right or wrong. Rather, depending upon what is of interest, one interpretation may be preferable over the other.

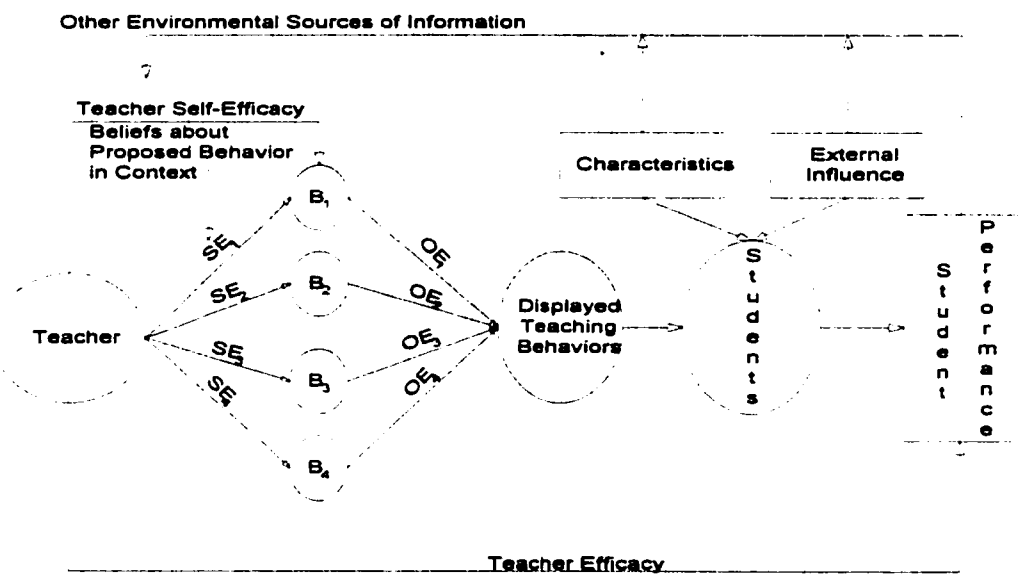

Figure 2: Model Demonstrating Differences Between Teacher Self-Efficacy Beliefs About Teaching Behaviors and Teacher Efficacy.

Most of the research in this area has been based on the definition of teacher efficacy and will be addressed more fully in Chapter 2. Conceptualizations of teacher efficacy are more in line with input-output or models of schooling where teachers are

placed in classrooms with students, and the output is expected to be student achievement. Student achievement is an important output of schooling. However, simply assessing teachers' generalized beliefs about abilities to affect student performance not only confounds self-efficacy beliefs with outcome expectations in this assessment, but also ignores possible valuable information as regards variation in teachers' situation-specific beliefs about their abilities to perform the complex, and often overwhelming, tasks associated with effective teaching. Additionally, it ignores the possible exploration of teachers' outcome expectancies as regards being able to impact student performance.

Only a few studies (Bobbett, 2001; Olivier, 2001) have addressed teachers' self-efficacy beliefs about teaching tasks that have been linked to effective teaching and learning *and* situated these beliefs in teachers' current teaching situations. However, these studies demonstrated promising results as relates to perceived school organizational effectiveness and in relationships with student outcomes.

The concept of *teacher efficacy* has been around for at least a quarter century and has demonstrated some useful information. Related research has examined *collective teacher efficacy*, or "the perceptions of teachers in a school that efforts of the faculty as a whole will have a positive effect on students" (Goddard, Hoy & Woolfolk Hoy, 2000, p. 480). The importance of relationships between teacher efficacy and student achievement in schools is encouraging regardless of whether in the form of strong individual teacher efficacy or strong collective teacher efficacy (Bandura 1993; 1995; 1997; Ashton, 1984b; Ashton & Webb, 1986; Goddard, Hoy, & Woolfolk Hoy, 2000). Teachers with high efficacy were found to create successful learning

experiences for their students and foster high efficacy beliefs among students in their classrooms while teachers with low efficacy beliefs fail to foster the development of students' beliefs in their capabilities (Bandura, 1997; Pajares, 1997). In schools characterized by strong teacher efficacy beliefs, teachers hold high expectations for the academic abilities of their students, set high standards for their students, and create opportunities for successful achievement of those standards.

In schools where teachers' efficacy beliefs are weak, teachers feel victimized and incapable of overcoming the many environmental, political, and social constraints that are part of working in schools (Bandura, 1997). Bandura (1993, 1997) demonstrated that the negative effects of poverty on achievement was partly due to the influence that poverty of students has on teachers' collective efficacy beliefs in their abilities to affect student performance.

Although results of much of the research on teacher efficacy and teacher collective efficacy are promising, issues as regards conceptualization, and subsequent measurement, of these constructs need to be addressed.

Measurement of Teacher Efficacy

The measurement of teacher efficacy has an unfortunate history in the field of educational research. Construct validity of several instruments (e.g. Berman & McLaughlin, 1977; Gibson & Dembo, 1984; Ashton & Webb, 1986) used often in the literature to measure teacher efficacy, and more recent attempts to operationalize teacher efficacy (e.g. Leithwood & Jantzi, 1999; Goddard, Hoy & Woolfolk Hoy, 2000; Schwarzer, Schmitz, & Daytner, 1999), is questionable based on several crucial issues. In reviewing the literature, these problems were present: a) lack of conceptualization of

teacher efficacy that is firmly grounded in the theory of self-efficacy, b) various and discordant operational definitions of the construct including confusion with other stable self constructs such as self-esteem, locus of control, self-concept, and outcome expectancy, c) confounding of extraneous factors (Guskey & Passaro, 1994; Deemer & Minke, 1999), d) lack of consideration of specificity and generality of task behavior, e) failure to consider the context or situation specific nature of efficacy beliefs, and f) failure to conceptualize, measure, and analyze teachers' efficacy beliefs in terms of the multidimensional task requirements of teaching.

Bandura (1993) measures teacher self-efficacy through perceptions of capabilities ("how much can you do to...") in accomplishing tasks/goals within several teaching-related domains of functioning. These areas include a) efficacy to influence decision making, b) efficacy to influence school resources, c) instructional self-efficacy, d) disciplinary self-efficacy, e) efficacy to enlist parental involvement, f) efficacy to enlist community involvement, and g) efficacy to create a positive school climate. Bandura (1997) makes a point of discussing the need to conceptualize teacher efficacy as a multi-faceted construct. He advocated use of the appropriate domain of functioning to correlate with whatever criterion variable is of interest (i.e. instructional efficacy to predict academic achievement of students). However, it seems reasonable that multiple domains of teacher functioning might be useful in predicting outcomes of schooling. It is unclear from the literature whether the multivariate nature of the measure (and the concept) is addressed in the analyses of the data generated by these measures (Bandura, 1993; 1997). Additionally, reliability and validity information is unavailable for data using these measures.

Recent attempts to develop conceptual models to guide measurement of teacher self and collective efficacy (Tschannen-Moran, 2000; Tschannen-Moran, et al., 1998; Goddard, 2000; Henson, Bennett, Sienty, & Chambers, 2000) continue to model and measure teacher efficacy as composed of an assessment of general teaching competence (stable trait independent of situation and task demands) mediated by assessments of task, situational, outcome expectancy and/or personal factors. Given that the first reported measure of teacher efficacy was based on Rotter's social learning theory and not Bandura's self-efficacy theory, it is easy to understand how more recent attempts to conceptualize and measure teacher efficacy (Tschannen-Moran, 2000; Henson, Bennett, Sienty & Chambers, 2000) continue to confuse other stable trait self-constructs such as locus of control and outcome expectancy in their models of teacher efficacy. Self-efficacy theory (Bandura, 1997) suggests that efficacy beliefs are not stable personal factors, but rather are task and situation specific. It is possible for efficacy beliefs to generalize to similar situations and/or tasks; however, as stated earlier, efficacy beliefs are an active, learned system of beliefs held in context that vary in level, strength, and generality.

Newer measures of teacher efficacy mentioned above (Tschannen-Moran, 2000; Goddard, 2000) are similar to Bandura's measure of teacher efficacy in that the item stems are the same (How much can you do to...) and there is an effort to include multiple tasks of teaching. Tschannen-Moran (2000) included teachers and teacher educators in a panel to develop a comprehensive assessment of teacher tasks because of dissatisfaction with the validity of Bandura's task analysis. Factor analysis of a 53-item instrument with 121 (59 preservice and 62 inservice) teachers resulted in a one-factor

solution explaining 41% of the variation in teacher efficacy scores. Thirty-six of the 53 items were retained. Although this and Bandura's attempt to measure teacher self-efficacy embrace self-efficacy theory more directly, these measures do not consider the actual *teaching context* in which efficacy beliefs are formed. Additionally, small sample size (Tschannen-Moran, 2000), unreported psychometric properties (Bandura, 1993), and failure to address research in effective teaching and learning, leaves a large gap in the measurement of this construct.

Other conceptions of teacher self and organizational efficacy include assessment of consequences of efficacy including levels of effort expended, persistence, and effort subsequent to failure to accomplish objectives (Loup, 1994). Several researchers (Clarke, 1997; Johnson, 1999) have combined direct assessment (perceived capabilities) with indirect assessment (perceived consequences) of efficacy for various groups in higher education and secondary schools.

A brief review of the literature as regards self-efficacy theory, teacher efficacy, and measurement issues in the teacher efficacy literature were presented here. It is *critical* to note the importance of the environment in the model of triadic reciprocal causation (see Figure 1). Bandura (1997) stresses the vital importance of teacher self and/or collective efficacy in transcending environmental constraints (e.g., impoverished home environments of students, poor funding, etc.) to impact student outcomes. But, as important, he continues by stressing the role of organizational environmental characteristics in providing efficacy information to enhance teacher efficacy beliefs.

Others (Ashton, 1984a; Ashton & Webb, 1986; Tschannen-Moran, et al, 1998; Lorsbach & Jinks, 1999) have also recognized the important relationship between the

environment and efficacy beliefs. The environment in which teachers work may be fruitful in providing *learning experiences* that are meaningful sources of information from which self and collective efficacy beliefs can be formed, and possibly strengthened. Teachers' professional learning environments may be useful, and possibly critical, to enhance teachers' self and collective efficacy beliefs. The section that follows provides a brief review of studies of learning environments with a focus on teachers' professional learning environments.

The Study of Learning Environments

The study of learning environments has an extensive history and a strong theoretical and methodological foundation (Ellett, 1989; Fraser, 1992). Historically, Lewin's (1947) theory of behavior, linking personal factors and the environment (B=PxE) as interacting causes of behavior, has guided conceptualizations of studies of learning environments. Much of the measurement of classroom learning environments was developed using Moos' (1980) conceptual framework. This framework modeled the psychosocial dimensions of the classroom environment as an interrelationship among four specific environmental factors: Structure and Organization, Cognitive Processes, Student Characteristics and Teacher Characteristics.

Over the last thirty years, the role of the classroom environment in influencing cognitive and affective outcomes of students has been extensively researched. Studies of learning environments have focused on the psychosocial characteristics of classroom learning environments that are important in explaining variation in student achievement, person-environment fit determined by examination of dissonance between actual and preferred learning environment characteristics, and person-environment fit as a means

to improve classroom environment (see also Fraser, 1992; Knight & Waxman, 1991; Wittrock, 1986). Additionally, current research and measurement in the study of classroom environments has evolved to include constructivist interpretations of learning environments and development of personal forms of instruments to measure these individual learning environments (Fraser, 1992).

Learning environment research has gone beyond the classroom to include school-level studies of teachers' and administrators' perceptions of the school learning environment, and has included multi-level studies of school learning environments from the perspective of the classroom and the school (Fraser, 1992). Recent research on school-level learning environments is grounded in conceptions of culture in which schools function as professional learning organizations valuing shared leadership and vision, professional values, professional relationships, professional commitment, and professional growth (Bobbett, Olivier, Ellett, Rugutt & Cavanagh, 1998; Cavanagh & Dellar, 1997; Cavanagh, Dellar, & Ellett, 1998; Loup, 1994; Olivier, Bobbett, & Ellett, 1999).

Linkages to Social Cognitive Theory

More recent studies of learning environments are framed within social cognitive theory and triadic reciprocal causation in which behavior becomes one of three reciprocating factors (along with personal and environmental factors) in affecting learning or change. Lorsbach and Jinks (1999) discuss the usefulness of self-efficacy theory in enhancing classroom learning environments through the effect high levels of self-efficacy might have on students' abilities to construct satisfying learning environments. However, important from both conceptual and operational perspectives,

these authors (Lorsbach & Jinks, 1999) neglect to address reciprocal relationships between environment, self-efficacy and student and/or teacher behaviors. Thus, missing the valuable contribution that learning environment characteristics can have in enhancing efficacy beliefs of students and/or teachers.

Bandura (1997) describes a strong need to understand organizational contributions in enhancing efficacy of teachers as a means to improve educational endeavors. Researchers (Loup, 1994; Ellett, Hill, Liu, Loup, & Lakshmanan, 1997) have found moderate relationships between dimensions of professional learning environments and teacher perceptions of individual and organizational levels of motivation, effort and persistence (a proxy measure for self and organizational efficacy). In a study examining intra- and inter-teacher variation in efficacy beliefs, Raudenbush and others (1992) found that teachers with strong efficacy beliefs enjoyed more control over instructional conditions and more collaborative relationships with fellow teachers than teachers with weak efficacy beliefs. Given the impact teachers' efficacy beliefs may have on the execution of effective teaching behaviors and the crucial mediating role efficacy beliefs play between knowledge and behavior, characteristics of teachers' working and learning environment could provide important opportunities for impacting how teachers exercise control over behaviors known to be effective in producing student learning.

In this section, linkages between environmental and behavioral factors in teachers' professional learning environments that may enhance the efficacy of teachers to accomplish educational tasks and goals needed to initiate and sustain meaningful change were addressed. The framework of this study pulls from two rich areas of

research. In the following section, a statement of the problem for this study is presented.

Statement of the Problem

This section presents the multi-faceted problems addressed in this study. There are several critical issues in the existing literature including:

1. lack of appropriate measures (conceptually and operationally) and subsequent analyses that adequately assessed teacher self and collective efficacy beliefs as reflected in the theory of self-efficacy,
2. no known measures to assess sources of efficacy information as provided in teachers' professional learning environments,
3. few studies that examined the emergent properties of teacher collective efficacy (work-group and faculty),
4. no known research that examined teacher efficacy beliefs from self, work-group and faculty levels, and
5. no known research to link sources of efficacy information in school learning environments and teachers' self-, work-group collective, and faculty collective efficacy beliefs).

The following section integrates the literature that documented each of these five issues that framed this study.

Present calls for reform in schools describe a need for fostering cultures that function as professional learning communities able to generate knowledge-based action by teachers (Fullan, 1993). In this model, effective schools foster learning environments where teachers become change agents that possess generative abilities to understand the

complexity of change, figure out what skills, knowledge, or actions are needed and learn and execute appropriate courses of action. What this model fails to address is the crucial link between knowledge and action. Researchers (Bandura, 1997; Goddard, Hoy, & Woolfolk Hoy, 2000) acknowledged this missing link and advocated a need to recognize and capitalize on the contribution that school organizational factors, as sources of efficacy information, can make to support efficacious beliefs in teachers (and students); however, no known studies have attempted to do so.

Envisioning schools (or other organizations) as learning organizations has become a popular model of change; however, little evidence exists as to what effects are realized by schools that are functioning in these cultures (Leithwood & Seashore Louis, 1998). Furthermore, previous studies (Loup, 1994; Ellett, et al., 1997) of professional learning environments, framed within conceptions of culture, found positive correlations, though moderate in strength, between dimensions of culture and professional learning environment characteristics and consequences of teacher self-efficacy beliefs. Others (Cavanagh & Dellar, 1997; Loup, 1994; Olivier, et al., 1999) have measured dimensions of culture in learning environments consistent with characteristics of learning communities and organizations. However, no known studies address sources of efficacy information available to teachers in supporting efficacious beliefs about teaching tasks. As well, different sources of efficacy information in the learning environment may be important for different domains of functioning (Bandura, 1997).

Previous attempts to measure teacher's self-efficacy beliefs assessed teachers' judgements about their capabilities to accomplish general teaching goals, and more

recently, to accomplish specific teaching tasks. Loup (1994) asked teachers to make judgements from a self and organizational perspective about consequences of efficacy beliefs including: a) levels of effort they were willing to expend, b) persistence in accomplishing said goals, and c) effort in the face of failure to achieve said goals. Instrumentation problems exist in the measurement of teacher efficacy beliefs including decontextualization of efficacy judgements, future-based phrasing of items, omnibus measurement of teacher efficacy, disagreement between appropriate scaling of items, etc. (See also Bandura, 1997; Pajares, 1997; Tschannen-Moran, et al., 1998). Two additional problems not cited in the literature include a) a failure in the existing measurements to link assessment of teacher self-efficacy beliefs to successful accomplishment of documented behaviors linked to effective teaching and learning and b) use of traditional item stems (I can do..., I am confident..., I am able to..., How much can I do...) to measure strength of efficacy beliefs in the absence of consideration of environmental context.

Efficacy information processing is a multidimensional process: information interacts with cognitive, affective, motivational and selective processes to produce efficacy beliefs (Bandura, 1995; 1997). Teachers' self-efficacy beliefs are also believed to be multidimensional, as teachers are required to be successful at tasks from many domains of functioning. Previous measurement, conceptualization, and analysis of teacher efficacy beliefs do not adequately honor the multidimensional nature of the construct. Rather it appears that bivariate analyses were performed where multivariate techniques may have been most appropriate. This methodological practice may introduce the possibility of erroneous interpretations of statistical results (Thompson,

1999; Fish, 1988). Future attempts at measuring and analyzing data assessing the efficacy of teachers and sources of efficacy information in schools should be consistent with the multivariate complexity of the relevant theory.

Research concerning the emergent property of collective efficacy is needed, as are adequate means to measure this construct (Bandura, 1997; Tschannen-Moran, et. al, 1998; Goddard, Hoy, & Woolfolk Hoy, 2000). In previous studies, collective efficacy was measured by aggregating individual self-efficacy assessments of group members or by having members assess the groups capabilities as a whole. Loup (1994) used teachers' ratings, for self and other faculty, of efficacy motivation to make inferences about teacher self and organizational efficacy. Others (Goddard, Hoy & Woolfolk Hoy, 2000) developed a measure of teacher collective efficacy similar to the Teacher Efficacy Scale (Gibson & Dembo, 1984) that asked teachers to make judgements about their faculty's ability to accomplish certain tasks and produce certain outcomes as well as about internal and external environmental impediments. However, small sample size, continued confounding of outcome expectations with efficacy expectations, and inadequate descriptions of scoring of items leaves much room for improving upon existing measurement in this area.

In addition to developing psychometrically sound measures of collective efficacy, there is a need to understand relationships between individuals' ratings of self-efficacy beliefs and collective efficacy beliefs of groups to which the individuals are members. Careful consideration of appropriate units of analysis is needed as aggregating teacher perceptions to school means may mask variation that is important practically and conceptually.

Purpose of the Study

Purposes of this study were four-fold. One purpose of this study was to examine relationships between sources of efficacy information, as provided by professional learning environments of schools, and teacher self, work-group collective and faculty collective efficacy beliefs. Issues regarding appropriate units of analysis for examining faculty efficacy were addressed by this study. A second purpose of this study was to assess relationships between teacher self-efficacy and teacher collective (work-group and faculty) efficacy beliefs. An examination of factors that contribute to or diminish efficaciousness of collectives of teachers (faculty) was conducted. A third purpose of this study was to address the strength of relationships between omnibus-type questions of teachers' self-efficacy beliefs and subject-specific perceptions of self-efficacy beliefs. The final two purposes of this study, vital to adequately address the purposes stated above, were to develop conceptually sound measures of two important facets of self-efficacy theory.

Significance of the Study

Professional learning environments of teachers can provide opportunities for efficacy generation from mastery experiences, vicarious learning, social persuasion, and physiological and emotional states (Bandura, 1997). It is important to know how these sources impact the strength of teachers' individual and collective efficacy beliefs. This study made significant contributions to a) extend self-efficacy theory, b) extend learning environments research, c) align change literature with relevant conceptual frameworks for future development and d) further discussion and awareness of methodological and measurement decisions necessary for sound research. Additionally, this study provides

important practical knowledge about what schools can do to enhance efficacy beliefs of teachers individually and collectively.

The measurement phase of this study was crucial because much of the measurement in the study of efficacy beliefs is deficient psychometrically and theoretically (Bandura, 1997; Pajares, 1997; Guskey & Passaro, 1994; Deemer & Minke, 1999; Tschannen-Moran, et al., 1998). This study was the first known attempt to measure sources of efficacy information for teachers, conceptualized in self-efficacy theory, within the context of the study of learning environments. In addition, this study provided psychometrically sound and theory-based measurement of teacher self, teacher work-group and faculty efficacy beliefs.

This study is significant in that it is designed to measure and analyze teachers' self-efficacy beliefs as a multivariate concept, thus matching methodology to conception. A second methodological issue concerns the unit of analysis for the study of teachers' faculty collective efficacy beliefs. This study examined the utility of using a) aggregated (to faculty level) teacher self-efficacy beliefs, b) individual assessments of faculty efficacy beliefs, or c) aggregated individual assessments of faculty efficacy beliefs in examining faculty collective efficacy beliefs. Efficacy and learning environment theory suggests that the relationships between sources of efficacy information and teacher efficacy beliefs may vary greatly within schools as well as between schools.

Study Variables

This section presents conceptual and operational definitions of the independent and dependent variables in the study. First, conceptual definitions are presented,

followed by operational definitions for the variables in the study. The measures used to operationalize each study variable are included in Appendix A.

Independent Variables

Conceptually, sources of efficacy information are external or internal events available from the environment, behaviors or personal factors which, operating through cognitive, affective, motivational and selective processes, are instrumental in establishing efficacy beliefs. Operationally, sources of efficacy information are defined as teachers self-reports of the quantity and influence of actual experiences or events available in the teachers' learning environment (consistent with cultures of professional learning environments) that provide sources of efficacy information through enactive mastery experiences, vicarious learning experiences, social persuasion, and emotional and physiological states.

Bandura (1997) states that multiple sources of information are available from individual events. However, the measurement system proposed in this study will attempt to operationalize efficacy information into four discrete categories consistent with current self-efficacy theory. Studies of culture of professional learning environments helped to frame specific items or events (Loup, 1994). There are four primary sources of efficacy information (Bandura, 1997).

Enactive Mastery Experiences

Conceptual definition. Enactive Mastery Experiences are authentic evidence (successes or failures) of one's ability to succeed in accomplishing a particular task at a certain level of quality or difficulty (Bandura, 1997).

Operational definition. Thought to be the most influential of the sources of efficacy information, this source will be operationalized through teachers' self-reports of

the quantity and influence of successful teaching-related experiences including instructional successes in various subject areas and professional successes such as collaboration and decision-making.

Vicarious experiences

Conceptual definition. Vicarious experiences are an active cognitive process in which individuals vicariously engage when thinking about or directly observing modeled behaviors.

Operational definition. The strength of this source of efficacy information may depend upon prior experience and similarity between the person and the model. This source of efficacy information will be operationalized through teachers' self-reports of the quantity and influence of actual experiences or events where modeled teaching behaviors were observed directly from others (e.g. teachers, mentors, administrators, other professionals, reading, videos, etc.) or from within through individual thought processes (e.g. self-reflection, guided imagery, etc.).

Social Persuasion

Conceptual definition. Social Persuasion is defined by meaningful verbal and/or symbolic communication from others about one's capabilities to succeed at a given task.

Operational definition. This source of efficacy is believed to be weak when used alone, but useful when the persuader has legitimacy and/or the person already has reason to believe that a task can be personally accomplished. Operationally, this source of efficacy information is defined as teachers' self-reports of the quantity and influence of actual experiences of meaningful verbal or symbolic persuasion from others (e.g.

teachers, students, parents, administrators, the public, etc.) regarding capabilities to accomplish teaching tasks.

Physiological and Emotional States

Conceptual definition. Physiological and emotional states are personal, internal, affective and cognitive states and physical conditions (e.g. euphoria, stress, anxiety, etc.) that accompany thought and action as individuals attempt, pursue or complete performance tasks (successfully or unsuccessfully).

Operational definition. Efficacy beliefs are changed when physiological states are enhanced and correctly interpreted and stress and other negative reactions are reduced (Bandura, 1997). Operationally, this construct will be defined as teachers' self-reports of the quantity and influence of perceived experiences of positive or negative physiological and/or emotional conditions occurring with teaching-related tasks.

Dependent Variables

Teacher Self-Efficacy Beliefs

Conceptual definition. Teachers' perceived beliefs in their capabilities to organize and execute courses of action to acquire given levels of attainment in situation-specific teaching tasks.

Operational Definition. Teachers' self-reports of the strength of beliefs in their capabilities to successfully accomplish specific teaching tasks situated in the context of teachers' current teaching situations.

Scores derived from an adapted version of the self-efficacy section of the Teachers' Efficacy Beliefs System (TEBS), the Teachers' Self-Efficacy Beliefs Scale (TEBS-S), were used to operationalize teacher self-efficacy beliefs (Dellinger, Bobbett, Olivier & Ellett, 2001). Teachers rated the perceived *strength of their beliefs* in their

capabilities to accomplish various teaching tasks within the *context of their current teaching situation* (school, classroom, resources, students, etc.). The majority of the teaching tasks or elements were adapted from an established classroom-based observation and assessment system used to judge indicators of the quality of teaching and learning in classrooms (Ellett, 1999). Additionally, some school improvement and non-instructional tasks were included as well as items at differing levels of generality.

Teacher Work-Group Collective Efficacy Beliefs

Conceptual definition. Individual teachers' shared group beliefs that a functional work-group of teachers (2 or more teachers), to which the individual belongs within their current school, is capable of accomplishing particular goals at specified levels of quality.

Operational definition. Individual teachers' self-reports of shared beliefs in their designated (group the teacher works with most) functional work-group's ability to accomplish group tasks and goals.

The work-group collective efficacy section of the TEBS, the Teacher Work-Group Collective Efficacy Beliefs Scale (TEBS-WG), was used to assess individual teachers' perceptions of their designated work-group's shared beliefs in their abilities to accomplish various goals such as enhancement of learning, non-instructional tasks, and school improvement goals.

Faculty Collective Efficacy Beliefs

Conceptual definition. Individual teachers' perceptions of the shared beliefs that the entire faculty is capable of accomplishing particular school tasks/goals at specified levels of quality in the context of teachers' current teaching situation.

Operational definition. Teachers' self-reports of the strength of their faculty's shared beliefs that they are capable of accomplishing various teaching and school-related tasks/goals in the context of their current teaching situation.

The faculty collective efficacy beliefs section of the TEBS, the Teacher Faculty Collective Efficacy Beliefs Scale (TEBS-F) was used to assess individual teachers' perceptions of their faculty's shared beliefs in its abilities to accomplish various goals such as enhancement of learning, non-instructional tasks (e.g. increasing parental involvement), and school improvement goals.

Research Questions

The following primary and supplementary questions guided the study. Each question is followed by a brief conceptual rationale.

Research Question 1

What is the structure and reliability of responses obtained from the measures developed for this study including the Sources in Professional Learning Environments Scale (SOURCES) and the three sections of the Teachers' Efficacy Beliefs System (TEBS-S, TEBS-WG, and the TEBS-F)?

Rationale

There are no known measures of sources of efficacy information provided by school professional learning environments although some researchers have found connections between organizational variables and various measures of teacher efficacy (Bandura, 1997; Cousins, 1998; Ellett, et al., 1997; Loup, 1994; Raudenbush, et al., 1992; Ashton & Webb, 1986). Studies have shown relationships between professional learning environment characteristics and teacher self and organizational efficacy

outcomes (Loup, 1994); however, means to measure the contribution these characteristics make in providing opportunities for efficacy generation are nonexistent.

Studies that included teacher self-efficacy as a variable are numerous (Bandura, 1997; Tschannen-Moran, et al., 1998); however, measurement of this construct is plagued with inadequate and discordant conceptualization and consequent operationalization of the construct. Teacher collective efficacy has been studied less often, and there is a need for appropriate measurement of this construct (Bandura, 1997; Goddard, 2000; Goddard, Hoy, & Woolfolk Hoy, 2000). Reliability and validity are crucial, but often overlooked, properties of measures in research using self-efficacy theory as a foundation. There is a need to understand the underlying structure of these measures to aid in interpretation of results, and to assess reliability of scores so that results are trustworthy.

Research Question 2

What relationships exist between teacher self-efficacy beliefs and teacher collective (work-group and faculty) efficacy beliefs? Are these relationships consistent across domains of functioning? When self-efficacy beliefs are statistically controlled, are there school differences in faculty collective efficacy beliefs?

Rationale

Bandura (1997) describes how collectives of individuals develop beliefs about their abilities to accomplish group goals; however, little is known about how these collectively held beliefs are generated and/or enhanced. When teachers function independently within schools, collective efficacy beliefs are the sum of teachers' self-efficacy beliefs. In most schools, however, teachers are not functionally independent,

but rather share many duties and responsibilities and must depend on each other to accomplish group tasks and goals. It is useful to examine the relationships between individual and collective efficacy beliefs as a means to assess the amount of variation in collective efficacy beliefs explained by self-efficacy beliefs. Accounting for this variation allows for examination of the emergent properties of collective efficacy among teachers working together in schools.

Research Question 3

What multivariate relationship exists between the set of sources of efficacy information available in professional learning environments and the set of teacher self-efficacy beliefs, work-group collective efficacy beliefs and faculty collective efficacy beliefs?

a. What relationship exists between the set of sources of efficacy information and teacher self-efficacy beliefs? Does this relationship differ across schools?

b. What relationship exists between the set of sources of efficacy information and teacher work-group collective efficacy beliefs? Does this relationship differ across schools?

c. What relationship exists between the set of sources of efficacy information and teacher faculty collective efficacy beliefs? Does this relationship differ across schools?

d. According to individual teachers, what characteristics of teachers' professional learning enviroments enhance (or weaken) efficacy beliefs of individuals or faculty members to accomplish required tasks or goals?

e. What variables (teachers' self-efficacy beliefs or professional learning environment characteristics) differentiate between schools where average faculty collective efficacy beliefs were high versus those schools where average faculty collective efficacy beliefs scores were low.

Rationale

Bandura (1997) states that self and collective efficacy beliefs are malleable and may be affected by exposure to sources of efficacy information. There is a need to understand the relationships between sources of efficacy information and teachers' efficacy beliefs (Pajares, 1997; Tschannen-Moran, et al., 1998). This study empirically examined how sources of efficacy information provided by school learning environments, that are consistent with conceptions of cultures of professional learning organizations, are related to levels of teacher self-, work-group collective and faculty collective efficacy beliefs.

Research Question 4

What is the strength of relationships between omnibus questions of teacher efficacy beliefs and task-specific assessments of teacher efficacy beliefs at varying levels of difficulty?

Rationale

Inadequate consideration of specificity and generality compounds measurement and inference problems in studies of self-efficacy (Bandura, 1997; Pajares, et al., 2000; Pajares, 1997). This study attempted to address whether teachers' perceptions of efficacy beliefs for teaching in general were strongly related to perceptions of efficacy beliefs in regards to more specific teaching tasks (i.e. teaching reading, teaching math,

maintaining discipline, etc.). In addition, an effort was made to examine patterns in results when task difficulty was varied.

Supplemental Research Questions

Although not part of the primary research questions addressed by this study, several questions were examined due to their import to the results of the primary questions.

Supplementary Question 1

What is the relationship between measures of teachers' situation and task-specific self- and collective efficacy beliefs and a traditional measure of teacher efficacy, a question based on the RAND items (Berman & McLaughlin, 1977)?

Supplementary Question 2

For teachers as the unit of analysis, what is the relationship between teacher experience, SES of students and teachers' perceptions of self- and faculty collective efficacy beliefs? For faculty collective efficacy beliefs, do these relationships differ using schools as the unit of analysis?

Assumptions and Limitations of the Study

This study utilized survey data to assess teachers' perceptions of their efficacy beliefs and perceptions of the quantity and influence of sources of efficacy information available in teachers' professional learning environments. It was assumed that

- Teachers attended to the items and contexts presented and were honest in responding to each item.

- Teacher volunteers provided a reasonably representative sample from which inferences can be made to similar teachers, work-groups, faculties and schools.

Limitations of the study included the following:

- Reliability of the data may attenuate relationships addressed by this study.
- Response rates were low (33%) possibly due to the length of the survey measures and to timing of data collection (Christmas holidays and state testing).
- Generalization to other teachers and schools may be limited as only two districts were included in the accessible population.

Chapter Summary

Chapter 1 presented an overview of thought regarding school change and possible links to teacher learning. An argument is presented that teachers' self- and collective efficacy beliefs might be important mediators between teachers' knowledge and the behaviors they exhibit. As well, the importance of the environment, particularly teachers' professional learning environments, in providing sources of efficacy information was presented as a viable area of study.

In Chapter 2, the literature related to teachers' self-efficacy beliefs is reviewed. Additionally, a review of literature in studies of learning environments pertinent to teachers' professional learning environments is presented.

CHAPTER 2: REVIEW OF THE LITERATURE

Introduction

Social cognitive theory provides the foundation upon which this study is built. Specifically, this study is framed by Bandura's (1997) model of triadic reciprocal causation that specifies the interactive and reciprocal, but not necessarily equivocal, relationships between person factors, the environment and behaviors. This study examined some of the relationships hypothesized to exist between behaviors, the environment and self-efficacy beliefs, a personal factor that is believed to be instrumental in human agency. Behaviors and environmental factors provide information that interacts with person factors to enhance or diminish self-efficacy beliefs about capability. The related literature for this study comes from two areas: studies pertinent to teacher self-efficacy beliefs and studies of learning environments, specifically professional learning environments of teachers. Reviews of pertinent literature from both areas are included.

Teachers' Self-Efficacy Beliefs and Teacher Efficacy

This review of the literature distinguishes between two related, but distinctly different, constructs. *Teacher efficacy* (or *teacher sense of efficacy*) is defined as a teacher's belief in their capability to affect student performance. *Teacher self-efficacy beliefs* are defined as a teacher's situation-specific beliefs in their ability to organize and execute courses of action necessary to successfully accomplish a specific behavior at a specified level of quality (Bandura, 1977; Bandura, 1997). This distinction may appear minor; however, it is necessary as, "Two men who perceive the same situation

differently but nevertheless employ the same vocabulary in its discussion must be using words differently" (Kuhn, 1996). And, as Pajares (1992) eloquently noted,

> All words begin as servants, eager to oblige and assume whatever function may be assigned them, but, that accomplished, they become masters, imposing the will of their predefined intention and dominating the essence of human discourse. It is for this reason that articulate conversation must demand not only clarity of thought and expression but also preciseness of word choice and meaning (p. 308-309).

As will be presented below, previous reviews of the literature in this area, as well as the majority of studies in this area, have not adequately distinguished between these terms either conceptually or operationally. Rather, they are used interchangeably.

A critical examination of the literature in the areas of teacher efficacy and teachers' self-efficacy beliefs is presented with particular emphasis given to theories framing measurement of these constructs. Past interpretations of research in these areas and not yet reviewed studies are examined with attention given to theory-groundedness as well as to sound measurement and data analytic properties. Finally, recommendations are made as to how work and thoughts on this topic might be reconciled in a theory-based interpretation of teachers' self-efficacy beliefs.

In knowledge-building enterprises, theories are proposed to simplify relationships among constructs. The building blocks of knowledge are science-based studies, often using agreed upon terminology and methodology, which examine properties of and relationships between theories (Kuhn, 1996). When these building blocks are not sound (for various reasons including lack of theory-groundedness, poor measurement, and faulty methodology) those trying to continue building are doing so on a crumbling foundation. Part of the purpose of this review of literature is to evaluate

(in the author's point of view) the condition of the foundation upon which future structural work will rest.

The earliest research on teacher efficacy (or teachers' sense of efficacy as it was called in early studies) is reportedly framed by Rotter's (1966) general expectancy theory of internal versus external locus of control while later studies claimed to be framed by Bandura's (1977; 1982; 1993; 1997) theory of self-efficacy. In the various works reviewed here, various terminology, multiple theoretical models, and subsequent operational definitions were used to define, measure and identify the constructs under investigation. This review is an attempt to clarify continuing misconceptions apparent in this field of study and to move the field beyond its current state of conceptual, operational, and methodological stagnation.

Rotter's Theory of Locus of Control

Rotter's (1966) theory of locus of control addresses how individuals perceive rewards or outcomes as dependent upon their behavior (internally-oriented) or under the control of other forces such as luck or chance (externally-oriented). Preferences for perceptions of internal versus external control of reward contingencies or outcomes are individual generalized expectancies about how the world works, and are not considered to be specific to any particular area of functioning.

To assess the degree of internal-external orientation, the I-E scale (Rotter, 1966) was developed. It consists of 23 pairs of statements (one externally-oriented statement and one internally-oriented statement along an outcome continuum) from which subjects choose one statement most appropriately representing the beliefs of the individual. Six filler items are included. As a whole, the I-E scale measures beliefs

(generalized expectations) about the relationship *between behavior and outcomes*. Rotter cautions that individual items do not indicate preference for internal versus external orientation in particular areas; rather, previous attempts to separate locus of control measures into different areas such as achievement, affection, political attitudes, etc. were abandoned due to the inability of items to discriminate between these and other areas. Thus, internal vs. external locus of control, as conceptualized and operationalized by Rotter, is an overall belief, or generalized expectation, about relationships between behavior and outcomes or "the nature of the world" (p. 10).

Rotter's (1966) theory of locus of control was used to develop two items used in two studies sponsored by the RAND Corporation in the 1970's. The two items that were developed are presented below, and henceforth, will be called RAND Item 1 and RAND Item 2. The two studies employing these items are discussed below.

Re-evaluating the RAND Change Studies

Armor, Conry-Oseguera, Cox, King, McDonnell, Pascal, Pauly, & Zellman (1976) and Berman and McLaughlin (1977), in attempts to quantify educational change through examination of relationships between project implementation and success and educational personnel characteristics, developed two items which were combined and designated as measures of teachers' sense of efficacy. These items were reportedly based on Rotter (1966). In both studies, teachers' sense of efficacy was defined as the extent to which the teacher believed he or she had the capacity to affect student learning or performance. These items are presented below:

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. (RAND Item 1)

2. If I really try hard, I can get through to even the most difficult or unmotivated students. (RAND Item 2)

From a conceptual standpoint, it appears that Rotter's (1966) admonitions and research evidence as to the generalized nature of the locus of control construct were ignored in these measures. These two items appear to be paired, as are items on the I-E Scale (Rotter, 1966), along a continuum. In this case, the continuum consists of being able to personally affect student performance outcomes versus attributing control of student performance outcomes to others. However, "these two questions were combined into a single measure of efficacy" (Berman & McLaughlin, 1977, p. 137) in both studies. It is unstated how Berman & McLaughlin (1977) combined the scores; however, Armor, et al. (1976), reverse-coded the second item (5=strongly agree to 1=strongly disagree) and used the product of the pair of 5-point scales to represent teachers' sense of efficacy. This scoring scheme results in a scale that ranges from 1 to 25 (not all scores were possible within that range). Based on this system, scores of 1 indicated teachers' strong beliefs that student performance outcomes are in the control of the student's home environment and cannot be overcome by teacher effort while scores of 25 indicated strong belief that student performance outcomes are believed to be the result of teacher effort that is not diminished by the student's home environment.

The specific response format in Berman and McLaughlin (1977) was not reported. It is assumed that the researchers used six or seven-point Likert scales of agreement (as most other measures in the study) which were summed. Descriptive statistics (M=9.7380, SD=1.4756, max=12 and min=5) seem to indicate this possibility. Additionally, it was not reported how the items were combined (whether the items were summed or multiplied or whether either item was reverse-coded before

combining). If summed, then high scores on both items would be indicative of teachers who strongly agree both that affecting student performance is out of their control (in the control of family and home) and that if they try hard they can get through to unmotivated/difficult students. If Item 1 (or likewise for Item 2) was reverse-coded before combining the measures, high scores using this scoring scheme indicate low agreement that affecting students' performance is in the hands of powerful others and high agreement with ability to control student outcomes through effort on the teacher's part. These missing pieces of information raise considerable issues about how results of the Berman & McLaughlin (1977) study are interpreted.

Results of Armor, et al. (1976)

In an examination of reading program effectiveness, the researchers collected data from 20 schools in the Los Angeles Unified School District which met the following criteria: 1) predominantly minority enrollment, 2) substantial and consistent gains on test scores from the 6th grade reading test (California Test of Basic Skills-CTBS), 3) school size large enough to provide adequate samples, and 4) Title I rank of 200 or less. Some of the outcome data collected included students' reading achievement scores from two previous successive years (5th and 6th grade) gathered from records at students' current junior high schools. Additional data contained the name of each student's 6th grade teacher with other pertinent demographic information. Former teachers were contacted and asked to complete a survey that asked teachers to recall characteristics about the previous year such as average monthly level of classroom disruptions and number of parent visits, and characteristics about the reading program. Teachers were also asked whether they agreed or disagreed with the two

efficacy items (as stated above). These data were collected from the reading teachers after the students were no longer in the teachers' classrooms *and* after the students' scores were available from the CTBS. Eighty-one out of eighty-three teachers responded to the surveys.

In a multiple regression analysis where students' background characteristics (including 5th grade CTBS reading score and demographic variables) were statistically controlled, the unstandardized regression coefficient (b=0.31) for teachers' sense of efficacy (as well as all other variables entered into the equation) was found to be statistically significant (t=2.54) in predicting improved reading (grade 6 score with grade 5 score included as a background variable) for black children. When all factors were included in the model (sense of efficacy, classroom setting variables, program content, and implementation strategies), there was an 11.4% increase in the amount of variation explained beyond that explained by students' background characteristics. The authors of this study conclude:

> The more efficacious the teachers felt, the more their students advanced in reading achievement. This measure was strongly and significantly related to increases in reading. Obviously, teachers' sense of efficacy is only one part of the morale and commitment to teaching that we presume is a major influence on learning. Our finding that efficacy affects achievement demonstrates the importance of these *predispositional* [italics added] factors for effective teaching. (p. 24)

Results of Berman & McLaughlin (1977)

The original sample size (n=1072) for this study (Berman & McLaughlin, 1977) was reduced to respondents who provided data on all independent and dependent variables (n=499). The authors of the study indicated little difference between data for subjects used in the analyses and preliminary findings using all subjects. All

independent variables (28 total), including teacher sense of efficacy, and dependent variables (e.g. percent project goals achieved, total teacher change, total student improvement, continuation of project methods, and continuation of project materials) were measured *concurrently* at the end of project implementation through teacher self-report. A condensed presentation of the regression results is presented in Table 1.

Table 1: Selected Statistics from Regression Results of Berman & McLaughlin (1977).

	Reduced-Form Regression[a] Standardized regression Coefficients			Recursive Regression[b] Standardized regression Coefficients				
Primary DV's	Teachers' Sense of Efficacy	Absolute Range for 26 Other IV's	R^2	Teachers' Sense of Efficacy	Absolute Range for 26 Other IV's	R^2	r_{xy}	$r_{partial}$
% Project Goals Achieved	.14***	(.00 to .25)	.50	.14***	(.00 to .25)	.50	.22	.12
Total Teacher Change	.11**	(.00 to .17)	.30	.09**	(.01 to .17)	.31	.15	.09
Total Student Improve-ment	.27***	(.00 to .27)	.39	.23***	(.00 to .27)	.46	-	NA
Continu-ation of Project Methods	.14***	(.01 to .28)	.36	.08*	(.00 to .38)	.47	-	NA
Continu-Ation of Project Materials	.08*	(.00 to .18)	.32	.04	(.01 to .20)	.37	-	NA

[a] Single dependent variable regressed on all independent variables.
[b] Single dependent variable regressed on all independent variables with certain dependent variables statistically controlled.

Zero-order and partial correlations between teachers' sense of efficacy and two of the primary dependent variables were reported to be low, but statistically different

from zero. Partial correlation coefficients appear to include adjustments for all other dependent and independent variables not listed on the vertical and horizontal margins. Standardized regression coefficients for teachers' sense of efficacy were statistically different from zero, and usually of moderate magnitude when compared to other standardized regression coefficients. One exception was in the case of teachers' ratings of Total Student Improvement.

An additional segment of the Berman & McLaughlin study attempted to identify variation in teacher efficacy ratings due to project and school effects. In this analysis, it was determined that for teachers' sense of efficacy, there was no variation due to project or school membership. In other words, knowing which project or school a teacher belonged to did not supply information as to teachers' sense of efficacy.

Based solely on statistically significant standardized regression coefficients for teacher sense of efficacy, one of 28 independent variables (multiple R^2 ranging from 0.21 to 0.50), in individual multiple regressions of all dependent variables measured, the authors conclude "...teachers' sense of efficacy emerged as a powerful explanatory variable; it had major positive effects on the percentage of project goals achieved, improved student performance, teacher change, and continuation of project methods and materials" (p. 73), and that "Teachers' attitudes about their own professional competence, in short, appear to have major effects on what happens to projects and how effective they are" (p. 137). The researchers do qualify their findings by stating, "Because we did not measure this teacher attribute before the project began, we cannot say whether project activities (such as training) may have changed it. Our impression

is, however, that it reflects teachers' school experiences as well as their personalities" (p. 138).

Conclusions Drawn from the RAND Studies

Both of the studies reviewed above allege causal relationships between *teacher sense of efficacy* (later called *teacher efficacy)*, as measured, and various outcome measures (standardized test scores or teacher self-report of project outcomes). Neither study measured teacher sense of efficacy prior to the effects for which this construct is proposed as the cause. Given the reported findings and design of the studies, any claims about the effects of teachers' sense of efficacy on project outcomes seem unfounded. At best, these results indicate a) a relationship of unknown strength between student reading improvement and teachers' beliefs about their ability to influence student outcomes and b) mild relationships between teachers' self-reports of belief in their efforts rather than the home environment to affect student motivation and performance (assuming proper coding of measures) and teachers' self-reports of Percent Project Goals Achieved, Total Teacher Change, Total Student Improvement, etc.

According to the results of these studies, after positive project outcomes or student outcomes in teacher-reported or standardized form are realized, teachers rate themselves highly in their ability to produce such outcomes. Returning to the Rotter's (1966) theory upon which these items were based, if it can be assumed that the RAND items measure internal versus external orientation, then the expectation is that internally-oriented teachers would be more likely to report successful experiences as failures would have to be attributed to their own lack of ability. Externally-oriented teachers would have no such investment in project outcomes. The same point can be

made about the Armor, et al. (1976) study results. Teachers whose students' reading scores had improved from 5th to 6th grade were more likely to believe strongly in their ability to affect student outcomes. According to Rotter's theory, this would make sense if these teachers' expectations were more in line with an internal locus of control.

Results of the studies of Berman & McLaughlin (1977) and Armor et al. (1976) were a catalyst for a prolific area of study as regards teacher sense of efficacy, or what was later termed, teacher efficacy. A majority of the studies reviewed here, including Tschannen-Moran, Woolfolk Hoy and Hoy's (1998) review of the literature in this area, included statements about the import of the relationships found by these studies (Berman & McLaughlin, 1977; Armor et al., 1976). As well, inferences to causal relationships stated by the authors of the RAND studies are present in many of the reviewed studies. However, a careful review of these studies (Berman & McLaughlin, 1977; Armor et al., 1976) including an examination of the research designs, measurements and methodologies, indicates there is no basis for claims about causality between teacher sense of efficacy and student achievement whether teacher self-reported or based on standardized test scores.

In addition to the results of these studies (Berman & McLaughlin, 1977; Armor et al., 1976) initiating further work in this area, the measures in these studies, RAND Item 1 and RAND Item 2, were used as a basis for development of many of the measures to assess teacher efficacy. Although the RAND items were used as a basis to measure teacher efficacy, later studies also reported using Bandura's (1977) theory of self-efficacy as a framework upon which studies were based. Thus, there was a need to

discuss self-efficacy theory as proposed by Bandura (1977). A discussion of self-efficacy theory (Bandura, 1977) follows.

Bandura's Theory of Self-Efficacy

Bandura (1977) introduced self-efficacy as part of a unifying theory of behavior that encompasses, but is distinct from, various other explanations for behavior. In social cognitive theory, self-efficacy is one part of a simple behavioral model (previously called reciprocal determinism (Bandura, 1986)) now termed *triadic reciprocal causation* (Bandura,1997). The model (see Figure 1) consists of three elements (person, behavior, and environment) that are hypothesized to interact reciprocally (not necessarily equivocally). In the model, *self-efficacy beliefs* are personal factors that are believed to be instrumental in human agency by mediating linkages between knowledge and action (Bandura, 1982). Twenty years after publishing his first work to explain self-efficacy theory and following with empirical evidence to support the theory, Bandura defines perceived self-efficacy as "...beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). Over the years, the definition has changed only slightly (Maddux, 1995). Bandura has, however, continued to clarify conceptual and measurement issues particularly where related constructs are concerned.

Confusion Related to Self-Efficacy Theory

One such area of confusion involves outcome expectancy. Bandura (1977; 1986; 1982; 1993; 1995c; 1997) repeatedly distinguishes between efficacy expectations and outcome expectations by discussing differences in the chronology of occurrence and focus of each type of expectation (see Figure 3). Efficacy expectations focus on

beliefs about whether behaviors can be performed, whereas outcome expectations focus on beliefs about whether behaviors lead to certain outcomes (i.e. positive or negative outcomes). Bandura (1977) defined efficacy expectation as distinct from outcome expectation in that "efficacy expectation is the conviction that one can successfully execute the behavior required to produce the outcome" (p. 193), whereas outcome expectations are based on whether behavior will result in certain outcomes. Locus of control (Rotter, 1966) is a type of outcome expectancy, or a generalized expectancy about the link between behavior and outcomes.

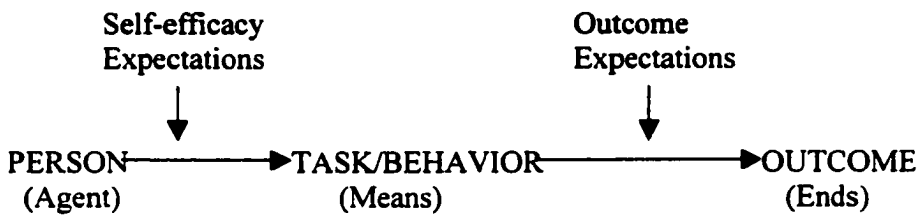

Figure 3: Chronology and focus of self-efficacy and outcome expectations adapted from Bandura (1997) and Skinner (1996).

Bandura (1997) maintains, "human behavior and affective states would be best predicted by the combined influence of efficacy beliefs and the types of performance outcomes expected within given social systems" (p. 20). For example, persons with high levels of efficacy beliefs and low outcome expectations are likely to become socially active and protest current environmental conditions which inhibit positive outcomes for successful performances. These persons intensify their efforts to gain valued outcomes through successful performance, and if social conditions continue to remain unresponsive, abandon the current system. Those with low efficacy beliefs and low outcome expectations tend to behave with resignation and feel powerless. Depression and despondency are typical reactions of those with low efficacy beliefs and

high outcome expectations because they see themselves as incapable of performing behaviors that can lead to valued outcomes.

> Self-efficacy theory distinguishes between two judgmental sources of futility. People can give up trying because they seriously doubt that they can do what is required. Or they may be assured of their capabilities but give up trying because they expect their efforts to produce no results due to the unresponsiveness, negative bias, or punitiveness of the environment (Bandura, 1982, p. 140).

Bandura (1982) contends, "But those who have a firm belief in their efficacy, through ingenuity and perseverance, figure out ways of exercising some control, even in environments containing limited opportunities and many constraints," (p. 125).

Although Bandura (1997) states that both efficacy beliefs and outcome expectations are useful in combination to predict behaviors, efficacy expectations are usually better predictors of behavior or actions as "the outcomes people anticipate depend largely on their judgements of how well they will be able to perform in given situations" (p. 21). Based on the chronology and focus of self-efficacy versus outcome expectations, measurement of self-efficacy beliefs is usually task or behavior-related, and not outcome-based. Beliefs about ability to attain outcomes confound self-efficacy and outcome expectations, not allowing for separation of beliefs about ability to perform behaviors and beliefs about the nature (i.e. responsivity, controllability, punitiveness, etc.) of the environment. Thus, when outcomes are externally controlled or relegated to chance and not due primarily to ability, self-efficacy beliefs provide little information in predicting behavior.

For example, asking teachers to rate their beliefs in their abilities to affect their students' performances ("teacher sense of efficacy"), say in mathematics measures at least two expectations: 1) belief in ability to perform necessary teaching tasks with

students in their specific classroom environment (self-efficacy beliefs) and 2) beliefs about whether those teaching behaviors will affect students and students will perform given students' characteristics, external controls, et. The first expectation is self-efficacy about teaching mathematics to specific students, and could certainly be considered a multidimensional task (i.e. teaching addition, teaching subtraction, teaching multiplication, etc.). Each of these individual tasks can be subdivided into specific tasks (i.e. teaching addition of single digit numbers, teaching addition of two digit numbers without regrouping, teaching addition of two digit numbers with regrouping, etc.). Teachers would hold expectations about their ability to perform these requisite tasks within the context of their classroom. However, teachers' beliefs about whether performance of these teaching tasks will lead to student achievement are outcome expectations. As earlier discussion indicated, the predictive power of self-efficacy beliefs on behavior is attenuated by whether outcomes contingent on the behavior are externally controlled or depend mainly on ability. In situations where teachers perceive that no amount of effort or persistence will impact student achievement (perhaps due to student abilities, home life, attitudes, etc.), their self-efficacy beliefs may not predict their behaviors. However, Bandura (1997) states that self-efficacy beliefs are predictive of the outcomes people expect.

Here it is important to note that student achievement is a possible outcome of teaching behaviors that may or may not be valued by the teacher. However, student achievement is typically valued by school systems that hire teachers, and therefore, would be considered a goal (valued outcome) of teachers. Whether this goal is

internalized or seen as externally mandated may impact whether teachers, to accomplish these goals, exhibit certain behaviors.

As discussed in Chapter 1, Maddux (1995) and Kirsch (1995) argue that although Bandura has repeatedly delineated between efficacy expectations and outcome expectations, Bandura's more recent definitions and discussions of self-efficacy theory perpetuate confusion of these types of expectation. A particular area of confusion lies in whether self-efficacy beliefs about performance attainments as defined by Bandura (1995c) confound both self-efficacy beliefs to perform the requisite tasks and outcome expectations about contingencies (attainments) attached to performance of such tasks. The confusion is not clarified in Bandura's (1995c) response to these criticisms. Rather his response appeared to indicate that it is preferable to accept performance attainments as defined as alternatives are unpleasant and messy conceptually. This reasoning included a description of how calling a performance attainment like getting an A grade in a course an outcome opens one up to a regressive, hierarchical system of behaviors and outcomes. This is certainly the case. However, Maddux (1999) responds that, "to talk about *self-efficacy for getting an* A expands the meaning of self-efficacy from beliefs about performing behaviors (however simple or complex) to beliefs about attaining outcomes and goals" and that "what researchers call this expectancy for achieving outcomes is less important than acknowledging that it is not the same as an expectancy for performing a behavior or set of behaviors" (p. 26).

This argument is relevant to the distinction between teacher efficacy and teachers' self-efficacy beliefs about teaching. Teacher efficacy is typically defined as beliefs in ability to produce/affect/impact student achievement or student learning. In

either case, student achievement/learning are outcomes of a complex array of behaviors on the part of teachers and on the part of students. Additionally, teachers' beliefs about the contingent relationship between their behaviors and student learning/achievement may be confounded in assessments of teacher efficacy. Teachers' self-efficacy beliefs were defined as teachers' beliefs in their abilities to accomplish teaching-related tasks or behaviors in a certain context. For instance, a teacher's belief about personal ability to perform a complex behavior such as *clarify student misunderstandings of concepts* in the context of their classroom might also be considered an outcome of a wide array of sub-tasks or behaviors. This interpretation of performance attainments is messy, and Bandura's (1995c) point is valid. However, arbitrarily designating behavioral contingencies as performance attainments to simply avoid conceptual messiness does not appear to be an adequate response. The seemingly hierarchical structure of tasks and outcomes as well as goals (Bandura, 1997) is difficult to integrate into self-efficacy theory, but also difficult to ignore. Thus, Maddux's (1999) point is also valid.

Besides confusion with outcome expectancy, other self-constructs that are often confused with self-efficacy beliefs include self-esteem, self-concept, and outcome expectancy constructs such as locus of control (see Bandura, 1997). Each of these is conceptualized as stable personality traits or characteristics. In contrast, Bandura describes self-efficacy beliefs as *situation* and *task-specific*. In other words, self-efficacy beliefs are formed about specific tasks within specific contexts and are not usually generalized beliefs about abilities to perform tasks apart from environmental or contextual factors. Given enough exposure to a task in various situations, self-efficacy

beliefs can become generalized; however, novel situations of increased difficulty may challenge generalized self-efficacy beliefs.

Structure of Self-Efficacy Beliefs

Self-efficacy beliefs vary in strength, generality and level. *Strength* of self-efficacy beliefs is the degree to which persons hold certain self-efficacy beliefs about a specific task/situation. *Level* refers to variation in the task/situation difficulty. *Generality* concerns how self-efficacy beliefs about certain tasks may generalize to other tasks or situations. Some examples include:

1. A teacher's belief in their ability to manage discipline in their classroom may be quite different from that same teacher's belief in their ability to manage discipline in a neighboring teacher's classroom that contains "difficult" students (difficulty level).
2. A teacher's strong beliefs in their ability to manage discipline in their classroom may carry over to their belief in their ability to manage discipline in many contexts such as running a scout troop, teaching swimming lessons, etc. (generality/level).
3. A teacher's beliefs in their ability to manage discipline of students in their classroom is strong compared to their belief in their ability to teach addition of fractions with unlike denominators to these same students (variation in strength and task difficulty).

Sources of Efficacy Information

Self-efficacy beliefs can be generated, increased or diminished, through four sources of efficacy information (Bandura, 1977). The model of triadic reciprocal

causation (see Figure 1) linking the person, environment and behaviors provides opportunities of learning about capabilities (abilities in context) through a) enactive mastery, b) vicarious experience, c) social persuasion and d) physiological and emotional states. Exposure to sources of efficacy information is not enough to alter efficacy beliefs. Rather, through cognitive, motivational, affective and selection processes, usually operating in concert, efficacy information is filtered to form self-efficacy beliefs that regulate human functioning (Bandura, 1977; 1997).

Enactive mastery experiences have been shown to provide the most persuasive information for formation of self-efficacy beliefs (Bandura, 1982). *Enactive mastery experiences* are sources of information about ability gained through successful (or unsuccessful) performance of tasks in a given context. Information about one's ability to successfully perform tasks can be gained through vicarious experiences. *Vicarious experiences* may include modeled behaviors from others (particularly others similar to oneself) and through cognitively modeled behaviors of self and others. Social persuasion provides another avenue for enhancement of beliefs in one's ability. *Social persuasion* through verbal or symbolic feedback regarding one's capability can affect the formation of self-efficacy beliefs. Finally, *physiological and emotional states* of a person can influence their self-efficacy beliefs. This may include feelings of stress, anxiety, pleasure, elation, etc., possibly manifested through increased heart rate, sweating, nervousness, etc. Depending upon how these physiological or emotional responses are interpreted, physiological and emotional states may provide information that one is able or unable to perform tasks in the context and to the degree required.

Collective Efficacy Beliefs

While self-efficacy beliefs determine the choice of tasks, effort put forth to produce given attainments, and persistence in the face of failure for individuals, collective efficacy beliefs are hypothesized to be instrumental in human agency at the group level in the same way (Bandura, 1982; 1993; 1995a; 1997). Collective efficacy beliefs have implications for societal change at all levels. For example, in schools where teachers work more or less independently in their own classrooms, to varying degrees faculty members must orchestrate their efforts to produce behaviors that are tied to desired school-level outcomes (e.g., student achievement). How collectives of individuals view their collective abilities to perform required tasks can influence choice of tasks and effort and persistence to accomplish tasks as well as expectancies about the likelihood of obtaining desired outcomes.

Zaccaro, Blair, Peterson & Zazanis (1995) state that considering collective efficacy as a straightforward extension of self-efficacy theory might be inadequate to explain the complexities in this construct. These authors discuss the lack of studies to examine collective efficacy beliefs as "attributable to problems in initial conceptions of collective efficacy and its treatment as a mere extension of self-efficacy theory to larger aggregations" (p. 307) and offer discussion of possible differences and relationships between self- and collective efficacy beliefs.

Measurement of Self-Efficacy Beliefs

Bandura (1995b) provides guidelines regarding measurement of self-efficacy beliefs. Self-efficacy beliefs are not global personality traits, but are a system of beliefs about capability to function in various domains. Therefore, Bandura suggests that

domain specification, and an understanding and acknowledgement of the requisite tasks encompassed by the domain of interest, should be the focus of self-efficacy items. Bandura also points out that useful information is gained by graduating the level of difficulty for required tasks. Another point is that items designed to assess self-efficacy beliefs should be stated in terms of judgement of capability. Bandura recommends CAN DO, versus statements of intention, or WILL DO. A standard response scale for self-efficacy items ranges from 0 to 100 anchored at "Cannot do at all" to "Certain can do"; however, some use a 10 point-scale. A recent measure of teacher self-efficacy beliefs circulated by Bandura asks teachers to rate "How much can you influence..." different elements related to teaching. Bandura also contends that assessment of self-efficacy beliefs should be situated in capabilities as of now, not on future capabilities. The guidelines include recommendations for establishing reliability of scores and construct validity.

Summary

Bandura's (1977) seminal article introducing self-efficacy as a viable cognitive component of social cognitive theory generated research in many areas including education. Several key studies claimed to have used self-efficacy theory as a basis for developing measures to assess teacher efficacy. The review continues with a careful look at how research in this area developed.

Framing Research on Teacher Efficacy

A common theme among most of the literature examined in this study involves accolades for and excitement about the results of the RAND Change studies of Berman & McLaughlin (1977) and Armor, et al. (1976). Almost all of the studies reviewed

mention a "significant relationship between teacher efficacy and student achievement" (Ashton, 1984), and many discuss these reported relationships in causal terms. A recent review (Tschannen-Moran, Woolfolk Hoy & Hoy, 1998), cited often by subsequent studies, states, "Twenty years ago researchers from the RAND organization added two items to an already extensive questionnaire (Armor et al., 1976). It may have been simply a hunch or a whim, but they got results, powerful results, and the concept of teacher efficacy was born" (p. 202). Typically, a discussion of the two questions used by the RAND Corporation researchers ensues, as well as a misstatement about how the two studies scaled and scored their measures.

Early conceptualization (Denham & Michael, 1981) of teacher sense of efficacy modeled the construct as a mediating variable between a combination of personal variables, system variables, training, experiences and attributions teachers make and measurable consequences of teachers' sense of efficacy. The measurable consequences of teacher efficacy were depicted as an interactive relationship between teaching behaviors and student outcomes. The model indicates that teaching behaviors and student outcomes feed back into the antecedent conditions. Again, whether intended or not, it is implied that teacher behaviors and student outcomes are taken together. Fuller and colleagues (1982) reviewed the organizational context of individual efficacy beliefs, and presented Bandura's self-efficacy theory as an exception to other conceptualizations of efficacy because this theory focuses on expectations about behaviors and not outcomes.

The measures and models in the following section of this review confound teacher behaviors and student outcomes because they are based on the definition of

teacher efficacy. Most of these studies use measures and conceptualizations that are based on some form of the original two RAND items. However, conceptual discussions typically include some mention of Bandura's theory of self-efficacy as including both efficacy and outcome expectations.

Almost concurrently in the early 1980's, two sets of researchers attempted to measure and further define teacher sense of efficacy (Ashton, Webb, & Doda, 1983; Ashton, 1984a; Ashton, 1984b; Ashton, Buhr & Crocker, 1984; Ashton & Webb, 1986; Webb & Ashton, 1987; Gibson & Dembo, 1984). The works of these researchers were based on the RAND Change Study questions described above, but they all use Bandura (1977) to ground explanations of models and results.

Early Work of Ashton and Colleagues

In the works of Ashton and others (1983; 1986; 1987), teacher sense of efficacy is defined as the extent to which teachers believe they have the capacity to affect student performance, and "refers to the learning *outcomes* [emphasis added] teachers expect will result from teaching" (Ashton & Webb, 1986, p. 7). Early on, the construct is said to be a generalized expectancy (Ashton, Webb & Doda, 1983) about this relationship, but later publications define the construct in terms of being situation-specific (Ashton & Webb, 1986). This definition, and the model presented by these researchers, links teacher beliefs about ability to expected outcomes of teaching behaviors and not directly to specific teaching behaviors. Thus, self-efficacy expectations, or beliefs about ability to perform specific teaching behaviors, are confounded with outcome expectations or beliefs that behaviors will lead to certain outcomes.

Ashton and colleagues (1983) developed their conceptual model around the RAND Change study questions, but used Bandura (1977) to ground the model in theory. *Teaching efficacy* (RAND 1-When it comes right down to it, a teacher really can't...) is defined as a belief about the general relationship between teaching and learning. *Personal efficacy* is a teacher's sense of effectiveness or belief in ability (decontextualized). *Personal teaching efficacy* (RAND 2-If I really try hard, I can...) is the combination of teaching and personal efficacy and is defined as the extent to which teachers believe they have the capacity to affect student performance.

Ashton and others (1983; 1984; 1986) report use of the two RAND items as separate measures of teaching efficacy and personal teaching efficacy, a new measure (Efficacy Vignettes) that included situational vignettes in which teachers were asked to rate their effectiveness based upon a scenario described in each of 15 items, and an eight item forced-choice measure (Webb Efficacy Scale). The Ashton vignettes were designed to more closely represent Bandura's theoretical framework that efficacy beliefs are situation-specific. Many of these items focused on teachers' ratings of their effectiveness in the future (How effective would you be...) in various hypothetical scenarios to produce specific behaviors, while some focused on the outcomes of specified behaviors. Based on a small, but statistically significant correlation between a norm-referenced version of the vignettes and the RAND items, it was asserted that teacher sense of efficacy was a norm-referenced construct. A self-referent version was not related to responses on the RAND items (Ashton, Buhr & Crocker, 1984). Nor did the Webb Efficacy Scale and the Ashton Vignettes correlate as strongly (compared to

the RAND items) with student outcomes in reading and mathematics achievement (Ashton & Webb, 1986).

As in early research using the RAND items (Berman & McLaughlin, 1977), ambiguity about response coding and scaling is present in these works (Ashton & Webb, 1986; 1983). A five point scale is used for both items (1=Strongly Agree to 5=Strongly Disagree); however, it is unclear whether either of the items was reverse coded. In the discussion of the results, the authors do not address implications that response coding may have had on the results. For instance, a positive correlation between RAND Item 2 and language achievement scores was interpreted as an increase in personal teaching efficacy associated with an increase in language achievement scores. According to the text and the accompanying appendix of instrumentation (Ashton, Webb & Doda, 1983; Ashton & Webb, 1986), teachers who more strongly disagreed (higher scores) with "If I really try hard, I can get through to even the most difficult or unmotivated students" had students whose scores were higher on the Metropolitan Language Achievement test. As well, response coding may invalidate conclusions from results in which the norm-referenced version of Ashton Vignettes was positively correlated with the total score on the RAND items.

Ashton and Webb (1986) reported a statistically significant, positive correlation of moderate strength between RAND Item 1 and students' mathematics achievement test scores with prior achievement test scores held constant. This relationship accounted for a 24% increase in the amount of variation explained in current math achievement scores. These results indicated stronger disagreement with RAND Item 1 (that a teacher really can't do much because most of a student's motivation and

performance depend on the home environment) was related to higher levels of achievement in mathematics. Unfortunately reports of a statistically significant positive correlation of moderate strength between RAND Efficacy 2 and students' language achievement test scores (with prior achievement scores held constant) which resulted in a 46% increase in proportion of variation explained in the dependent variable and conclusions drawn from these results are suspect due to ambiguity of coding. Additionally, qualitative results that linked certain school and classroom level characteristics to levels of teacher efficacy may be invalid given that the "total" score on the RAND items was used to choose subjects for further examination.

Webb & Ashton (1987) studied 42 middle and high school teachers to assess ecological or situational factors that affect teacher sense of efficacy. Seven threats were noted: 1) excessive role demands, 2) inadequate salaries and low status, 3) lack of recognition and professional isolation, 4) uncertainty, 5) a sense of powerlessness, 6) alienation and 7) the decline in teacher morale. The authors framed this work by discussing policy implications that take two approaches to improving student achievement: Either screen out the low efficacy teachers or change the conditions of teaching. The authors offer the second as the best option, and provide argument that the school environment may impact (increase or diminish) teacher efficacy.

Few studies have used the Ashton Vignettes to explore teacher efficacy. One such study using the Ashton Vignettes as a measure of Personal Teaching Efficacy reported that classroom teachers, as opposed to preservice teachers and college faculty, had lower levels of PTE for motivation-related scenarios. More experienced groups

were more efficacious in situations which related to planning and evaluation (Benz, Bradley, Alderman & Flowers, 1992).

The Ashton Vignettes were aligned for the most part with self-efficacy theory, aside from the format of the item stem for each of the situational vignettes. These items appeared to more closely measure teacher self-efficacy for the given tasks and situations than teacher efficacy. Given this close match, Webb & Ashton (1987) and Benz, Bradley, Alderman & Flowers (1992) missed an opportunity to link sources of efficacy information with the seven threats cited in the former study and with possible implications for enhancing self-efficacy beliefs.

The Teacher Efficacy Scale (TES)

Gibson & Dembo (1984) report using the RAND items, a conceptual model of teacher sense of efficacy (Ashton, Webb & Doda, 1983), and Bandura's (1977) theory of self-efficacy to guide development of an instrument to measure teacher efficacy. Initial item development "was based on teacher interviews and an analysis of the literature that reported characteristics of teachers identified by previous researchers as having a sense of efficacy" (Gibson & Dembo, 1984, p. 571). Items were formatted similar to RAND Item 1 and RAND Item 2.

A 30-item measure was factor analyzed based on responses from 208 teachers. A two-factor solution of weakly correlated factors was used for interpretation of the measured construct. RAND Item 2 (When I really try, I can get through to most difficult students.) loaded on the Personal Teaching Efficacy (PTE) factor as did other items of similar format (Given a hypothetical situation – I did know, would know or could find out what to do) that were self-referent and positively stated. The second

factor, Teaching Efficacy (later coined General Teaching Efficacy or GTE), included RAND Item 1 and many items similar in format (Teacher/teaching-related factor unable to overcome impact of environmental factors) that were generally other teacher-referenced and negatively stated.

The authors concluded that Personal Teaching Efficacy corresponded to efficacy expectation, or "belief that one has the requisite skills to bring about the outcome" (p. 574), and that this factor reflected "the teacher's sense of personal responsibility in student learning and/or behavior" (p. 573). The second factor, Teaching Efficacy, corresponded to outcome expectancy or "belief that behavior will lead to desirable outcomes" (p. 574), and is indicative of "belief that any teacher's ability to bring about change is significantly limited by factors external to the teacher, such as the home environment, family background, and parental influences" (p.574).

The authors conclude that the factors follow Bandura's (1977) theory of self-efficacy and Ashton, Webb & Doda's (1983) model. However, this conclusion appears to suffer from inconsistencies. First, in Bandura's theory, beliefs in ability to bring about outcomes encompasses *both* self-efficacy and outcome expectations thus leaving the Teaching Efficacy factor as a redundant measure of "outcome expectancy". Second, in Ashton, Webb & Doda (1983), Personal Teaching Efficacy (measured by RAND 2) is the product of Teaching Efficacy (measured by RAND 1) and Personal Efficacy (not explicitly measured) again making Teaching Efficacy a redundant measure. Conceptually, as these factors were only weakly correlated ($r = -0.19$), it seems unlikely that Teaching Efficacy measured outcome expectancy. Other works (Guskey &

Passaro, 1994; Deemer & Minke, 1999) bear out this and other points as regards the TES and will be discussed later.

Internal consistency reliability coefficients for data gathered on each subscale (Personal Teaching Efficacy and Teaching Efficacy) were .78 and .75, respectively. Only 16 of the original 30 items were suggested for use in further research. The authors provided discriminant and convergent validity evidence in their results. In an attempt to assess characteristics of high and low efficacy teachers, factor scores from each subscale were used to select the 4 highest efficacy teachers (highest on PTE and lowest on TE) and the 4 lowest efficacy teachers (lowest on PTE and highest on TE). The authors recognized the need to consider reverse coding the Teaching Efficacy factor. Results indicated that high efficacy teachers used more whole class instruction, answered questions more, criticized less and seemed to keep students engaged.

Framing TES-Based Research

The following section presents research utilizing the TES in some form. These measures may include total scale scores, using both factors separately or using only one of the factors. Additionally, research employing RAND Items 1 and/or 2 or their sum is presented as well. However, two studies (Guskey & Passaro, 1994; Deemer & Minke, 1999) are presented first as the results provide a lens through which this research should be examined.

For ten years the TES was unchallenged as a measure of teacher efficacy aside from recognition that positive versus negative item wording problems may exist (Woolfolk & Hoy, 1990; Hoy & Woolfolk, 1993). Rich, Lev & Fischer (1996), after translating the TES to Hebrew and factor analyzing responses from 218 Israeli teachers,

indicated that the PTE and TE subscales may "vary not only on intended dimension[s] but also due to semantic issues" (p. 1024). Also, Hoy and Woolfolk (1990) indicated that the Teaching Efficacy subscale (henceforth called General Teaching Efficacy (GTE)) did not appear to assess outcome expectancy, but rather a "general belief about the power of teaching to reach difficult children" and has to do with "teachers' conservative or liberal attitudes toward education" (p. 283).

In 1994, Guskey & Passaro published a study that successfully challenged the TES based on semantic differences in the subscales such that Personal Teaching Efficacy items were self-referent (I) and General Teaching Efficacy items were other teacher-referent (teachers). Balancing the referent on the two factors, Guskey & Passaro (1994) concluded that the factors represent internal (perceptions of personal influence, power, and impact in teaching and learning situations from a perspective that is positive) versus external (perceptions of influence, power, and impact of elements that lie outside the classroom or beyond the direct control of teacher from a perspective that is negative) distinctions. Guskey & Passaro (1994) indicated that there was possible confounding of positive versus negative language in items across subscales; however, their study did not address this.

Five years later, Deemer & Minke (1999) addressed the issue of item wording such that positive versus negative item wording was balanced on both factors. The results of their study indicated that the TES factored into a single factor. However, the authors stopped short of designating this factor as a measure of teacher self-efficacy beliefs due to inconsistencies with Bandura's self-efficacy theory. Nonetheless, the TES was, and still is, used frequently to assess *teacher efficacy*.

Research Using the Teacher Efficacy Scale

Research which used a total scale score derived by summing items on the TES found positive relationships with commitment to teaching (Evans & Tribble, 1986), preservice training in specific behavioral and academic interventions (Newman, 1999) and principal leadership behaviors (Hipp, 1997). These studies did not indicate whether items on the GTE subscale were reverse-coded before obtaining total scores.

Several studies did use a single TES score after reverse coding the GTE subscale and combining the GTE and PTE subscales into a single variable. Chester & Beaudin (1996) combined scale scores from the PTE and GTE subscales after reverse-coding the GTE items and found that declines in beginning teacher's efficacy were mediated by age and experience and related to opportunities to collaborate and levels of attention from supervisors. Researchers (Parkay, Greenwood, Olejnik & Proller, 1988; Greenwood, Olejnik & Parkay, 1990), using a TES total score, found a positive relationship with measures of internal locus of control for both positive and negative outcomes and a negative correlation with levels of stress. Guskey (1987) found moderate positive correlations between the RAND items (individually and as a total score with appropriate recoding of items) and measures of teacher's perceptions of responsibility for positive and negative student outcomes. These results suggest a link between locus of control and teacher efficacy as measured by the TES, and was not unexpected given the theoretical and semantic foundation of items on the TES (e.g., the RAND items).

Research Using Individual Subscales of the TES

The bulk of research using the TES distinguished between Personal Teaching Efficacy and General Teaching Efficacy and used both factors as variables. Studies reviewed in the current section are grouped according to whether preservice teachers, beginning teachers and/or practicing teachers are the focus.

Research on Preservice Teachers.

Personal Teaching Efficacy of preservice teachers was found to increase while General Teaching Efficacy decreased during student teaching (Hoy & Woolfolk, 1990), and prospective teachers with high levels of GTE were more humanistic in their approach to teaching particularly if their PTE scores were also high (Woolfolk & Hoy, 1990). As stated earlier, Hoy & Woolfolk (1990) renamed the Teaching Efficacy subscale as the General Teaching Efficacy (GTE) subscale. Woolfolk & Hoy (1990) also emphasized that the PTE subscale appeared to measure separately teacher's personal responsibility for positive and negative student outcomes.

Others (Housego, 1992) found early increases in PTE which stabilized over the course of a preservice program with decreases in GTE subscale score (not reverse-coded). However, Housego (1992) misinterprets this decrease as a decline in preservice teachers beliefs about the ability of teaching to overcome environmental constraints. Among Korean prospective early childhood and elementary teachers, personal teaching efficacy was found to steadily increase with experience while GTE items were found to be more stable (Gorrell & Hwang, 1995). Results were attributed to increases in experience and to educational opportunities available in teacher education programs. In a causal-comparative study, Parameswaran (1998) found that preservice teachers'

exposure to field-based trips to diverse communities was related to positive post test differences in PTE, GTE and specific teaching efficacy regarding cultural differences.

Researchers have also found relationships between PTE and/or GTE and prospective teacher behaviors. Student teachers' PTE scores were positively, but weakly related to lesson presentation, questioning and classroom management behaviors (Saklofske, Michaylu & RANDhawa, 1988). In developing a scale to measure teacher efficacy in classroom management and discipline, Emmer & Hickman (1991) note that efficacy items for these specific domains were distinguishable from PTE and GTE, with a few exceptions, in a factor analysis of 119 preservice and 42 student teachers. Additionally, preferences for positive strategies for classroom management and discipline were positively correlated with PTE, GTE and the Classroom Management Efficacy subscale.

Other researchers (Enochs, Scharmann & Riggs, 1995) attempted to develop domain specific measures of teacher efficacy using the TES as a model. These researchers recognized problems with the face validity of the TES subscales to measure outcome expectancy (GTE) and self-efficacy (PTE). Items such as "I wonder if I have the necessary skills to teach science" were used to measure Personal Science Teaching Efficacy Beliefs, and items similar to "If students are underachieving in science, it is most likely due to ineffective science teaching" were used to measure Science Teaching Outcome Expectancy. Science teaching self-efficacy was positively associated with a more humanistic approach toward control and management in the classroom. Science teaching self-efficacy and outcome expectancy were found to be moderately correlated, but demonstrated differing relationships with other variables such as perceived

effectiveness in teaching science, number of college science courses, and choice of science instructional delivery.

Comparison of Preservice and Inservice Teachers

Outstanding preservice and inservice teachers did not differ in PTE and GTE across experience levels (Pigge & Marso, 1994). Despite the fact that no differences were found overall between the groups, some differences were reported between groups for individual items. However, these statistically significant results may be spurious and due to increased levels of experimentwise error rate. In another study that surveyed preservice and inservice teachers, those teachers with one to two years experience demonstrated lower levels of PTE than either preservice or more experienced teachers, but did not differ in levels of GTE (Soodak, 1997).

Research on Beginning Teachers

In a study to determine if differences in PTE and GTE exist for beginning teachers educated in traditional versus alternative preparation programs, researchers (Guyton, Fox & Sisk, 1991) administered the TES at mid-year and the end of the year. According to their analysis of the data, no differences in Personal and General Teaching Efficacy were found across programs or across time of measurement. Although there is no indication that GTE items were reverse-coded, others (Anderson, Greene & Loewen, 1988) found that beginning teachers' PTE and GTE scores were higher at the start of their first year, and that Grade 3 teachers' PTE was positively correlated with students' achievement scores.

Research on Practicing Teachers

Modifying the TES, Riggs & Enochs (1990) developed the Science Teaching Efficacy Belief Instrument (STEBI) by rewriting PTE items they believed reflected a task-related emphasis and GTE items that reflected outcome expectancy. This measure was given to 305 elementary teachers. The authors found statistically significant moderate positive correlations between their Personal Science Teaching Efficacy Belief subscale and choice of teaching science, time teaching science, use of activity-based teaching, science teaching self-ratings, subject preference and principals' ratings of teachers. Whereas weak positive correlations (.12 to .19) were found between Science Teaching Outcome Expectancy and subject preference, time teaching science and the Personal Science Teaching Efficacy Belief subscale. A weak relationship between these authors' outcome expectancy scale and their teaching efficacy beliefs scale is inconsistent with self-efficacy theory if the teachers perceived the outcomes to be contingent upon their ability (Bandura, 1997).

In research involving practicing teachers, teacher sense of efficacy as measured by PTE and GTE was related to various attitudinal and behavioral variables. Practicing teachers with high levels of GTE were more likely to approach management and control from a humanistic orientation (Woolfolk, Rosoff, & Hoy, 1990), were more likely to choose teaching as a career again (Coladarci, 1992) and were more likely to use knowledge obtained in inservice programs (Ross, 1994). Assuming GTE items were properly reversed, practicing teachers with high GTE were less hostile about inclusion if they also were using differentiated teaching techniques (Soodak, Podell & Lehman, 1998).

Low levels of PTE in practicing regular education teachers were associated with an increased likelihood of referring low SES students to special education in hypothetical case studies (Podell & Soodak, 1993) while high PTE teachers were more likely to agree with regular education placement (Soodak & Podell, 1993). Special education teachers high on both PTE and GTE exhibited increases in the number of goal changes for students performance expectations, and high levels of PTE were associated with higher levels of achievement outcomes (Allinder, 1995). In an earlier study, Allinder (1994) found that high levels of PTE for special education teachers was related to business-like orientation, confidence/enthusiasm, and trying different ways of teaching.

Weak positive relationships were found between practicing teachers' perceptions of PTE and their perceptions of principal influence and academic emphasis and their level of education (Hoy & Woolfolk, 1993). Responses from practicing middle school and high school teachers in Beirut indicated that PTE was positively correlated with attitudes toward implementing new instructional practices. Data from other Lebanese regular education teachers indicated PTE was negatively related to perception of teaching concerns (Ghaith & Shaaban, 1999).

Antecedents to Teacher Efficacy. In attempts to find antecedents to practicing teachers' sense of efficacy, researchers have examined various factors. Organizational structure and process variables were positively related to PTE (Reames & Spencer, 1998). Classroom observation was found to be a crucial element to teacher collaboration models if increased student achievement and higher levels of PTE are desired (da Costa, 1995). In a similar vein, middle school teachers' PTE was higher if

they belonged to interdisciplinary teams with common planning time than if they belonged to teams without common planning time (Warren & Payne, 1997). Additionally, Ross (1992) reported higher achievement outcomes were related to higher levels of PTE, but teachers with high and low efficacy (as measured by the total scale score of the TES) benefited from coaching in terms of student achievement outcomes.

Using existing groups (control versus inservice training), researchers (Fritz, Miller-Heyl, Kreutzer & MacPhee, 1995) reported increases in PTE with continued use of inservice practice. However, no relationship was shown to exist between exposure to a teacher peer-coaching program and levels of teacher efficacy as measured by a modified version of the TES (O'Connor & Korr, 1996). Using total scores from another version of the TES, modified for the special education resource-room context and administered to 378 resource-room teachers, resulted in statistically significant relationships between these scores and the perceived utility of supervision, but not with the frequency of supervision (Coladarci & Breton, 1997).

Soodak & Podell (1996), using a modified version of the TES, found three factors believed to represent Personal Efficacy, Outcome Efficacy and Teaching Efficacy. Teachers differed on the Outcome Expectancy scale by teaching level (Preschool and Elementary versus Junior High) and by experience (1-6 years versus > 6 years), but did not differ on Personal Efficacy and Teaching Efficacy.

Research Using the GTE Subscale

Only one study was found that used the GTE subscale alone. Results indicated no relationship between GTE and implementation of curricular change (Poole & Okeafor, 1989).

Research Using the PTE Subscale

Two studies, using only RAND Item 2 to measure PTE, indicated classroom contextual variables such as lower concentration of low achieving students, higher levels of certainty of practice, smaller classes (Smylie, 1988), perceptions of high levels of student engagement along with perceptions that their schools function as learning organizations (Ross, Cousins & Gadalla, 1996) were related to higher levels of PTE. Additionally, math and science teachers' efficacy (PTE) appeared to be linked to their stated levels of preparedness (Ross, Cousins & Gadalla, 1996).

Midgley, Feldlaufer & Eccles (1989) measured Personal Teaching Efficacy using RAND Item 2 as well as 4 other items from various sources (4 out of 5 similar in construction to PTE items of the TES). Their study results indicated that students who had mathematics teachers with high levels of PTE had higher expectations for success in math and were performing better than students whose teachers had low levels of PTE. Also, analyses using combinations across transition years from elementary to junior high school of high/high, high/low, low/high, and low/low levels of PTE point out the detrimental effect of having a low PTE teacher in junior high school on performance expectations and perceived performance. This effect was especially salient for low achieving students.

Practicing teachers with high and low PTE differed in how individual teachers approach and experience professional development. Described in relation to Bandura's four sources of efficacy information, teachers with high levels of PTE were more likely to recognize, learn from and use mastery experiences, work with and share experiences and see learning opportunities in many activities (Scribner, 1998).

PTE was not useful in predicting effective teaching behaviors of 33 Canadian teachers (Stanovich & Jordan, 1998); however, PTE was useful in predicting home economics teachers' global (perspective) education practices while GTE was useful in predicting global (perspective) education attitudes (Mumaw, Sugawara& Pestle, 1995). International comparisons between Scottish and American teachers resulted in no differences in PTE (measured with PTE items as well as skill-based items); however, higher levels of PTE were associated with higher levels of age, education and experience for both sets of teachers (Campbell, 1996). These results are inconsistent with other studies which found decreases in PTE with experience. A study of Dutch regular education teachers indicated a statistically significant negative relationship between PTE (adapted version of PTE subscale) and problem ratings and referral chance (Meijer & Foster, 1988).

Summary of TES Research

The research literature reviewed above must be critically examined keeping key points in mind. First, two studies (Guskey & Passaro, 1994; Deemer & Minke, 1999) raise serious questions about the factor structure of the TES due to item wording. This issue calls into question the validity of any conclusions derived from this measure particularly as a two factor model of "teacher sense of efficacy". Additionally as Deemer & Minke (1999) note, even as a single factor the TES may not adequately capture the dimensions of teachers' self-efficacy beliefs because of its *global* and *decontextualized* nature. As noted by others (Deemer & Minke, 1999), in several studies where domain-specific measures of competence were included with the TES, results distinguished between the domain specific measures (although decontextualized) and

the positively worded and negatively worded factors of the TES (Ashton, Buhr & Crocker, 1984; Emmer & Hickman, 1991; Rich, Lev & Fischer, 1996; Benz, Bradley, Alderman & Flowers, 1992).

Nonetheless, results described here, and models (and measures) derived from these results, are suspect and should be carefully examined before conclusions are drawn. Based on the results described above, Personal Teaching Efficacy was more consistently related to various positive outcome measures and organizational structures and processes than General Teaching Efficacy. Deemer & Minke (1999) question results of some of their own work using the TES, but add "... the positive findings for the personal teaching efficacy factor probably remain supported because this factor is similar to the single factor found in this study" (p. 9).

A note must be made that a thorough review of the appropriateness of various statistical methodologies used to conduct analyses in these studies was not included here. However, problems seemed evident in many of the studies using the TES. A sample of some of these problems included inadequate sample size, multiple t-tests rather than analysis of variance used to test for differences in multiple factors, multiple ANOVA's used to test for differences in teacher sense of efficacy (using both PTE and GTE) rather than using multivariate procedures, and use of post hoc procedures to identify differences when overall differences were not statistically significant. PTE and GTE subscale scores were usually treated as separate dependent variables rather than as factors of a single construct, with a few exceptions (e.g., Woolfolk & Hoy, 1990).

It is also important to note that many of the studies cited here used Gibson & Dembo's (1984) subscale reliability estimates as indications of the reliability of the

TES. However, reliability is not a property of an instrument, but rather reliability is a characteristic of scores and is a function of the sample from whence the scores were produced (Vacha-Haase, 1998; Vacha-Haase, Ness, Nilsson & Reetz, 1999; Thompson & Vacha-Haase, 2000). Henson, Kogan & Vacha-Haase (2000) demonstrated this fact in a reliability generalization study of the TES and its subscales and various other measures related to teacher sense of efficacy. These methodological issues, noted in concert with factor structure problems of the TES, scoring issues and inconsistencies in conceptualization and interpretation of results, provide damaging evidence of the construct validity of interpretations based on this measure.

Non-TES Measures of Teacher Efficacy

Various attempts at measuring and studying the construct of *teacher efficacy* were made over the last 25 years. Most studies used the TES or some modified version of this measure; however, some researchers decided to develop their own measures of teacher efficacy. Because of the variety in measures used here, these works are presented chronologically and/or grouped by author and focus for discussion. All of these studies either implicitly or explicitly appeared to use the definition of teacher efficacy to guide the studies. The first section presents studies of teacher efficacy as relates to individuals while the second presents studies as relates to teacher sense of efficacy at the school level. A summary of results from these two sections follows.

Teacher Efficacy - Individual

Trentham and colleagues (1985) used an adapted measure from an unpublished dissertation to assess teacher sense of efficacy. These authors do not provide an instrument nor do they provide sample items. However, teacher efficacy was related to

superintendent ratings of teacher competency, birth order and whether teachers would choose teaching as a career again. Additionally, the authors were able to successfully classify approximately 80% of the teachers as low competency versus average/high competency using teacher efficacy scores and three other variables, including race, competency with life, and birth order.

Two other studies (Hoover-Dempsey, Bassler & Brissie, 1987; Hoover-Dempsey, Bassler & Brissie, 1992) provided a single sample item (out of 11) used to measure teacher sense of efficacy. The item read, "I feel that I am making a significant difference in the lives of my students" (Hoover-Dempsey, Bassler & Brissie, 1987, p. 425). Since none of the other 10 items are included, it is difficult to judge the face validity of the authors' measure. Based on the single item, the measure would not appear to assess teachers' beliefs in their capability to affect student performance. Although it is not clear in the reported data analysis, it is inferred that teachers' perceptions of efficacy and parental involvement and support were aggregated to the school level. Nonetheless, results from both studies indicate strong positive relationships between teacher efficacy, as measured, and teachers' perceptions of parental involvement and support.

Responsibility for student achievement was equated with teacher sense of efficacy in several studies (Guskey, 1982; 1984; 1988). RAND Item 1 and RAND Item 2 were used as measures of general efficacy. The author concluded that teachers make causal attributions differently when explaining positive versus negative student outcomes. Positive outcomes are generally attributed to teacher effort and ability. Negative outcomes are more likely attributed to external causes such the difficulty of

teaching a particular group of students, but were also more often attributed to lack of teacher effort than lack of teacher ability. There were differences in the causal attributions of elementary and high school teachers (Guskey, 1982). Teachers who exhibited positive change after implementing a new instructional program demonstrated higher levels of responsibility for both positive and negative student outcomes, higher levels of affect toward teaching, but lower levels of confidence in ability (Guskey, 1984). Also, teachers with higher levels of responsibility for student achievement were more likely to have high receptivity to implementation of new programs (Guskey, 1988). Based on these and other works, Guskey (1989) models the process of teacher change such that learning of new instructional practices followed by change in practice and change in student learning outcomes results in change in teachers' attitudes and perceptions (i.e. teacher efficacy). In light of self-efficacy theory, mastery experiences and related outcomes may contribute to changes in beliefs about ability.

Ross, McKeiver & Hogaboam-Gray (1997) completed a qualitative study of 4 teachers during destreaming (mainstreaming). The focus of these case studies was to assess factors that were related to changes in teachers' sense of efficacy. Teachers' sense of efficacy declined at the outset of destreaming, but rebounded as teachers worked through problems of implementation. Researchers credit the rebound to mastery experiences, feedback about student outcomes, high levels of collaboration and encouragement from others. Teachers with more experience drew from their experiences to solve instructional problems while less experienced teachers used collaborative relationships with other teachers to gain knowledge of new teaching methods.

Teacher Efficacy – School Level

In a study to examine organizational characteristics that affect school sense of efficacy, researchers (Newmann, Rutter & Smith, 1989) measured teacher efficacy using 4 items from the High School and Beyond Administrator/Teacher Survey. Two of the items assess teacher job satisfaction while the other two were believed to assess a small component of teacher efficacy. The efficacy-related items were said to be "To what extent do you feel successful in providing the kind of education you would like to provide for most of your students?" and "I sometimes feel it is a waste of time to try to do my best as a teacher" (p. 228). All four items were aggregated to the school level. Results of the study indicated when background characteristics were controlled, organizational characteristics such as orderly behavior of students, teachers' knowledge of other teachers' courses and a spirit of innovation were positively related to average teacher efficacy, as measured, in schools. The authors also noted the possible importance of examining the cohesiveness or variability in teacher efficacy scores within schools.

Using the same 4 items from the High School and Beyond Administrator and Teacher Survey, researchers (Lee, Dedrick & Smith, 1991) also examined organizational characteristics related to levels of teacher efficacy. Findings suggested that teachers from Catholic schools were more efficacious than public school teachers. Additionally, intrinsic sources of information (classroom characteristics such as control of classroom practice and students' level of ability) were more strongly related to levels of efficacy and satisfaction than extrinsic sources such as salary. Strength of principal leadership was positively related to the measure of teacher efficacy.

Taylor (1992) describes a measure developed to assess teachers' beliefs that they can affect students' learning. Perceptions of influence in ten learning and behavior areas (e.g., reading, mathematics, attendance, behavior, etc.) were used to assess indicators of teachers' sense of efficacy and principals' sense of efficacy. Teachers' scores were not aggregated to the school level for comparisons. Differences were noted between elementary teachers' perceptions of influence and both junior and senior high school teachers' perceptions of influence. Principals had higher levels of efficacy in general than did teachers. The author concludes that due to a lower sense of efficacy, teachers at junior and senior high school levels as opposed to elementary levels may suffer from burnout more often, be less effective and more reluctant to change.

Petrie, Hartranft & Lutz (1995) used leadership and organizational characteristics hypothesized to be related to teacher sense of efficacy to develop a measure of teacher efficacy. Items assessed collaboration, sharing information, administrative support, articulation of responsibilities, availability of resources and respect. Relationships between four factored subscales (Personal Belonging, Being Informed, Being Influential, and Harmonious Alignment of Work Structure and Values) and ratings of school effectiveness were hypothesized to exist. Researchers concluded that rankings of school effectiveness were significantly related to the school means of teacher efficacy as defined by these researchers.

Bandura (1993), using definitions for and citing studies from the teacher sense of efficacy literature, measured individual teacher's sense of efficacy in order to aggregate these measures to the school level. The aggregated school mean of individual teachers' efficacy beliefs was used as a measure of collective teacher efficacy. Bandura

(1993) did not report how he measured individual teachers' efficacy beliefs. However, according to Pajares (1996), the following item was used to assess teacher sense of efficacy in Bandura (1993): "Please indicate your confidence that you can attain the following grade level gains with the students in your class this year. [gains in 2-month increments presented]". Although Bandura (1977; 1982; 1997) repeatedly distinguishes between self-efficacy and outcome expectations, Bandura (1993) equates teachers' self-efficacy with teacher sense of efficacy.

In addition, the item cited above appears to measure teachers' confidence in their abilities to produce certain grade level gains or outcomes with their students. Attaining certain grade level gains with students is not a behavior. As stated earlier in this review, and repeatedly by Bandura, measures such as these *confound* beliefs about ability to perform tasks or behaviors with beliefs about expected outcomes. In other words, although the item stated above produces a rating of a teacher's confidence that they can produce certain outcomes, it does not indicate the strength of that teacher's belief in their ability to execute teaching behaviors that might produce the stated outcomes.

Additionally, aggregation of individual teachers' assessments of efficacy may not be an adequate operational measure for teacher collective efficacy. Bandura (1993) discussed how aggregated individual assessments of self-efficacy beliefs are only appropriate if teachers are functionally independent of other teachers in their schools. He also stated that teachers were believed to be moderately inter-dependent; therefore, mean aggregation of individual scores as regards individual teacher efficacy may not be appropriate.

Bandura (1993) is presented here because, as with other outcome-based measures (e.g. TES), self-efficacy beliefs about context- and task-specific teaching behaviors are not exclusively assessed. Nonetheless, Bandura concluded that teacher efficacy is a positive correlate of student academic achievement and that student characteristics such as SES and student body stability affect student achievement through their negative impact on teachers' collective efficacy beliefs. Additionally, teaching experience was found to negatively impact teachers' collective efficacy beliefs (Bandura, 1993).

Summary of Non-TES Measures of Teacher Efficacy

Some studies in this section included items that did not possess face validity as assessments of *teacher efficacy* as defined earlier in this review nor did they possess face validity as assessments of *teacher self-efficacy* as previously defined. As with some studies utilizing the TES, common methodological problems (Thompson, 1999) were evident in measurement and/or analysis of data. As well, conceptual and measurement inconsistencies were evident in some of these studies such that teacher efficacy was equated with teacher responsibility for student achievement (Guskey, 1982; 1984), statistical definitions of teacher efficacy were created with existing measures instead of conceptual definitions guiding development of items used to assess teacher efficacy, and possibly inappropriate aggregation of individual assessments of teacher efficacy to represent collective teacher efficacy when teachers were described as being moderately dependent upon other teachers in accomplishing goals.

Measures of Teacher Self-Efficacy Beliefs

The studies reviewed in this section define and measure teacher self-efficacy beliefs in terms of task-specific assessments of ability. Not all measures discussed in this section consider the contextual specificity of self-efficacy beliefs. However, self-efficacy theory as proposed by Bandura (1977; 1997) maintains that self-efficacy beliefs are task *and* situation specific.

Using individual teachers' ratings of the extent to which they felt successful in providing the kind of education they would like to provide for their students in each of their classes as a measure of teachers' self-efficacy beliefs, Raudenbush, Rowan & Cheong (1992) concluded that a large portion of the variance in teachers' self-efficacy beliefs (as measured) was due to intra-teacher variation. In other words, teachers felt differently about the extent of their success with different classes. Certain characteristics of classes, including tracking, perceptions of engagement and age, accounted for this variation, and organizational factors, such as high levels of collaboration and control over instructional conditions, accounted for inter-teacher variation. Unfortunately, the face validity of the single item measure in this study is somewhat suspect because it focuses evaluations of success on past behaviors and not on proposed behaviors. A possible interpretation of this measure might be that it is a combined measure of sources of efficacy information.

Loup (1994) developed a measure to assess motivational consequences of teacher self and organizational efficacy beliefs in accomplishing specific school-level goals. Bandura's theory of self-efficacy suggests that persons with high levels of self-efficacy about a task are motivated to perform that task as evidenced by the effort

expended, persistence in accomplishing tasks when obstacles are present, and increased levels of effort when faced with failure. These consequences of efficacy (relative to particular stated school-level goals) were assessed from both a self and other teacher perspective. In other words, teachers responded as to their own effort, persistence and decrease in effort in the face of failure to accomplish particular goals, and they were asked to rate levels of effort, persistence and decrease in effort following failure for other teachers in their school to accomplish the same goals. Typically, the goal statements were school-level goals such as "to establish professional relationships with administrators and other teachers" (Ellet, Hill, Liu, Loup & Lakshmanan, 1997, p. 28) and were situated in the context of the teacher's school.

Research results (Loup,1994; Ellet et al., 1997; Hunt, 1999) identified linkages between professional learning opportunities in schools and teachers' ratings of self and organizational efficacy motivation. As well, factor analytic findings from Loup (1994) indicated three factors called Me, We and Thee. Loup's (1994) interpretation of the factors indicated that teachers distinguished between themselves and other teachers in efficacy motivation except in relation to behavior motivation in response to failure.

Two studies attempted to assess teacher self-efficacy beliefs about implementing instructional changes. De Mesquita & Drake (1994) used 21 items to measure teachers' beliefs about their abilities to successfully perform specific program tasks. A sample item was, "I can balance teacher-directed and child-initiated activities" (p. 296). The items were developed based on seven domains such as developmentally appropriate practices, multi-age/multi-ability grouping, continuous progress monitoring, etc. It does not appear that any effort was made to designate a context or situation (e.g., In my

classroom, I can...) under which self-efficacy beliefs were to be assessed. Teachers indicated the highest levels of self-efficacy beliefs in their ability to work in teams compared to all other areas. Lowest levels of self-efficacy beliefs were in the areas of performance assessment and heterogeneous groupings. Overall, less experienced teachers in this study rated their self-efficacy beliefs higher than more experienced teachers. Although multiple items were used to assess self-efficacy beliefs about seven domains of functioning, no attempt was made to analyze data using multivariate methods.

In a similar study, Stein & Wang (1988) developed a measure of teacher self-efficacy that asked teachers to rate "on a five-point scale how well they feel they can implement the particular behavior, role, or classroom condition [required for successful program implementation] described by the item" (p. 177). Findings for this study found relationships existed between teachers' perceptions of self-efficacy to implement program specific behaviors and successful implementation of program requirements. Specifically, higher self-efficacy scores followed higher levels of success at implementing program objectives. Teachers also related to the researchers that successful accomplishment of incremental self-set goals helped boost their beliefs in their abilities to implement program goals.

Teachers' beliefs in their abilities to effectively use strategies specific to teaching gifted and talented children were found to be higher for teachers trained as gifted and talented teachers than for regular classroom teachers and prospective teachers (Starko & Schack, 1989). A positive relationship was also found to exist between teachers' self-efficacy beliefs about using gifted and talented instructional strategies and

the use of such strategies (target behavior). Teacher self-efficacy in this study was measured by asking teachers to rate their confidence in being able to perform specific instructional strategies (non-situation specific) used in educating gifted and talented students (e.g., independent study on student interests, teach units with higher level thinking, etc.).

Bandura's (personal communication, November, 2000) own 30-item measure of teacher self-efficacy divides teaching tasks into 7 areas of functioning. These areas include influence on decision making, influence on school resources, instructional efficacy, disciplinary efficacy, enlisting parental involvement, enlisting community involvement, and creating a positive classroom climate. A sample item for the disciplinary efficacy subscale reads, "How much can you do to get children to follow classroom rules?" This measure did not appear to require a situational assessment of self-efficacy beliefs (e.g., With the students in your class at this time, how much can you do to...); however, some items (e.g., How much can you influence the decisions that are made in your school?) imply a specific context (i.e. in your school). Only one published study utilizing this measure was found (Woolfolk Hoy, 2000).

The Cyclical Model of Teacher Efficacy

Some newer measures in this area are based on a model of teacher efficacy (see Figure 3) proposed by Tschannen-Moran, Woolfolk Hoy & Hoy (1998). This model is said to improve upon previous conceptualizations of teacher efficacy, and incorporate both Bandura's theory of self-efficacy and Rotter's outcome expectancy construct. Studies are reviewed by the authors (Tschannen-Moran et al., 1998) and categorized based on whether measures grew out of Rotter's conception of generalized expectancies

of reinforcement or Bandura's concept of self-efficacy. A model is proposed by the reviewers to guide future research.

At first glance, the model appears to be in line with self-efficacy theory. A cyclical process is depicted whereby cognitively processed sources of efficacy information feed the interactive relationship between analysis of the teaching task and assessment of personal teaching competence which forms teacher efficacy beliefs that result in goal setting, effort, persistence, etc. and subsequent performance (or nonperformance) of the task. Finally, the results of the task performance feed back into the model as new sources of efficacy information.

However, the authors (Tschannen-Moran, Woolfolk Hoy & Hoy, 1998) do not explicitly include the role of outcome expectations in their model of teacher efficacy. Rather, its role must be ferreted out in the text of the review. As stated earlier, Bandura's theory of self-efficacy (see Figure 2) is distinct in that it distinguishes between beliefs about ability to produce behaviors, or agent-means relationships, and expectations about what outcomes are realized from the behaviors, or means-ends relationships (Skinner, 1996). Self-efficacy beliefs are beliefs about agent-means relationships. Tschannen-Moran and others (1998) argue that "a consideration of means-ends relationships, in the form of *judgements about the requirements of the teaching task* [emphasis added], is an important factor in teacher efficacy" (p. 210). And continue to say, "Our conceptualization of the analysis of the teaching task is consistent with Skinner's (1996) concept of contingency or means-ends relationships" (p. 232).

Thus, Tschannen-Moran and colleagues (1998) equate the task and context-specificity of self-efficacy beliefs with teachers' analysis of the task at hand which they equate with means-ends contingencies (outcome expectations). Or as these authors stated, "What *outcomes* [emphasis added] do I seek, that is, what is success in this teaching task?, and, What *means* [emphasis added] or actions will be required to accomplish this particular teaching task—to succeed in this situation?" (p. 232). It appears from these citations that these authors confused behaviors or tasks (means) with outcomes (ends), just as the definition of teacher efficacy, or belief in one's capability to affect student learning, fails to address teachers' beliefs about their abilities to perform the required tasks (means) that can affect student learning (ends).

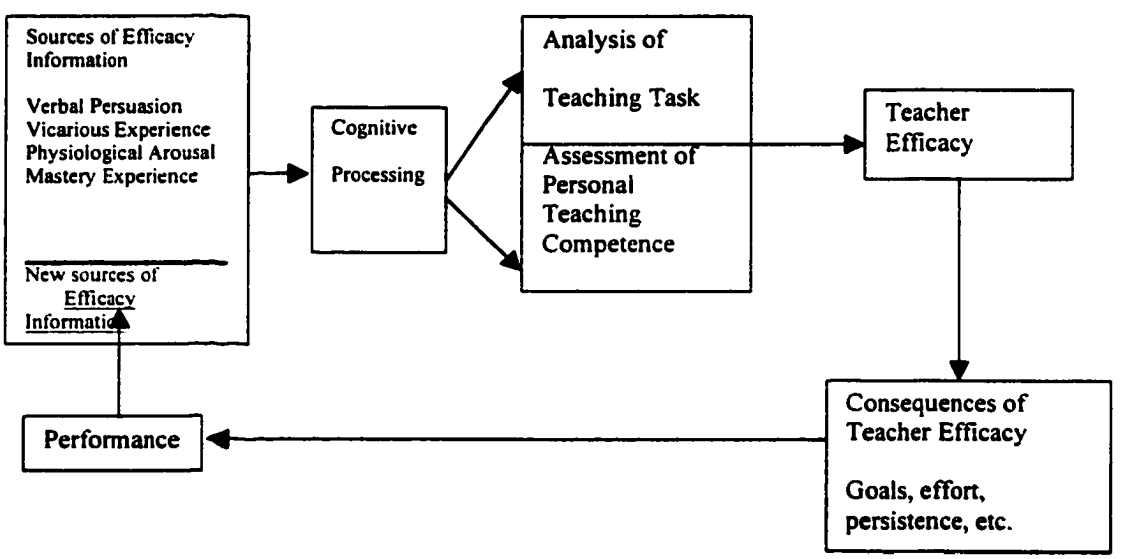

Figure 4: Tschannen-Moran et al.'s (1998) Cyclical Model of Teacher Efficacy

This interpretation of agent-means-ends relationships certainly does not flush with the authors' (Tschannen-Moran, Woolfolk Hoy & Hoy, 1998) definition of teacher

efficacy as "the teacher's belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (p. 233). This definition describes teacher self-efficacy beliefs about teaching-related tasks. However, the model and the authors' interpretation of the model, do not follow self-efficacy theory. As stated earlier, and based on the definitions given earlier in this review of teacher efficacy and teacher self-efficacy, the model proposed by Tschannen-Moran and colleagues (1998) was aptly named "The cyclical nature of teacher efficacy" (p. 228) as outcome expectations are still confounded within.

This model is inconsistent with self-efficacy theory in another way. Tschannen-Moran and others (1998) contend that self-efficacy beliefs are future-oriented because these beliefs are about future capability to successfully accomplish a task in a certain situation. Assessments of Personal Teaching Competence depicted in the model are said to be "perceptions of current functioning" (p. 232). However, Bandura (1997) places self-efficacy beliefs as current beliefs in abilities to perform tasks in a given situation. Thus, in this model, Assessments of Personal Teaching Competence in context should be equated with Bandura's description of self-efficacy beliefs.

Measures Based on the Tschannen-Moran, et al. (1998) Model

Various measures have been based on the Tschannen-Moran, Woolfolk Hoy & Hoy (1998) model. Two measures were designed to assess individual teacher efficacy and one was developed to measure teacher collective efficacy. Tschannen-Moran (2000), dissatisfied with the validity of domains of functioning on Bandura's measure of teacher efficacy, employed a group of educators to define tasks that were more

relevant to teaching. This new measure is called "The Ohio State Teacher Efficacy Scale". Fifty-two items designed to "assess the full range of teaching tasks and capabilities" were developed. The items and response scale were similar in format to Bandura's teacher self-efficacy scale. A sample item reads, "How much can you do to motivate students who show low interest in school work?" (p. 14). A 9-point Likert scale, anchored with 1=Nothing and 9=A Great Deal was used to gain responses from 59 preservice and 62 inservice teachers. Factor analysis of the 52-item instrument resulted in a single factor explaining 41% of the variation in teachers' scores. Thirty-six of the 52 items were retained, and an estimate of internal consistency reliability of scores from this sample was 0.97. Positive moderate and positive weak correlations were found between summed scores on this measure and TES measures of PTE and GTE, respectively. Also, scores from The Ohio State Teacher Efficacy Scale exhibited weak negative correlation with measures of work alienation.

This measure (Tschannen-Moran, 2000) did not explicitly or implicitly require a situation-specific assessment of teacher self-efficacy beliefs. No directions are given to situate assessments of future functioning, nor are the items worded in such a way as to imply a particular situation/context. As a matter of fact, it may be argued that the item stem most often used in this measure, "How much can you do to...", may be interpreted by respondents as how much have you been able to do to accomplish the various tasks listed. Regardless, The Ohio State Teacher Efficacy Scale appears not to measure *teacher efficacy* at all, but instead, absent a contextual element, appears to measure *teachers' self-efficacy beliefs* about the stated teaching tasks.

Woolfolk Hoy (2000) reported results from a study in which the TES, Bandura Teacher Self-Efficacy Scale and the OSU Teaching Confidence Scale, a program specific measure of efficacy, were used to assess changes in efficacy beliefs for prospective teachers through their first year of employment as a teacher. The OSU Teaching Confidence Scale asked teachers to rate their confidence in their ability to accomplish various tasks on a 6-point scale. Although sample size was relatively small (n=55), responses for each of the measures listed above were factor analyzed. Results obtained using paired t-tests on all three measures across 3 administrations indicated similar response patterns. In general, levels of efficacy rose during teacher preparation, but declined upon completion of the first year of teaching. These findings are consistent with other research reviewed above.

Henson, Bennett, Sienty & Chambers (2000) reported results from an instrument designed to be in line with the model proposed by Tschannen-Moran and her colleagues (1998), following Bandura's (1997) admonitions to examine factors affecting assessment of task difficulty and using hypothetical vignettes or case-based assessment of teacher efficacy. The authors cite Tschannen-Moran, Woolfolk Hoy & Hoy's model of teacher efficacy as being relevant to their study, and found,

> Important in this model is the claim that an analysis of the teaching task is a critical contributory element to ultimate self-efficacy judgements by teachers. That is, in any efficacy judgement, a teacher must weigh his or her abilities and resources against the factors that may inhibit student learning or at least make learning difficult (p. 7).

Student learning and/or achievement are not teacher behaviors. Again, self-efficacy beliefs are construed as focused on outcomes rather than prerequisite behaviors.

Nonetheless, Henson and colleagues (2000) employed a measure developed from a different and interesting perspective. The Means-End Teaching Task Analysis, developed by the first author, uses a case-based scenario to develop a hypothetical context in which teachers record responses to three challenges: 1) providing effective instruction, 2) facilitating the student's motivation, and 3) managing the student's behavior. Respondents are also asked to list, and rate, elements that make it difficult to teach the student and for the student to learn and that help in teaching the student and for the student to learn. This measure also includes a third section that consists of 12 efficacy items (similar to the PTE items), specific to the student in the case study, that assessed competence in the three challenge areas listed above.

An attempt was made to use analysis of the teaching task (ratings of elements that help and hinder teaching and student learning), personal teaching competence and external locus of control (GTE) to predict context specific efficacy and global personal teaching efficacy (PTE). It should be noted that the authors (Henson et al., 2000) use the GTE subscale (called External Locus of Control by the authors) as a predictor of self-efficacy because, "In their model, Tschannen-Moran et al. *alluded* [emphasis added] to this possibility but emphasized the need for a task analysis variable" (p.21). Context specific efficacy included instructional efficacy, positive classroom management efficacy and negative classroom management efficacy.

Henson et al. (2000), based upon results of factor analysis of the PTE items, conclude that the PTE measure assessed personal teaching competence, or present or past competence, and general assessment of future functioning, or personal teaching efficacy. These conclusions are said to support Tschannen-Moran et al.'s (1998) model.

As such, Personal Teaching Competence was used as a predictor and Personal Teaching Efficacy as a dependent variable in this study.

Results of canonical correlation analyses from the study by Henson and colleagues (2000) indicated that variation in a latent dependent variable consisting primarily of context specific instructional efficacy was primarily explained by variation in assessment of personal teaching competence. The second canonical variate indicated negative relationships between external locus of control (GTE) and context specific, classroom management efficacy variables. The relationship between task analysis and context specific (or global) teacher efficacy was not supported. Reliability coefficients were reported as marginal in this study.

In an attempt to define and measure collective teacher efficacy, Goddard, Hoy & Woolfolk Hoy (2000) propose a model similar to the Tschannen-Moran et al. (1998) model. The difference between these models is that in place of performance, the word feedback is used. Otherwise, the model and its interpretation are similar to Tschannen-Moran et al. (1998). The authors of this study define collective teacher efficacy as "the perceptions of teachers in a school that the efforts of the faculty as a whole will have a positive effect on students" (p. 480). Goddard et al. (2000) also used the TES as a model to develop items that assess group competence positively-stated, group competence negatively-stated, task analysis positively-stated and task analysis negatively-stated.

It should be noted that for the most part the items on the Goddard et al. (2000) measure described here situated responses in the context of teachers' schools. Additionally, items on this measure assess collective teacher efficacy from a group

perspective (e.g., "Teachers in this school...) rather than aggregating ratings of self-based teacher efficacy to the school level. "Teachers here are confident they will be able to motivate their students" is an example of a group competence (positive) item. "Homelife provides so many advantages they are bound to learn" is an example of a task analysis (positive) item. Data from teachers and students from 47 elementary schools were used in this study. Teachers' responses were aggregated to the school level and factor analyzed. Factor analysis of the 21-item instrument was performed on mean item scores from 47 schools. Results indicated a single factor on which all items loaded. A two factor solution was studied and found to result in strongly correlated factors. The researchers concluded that these results "provided further evidence that collective teacher efficacy is the common unobserved factor operationalized by our revised collective efficacy scale" (p.494).

Findings from the Goddard, et al. (2000) study indicated that collective teacher efficacy was moderately correlated with PTE and trust in colleagues and negatively correlated with teacher powerlessness. Collective teacher efficacy was also found to be a statistically significant predictor of student achievement scores in reading and mathematics with demographic variables controlled. Additionally, collective teacher efficacy explained over half of the variance between schools in student achievement. It is important to note that prior achievement in reading and math were not accounted for in the models used, and whether student achievement was measured before/after ratings of collective teacher efficacy were measured was not reported.

Context-Specific Measures of Self-Efficacy Beliefs

Dellinger, Bobbett, Olivier & Ellett (2001) reported on development of a measure to assess teacher self-efficacy beliefs. This measure, called the Teacher Self-Efficacy Beliefs Scale (TEBS-S), uses 30-items to assess teachers' beliefs in their abilities, in the context of their own classrooms, to accomplish specific tasks that are linked to empirically to effective teaching and learning. The TEBS-S is one measure in a three-part assessment of teachers' self-, work-group collective and faculty collective efficacy beliefs. This three-part assessment system is called the Teachers' Efficacy Beliefs System (TEBS).

Items for the TEBS-S were reduced from an initial list of 52 items to a 30-item measure based on expert educators' assessments of each item's importance as an indicator of belief in teaching ability. All items for the TEBS-S were developed from assessment indicators of the PACES (Ellett, 1999), a classroom and observation-based assessment of indicators linked to effective teaching and learning (Davis, 2000). The TEBS-S items assess beliefs in abilities to function in the following areas: a) Long-range Planning, b) Managing the Learning Environment, c) Maintaining a Positive Classroom Climate, d) Enhancing and Enabling Learning, e) Enabling Thinking, and f) Classroom-Based Assessment of Student Learning. A sample item reads, "Right now in my present teaching situation, the strength of my personal beliefs in my ability to plan activities that accommodate the range of individual differences among students is..." (p. 17). Response options were presented on a 4-point scale anchored at 1=Very weak belief in my ability to 4=Very strong belief in my ability.

This measure improves upon other measures of teacher self-efficacy beliefs in several ways. The TEBS-S is the only known measure of teacher self-efficacy beliefs that is firmly grounded in self-efficacy theory. Items assess situated perceptions of ability to perform teaching tasks in the context in which they are formed (i.e. the classroom). And, it is one of the few measures that used specific tasks, skills or behaviors related to teaching, specifically to behaviors that are linked by empirical evidence to effective teaching and learning (Davis, 2000).

As stated previously, the TEBS-S was only one part of a set of measures designed to assess teachers' efficacy beliefs. The other parts assess work-group collective and faculty collective efficacy beliefs. These measures do not assess teachers' individual beliefs in their abilities to accomplish teaching tasks. Rather the items on the Teacher Work-Group and Faculty Collective Efficacy Scales were designed to measure teachers' perceptions of the appropriate groups' shared beliefs in their abilities to accomplish various goals. Goals are valued outcomes, for example *effectively communicating with parents* is an example of a faculty-level goal for many school faculties that might result from behaviors completed by faculty members. These teachers may or may not work together at the same time to complete these behaviors. Thus, the issues raised by others (Bandura, 1995c; Maddux, 1999; Kirsch, 1995) regarding the use of outcomes as behaviors are pertinent to this discussion. However, in developing this measure, the authors decided that group level tasks may best be represented to group members as group goals and not component tasks required to accomplish the outcome.

Several recent studies in the state of Louisiana have used the self- and collective efficacy sections of the Teachers' Efficacy Beliefs System (TEBS). Results (Olivier, 2001; Bobbett, 2001) of factor analyses using data obtained from the Teacher Self-Efficacy Beliefs Scale (TEBS-S) for large samples of teachers suggested that teachers' beliefs about the stated teaching tasks were separable into domains of functioning. Specifically, Bobbett (2001) found four viable factors including Classroom Management, Communication/Clarification, Accommodating Individual Learning Differences and enhancing the development of Higher Order Thinking Skills. Olivier (2001) found five factors to be salient including Communication/Clarification, Management/Climate, Accomodation of Individual Differences, Motivation of Students and Higher Order Thinking Skills.

In Bobbett's (2001) study, teachers' average self-efficacy beliefs were of interest. Specifically, at the school level, Classroom Management and Communication/Clarification subscales of the TEBS-S were found to be positively and moderately related to Louisiana School Performance scores. Additionally, the four subscales in this study (Bobbett, 2001) were positively related to teachers' perceptions of professional commitment. Olivier (2001) used both the self-efficacy section of the TEBS and the faculty collective efficacy beliefs section. Items used to assess teacher faculty collective efficacy beliefs factored into a single subscale. Olivier (2001) found strong relationships between perceptions of shared leadership, collegial teaching and learning, professional commitment and teachers' individual perceptions of faculty collective efficacy beliefs averaged to the school level. The sample size for this study was large (> 1000 teachers) and therefore, many significant bivariate correlations were

found to be statistically significant, but were weak in strength. Additionally, Olivier (2001) found that teachers' faculty collective efficacy beliefs were strongly correlated with Louisiana School Performance Scores, while one subscale of the self-efficacy beliefs measure, Management/Climate, was moderately correlated with the Louisiana School Performance Scores as well.

In both of these studies, however, predictive relationships were not established as Louisiana School Performance Scores were obtained for the year preceding each of these studies. The importance of these results is in providing evidence that past mastery experiences, successful school performance scores, may have had a role in impacting levels of faculty collective and self-efficacy beliefs.

Summary of the Literature Related to Teachers' Self-Efficacy Beliefs

The studies reviewed here represent a large body of literature regarding teacher sense of efficacy and teacher self-efficacy beliefs. The purpose of this review was to initiate discussion on whether this body of literature constitutes knowledge, and if so, what is the structure and condition of that knowledge. The following summarizes information gained from this content analysis of the studies in this area.

The RAND Change studies (Berman & McLaughlin, 1977; Armor et al., 1976) used the term "teacher sense of efficacy" but based item development on theories of locus of control. Subsequent researchers continued to use the same term, but attached a different meaning. As the definitions of teacher efficacy have evolved, it is clear that the definition most often used, teachers' beliefs in their abilities to affect student performance, is distinct from teacher self-efficacy or a teacher's belief in their ability to perform situation specific teaching-related tasks. This distinction is not recognized in

the extant literature. Unfortunately, these terms are used interchangeably by most researchers in this field (e.g., Bandura, 1993; 1997; Soto & Goetz, 1998). This conceptual distinction is elemental if scientists are to continue discourse, develop appropriate operational measures, perform research in this area, and draw valid theory-related conclusions.

Results of the RAND studies (Berman & McLaughlin, 1977; Armor et al., 1976) are not as powerful as reported in those studies or as presented in subsequent literature and previous reviews. Causality is questionable under the design and methods of both studies. These studies and others using the RAND items should be re-examined with careful attention paid to item scaling and scoring.

Likewise, results from studies using the Teacher Efficacy Scale (Gibson & Dembo, 1984) should be re-examined due to validity issues. Conceptual and measurement problems are present in these studies. Conceptually, the definition of teacher sense of efficacy or teacher efficacy ties teachers' beliefs about their abilities to student performance, a possible outcome of teaching behaviors. Thus, measures of this construct confound self-efficacy and outcome expectations. Whether the TES measures teacher efficacy or teacher self-efficacy is unknown particularly since item semantics on the TES resulted in confounding of self versus other-teacher referents and positive versus negative item wording.

Attempts by some to develop domain specific measures of teacher efficacy beliefs have generally resulted in distinct factors when included with the TES items. Results from development of the STEBI (Enoch & Riggs, 1990) provide evidence that

behavior or task-specific assessments of competence relate more strongly to behavior-related measures than items from the outcome expectancy subscale.

Despite evidence that the TES may not be a valid measure of teacher efficacy (Guskey & Passaro, 1994; Deemer & Minke, 1999), and certainly is not a valid measure of teacher self-efficacy, the field has not recognized this evidence. In a search of related dissertations catalogued by Dissertation Abstracts from 1999 through 2000, about half (n=29) used the TES or a modified version of the TES. Additionally, recent studies (e.g., Goddard et al., 2000) of teacher and collective teacher efficacy published since Deemer & Minke (1999) have not cited this study in their discussions of the TES.

Newer, but still troublesome conceptualizations of teacher efficacy (Tschannen-Moran et al., 1998) and collective teacher efficacy (Goddard et al., 2000) continue to misrepresent the role of outcome expectancy in the formation of self-efficacy beliefs. In both models proposed by these researchers, analysis of the teaching task is equated with outcome expectancy or means-ends contingency. Use of these models to develop measures of teacher efficacy and collective teacher efficacy has implications for interpretation of results from these studies. Additionally, failure to distinguish between beliefs about performing behaviors and beliefs about outcomes resulting from behaviors in reviews of the literature on teacher efficacy (Bandura, 1993; 1997; Tschannen-Moran, 1997; Ross, 1998), as well as the model proposed by Tschannen-Moran et al. (1998) in their review of the literature, perpetuate misunderstandings (and consequent mismeasurement) of teacher efficacy and teacher self-efficacy beliefs about context-specific teaching behaviors.

The scientific process is a public process so that peers in this process participate as reviewers of works of others and vice versa. Even with perfect conceptualizations and operational measures of constructs, researchers use methodologies accepted by others in their field to analyze data. Ideas about best practices in methodology change somewhat through the years. However, when reviews of the literature include only a cursory regurgitation of stated results, the process of review breaks down. Although most of the reviews in this area presented results of studies organized into relevant categories, a careful examination of the quality of these studies appeared lacking. Without including information about the quality of the studies reviewed, the condition of the foundation upon which future studies are built may be questionable. Although a review of the methodological appropriateness of studies cited here was not a focus, it was evident that this area of study suffers from some common methodological errors (Thompson, 1999). Rigor in methodology is as important as rigor in conceptualization as results of studies, whether properly or improperly analyzed and interpreted, contribute to the shaping of theories.

Several studies reviewed here use task specific assessments of capability to measure self-efficacy beliefs of teachers. According to self-efficacy theory, self-efficacy beliefs are task *and* situation specific beliefs about ability. Few studies assessed context specific self-efficacy beliefs (Henson et al., 2000; Dellinger et al., 2001; Olivier, 2001; Bobbett, 2001). Henson et al. (2000) used hypothetical contexts (students in a case study) whereas Dellinger et al. (2001), Bobbett (2001) and Olivier (2001) situate assessments of teacher self-efficacy beliefs in teachers' current classrooms with their current students. As noted by Bandura (1995b; 1997), in order for

self-efficacy beliefs to have predictive ability, the task(s) and related behaviors should be causally linked. Self-efficacy assessments based on hypothetical situations may not be as strongly related to teacher behaviors in their classrooms, or to student outcomes. In assessing collective teacher efficacy, Goddard et al. (2000) included items to assess the "analysis of the teaching task", however, wording of task-related items in their measure are situated in the teacher's school.

None of the studies of self-efficacy beliefs reviewed here attempted to systematically assess variation in efficacy beliefs due to variations in level of task difficulty as suggested by Bandura (1997). Also, no studies reviewed here examined the generality of teacher self-efficacy beliefs. In other words, do teachers' beliefs in their abilities to perform specific tasks (e.g., redirect off task behavior, use positive reinforcement, etc.) that are part of a general domain of functioning (e.g., classroom management) generalize to their beliefs about their ability to perform the domain-specific task? Or, do teachers' beliefs about performing a certain task generalize to various situations? Rather, teacher self-efficacy beliefs in many of these studies are treated as assessment of abilities devoid of context. Henson et al. (2000) did note that (hypothetically-situated) context-specific efficacy beliefs and PTE (global efficacy assessment) were related differently in canonical functions of these variables.

Many of the studies reviewed here, with a handful of exceptions, discuss the multidimensional structure of teacher efficacy (most referring to the PTE and GTE subscales) but fail to use multivariate analyses in their studies. Bandura (1997) describes self-efficacy as a multidimensional construct. However, it should be noted that multi-dimensionality is due to variations in strength, level and generality as

evidenced in task and situation specific beliefs about abilities. In assessing teacher self-efficacy beliefs, domains of functioning may represent the multidimensional elements of the construct and should be treated as such in the methodology employed. Henson et al. (2000) provides an excellent model in this respect.

Little seems be known about the structure, antecedents and consequences of teacher self-efficacy beliefs because most of the conceptual models and measurements developed and used thus far confound these beliefs with outcome expectations. Therefore, not enough is known about how teacher self-efficacy beliefs might be changed, how these beliefs are structured, or what follows from these beliefs. For example, the teacher efficacy literature provided some evidence that teacher efficacy is predictive of student outcomes. However, as mentioned previously, these relationships may result from teachers' beliefs in their ability to teach or because, based on their beliefs in their ability, they expect that certain students will or will not achieve.

Scientific examination of any phenomena requires an implied agreement among scientists for careful and deliberate use of terms to identify the construct of interest and careful and deliberate use of appropriate methodologies to examine relationships among variables. This review provided evidence that it is certainly time to distinguish between teacher efficacy and teacher self-efficacy beliefs more carefully, and hopefully, through continued research, fortify the foundation of knowledge about teacher self-efficacy beliefs using stronger and sounder theory and methodology than used in past research.

The previous section of Chapter 2 reviewed the literature as related to teachers' self- and collective efficacy beliefs. As part of the triadic reciprocal causation model, efficacy beliefs are formed as a result of processing and attending to sources of efficacy

information available from the interactive and reciprocating relationships between the environment, behaviors and person factors. Teachers' learning environments possibly play a major role in changing teachers' beliefs in their abilities to perform tasks necessary to do their jobs (Bandura, 1997). The following section of this chapter addresses the theory and research in studies of learning environments.

The Study of Learning Environments

As stated previously, social cognitive theory as a theory of learning, and specifically triadic reciprocal causation, provide the overarching framework for this study. Self-efficacy theory posits that self-efficacy beliefs are malleable within the model of three reciprocating causative elements. Thus, behaviors, the environment and cognitive processes provide reciprocating sources of information upon which self-efficacy beliefs are formed and enhanced or diminished. For teachers, self-efficacy beliefs about teaching-related tasks may be functions of the professional learning environment within which they work (Bandura, 1993; 1997). These environments do provide sources of efficacy information that teachers may cognitively incorporate into changed self-efficacy beliefs. The study of learning environments was relevant and useful to examine relationships between possible sources of efficacy information available in teachers' professional learning environments and teachers' self and collective efficacy beliefs.

The groundwork for studies of learning environments was laid by Lewin's (1936) work that explained behavior in terms of a function of environment by person interaction [B=(PxE)]. Lewin's model went beyond behavioral theories of learning by introducing personal characteristics of the individual as an element not only affected by

environmental stimuli, but also interactively affecting the environment. This model of behavior was useful in framing studies of classroom and school-level learning environment research such that students' and/or teachers' perceptions of the learning environment are used to predict behavior (Fraser, 1986). As noted earlier however, Bandura's model allowed for reciprocating relationships between behaviors, personal characteristics and environmental factors.

Moos (1980) developed a model of environmental factors that affect the classroom (or work environments). For the classroom, four factors are specified in this model. They are a) Structure and Organization, b) Cognitive Processes, c) Student Characteristics and d) Teacher Characteristics. In later work, Moos (1987) provides a holistic model that integrates school, teacher work and student family settings to help explain student behavior and outcomes. Three social climate domains, Relationship, Personal Growth and System Maintenance and Change, organize dimensions of classroom, teacher work and student family settings. The learning environment of students serves as a work environment for teachers; thus, these environments are hypothesized to be closely related. This relationship, consistent with triadic reciprocal causation, provides the impetus for examining teachers' work environment. Moos' conceptual work on psychosocial characteristics of environment and Walberg's (1968) development and use of the Learning Environment Inventory have set the stage for much of the work in this area.

Most of the work in studies of learning environments centers on classroom learning environments and their relationship to student cognitive and affective outcomes (Fraser, 1992). Psychosocial characteristics of classrooms explain variance in student

outcomes (Fraser, 1992; Ellett, 1986). Classrooms that are perceived as having high levels of Cohesiveness, Satisfaction, and Goal Direction along with low levels of Disorganization and Friction were said to foster higher levels of student achievement (see Fraser, 1986). Students' perceptions of the learning environment have been used to improve the learning environment through changing preservice teachers' instructional methods (Waxman & Duschl, 1987). Teacher attitudes (Bhushan, 1986), characteristics and behaviors (Loup, Ellett, Chauvin, Lofton, Evans & Hill, 1993), as elements of classroom learning environments, have been empirically linked to students' perceptions of the learning environment.

In studies of learning environments, school-level learning environments differ from classroom-level learning environments in that the former is the psychosocial environment in which teachers interact with other teachers, administrators and staff while the latter is the psychosocial environment in which teachers interact with students who also interact with other students in individual classrooms. Fisher, Fraser, Wubbels & Brekelmans (1993) found no evidence of a relationship between teachers' interpersonal classroom behaviors and the school learning environment. However, others have found that exemplary teachers expressed a desire to have collaborative relationships to share professional knowledge (Templeton & Jensen, 1993).

Measurement in Studies of Learning Environments

Many measures have been developed to assess characteristics of school-level learning environments. Some of these measures include the Work Environment Scale (Moos, 1981) and the School-Level Environment Questionnaire (Fisher & Fraser, 1993). Both measures are based on Moos' social climate dimensions. Another

measure, the Professional Learning Environment Inventory (Loup, 1994), was developed based on conceptualizations of culture, studies of learning environments and on current research and thinking about professionalization of teaching through learning (Fullan, 1993). The PLEI assesses teachers' perceptions of their professional learning environment by requiring teachers to record the frequency of factors, events and conditions in the environment that enhance teacher learning. The PLEI measures factors associated with learning, such as norms of communication, participation, decision-making, etc., as well as factors associated with structure (e.g, norms of administrator roles, teacher roles, teacher autonomy, etc.) (Loup, Ellett, Park & Naik, 1994). Factor analyses of the PLEI has generally identified four factors: a)Opportunities for Professional Learning and Development, b) Teacher/Administrator Relationships, c) Beliefs/Values/Expectations, and d) Teacher Autonomy.

Research using the PLEI showed promising linkages between elements of teacher characteristics such as receptivity to change and teacher self- and organizational efficacy motivation and perceptions of organizational effectiveness. Loup et al. (1994) developed the Revised Model of School Change and Effectiveness, based on the results of their study, and included teacher self and organizational efficacy as mediating factors between teacher professional learning opportunities and school effectiveness elements. This model set the groundwork for considering professional learning opportunities as sources of efficacy information for individual teachers and collectives of teachers in schools.

In a study by Olivier (2001), strong bivariate relationships were demonstrated between teachers' perceptions of faculty collective efficacy and teachers' perceptions of

the school culture. This author used the Revised School Culture Elements Questionnaire (RSEQ) to assess teachers' perceptions of school culture "grounded in norms, beliefs, and values reflecting professional behavior in schools" (p. 121), and identified three factors including Shared Leadership, Collegial Teaching and Learning and Professional Commitment. This study found moderately strong correlations (r > .62) between each of these three factors of school culture and teacher's perceptions of faculty collective efficacy at the school mean level.

Lorsbach & Jinks (1999) also pointed out the impact that self-efficacy beliefs can have on the school and classroom learning environment. However, they neglect to consider the reciprocal nature of this relationship and provided no empirical support for their contentions about relationships between efficacy beliefs and the environment.

Bandura (1997) stresses the importance of the impact of the school environment on teachers' self and collective efficacy beliefs (particularly as he found these beliefs to be linked to higher levels of student achievement). Likewise, no empirical evidence was offered to substantiate this statement.

Several studies, included in the review of literature related to teachers' self-efficacy beliefs in a previous section of the chapter, found that some organizational elements and school-level characteristics were associated with differential levels of teacher efficacy, teacher self-efficacy beliefs, or consequences of teacher efficacy (e.g., Ashton & Webb, 1986; Newmann, Rutter & Smith, 1989; Lee, Dedrick & Smith, 1991; Petrie, Hartranft & Lutz, 1995; Raudenbush, Rowan & Cheong, 1992; Loup, 1994, etc.). Nonetheless, few studies were found that conceptually linked school-level organizational characteristics and opportunities to learn to sources of efficacy

information in the environment. No study was found that systematically and empirically linked sources of efficacy information available in teachers' professional learning environments to teachers' self- and collective efficacy beliefs.

According to self-efficacy theory, professional learning opportunities must provide information about teachers' abilities in the form of enactive mastery experiences, vicarious experiences, social persuasion and enhanced physiological and emotional states to impact teachers' self- and/or collective efficacy beliefs. As well, these opportunities must be cognitively processed and weighted by teachers before the impact is realized. Thus, in assessing the impact of sources of efficacy information available in professional learning environments, the frequency of occurrence of opportunities/events must be weighted by the influence of these separate events. And, as Bandura (1986) points out, "The weights assigned to different types of efficacy information may vary across different domains of activity" (p. 409).

Chapter Summary

This chapter provided an indepth examination of literature related to teachers' self-efficacy beliefs, as well as a review of literature in the studies of learning environments pertinent to this study. In summary, the results of these reviews of the literature revealed various conceptual inconsistencies and methodological inadequacies in studies related to teachers' self-efficacy beliefs, and a lack of empirical evidence that demonstrates linkages between characteristics of teachers' professional learning environments and teachers' perceptions of self- and collective efficacy beliefs.

CHAPTER 3: DESIGN, METHODOLOGY, AND PROCEDURES

Chapter three presents a discussion of the research design, instrumentation, data collection procedures and data analyses used to address the primary and supplementary research questions framing this study.

Research Design

This study involved measurement of teachers' perceptions of sources of efficacy information in professional learning environments and self, work-group collective and faculty collective efficacy beliefs. A pragmatic orientation to research design influenced the study design and subsequent methodologies employed (Tashakkori & Teddlie, 2000). Both qualitative (open-ended questions) and quantitative (forced-choice Likert scaled data) methods are used simultaneously to enhance the exploratory and correlational design of the study. Mixing methodologies in this study allowed for the collection of validity evidence for new measures and provided depth to quantitative findings.

It was stated earlier in Chapter 1 that one of the limitations of this study was that teachers' perceptions on various variables were used. However, this was a study of *belief* systems of teachers. As such, this study attempted to directly measure the efficacy beliefs of teachers by asking them about the strength of their beliefs to accomplish various situation specific tasks. Although observations of displayed behaviors may have been a more objective way to measure teachers' beliefs, these types of measures would not provide adequate delineation between teachers' efficacy beliefs (self- or collective) and teachers' outcome expectations which may in combination influence displayed behaviors.

Sampling Procedures

Elementary school teachers from grades K-5 were targeted for this study. Teachers at this level were more likely to teach a single group of students in self-contained classrooms. According to Bandura (1997), self-efficacy beliefs are situation specific, and some evidence exists that, for teachers, this may be class specific in departmentalized situations (Raudenbush, Rowan, & Cheong, 1992).

Two school districts in two southern states agreed to allow voluntary participation of elementary schools in the respective districts. Permission was received from the superintendent's office in both school districts to select a sample of elementary schools and contact each school's principal. The principals at each school in the study agreed to allow teachers to participate. Teacher participation was voluntary within schools.

District A schools were from a suburban/rural area outside of a mid-size city. Eight suburban schools out of eighteen elementary schools serving Kindergarten through fifth grade students agreed to participate. In the 1999-2000 school year, thirty-four percent of the district's teachers had advanced degrees. Approximately 53% of elementary school classes ranged in size from 1 to 20 students while 36% ranged in size from 21 to 26 students per class. The average student attendance rate for elementary schools in the 1999-2000 school year was 95.3%, with an average student population size of 501 students. National standardized test results put this district's elementary schools at approximately the 60th percentile rank in grades 3 and 5. Appoximately 44% of students in District A received free/reduced cost lunch.

District B schools were sampled from urban/suburban areas of a large metropolitan area. The district is divided into six geographic regions; therefore, an attempt was made to select a stratified, proportional random sample of schools from these regions. Principals at each of the randomly chosen schools were contacted (at multiple times and in multiple ways, when necessary). If a principal declined the offer to participate, randomly selected substitutions within the appropriate region were chosen until a total of 42 elementary schools out of a total of 206 agreed to participate in the study. Six schools subsequently declined to participate; therefore, a total of 36 schools from District B participated in the study.

Average class size for elementary schools in District B was 24.8 students in 1999-2000. Approximately 43 % of teachers in this district hold advanced degrees, and have been teaching, on average, for about 12 years. This district's 206 elementary schools served 176,705 elementary students in the 1999-2000 school year. If the number of students is divided by the number of schools, an estimate of the average number of students per school would be approximately 858 students per school. Also, approximately 6.7% of the district's elementary students missed more than 21 days in the 1999-2000 school year. About 70% of students in District B received free/reduced cost lunch.

Data Collection Procedures

At each of the 44 schools selected, all teachers were asked to provide survey responses to each of the measures in this study in addition to completing a questionnaire to obtain demographic information. The Demographic Information Survey is in Table A.1 (see Appendix A). The measures in this study included the Open-Ended Sources

Questionnaire (OSQ), Sources of Efficacy Information in Professional Learning Environments Scale (SOURCES), and the Teachers' Efficacy Beliefs System which included a self-efficacy (TEBS-S) section, work-group collective efficacy (TEBS-WG) section and faculty collective efficacy (TEBS-F) section. Before answering items on the TEBS-WG, teachers were asked to reference a functional work-group with which they work most in their current school. Teachers were asked to reference the entire faculty at their present school before answering items on the TEBS-F that refer to faculty efficacy beliefs. Additionally, teachers were asked to answer several open-ended questions (OSQ) in regards to important elements in their working and learning environment that enhance and weaken beliefs in their ability to be successful as a teacher. Teachers were also asked to report important elements in their working and learning environment that enhance and weaken the faculty's beliefs in their abilities to be successful in accomplishing relevant goals.

The study measures were distributed to a contact person designated by the principal at each school. Individual envelopes and instructions were provided for each of the K-5 regular education teachers at each school. Teachers were asked to voluntarily fill out the survey questionnaires (bubble sheets and open-ended responses), and return these in a timely manner to the contact person. The contact person received a large postage-paid envelope to return the completed questionnaires. The contact person at each school was contacted by phone and/or fax on several occasions to facilitate return of an adequate number of surveys.

Study Measures

For development of measures in this study, teachers were the units of analysis. The measures developed for this study included: a) Sources of Efficacy Information in Professional Learning Environments (SOURCES), b) the three-part Teachers' Efficacy Beliefs System (TEBS-S, TEBS-WG and TEBS-F), and c) Open-ended Sources Questionnaire (OSQ). Discussion of each of these measures follows.

Sources of Efficacy Information in Professional Learning Environments (SOURCES)

Recent measurement in the study of school learning environments conceptualizes school cultures that function as professional learning organizations which value shared leadership and vision, professional values, professional relationships, professional commitment, and professional growth (Bobbett, et al., 1998; Cavanagh & Dellar, 1997; Cavanagh, et al., 1998; Loup, 1994; Olivier, et al., 1999; Olivier, 2001). SOURCES items were developed using characteristics of professional learning cultures, as measured by the PLEI, Professional Learning Environment Inventory (Loup, 1994), to guide item development. For example, factored subscales of the PLEI, such as Opportunities for Professional Learning and Development, as well as several specific items on the four factors of the PLEI, were examined. Useful items were rewritten to assess a single source of efficacy information. For instance, an item which read, "Opportunities for participation in professional development activities" (p. 241) needed to be reconfigured in several ways. Items addressing specific types of professional development activities were developed and an attempt was made to have each item assess a single source of efficacy information. For example, an item might read *Attending workshops, inservices, video courses, etc. where successful*

demonstration of teaching-related tasks were observed. The PLEI provided the general structure for development of the 50 items on the SOURCES.

The SOURCES measure can be found in Table A.2 (see Appendix A). The SOURCES is a self-report measure to assess teachers' judgements of the *quantity* and *influence* of experiences in their current learning environment in each of four efficacy information categories: Enactive Mastery, Vicarious Experiences, Social Persuasion and Physiological and Emotional States. Items on this measure were developed because it was believed that these items represented experiences and/or learning opportunities that should be available in schools that foster professional learning (Loup, 1994).

Face and Content Validity

Fifty items were presented to three knowledgeable researchers in the area of learning environment research and self-efficacy theory for review as to face and content validity and clarity of questions. Suggestions for wording and item content were followed.

Additionally, the SOURCES was included in a questionnaire packet for review by a small convenience sample (n=10) of classroom teachers. The teachers were asked to provide comments regarding clarity of questions, corrections, suggestions for changes, etc. Suggestions were noted and integrated into the final version of the measure.

Structure and Scoring

The four categories of efficacy information are listed below along with 2 sample items for each source.

1. Enactive Mastery Experiences

a. Success in managing behavior of students.

b. Successfully collaborating with fellow teachers to accomplish various goals.

2. Vicarious Experiences

a. Observing colleagues at your school being successful as teachers.

b. Learning about effective teaching techniques from other faculty members.

3. Social Persuasion

a. Receiving awards such as certificates, grants, recognition, etc. for your teaching.

b. Receiving encouragement from other teachers about your teaching ability.

4. Physiological and Emotional States.

a. Excitement when reaching difficult students.

b. Hopelessness when teaching your students.

For each item, teachers were asked to respond to two questions. The first question was "Since being employed by your present school, how frequently have you had these experiences?" and responses were obtained using a four-point scale (1=Never Happens, 2=Rarely Happens, 3=Occasionally Happens, 4=Regularly Happens). In addition to the frequency of occurrence of each experience, teachers were asked to rate "How influential are these experiences in strengthening your beliefs in your ability to be a successful teacher?" Response options were 1=Not Influential, 2=Somewhat Influential, 3=Influential, and 4=Extremely Influential. This second rating allowed

teachers to qualitatively rate each experience and provided insight into teachers' cognitive processing or weighting of available efficacy information. Bandura (1977; 1993; 1997) noted that persons cognitively process information obtained by exposure to sources of efficacy information. It was believed that the influence scale on this measure would provide important information about what experiences teachers attend to and consider influential in enhancing their beliefs in their abilities to be a successful teacher.

The final 50-item measure consisted of 17 enactive mastery items, 17 vicarious experience items, 8 positively-stated social persuasion items, 1 negatively-stated social persuasion item, 4 positively-stated physiological and emotional states items and 3 negatively-stated physiological and emotional states items.

Experiences that supply information for the formation of efficacy beliefs often supply multiple sources of efficacy information. Items in the SOURCES were developed to target single sources of efficacy information. For example, it is possible that successful teaching experiences may provide learning about teaching ability through enactive mastery and/or through physiological and emotional states (e.g., feelings of pleasure, elation, stress reduction, etc.). The same experiences of success in teaching may also elicit praise from fellow teachers or administrators (social persuasion). Thus, items on the SOURCES were not expected to factor into source subscales, but rather would be expected to factor into elements of the professional learning environment that were present for the teachers sampled (e.g., types of opportunities for professional learning, etc.). Subsequent to data collection in this study, factor analyses were performed on both the occurrence and influence scales of the SOURCES.

Criterion-related and Concurrent Validity

Through the use of multivariate correlation techniques and based on self-efficacy theory, criterion-related validity was examined by correlating the four sources of efficacy information as measured by the SOURCES with the various types of teacher efficacy beliefs (self-, work-group collective and faculty collective) as measured by the TEBS. Additionally, through use of content analysis of data from OSQ responses, concurrent validity evidence was examined. The OSQ asked teachers to describe important elements in their learning environment which enhance and diminish their (or the faculty's) beliefs in their abilities to be successful as a teacher (or faculty). These responses were compared to item content and mean ratings of occurrence and influence to assess whether additional items needed to be added to the SOURCES and to examine whether similar results were obtained from the quantitative and qualitative measures.

Reliability of Sample Data

Internal consistency of scores on each of the factored subscales of the SOURCES was examined by calculating Cronbach Alpha reliability estimates. Additionally, item analysis was performed by examining the change in alpha for a subscale when individual items were removed. Results of reliability analysis of data from the items on each subscale were useful in determining which items were retained on the factors.

Teachers' Efficacy Beliefs System (TEBS)

The TEBS (Bobbett, Dellinger, Ellett & Olivier, 2000), is a three-part measure designed to assess teachers' self, work-group collective, and faculty collective efficacy

beliefs about their capabilities to successfully accomplish various teaching-related tasks or goals. Each of the three parts of this measure are discussed below.

Teacher Self-Efficacy Beliefs Scale (TEBS-S)

The Teacher Self-Efficacy Beliefs Scale (TEBS-S) is presented in Table A.3 (see Appendix A). Prior to this study, several preliminary steps of the instrument development process were completed for this measure including:

1. In prior pilot research (Dellinger, Bobbett, Olivier & Ellett, 2001), surveys were ascertained from approximately 450 teachers to examine whether using item stems stated in three different ways, a) "I can...", b)"I am able to...", or c) "My personal belief in my ability to...", to assess teachers' self-efficacy beliefs would produce different results. Results indicated "I can" and "I am able to" responses were strongly correlated while "My personal belief" items were moderately correlated with either of the other forms. Based on these results, the Belief item stem was used on the final instrument due to its consistency with self-efficacy theory.
2. Six domains of functioning from a classroom-based observation and assessment measure designed to facilitate judgements of the quality of teaching and learning (Ellett, 1999) were used to develop items to assess teachers perceptions of self-efficacy beliefs in these areas. These domains were a) Long-Range Planning for Teaching and Learning, b) Managing the Learning Environment, c) Maintaining a Positive Classroom Climate, d) Enhancing and Enabling Learning, e) Enabling Thinking, and f) Classroom-Based Assessment of Student Learning. Several items were adapted from each of these domains included in the initial instrument

for a total of 41 items. In addition, 17 items addressing school improvement, teacher collegiality, parent and community relations, and teacher-administration relations were included. Subsequently, 7 items were dropped because they lacked face validity.

3. In a final phase of item selection, 46 expert educators were chosen to rate each of the remaining 51 items as to its importance in assessing teachers' beliefs about their abilities as a teacher. Thirty of the 58 items were retained at this point in the instrument development process (See Appendix A).

The item stem from Dellinger et al. (2001) was modified and an example item from the TEBS-S follows:

> Right now in my present teaching situation, *the strength of my personal beliefs in my ability to...* implement teaching methods at an appropriate pace to accommodate differences among my students is...

Responses were obtained on a 4-point scale (1=weak beliefs in my ability, 2=somewhat strong beliefs in my ability, 3=strong beliefs in my ability, and 4=very strong beliefs in my ability).

The 30 items developed by Bobbett et al. (2000) were used in this study. Additionally, several items were added for a total of 41 items. These additional items were designed to address measurement issues specific to self-efficacy beliefs (i.e. variations in generality and level). Self-efficacy theory posits that self-efficacy beliefs vary in strength as well as level and generality (Bandura, 1997). Two omnibus-type measures of self-efficacy about teaching were added. These items asked teachers to rate their beliefs about their ability to be successful as a teacher in their current teaching situation. As well, other items were included to assess teachers' beliefs in their abilities

to successfully teach in specific subject areas (math and reading). For both of these subject areas, teachers were asked to rate their beliefs in their ability to teach all of their students, their higher ability students and their lower ability students.

Teacher Work-Group Collective Efficacy Beliefs Scale (TEBS-WG)

The TEBS-WG was designed to ascertain individual teachers' self-reports of the strength of shared beliefs of a *particular work-group* to successfully accomplish various tasks and is presented in Table A.4 (see Appendix A). Some of these tasks resemble, and may be considered, group goals. For example, items included questions about school improvement issues, behavior management, instructional decisions, policy implementation, parental involvement, curriculum development, etc. Teachers were instructed to reference the functional work-group to which they work with most to answer the 12 items on this measure. A sample item was, "The strength of our WORK-GROUP'S collective beliefs in our abilities to... provide input in making important school decisions is...". The response choices are the same as for other items on the TEBS (1=weak beliefs in our abilities, 2=somewhat strong beliefs in our abilities, 3=strong beliefs in our abilities, and 4=very strong beliefs in our abilities).

Teacher Faculty Collective Efficacy Beliefs Scale (TEBS-F)

The TEBS-F section of the TEBS was designed to assess individual teachers' self-reports of the entire faculty's *shared beliefs in their abilities* to accomplish various tasks or goals in their school, and is presented in Table A.5 (see Appendix A). Response choices were the same as other sections of the TEBS. As in the TEBS-WG, the items for the TEBS-F addressed school level concerns such as:

1. School-wide Improvement

2. Student Learning

3. School Environment

4. Parent/Community Relations

5. Collegiality/Support

A sample item addressing Collegiality/Support reads, "The strength of our faculty's collective beliefs in our abilities to... support each other in addressing new policies, rules, and regulations is..."

Structure and Scoring

Prior to completing the TEBS-S, teachers were asked to consider their own abilities within the context of their current school and classroom including current job roles and responsibilities, available resources and support, current policies, help from colleagues and so on. For both the TEBS-F and the TEBS-WG, teachers were reminded to consider the faculty's (or work-group's) collective abilities within the context of their current school including current job roles and responsibilities, available resources and support, current policies, help from colleagues, etc.

Validity Evidence for the TEBS

Some evidence to establish construct validity of the TEBS measures was gathered prior to soliciting survey responses from teachers. A thorough review of other instruments purported to measure teacher efficacy, teacher self-efficacy beliefs and teacher collective efficacy beliefs was performed. Items were constructed based on self-efficacy theory (Bandura, 1997) and an established measure of effective teaching and learning components (Ellett, 1999). Teachers and experts, knowledgeable about

self-efficacy theory and/or teaching, were asked to assess face validity and/or content validity of the TEBS-S measure.

Each of the items for the TEBS measures provided a 4-point response scale ranging from 1=weak beliefs in my (our) ability(ies) to 4=very strong beliefs in my (our) ability(ies). A series of factor analyses were completed to simplify interpretation by identifying latent variables in each of the TEBS sections. The simplest factor structure was the primary objective in these factor analyses, and both orthogonal and oblique rotations were examined. However, oblique rotation made more sense theoretically for measures in this study as domains of functioning in teaching tasks may be correlated. For all instruments developed in this study, self-efficacy theory and the original domains of functioning were used to guide labeling of latent variables.

Reliability of Sample Data

Once latent constructs were identified and named, reliability analysis of scores on the factored subscales was performed. Estimates of internal consistency, Cronbach Alpha coefficients, were calculated to provide evidence of the reliability of scores from this study for the TEBS. Reliability estimates when items were deleted were used to provide evidence of the usefulness of each item to the appropriate subscale.

Open-Ended Sources Questionnaire (OSQ)

Four open-ended items were included in the survey packet for teachers. The first item asked that teachers describe important elements perceived in the "working and learning environment that enhance your belief in your ability to be successful as a teacher with your current students." The second item was stated similarly, but asked teachers to describe elements that weaken their belief in their ability to be successful as

a teacher with their current students. The third and fourth item were similar to items one and two, respectively, except that teachers were to describe important elements about their working and learning environment that enhance (or weaken) "the beliefs of your school's faculty in their ability to be successful as a group in accomplishing their goals." As stated earlier in the section on the SOURCES, this measure was designed to provide evidence of concurrent validity for the SOURCES and to bring depth to the study's results.

Demographic Information Survey

Teachers responded to several demographic questions that were used to answer supplementary questions in this study. The Demographic Information Survey was provided in Table A.1 (see Appendix A). Teachers included information about themselves including number of years of experience as a professional educator and the highest degree they have obtained. Additionally, teachers were asked to record the proportion of students in their classes on free or reduced cost lunch. Responses to this item were used as a proxy measure for students' socioeconomic status (SES).

Data Analysis Procedures

Teachers were the units of analysis for most analytic procedures in this study with exceptions noted below. The study depended heavily on correlational methods (e.g. bivariate correlation, regression, canonical correlation). In addition, descriptive statistics for the full sample, as well as by relevant sub-groups, were reported. The following section describes the data analytic methods that were used to address the research questions in this study.

Descriptive Statistics

Descriptive statistics of the sample and of relevant sub-groups (e.g., districts and school) were computed for demographic variables and items and subscales of the study measures. Bivariate correlations were calculated between subscales of various measures in the study and between subscales and demographic information (e.g., % of students on free/reduced lunch in teachers class, number of years of teaching experience, etc.).

Factor Analysis of Study Measures

Factor analytic techniques were used to explore and identify latent constructs measured by the three sections of the TEBS and the SOURCES. Principal component analyses with both orthogonal (Varimax) and oblique (Direct Oblimin and Promax) rotational methods were employed to obtain parsimonious solutions because principal axis factor analyses, using identical rotation methods, resulted in similar results. The number of factors was determined by examining, in combination, the factors with eigenvalues > 1, the relevant Scree plot, and the item content for theoretical consistency. Items were assigned to a factor based on the following criteria: 1) correlation between the item and the factor was greater than 0.40 with correlation between the item and all other factors near zero or 2) correlation between the item and the factor in question was greater than 0.40 and there was at least a 20% difference in the proportion of variation shared by an item and factors with non-zero correlations. Additionally, factor pattern matrix coefficients were examined in tandem with factor structure coefficients to make final decisions regarding item retention for oblique rotations.

Correlational Procedures

Canonical correlation was used to examine relationships between the study measures. Canonical correlation analysis has been shown to subsume other correlational methods such as regression, ANOVA and MANOVA (Fan, 1996). Where possible, results were reported consistent with the canonical correlation results to provide for continuity in presentation of results and so that structure coefficients as well as beta weights (standardized regression coefficients) might be examined as recommended by Thompson & Borello (1985).

Canonical correlation analyses were performed to correlate teacher self-efficacy with work-group and faculty collective efficacy to address Research Question 1. Specific relationships between self and collective efficacy for various domains of functioning were also examined through use of canonical correlation.

To address Research Question 2 and sub-questions 2a, 2b, and 2c, canonical correlation analyses or multiple regression analyses were employed. Additionally, in Research Question 2 and its sub-parts, school differences were examined for levels of self-, work-group collective and faculty collective efficacy beliefs with the sources factors statistically controlled by including school as a fixed factor in a general linear model of the appropriate efficacy subscale(s) regressed on the SOURCES subscales. Only schools with at least 10 teachers responding to the survey questionnaire were included in across schools comparisons.

To address sub-question d and e of Research Question 2, the constant comparative method of content analysis was used to assess emergent themes or categories in the data for each of the four questions on the OSQ. After categories were

developed, counts for each category were determined overall for all respondents. Additionally, at the school level, common themes were extracted and compared across schools separately for the faculty collective and self-efficacy related items of the OSQ.

Research Question 4, addressing self-efficacy measurement issues as regards level, generality and strength of self-efficacy beliefs in the context of teaching, was addressed by examining patterns in bivariate correlation coefficients for the items of interest.

Several supplementary questions were examined through the use of bivariate correlation coefficients and regression analysis.

Chapter Summary

This chapter described the research design, measurement and methodology used in this study. The study results are presented in Chapter 4.

CHAPTER 4: SUMMARY OF RESULTS

The results of the study are presented in Chapter 4. These results are presented in the following order: 1) characteristics of the accessible population; 2) demographic information from the sample; 3) factor analyses for the SOURCES and the three sections of the TEBS to answer Research Question 1; 4) descriptive statistics for subscales of study measures; and 5) results of analyses to address each of the research questions posed in Chapter 1. Results of reliability analyses for data obtained on each of the study measures are presented as part of the factor analysis results.

Response Rate to Survey

Two school districts allowed elementary school teachers in their district to participate in the study. Principals at each school volunteered to allow teachers in the school to fill out a survey for the study. A total of 431 surveys were returned out of 1494 sent to teachers at 44 schools that agreed to participate. Return rates were similar for the two districts participating in the study (approximately 33%). The survey packet was lengthy and this may have accounted for the somewhat low return rates. Twenty-one survey packets were deemed to have large amounts of missing data and were deleted before final data analyses were run resulting in a final sample size of 410. Additionally, and possibly due to the format of the survey, 4 items on the TEBS-S were not completed for a significant proportion of the respondents (approximately 10%). Because of this substantial percentage of missing data, and because the content of these items, in general, was covered by other items, the last 4 items of the TEBS-S were omitted from all of the analyses in this study. Only complete data were used in factor

analyses associated with the SOURCES and the three-part TEBS. Once factor analyses were completed, item means were substituted for remaining missing data.

Summary of Descriptive Statistics for the Sample

Descriptive statistics relative to the sample are included in Appendix B. Table B.1 contains selected statistics for the districts participating in the study. In Table B.2, descriptive statistics are presented by district for schools participating in the study. To determine whether participating teachers in each school district were similar to the average elementary school teacher in the district, demographic information from survey respondents (see Table B.3) was compared to statistics from the respective districts.

According to personnel statistics from the 1999-2000 school year for full-time instructional staff from District B, white teachers have been slightly underrepresented (27.6% for sample versus 37.4% for the population) in this sample while Hispanic teachers may be slightly over-represented (44.5% for the sample versus 35.1% for the population). The sample from District B may have been slightly more educated than the population as 49.7% of the sample reported having at least a masters degree while District B reported that 43.2% of teachers in the district had advanced degrees in the 1999-2000 school year. The sample of teachers from District B appeared to be more experienced ($\underline{M}$=14.91; $\underline{SD}$=10.97) than the population with 12.1 years of experience on average. Teachers from District B reported that on average 67.16% of their students were on free/reduced price lunch (a proxy measure of socio-economic status). This average was in line with district statistics that report 70.1% of students on free/reduced price lunch in the 1999-2000 school year.

Approximately 34% of District A's teachers had advanced degrees according to 1998-1999 school year statistics. However, 66.2% of the sample from this district report that the highest degree completed was the bachelors degree, 26.5% reported they had at least a masters degree, while 7.4% declined to answer. Information about the percentage of students on free and reduced lunch in District A indicated tht 44% of all students in the district received free/reduced cost lunch. Teachers in this district reported that, on average, 47.3% of students in their classes are on free/reduced lunch.

Descriptive Statistics for Demographic Characteristics of the Sample of Respondents

In Table B.3 (see Appendix B), select demographic characteristics of the respondents in this study are reported. Teachers were asked to respond to questions regarding various personal and professional characteristics. Females made up the majority of respondents in this study. Out of the 431 teachers responding to the survey, only 5.3% of respondents reported their gender as male. Overall, the racial makeup of the participants was quite varied; however, most of the variation was due to District B respondents. Only 5.9% of teachers in District A were non-white, while 67.3% of teachers in District B were non-white with Hispanic teachers making up the majority (44.5%) of teachers in District B. Most teachers in the sample reported that their native language was English (67.9%). Teachers at schools in District B were more likely to have advanced degrees (49.7%) than teachers from District A (26.5%).

Most of the teachers in the sample reported that they taught in self-contained regular education classrooms (77.4%) and taught all subject areas (83.7%). Teachers from both school districts were experienced on average (M=15.0 years; SD=10.6) and had been teaching at their current school for an average of 10.3 years (SD=8.3).

Teachers were asked to report the approximate percentage of students in their class on free/reduced lunch programs as a proxy measure for students' socio-economic status. On average teachers in the entire sample reported that approximately 65% of their students were on free or reduced cost lunch programs. District A teachers reported 47.3% of students on free/reduced cost lunch. District B teachers reported on average 67.2% of students on free/reduced price lunch.

An additional item was included to measure teachers' response to an item that incorporates both RAND Item 1 and RAND Item 2 as anchors on a 7-point continuum. This was a novel way to measure responses to these items; however, it was believed that teachers' responses to the continuum would parallel traditional scaling and scoring of these items into a single scale (see Armor et al., 1976). Additionally as these items were reportedly developed based on Rotter's theory of locus of control, this continuum more nearly paralleled Rotter's (1966) recommendations for measuring locus of control as a preference for internal versus external orientation. This item was included on the Demographic Information Survey in Table A.1 (see Appendix A). RAND Item 1 represented the lower end of the continuum, RAND Item 2 represented the higher end of the continuum, and a neutral response was included in the middle. The average response on this item for all respondents was 5.5 ($\underline{SD}$ = 1.4). Responses from individual districts did not differ much from the overall average.

Summary of Results Addressing Primary Research Questions

In the section that follows, summaries of results addressing each research question are presented separately. The primary research questions are posed at the beginning of each section followed by discussion of the statistical analyses and results.

Research Question 1

What is the structure and reliability of responses obtained from the measures developed for this study including the Sources of Efficacy Information in Professional Learning Environments (SOURCES) and the three parts of the Teachers' Efficacy Beliefs System (TEBS)?

This section contains summaries of factor analyses and reliability analyses of data from each of the measures developed for this study. Estimates of internal consistency were calculated from items on factored subscales of the measures.

Results of Factor Analysis of the Teachers' Efficacy Beliefs System (TEBS)

Data from all three parts of the TEBS were submitted to factor analytic procedures. The three sections of the TEBS were factor analyzed together in a preliminary analysis and are presented in Table C.1 (see Appendix C). As these constructs are hypothesized to be correlated, oblique rotation was used with principal components extraction. Items on the TEBS-S clearly separated into one factor while all items from both collective efficacy scales (TEBS-WG and TEBS-F) separated into another factor. The two factor initial solution represented 54.1% of the variation in these data. The two factors, representing measures of self and collective efficacy beliefs of teachers, were moderately correlated (r = .51).

A second preliminary factor analysis of just the items from the collective efficacy scales of the TEBS was performed, and the results are summarized in Table C.2 (see Appendix C). In this factor analysis, all items loaded with items from the appropriate measure (either the TEBS-WG or the TEBS-F) when examining the factor pattern matrix. Examination of the factor structure matrix indicated each of the items

from the respective scales was most correlated with the factor representing the respective scales. These factors, representing measures of teachers' work-group collective and faculty collective efficacy beliefs, were strongly correlated ($r = .74$).

As responses on items from each of the scales of the TEBS was shown to be differentiable into measures of self- (TEBS-S), work-group collective (TEBS-WG) and faculty collective (TEBS-F) efficacy beliefs, each measure was treated to separate factor analyses. These results are presented below.

Teacher Self-Efficacy Beliefs Scale (TEBS-S)

A total of twenty-seven items from six domains of functioning were included. The items are listed in Table A.1 (see Appendix A). Due to formatting problems in the survey packet, three items from the original TEBS measure and one additional item were omitted in these analyses due to incomplete data for a substantial portion of the sample (more than 10%). Item means and standard deviations are included in Table C.3 (see Appendix C). Table C.3 includes item means and standard deviations for complete data only and for data after mean replacement of missing values. Examination of the results summarized in Table C.3 indicated that mean replacement of missing data had little effect on item means and standard deviations. It is important to note that Table A.3 (see Appendix A) can be used to cross-reference item numbers to item content. It should be noted item means are lowest for items that ask about instructional procedures that are related to accommodating individual differences and enhancing higher order thinking skills. The highest means belonged to items dealing with maintaining a positive classroom climate.

Additional descriptive data from the TEBS-S in the form of the inter-item correlation matrix are included in Table C.4 (see Appendix C). Bivariate correlations between item responses ranged from .24 to .80.

Summary of Factor Analysis. Only complete data were used (n=381) in factor analyses of responses from the TEBS-S. Principal components and principal axis factor analysis of the correlation matrix were used to explore latent constructs measured by the 28 items of the TEBS-S. The number of factors was determined by examining, in combination, both the scree plot and factors with eigenvalues greater than 1 as well as by researcher judgement of theoretical consistency. Both orthogonal (Varimax) and oblique (Direct Oblimin with delta=0 and Promax with kappa=4) rotations were used to simplify structure and interpretation of factors. A four-factor solution was determined to be the best representation of the self-efficacy construct. Using both extraction methods, orthogonal and oblique rotations of a four-factor solution resulted in similar factors with nearly identical items loading on each factor with few exceptions. Based on these results and considering issues of reliability for factors with a small number of items, principal components extraction with oblique rotation was used. Table 2 contains initial communality estimates and the factor pattern and structure matrix from oblique rotation (direct oblimin, delta=0) of a four-factor solution. Correlated factors were used because it seems reasonable that teachers' beliefs about their abilities across various domains of functioning for various behaviors associated with effective teaching and learning might be correlated. For example, teachers who effectively maintain a positive classroom climate might also be more likely to effectively manage learning routines.

Both factor pattern and factor structure coefficients were interpreted to select items to be retained on the four factors. Factor pattern and structure coefficients are included in Table 2. The factor structure coefficients represent bivariate correlations between the items and the factor headings for each column of the matrix. The original domains of functioning used to develop the items on the TEBS-S were used to name the four factors. Highlighted items under each factor are items selected to define the respective factor. Items were retained if, in relation to their import to the respective factor (relative size of the factor pattern coefficient), the factor structure coefficient was at least 0.400 and all other structure coefficients in that row were near zero. If not all structure coefficients for an item were near zero, then an item was retained if the largest structure coefficient was at least 0.40 and the difference between the largest squared structure coefficient and the next largest squared structure coefficient was greater than 0.20.

The initial eigenvalues extracted from the matrix of association for the four factors explained 61.44% of the variance. The four factors emerging from this particular factor analysis are: 1) Accommodating Individual Differences (AID), 2) Maintaining a Positive Classroom Climate (CC), 3) Monitoring and Feedback for Learning (MFL), and 4) Managing Learning Routines (MLR).

Items 1, 2, 17, 18, and 37 define the AID factor. This factor contains items which cut across domains of functioning (e.g., long-range planning, enhancing and enabling learning, and maintaining a positive classroom climate), but deal specifically with ability to accommodate individual differences among students in these areas.

Table 2: Initial Communality Estimates, Eigenvalues, and Rotated Factor Pattern and Structure Coefficients for the Teacher Self-Efficacy Beliefs Scale (TEBS-S).

Item	Initial Communalities	Rotated Factor Pattern Matrix (Direct Oblimin, δ=0)							
		Factor I		Factor II		Factor III		Factor IV	
		FPC	r_s	FPC	r_s	FPC	r_s	FPC	r_s
1	.716	.802	.815	-.168	.246	-.029	-.458	.214	.421
2	.695	.834	.820	-.147	.244	-.020	-.442	.117	.337
4	.677	.307	.551	.128	.449	-.005	-.457	.604	.742
5	.734	.155	.489	.132	.477	-.135	-.525	.659	.797
6	.584	.225	.501	.213	.496	-.051	-.470	.512	.668
7	.556	.327	.584	.421	.638	-.062	-.520	.156	.414
9	.543	.272	.539	.363	.593	-.037	-.489	.311	.524
10	.795	.071	.378	.917	.879	.177	-.377	.085	.335
11	.728	-.155	.274	.811	.839	-.116	-.494	.096	.346
12	.515	-.004	.411	.196	.519	-.508	-.672	.176	.418
14	.577	.477	.648	.402	.600	-.099	-.517	-.159	.153
15	.683	-.044	.361	.732	.814	-.149	-.536	.070	.341
17	.644	.611	.764	.139	.486	-.091	-.552	.144	.411
18	.606	.663	.764	.081	.421	-.104	-.523	.032	.303
19	.554	.399	.642	.261	.556	-.264	-.611	-.032	.270
20	.450	.212	.506	.233	.514	-.242	-.555	.206	.433
21	.616	.147	.542	.209	.566	-.550	-.748	.019	.328
22	.653	.013	.442	-.024	.402	-.834	-.805	-.064	.229
23	.675	.006	.444	.047	.450	-.827	-.814	-.116	.196
24	.582	.298	.597	.115	.478	-.526	-.708	.120	.197
25	.560	.345	.612	.244	.544	-.372	-.674	-.122	.195
28	.559	.282	.597	.062	.458	-.460	-.689	.117	.388
29	.687	-.092	.381	-.130	.344	-.776	-.771	.320	.527
30	.585	.164	.521	-.117	.343	-.662	-.738	.133	.383
32	.555	-.220	.251	.372	.592	-.402	-.588	.308	.501
35	.533	.315	.597	.153	.492	-.427	-.662	-.052	.247
36	.562	.299	.578	.369	.612	-.305	-.617	-.133	.186
37	.581	.647	.747	.099	.424	-.104	-.515	.009	.279
	Initial Eigenvalues		13.240		1.656		1.289		1.019
	% Variance Explained		47.285		5.914		4.605		3.641

Note. FPC = Factor Pattern Coefficient; r_s = Factor Structure Coefficient

Factor II, CC, has three items (10, 11, and 15) that represent teachers' beliefs in their ability to maintain a positive classroom climate that is fair, impartial, courteous

and respectful. Monitoring and Feedback for Learning (MFL) is the third factor and is represented by items that relate to providing feedback and suggestions for improving learning by monitoring involvement of students and adjusting teaching and learning activities when necessary. These items are numbered 21, 22, 23, 29, and 30, and loaded negatively on this factor. However, it is important to note that the sign of the factor pattern and structure coefficients for correlated factors must be interpreted along with the correlation coefficients between the factors. The correlation between Factor III and each of the other factors was negative. Thus, the signs of the factor pattern and structure coefficients can be ignored. The final factor, MLR, consists of items 4, 5, and 6. These items describe abilities that relate to managing routines for learning such as giving directions and maximizing learning through appropriate use of time. The correlations between these factors were moderate and ranged from .31 between Factors I and IV to .55 for Factors I and III.

Reliability of Scores on Factored Subscales. Reliability estimates were calculated for data on each of the factored subscales (n=410). Cronbach alpha coefficients were used to estimate internal consistency of data for items on each factored subscale. Alpha coefficients were 0.87, 0.86, 0.86, and 0.80 for the AID, CC, MFL, and MLR factors, respectively. Item scores specific to each factor were summed to form a subscale score for each factor. Item scores ranged from 1 to 4. The minimum and maximum values for each factor was dependent upon the number of items for that factor. AID and MFL factors have minimum and maximum scores of 5 and 20. MLR and CC factors have minimum and maximum scores of 3 and 15.

Teacher Work-Group Collective Efficacy Scale (TEBS-WG)

Descriptive statistics for items on the TEBS-WG are presented in Table C.4 (see Appendix C) for both complete data (n=399) and after mean replacement of missing data (n=410). As expected, the item means do not change substantially, as is the case with the standard deviations for all items on this measure. On average, teachers rated their work-group collective efficacy beliefs lowest on Item 7, *provide input in making important school decisions*, and highest on Item 6, *maintaining a school environment in which students feel good about themselves.*

Complete data (n=399) from the TEBS-WG were factor analyzed using the same procedures described above. A summary of the factor analysis results follows. Additionally, reliability analysis of data from the TEBS-WG factored subscales is presented in the following section.

Summary of Factor Analysis Results. Item inter-correlations are provided in Table C.7 (see Appendix C). The items of the Teacher Work-Group Collective Efficacy Scale (TEBS-WG) were moderately to strongly correlated (0.527 to 0.830). As with factor analysis of the TEBS-S, both orthogonal and oblique rotations were used after examination of the unrotated solution from principal components and principal axis factor extractions. Results of factor analyses indicated a single factor explained the underlying latent construct measured by this scale regardless of the method of extraction. The results of the factor analysis is presented in Table 3, and contains the communality estimates, eigenvalues and component matrix for the initial one-factor solution for these data. The percentage of variance explained by this factor was about 66%. As all items were strongly correlated with the single factor ($r_s > .761$) all twelve

items were used to define the factor named Work-Group Collective Efficacy Beliefs (WGE).

Estimates of Reliability. Internal consistency reliability estimates were calculated for the single factor of the TEBS-WG using data (n=410) with mean replacement for missing values. Cronbach Alpha for these data was 0.95. All items on the TEBS-WG were summed to form the WGE factor score for subjects in the final data set. The minimum and maximum scores on this factor are 12 and 48, respectively.

Table 3: Summary of Item Communalities, Pattern/Structure Coefficients, and Eigenvalues for a One-Factor Solution for the TEBS-WG.

Item	Factor Pattern/Structure Coefficients	Communality Estimates h^2
1	.801	.642
2	.833	.695
3	.855	.731
4	.761	.579
5	.790	.623
6	.849	.721
7	.802	.643
8	.822	.676
9	.818	.669
10	.789	.622
11	.835	.697
12	.802	.643
Eigenvalue	7.941	
% of Variance	66.179	

Teacher Faculty Collective Efficacy Scale (TEBS-F)

Descriptive statistics for each of the items on the TEBS-F are included in Table C.5 (see Appendix C). These statistics were calculated with complete data and after mean replacement of missing values. The means and standard deviations did not appear to differ substantially. As with the TEBS-WG, the highest mean score on the TEBS-F

was for Item 6, *maintain a school environment in which students feel good about themselves*. Likewise, the lowest mean score was for Item 7, *provide input in making important school decisions*.

Complete data from the TEBS-F (n=399) were used in factor analyses following the same procedures as described above for the TEBS-S and the TEBS-WG. The results are presented below. Additionally, reliability estimates for the factored subscales are included below.

Summary of Factor Analysis Results. As with the Teacher Work-Group Collective Efficacy Scale (TEBS-WG), items on the Teacher Faculty Collective Efficacy Scale (TEBS-F) were strongly correlated. Item inter-correlations are provided in Table C.8 (see Appendix C), and ranged from .652 to .929. After examining the unrotated solution, Scree plot and eigenvalues greater than 1, and both orthogonal and oblique rotations, a single factor solution best represented the underlying construct measured by the items on the TEBS-F. Table 4 contains the communalities, eigenvalue and factor pattern/structure coefficients for the initial one-factor solution for these data. As with items on the TEBS-WG, items on the TEBS-F are strongly correlated with the single factor that explained approximately 75% of the variance. All twelve items were used to define the factor on the TEBS-F, and the factor was named Faculty Collective Efficacy Beliefs (FCE).

Estimates of Reliability. Internal consistency reliability estimates were calculated for the single factor of the Teacher Faculty Collective Efficacy Scale (TEBS-F) using data (n=410) with mean replacement for missing values. Cronbach Alpha for these data was 0.96. All items on the TEBS-F were summed to form the FCE factor

score for subjects in the final data set. The minimum and maximum scores for this factor are 12 and 48, respectively.

Table 4: Summary of Item Communalities, Pattern/Structure Coefficients, and Eigenvalues for a One-Factor Solution for the TEBS-F.

Item	Factor Pattern/Structure Coefficients		Communality Estimates h^2
1	.842		.709
2	.897		.804
3	.874		.765
4	.836		.700
5	.880		.774
6	.864		.747
7	.845		.713
8	.865		.748
9	.867		.751
10	.884		.782
11	.869		.754
12	.863		.744
Eigenvalue		8.992	
% of Variance		74.934	

Sources of Efficacy Information in Professional Learning Environments (SOURCES)

The SOURCES was designed to measure teachers' perceptions of the rate of occurrence of experiences from four sources of efficacy information theoretically related to teachers' self, work-group and faculty collective efficacy beliefs and the perceived influence each of these experiences had on teachers' beliefs in their abilities to be successful as a teacher. Each item described a particular positive experience of enactive mastery or vicarious learning or positive or negative experiences of social persuasion or physiological/ emotional states. Teachers rated the relative frequency of occurrence (OCCUR) of these experiences as well as the influence (INFL) these experiences have had on beliefs in their abilities to be successful as a teacher. The item

scales originally ranged from 1 to 4 on both the OCCUR and INFL scales; however, each item was recoded to range between 0 and 3. Recoding the scale in this manner shifted the mean down 1 scale point, but did not affect variation in the data. Recoding was performed to equate *Never Happens* and *Not Influential* with a zero score. For the OCCUR scale, 0=Never Happens, 1=Rarely Happens, 2=Occasionally Happens, and 3=Regularly Happens. For the INFL scale, 0=Not Influential, 1=Somewhat Influential, 2=Influential, and 3=Extremely Influential. Item means and standard deviations for the OCCUR and INFL scales of the SOURCES are available in Table C.9 (see Appendix C).

Results of Factor Analysis. For the OCCUR and INFL scales of the SOURCES, it was not expected that responses within one source would be answered similarly for an individual. As well, it was important to examine the underlying structure of the responses on these two scales. The SOURCES consisted of 17 enactive mastery items, 17 vicarious experience items, 8 social persuasion items, and 4 physiological and emotional states items for which OCCUR and INFL scores were generated. Items are labeled appropriately on the survey form in Table A.2 (see Appendix A). Bivariate correlations between the OCCUR and INFL scores for each item were weak to moderate in strength. Bandura (1997) states that experiences that provide sources of efficacy information are cognitively processed and weighted as to their import before efficacy beliefs are changed. Based on this theoretical point and the fact that simple bivariate item correlations were only weak to moderate in strength, the INFL scores were factor analyzed and included in all analyses.

The OCCUR and INFL scores were factor analyzed separately using the same procedures that were used for factor analyzing the TEBS measures. Principal components and principal axis factor analysis were employed to investigate the structure of the scores on the SOURCES. Only completed data were factor analyzed. As the results were similar for both extraction methods, principal components factor analysis results were used. For both scales oblique rotation resulted in a four-factor solution that was determined to be the best structure in terms of simplicity and theoretical clarity. Factors on both scales were similar; however, several additional items loaded on the factors of the INFL scale. Factor analysis results for the OCCUR scale are presented in Table 5.

The initial solution for the OCCUR scale explained approximately 41% of the variance in item scores. Items 13 through 19 represent the first factor of the solution called Occurrences of Professional Development Experiences (OCCPD). This factor consists of items that focus on *vicarious learning experiences* gained through discussions with peers and administrators, modeled behaviors by administrators and outside experts and learning about new instructional techniques through reading in professional literature. Factor III also consisted of *vicarious learning experiences*; however, these items (39, 44, 45, 46 and 50) are classroom-based observations of other teachers successfully teaching in general and in specific subject areas. Factor III was called Occurrences of Observation of Other Teachers (OCCOOT). Factor II, defined by items 29, 33, 34, and 35, appeared to represent a contrast between negative affect (*physiological and emotional states*) associated with teaching experiences and positive feedback from students about the success of a teacher's teaching. Although item 29

does appear to provide an appropriate amount of information and influence to be included in this factor, estimates of internal consistency indicated that alpha coefficients increased considerably when item 29 was deleted. Therefore, item 29 was not included in the factor. Factor II was named Occurrences of Negative Affect (OCCNAF).

Enactive mastery experiences associated with meeting the demands of teaching and being successful as a teacher in specific subject areas were influential in defining Factor IV. This factor was named Enactive Mastery for Teaching (OCCEMT).

Table 5: Direct Oblimin (δ=0) Four-Factor Solution and Initial Communalities and Eigenvalues for the OCCUR scale of the SOURCES (n= 312).

		Rotated Factor Pattern and Structure Coefficients (Direct Oblimin, δ=0)							
	Extraction	Factor I		Factor II		Factor III		Factor IV	
Item	Communality	Func	r_s	Func	r_s	Func	r_s	Func	r_s
1	.354	-.022	.169	-.349	-.471	.029	-.107	.395	.496
2	.239	.328	.441	.046	-.104	-.119	-.315	.194	.318
3	.338	.074	.194	-.349	-.460	.152	-.022	.359	.463
4	.060	.174	.214	-.044	-.114	.010	-.105	.106	.177
5	.360	.425	.504	-.066	-.246	.087	-.201	.319	.463
6	.410	.537	.598	-.056	-.232	.052	-.265	.220	.406
7	.430	.447	.599	-.104	-.276	-.152	-.422	.174	.395
8	.218	.179	.332	-.201	-.318	-.093	-.256	.203	.351
9	.331	.156	.351	-.130	-.310	-.059	-.253	.418	.528
10	.416	.228	.473	.105	-.055	-.467	-.591	.132	.284
11	.390	.393	.532	.204	.038	-.293	-.479	.124	.258
12	.159	.279	.339	-.134	-.233	.029	-.157	.138	.269
13	.505	.665	.705	-.003	-.146	-.102	-.413	-.029	.219
14	.592	.667	.752	-.051	-.206	-.175	-.494	-.027	.255
15	.506	.732	.709	.045	-.107	.047	-.302	.023	.243
16	.542	.769	.724	-.070	-.178	.026	-.318	-.141	.134
17	.433	.640	.647	.104	-.034	-.069	-.355	-.012	.185
18	.510	.708	.701	.115	-.027	-.063	-.374	-.040	.174
19	.463	.715	.677	.054	-.084	.056	-.276	-.001	.207
20	.390	.450	.575	-.060	-.177	-.268	-.481	-.046	.188
21	.183	.159	.301	.035	-.115	-.093	-.237	.313	.376
22	.402	.356	.514	-.224	-.299	-.337	-.506	-.147	.127
23	.526	.418	.587	-.384	-.483	-.235	-.477	-.065	.258
24	.346	.175	.404	-.271	-.360	-.366	-.488	-.056	.230
25	.403	.062	.380	-.157	-.303	-.461	-.561	.194	.377

Table 5 (continued)

26	.168	.080	.079	.424	.350	-.088	-.094	.135	.042
27	.400	.211	.426	-.389	-.475	-.281	-.441	.004	.270
28	.386	.026	.321	-.339	-.436	-.408	-.493	.093	.311
29[a]	.444	.023	.291	-.502	-.587	-.256	-.373	.129	.364
30	.241	.006	.238	-.248	-.357	-.222	-.315	.224	.361
31	.181	-.024	.188	-.235	-.313	-.247	-.304	.138	.266
32	.448	.152	.332	-.440	-.568	.027	-.184	.307	.497
33	.369	.041	-.106	.612	.605	.061	.127	.024	-.180
34	.417	.107	-.055	.640	.639	.029	.085	-.050	-.232
35	.394	.035	-.036	.643	.613	-.115	-.040	.019	-.155
36	.342	.162	.245	-.482	-.543	.136	-.048	.145	.327
37	.419	.299	.400	-.514	-.580	.029	-.197	.026	.289
38	.440	.166	.388	-.443	-.561	-.139	-.330	.191	.426
39	.555	.139	.457	-.099	-.210	-.659	-.728	-.048	.188
40	.303	-.179	.113	-.086	-.241	-.244	-.283	.470	.496
41	.279	.054	.256	-.171	-.325	-.070	-.216	.398	.489
42	.346	-.104	.110	-.131	-.295	.003	-.101	.560	.569
43	.358	.481	.561	-.003	-.107	-.227	-.436	-.088	.129
44	.817	.104	.479	.119	-.016	-.872	-.892	-.051	.152
45	.786	-.047	.361	.140	.013	-.917	-.874	-.001	.155
46	.815	.035	.431	.106	-.024	-.903	-.895	-.039	.152
47	.513	-.036	.192	.165	-.082	-.012	-.152	.762	.698
48	.479	.038	.257	.075	-.165	.001	-.172	.701	.688
49	.557	.161	.332	.132	-.130	.104	-.128	.738	.724
50	.679	.057	.423	.130	-.014	-.798	-.814	.038	.203
		Factor I		Factor II		Factor III		Factor IV	
Initial Eigenvalues		12.432		4.126		2.168		1.916	
% Variance Explained		24.864		8.252		4.336		3.831	

[a] Item 29 dropped from Factor II due to reliability analysis.

The four factors on the OCCUR scale of the SOURCES demonstrated moderately weak correlations ranging from -.33 for Factors II and IV to .48 for Factors I and III. All correlations were of the appropriate sign to indicate that Factor II, OCCNAF, is negatively associated with each factor. Again, the sign of the factor pattern and structure coefficients may be ignored if aware of the direction of the correlations between the factored subscales.

The INFL scores of the SOURCES were subjected to factor analysis procedures described earlier and are presented in Table 6. The results of factor analyzing the INFL scores provided additional information to examine teachers' perceptions of their professional learning environment. The initial four-factor solution explained approximately 51% of the variance in INFL scores. A four-factor oblique rotation was selected as the best solution to describe the latent constructs measured by these items. Factor I, Influence of Professional Success and Learning Opportunities (INPSLO), consisted of items related to successful experiences handling classroom and school improvement tasks as well as opportunities outside of the classroom for learning from colleagues, administrators and others. The items on this subscale include items 2, 4, 5, 6, 7, 9, 10, 11, 13, 14, 15, 16, 17, 18, and 19. It should be noted that this scale basically parallels Factor I, OCCPD, on the OCCUR scale except that only items regarding vicarious learning loaded cleanly onto the OCCPD subscale (items 13 through 19). Items 2, 4, 5, 6, 7, 9, 10 and 11 have consistently strong positive correlations with the subscale factor on the INFL, but this was not so on the OCCPD factor.

The second factor in the analysis of INFL scale responses represents the influence that teachers perceived both past teaching success with students and the positive physiological and emotional responses to teaching success have on their beliefs in their abilities to be successful as a teacher. The items on Factor II, Influence of Teaching Success and Positive Affect (INTS), were 1, 29, 32, 36, 37, 38, 40, 42, 47, 48 and 49. This factor appears to parallel Factor IV on the OCCUR scale, OCCEMT. There were substantial differences between the item loadings on these factors, however. INTS contains items indicative of the influence of positive emotional and physiological

responses to teaching success as well as some items regarding successful teaching experiences that did not load on OCCEMT. OCCEMT does not contain these items, but rather perceived occurrences of teaching success in terms of meeting the demands of teaching and being successful in specific subject areas (math, reading and science) loaded together on the OCCUR scale.

Table 6: Direct Oblimin (δ=0) Four-Factor Solution and Initial Communalities and Eigenvalues for the INFL scale of the SOURCES (n=319).

		Rotated Factor Pattern and Structure Coefficients (Direct Oblimin, δ=0)							
	Extraction	Factor I		Factor II		Factor III		Factor IV	
Item	Communality	Func	r_s	Func	r_s	Func	r_s	Func	r_s
1	.417	.200	.362	.563	.592	-.084	.023	.235	.054
2	.413	.575	.631	.131	.401	.016	.170	.025	-.215
3	.416	.345	.480	.417	.547	.103	.216	.239	.004
4	.291	.525	.520	.017	.263	.114	.220	.109	-.106
5	.624	.732	.729	.224	.500	-.131	.042	.218	-.073
6	.636	.757	.761	.178	.482	-.148	.040	.124	-.162
7	.383	.556	.581	.088	.348	.159	.278	.150	-.100
8	.421	.448	.533	.343	.510	.047	.170	.245	-.001
9	.460	.584	.658	.182	.449	-.054	.116	-.001	-.242
10	.394	.573	.614	.573	.276	-.030	.177	-.137	-.342
11	.480	.694	.680	.694	.244	-.112	.237	-.054	-.297
12	.344	.416	.537	.416	.427	.226	.054	-.104	-.286
13	.584	.700	.754	.700	.386	.033	.158	-.128	-.383
14	.620	.704	.766	.704	.348	-.037	.285	-.157	-.423
15	.620	.790	.786	.790	.373	.006	.137	-.013	-.292
16	.535	.662	.724	.662	.390	.053	.200	-.090	-.346
17	.520	.536	.674	.536	.397	.081	.228	-.251	-.470
18	.558	.719	.713	.719	.225	-.155	.161	-.197	-.421
19	.520	.731	.690	.731	.180	-.203	.223	-.107	-.341
20	.540	.540	.645	.540	.294	-.030	.111	-.378	-.553
21	.260	.267	.435	.267	.431	.284	.154	-.075	-.238
22	.476	.230	.492	.230	.462	.280	.062	-.434	-.556
23	.475	.132	.446	.132	.502	.354	.116	-.442	-.556
24	.386	-.051	.264	-.051	.382	.307	.059	-.519	-.553
25	.430	.018	.345	.018	.406	.280	.175	-.518	-.590
26	.550	-.018	.199	-.108	.178	.037	.736	-.087	-.220
27	.516	.040	.432	.070	.546	.414	.177	-.455	-.571
28	.385	.047	.364	.047	.565	.495	.115	-.250	-.369
29[a]	.494	-.013	.308	-.013	.699	.720	.062	016	-.125

Table 6 (continued)

30	.258	.015	.283	.015	.485	.440	.166	-.127	-.239
31	.365	.100	.399	.100	.525	.408	.294	-.187	-.342
32	.642	-.047	.317	-.047	.794	.834	.139	.096	-.071
33	.674	-.040	.166	-.040	.239	.141	.801	.142	-.024
34	.708	-.051	.175	-.051	.183	.051	.840	-.012	-.160
35	.672	.019	.199	.019	.143	-.011	.819	.021	-.134
36	.563	-.011	.341	-.011	.750	.760	.133	.021	-.140
37	.607	-.039	.345	-.039	.778	.791	.140	-.026	-.185
38	.642	-.109	.313	-.109	.793	.821	.220	-.034	-.190
39	.482	.270	.506	.270	.335	.085	.266	-.475	-.610
40	.413	.110	.398	.110	.630	.566	.141	-.055	-.219
41	.548	.329	.602	.329	.645	.452	.228	-.135	-.361
42	.490	.010	.369	.010	.666	.612	.325	-.060	-.234
43	.512	.489	.647	.489	.373	.061	.271	-.296	-.504
44	.760	.388	.622	.388	.288	-.064	.393	-.599	-.763
45	.720	.279	.547	.279	.279	-.036	.454	-.600	-.746
46	.721	.270	.559	.270	.328	.024	.414	-.614	-.760
47	.466	.091	.402	.091	.674	.618	.189	-.015	-.193
48	.408	-.037	.309	-.037	.620	.594	.226	-.109	-.245
49	.430	.078	.402	.078	.627	.547	.239	-.113	-.279
50	.664	.290	.530	.290	.244	-.066	.399	-.595	-.728
		Factor I		Factor II		Factor III		Factor IV	
Initial Eigenvalues		16.806		3.837		2.835		2.015	
% Variance Explained		33.613		7.675		5.670		4.030	

Factor III on the INFL scale, Influence of Negative Affect and Feedback (INNAF), contains items 26, 33, 34, and 35. This factor closely parallels OCCNAF except that OCCNAF does not contain item 26, "Being reprimanded for your teaching practices." Factor IV, Influence of Observation of Other Teachers (INOOT), contained items 44, 45, 46 and 50, also closely parallels a subscale of the OCCUR responses. A single item, number 39, is not included in the INOOT subscale, but is included in the OCCOOT subscale.

For the most part, structure coefficients for each of the items on the four INFL factored subscales were substantial at about 0.7. However, some of the factor pattern

coefficients were small indicating that the item was explaining some of the variation already explained by other items loading on the particular factor

Validity Evidence from the OSQ. The Open-Ended Sources Questionnaire (OSQ) was included in this study for several reasons, one of which was to provide construct validity evidence for the SOURCES. Items on the OSQ are presented in Table A.6 (see Appendix A). Two researchers independently analyzed qualitative responses (n=281) to each of the questions on the OSQ, and reached similar conclusions on most categorizations of responses. Inconsistencies on two occasions in coding between the two researchers were discussed and the researchers resolved their differences. Of particular importance here are the responses to questions 1 and 3 which refer to important elements of the working and learning environment that enhance teachers' (and the entire faculty's) beliefs in their ability to be successful.

Most items on the SOURCES were mentioned by teachers in either question 1 or 3 as elements that enhance their efficacy beliefs as individuals or group members. None of the negatively-stated items were mentioned in response to these questions although some were mentioned as elements that weaken beliefs in abilities. Those items not mentioned on the OSQ are listed in Table 7. Item means and standard deviations for both OCCUR and INFL scores are included. None of these three items were included on the SOURCES factored subscales.

Items related to self-reflection are rated relatively high on average, but do not explicitly appear on the OSQ; however, many teachers mentioned the roles that their own knowledge, ability and willingness to learn play in their beliefs about their ability to be successful as a teacher. Both item 12 and 21 have means that are substantial given

the range of the scores was 0 to 3. This indicated that teachers in the sample did have these experiences fairly often since being employed by their present school. Stress-reduction was not explicitly included in responses from teachers and the mean response on that item indicated an experience that occasionally happens. Negatively-stated physiological and emotional responses such as stress and hopelessness were mentioned as elements that weaken teachers' beliefs in their abilities.

Table 7: Means and Standard Deviations of OCCUR and INFL scores for SOURCES Items not Listed in Questions 1 and 3 on the OSQ.

Item	OCCUR (n=312)	INFL (n= 319)	Experiences of...
12	2.71 (.55)	2.45 (.76)	Imagining yourself successfully teaching your students
21	2.64 (.57)	2.44 (.70)	Using self-reflection as a means to improve your teaching
31	1.93 (.85)	2.16 (.90)	Stress-reduction because you learned ways to improve your teaching

Reliability Analysis of Factored Subscales. Cronbach alpha reliability estimates for data on each of the four factored subscales of the OCCUR scale ranged from a low of .74 for Factor II (OCCNAF) to .92 for Factor III (OCCOOT). As mentioned previously, item 29 was deleted from OCCNAF due to a decrease in internal consistency on the factor when it was included. Reliability estimates for the four subscales of the INFL responses were also satisfactory. Estimates of internal consistency for data on these factors ranged from .81 for the INNAF subscale to .94 for the INOOT subscale.

Descriptive Summaries for Subscale Scores on Study Measures

Descriptive statistics for each of the factored subscales of the TEBS and the SOURCES measures are presented in Table 8. Means, standard deviations and means

expressed as percentages of the maximum possible scores are presented for all subscales. The mean is presented as a percentage of the maximum possible score to make score more directly comparable. The number of items on each subscale was included next to each subscale name. For the TEBS subscales, the items can be multiplied times 4 to compute the maximum possible score. For the SOURCES subscales, the number of items was multiplied by 3 to obtain the maximum possible score. Descriptive statistics are presented for the sample overall and by district.

Table 8: Descriptive Statistics For Subscale Scores on Study Measures (n=410).

Teacher Self-Efficacy Scale (TEBS-S)	Mean	Standard Deviation	% of Maximum Possible Score
AID (5 items)[a]			
AID (5 items)[a,b]	16.42	2.95	82.1%
District A[b]	16.15	2.93	80.8%
District B[c]	16.48	2.96	82.4%
CC (3 items)	11.05	1.36	73.7%
District A	10.88	1.23	72.5%
District B	11.09	1.39	73.9%
MFL (5 items)	17.71	2.34	88.6%
District A	17.13	2.69	85.7%
District B	17.82	2.25	89.1%
MLR (3 items)	10.48	1.60	69.9%
District A	10.44	1.55	69.6%
District B	10.49	1.61	69.9%
Teacher Work-Group Collective Efficacy Scale (TEBS-WG)			
WGE	38.86	7.68	81.0%
District A	38.50	8.65	80.2%
District B	38.92	7.50	81.1%
Teacher Faculty Collective Efficacy Scale (TEBS-F)			
FCE	38.47	8.04	80.1%
District A	38.42	8.50	80.0%
District B	38.48	7.96	80.2%

Table 8 (continued)

SOURCES (Factored Subscales)			
OCCPD (7 items)	14.63	4.00	69.7%
District A	14.73	3.45	70.1%
District B	14.61	4.10	69.6%
OCCNAF (3 items)	3.52	2.06	39.1%
District A	3.41	3.41	37.9%
District B	3.54	3.41	39.4%
OCCOOT (5 items)	7.04	4.28	46.9%
District A	6.50	4.08	43.3%
District B	7.14	4.08	47.6%
OCCEMT (4 items)	10.21	2.11	85.1%
District A	10.00	2.35	83.3%
District B	10.25	2.06	85.4%
INPSLO (15 items)	30.64	8.30	68.1%
District A	29.98	8.16	66.6%
District B	30.77	8.34	68.4%
INTS (11 items)	28.25	4.87	85.6%
District A	27.52	5.42	83.4%
District B	28.39	4.75	86.0%
INNAF (4 items)	5.56	3.49	46.3%
District A	4.98	3.34	41.5%
District B	5.67	3.51	47.2%
INOOT (4 items)	7.17	3.59	59.8%
District A	6.80	3.73	56.6%
District B	7.24	3.56	60.4%

[a] Multiply number of items by 4 for TEBS scales and 3 for SOURCES scales to get maximum possible score.
[b] n=66
[c] n=344

Districts A and B do not appear to differ appreciably on any of the subscales of the study measures. The sample, in general, indicates weaker self-efficacy beliefs for CC and MLR than for MFL and AID. An important point to note was that teachers' perceptions of faculty collective efficacy (FCE) and work-group collective efficacy beliefs (WGE) were at approximately the same levels. Many of the items were similar on the two scales (see Appendix A); however, teachers were to reference a functional

work-group (e.g., grade-level planning group) for the WGE scale and their school's faculty as a whole for the FCE.

Bivariate correlation coefficients between the factored subscales of the TEBS and the factored subscales of the SOURCES were calculated and are presented in Table 9. The magnitude of the correlations are weak to moderate in strength. Correlations between the self-efficacy factors (AID, CC, MFL and MLR) are quite weak with all less than 0.361. Correlations between FCE and the SOURCES factors are slightly more substantial with the highest correlations being between FCE and Occurrences of Professional Development Experiences (r = .483) and Occurrences of Observation of Other Teachers (r = .415). WGE was also moderately related to OCCPD and OCCOOT.

Table 9: Bivariate Correlations Between Subscales of the TEBS and Subscales Of The SOURCES (n=410).

Subscale	AID	1	2	3	4	5	6	7	8
1. CC	.485								
2. MFL	.670	.578							
3. MLR	.646	.560	.600						
4. FCE	.433	.340	.416	.355					
5. WGE	.526	.401	.504	.425	.768				
6. OCCPD	.320	.148	.241	.179	.483	.449			
7. OCCNAF	-.301	-.307	-.209	-.215	-.263	-.258	-.098		
8. OCCOOT	.254	.078	.181	.164	.415	.364	.519	-.049	
9. OCCEMT	.332	.285	.330	.361	.276	.344	.278	-.251	.154
10. INPSLO	.252	.198	.214	.211	.356	.300	.515	-.096	.333
11. INTS	.288	.341	.341	.297	.237	.207	.116	-.172	.065
12. INNAF	-.079	-.089	-.065	-.053	-.033	-.089	-.008	.342	.007
13. INOOT	.092	.056	.110	.054	.253	.189	.282	.013	.415

Subscale	9	10	11	12
10. INPSLO	.190			
11. INTS	.342	.513		
12. INNAF	-.097	.249	.243	
13. INOOT	.050	.615	.371	.348

In examining correlations between the OCCUR factors and the INFL factors, generally parallel factors were moderately correlated. For example, OCCPD, or

Occurrences of Opportunities for Professional Development, and INPSLO, or Influence of Professional Success and Learning Opportunities were moderately correlated (r = .515). For the most part, none of the subscales of the SOURCES are strongly correlated.

This section presented a summary of descriptive statistics from the various study variables. These variables included the factored subscales of the TEBS and the factored subscales of the SOURCES. In the following section, each of the research questions posed by this study are addressed.

Research Question 2

What relationships exist between teacher self-efficacy beliefs and teacher collective (work-group and faculty) efficacy beliefs? Are these relationships consistent across domains of functioning? When self-efficacy beliefs are statistically controlled, are there school differences in teachers' perceptions of faculty collective efficacy beliefs?

Results

Canonical correlation analysis was employed to address this question. Of primary interest was the relationship between the combination of AID, CC, MFL and MLR and the combination of WGE and FCE. The results from this analysis were included in Table 10. A single function (R_{cI} = 0.575) of two (R_{cII} = 0.018) from a canonical correlation analysis of the self-efficacy and collective efficacy variables was determined to be worthy of interpretation to answer Research Question I. Two maximally correlated latent variables (collective and self-efficacy) share approximately 33.1% of the variance between them.

Based on both the standardized canonical function coefficients and the structure coefficients, all variables in both sets appear to provide substantial information for this function. Although the function coefficient for FCE is small relative to the function coefficient for WGE, the structure coefficients for both are large. The weight for FCE is smaller probably because WGE and FCE overlap in the amount of variance explained. This is not surprising as the bivariate correlation between FCE and WGE was 0.768. The self-efficacy latent variable appears to be primarily defined by AID and MFL, but CC and MLR also provide substantial proportions of information for this function.

The self-efficacy latent variable shared approximately 32.8% and 22.5% of the variation in WGE and FCE, respectively. This result provided evidence as to the average inter-relatedness of teacher self and collective efficacy and as to whether self-efficacy scores should be averaged as a proxy measure of teachers' collective efficacy beliefs.

Bivariate correlations (r_{cross}) between self-efficacy factors and the collective efficacy synthetic variable provided insight as to how self-efficacy beliefs in different areas of functioning may be related to teachers' collective efficacy beliefs. AID and MFL are more strongly correlated with the collective efficacy latent variable than CC and MLR. CC and MLR are similar in that both refer to beliefs about abilities to manage psycho-social and physical aspects of the classroom learning environment and routine.

In order to examine relationships between teachers' self-efficacy beliefs and faculty collective efficacy beliefs, FCE, and work-group collective efficacy beliefs,

WGE, separately, multiple regression was used. AID, CC, MFL and MLR were entered into the regression as independent variables and FCE and WGE were entered separately as dependent variables. Results of these analyses are presented in Table 11.

Table 10: Canonical Correlation (Function I) Results Between Teacher Self-Efficacy Variables and Teacher Collective Efficacy Variables (N=410).

Variable/Statistic	Function Coefficient	r_s	r_s^2/h^2	r_{cross}	r^2_{cross}
WGE	.884	.996	99.2%	.573	32.8%
FCE	.145	.824	67.9%	.474	22.5%
Adequacy			83.6%		
R_d			27.6%		
R_c^2			33.1%		
R_d			22.0%		
Adequacy			84.3%		
AID	.532	.918	84.3%	.528	27.9%
CC	.191	.702	49.3%	.404	16.3%
MFL	.371	.879	77.3%	.506	25.6%
MLR	.069	.742	55.1%	.427	18.2%

Note. r_s = bivariate correlation between the factor and its latent variable
r_{cross}= bivariate correlation between the factor and the opposite latent variable.

From the results in Table 11, it appears that the contributions of various domains of functioning of the self-efficacy variable are related to FCE and WGE in the same way. Also, the relationships between the self- and collective efficacy factors are similar to the results indicated in the canonical correlation analysis. This is not surprising given the strong correlation between these two collective efficacy variables. However, teachers' self-efficacy beliefs in the four areas of functioning are more strongly related to teachers' work-group collective efficacy than to faculty collective efficacy beliefs. Differences in functional dependence and proximity between individual teachers and these two groups in which they work may be responsible for the additional shared variance between the self-efficacy belief variables and WGE.

To answer the final part of Research Question 2, only schools with at least 10 respondents were used in the analyses. Eighteen out of 44 schools had 10 or more respondents for a total of 283 teachers. When a SCHOOL variable was included as a factor in a general linear model and self-efficacy beliefs were statistically controlled, schools did differ in the mean level of faculty collective efficacy beliefs of teachers ($p < .05$).

Table 11: Multiple Regression Results for FCE and WGE Regressed Separately on Self-Efficacy Factors (N=410).

DV	WGE		FCE	
IV or Statistic	β	r_s	β	r_s
AID	.306	.918	.245	.914
CC	.107	.700	.101	.717
MFL	.213	.880	.172	.878
MLR	.039	.742	.037	.749
R^2	32.8%		22.5%	
Adjusted R^2	32.2%		21.7%	

Research Question 3

What multivariate relationship exists between the set of sources of efficacy information available in professional learning environments and the set of teachers' self-, work-group collective and faculty collective efficacy beliefs?

Results

Canonical correlation analysis was appropriate to answer Research Question 3. Table 12 includes results of a canonical correlation analysis using the factored subscales of the SOURCES measure and the TEBS variables. Additionally, in Table 13, INFL factored subscales were omitted in a second canonical analysis to examine whether these factors are able to explain additional variation in the TEBS scales and whether the relationships remain consistent between the efficacy variables and the OCCUR factors

without the INFL variables. In both analyses, two canonical functions were found to be interpretable and are presented.

Table 12: Results of Canonical Correlation Analysis Between Factored Subscales of the SOURCES and Teacher Self- and Collective Efficacy Variables (N=410).

Variable/	Function I				Function II				
Statistic	Func	r_s	r_{cross}	r_s^2	Func	r_s	r_{cross}	r_s^2	h^2
AID	-.368	-.768	-.496	59.0%	.107	-.280	-.104	7.8%	.668
CC	-.135	-.574	-.371	32.9%	-.653	-.697	-.259	48.6%	.815
MLR	.004	-.644	-.416	41.5%	-.302	-.473	-.176	22.4%	.639
MFL	-.012	-.592	-.382	35.0%	-.389	-.555	-.207	30.8%	.658
WGE	-.187	-.850	-.548	72.3%	.293	.175	.065	3.1%	.754
FCE	-.538	-.888	-.573	78.9%	.527	.313	.117	9.8%	.887
Adequacy				53.3%				20.4%	
R_d				22.2%				2.8%	
R_c^2				41.6%				13.8%	
R_d				11.7%				2.0%	
Adequacy				28.1%				14.7%	
OCCPD	-.437	-.747	-.482	55.8%	.493	.488	.182	23.8%	.796
OCCNAF	.350	.532	.343	28.3%	.079	.271	.101	7.3%	.356
OCCOOT	-.327	-.614	-.396	37.7%	.223	.493	.184	24.3%	.620
OCCEMT	-.209	-.582	-.376	33.9%	-.296	-.388	-.144	15.1%	.490
INPSLO	-.067	-.571	-.368	32.6%	-.083	.070	.026	0.5%	.331
INTS	-.297	-.495	-.320	24.5%	-.674	-.605	-.225	36.6%	.611
INNAF	.039	.117	.076	1.4%	.143	.124	.046	1.5%	.029
INOOT	.072	-.330	-.213	10.9%	.324	.290	.108	8.4%	.193

On Function I in Table 12, the efficacy latent variable appeared to be mainly composed of collective efficacy variables, specifically FCE, and by the AID subscale of the self-efficacy variables. The other three self-efficacy variables are moderately correlated with the latent variable, however, the variation in these items, particularly for MLR and MFL, may be explained by another efficacy variable. In interpreting the synthetic variable of Function I for all of the factored SOURCES variables, this canonical variate presented a contrast between the occurrence and influence of negative

affect (negative feedback and physiological and emotional responses to teaching) and all other SOURCES variables in the model.

On Function II, the synthetic variables appeared to represent a contrast between self-efficacy beliefs low in CC, MFL and MLR and high collective efficacy beliefs for the efficacy set. For the SOURCES variable set, the latent construct represented a contrast between occurrences of enactive mastery experiences specific to teaching subject matter (OCCEMT) and the influence of teaching success (INTS) and all other SOURCES variables, particularly occurrences of professional development (OCCPD) and occurrences of observation of other teachers (OCCOOT), or the vicarious experiences specific to observation of other teachers and opportunities for successful professional learning from colleagues and others. These latent canonical variables shared 13.8% of the variation between them and were positively correlated. Lower levels of self-efficacy beliefs and higher levels of collective efficacy beliefs were associated with lower levels of enactive mastery experiences (specifically as related to teaching math, reading and science and handling the daily demands of teaching) and influence from teaching success and with higher levels of opportunities for professional development, observation of other teachers and negative affect.

To examine whether the INFL factored subscales were useful in explaining additional variation in efficacy beliefs, these factors were removed and a canonical analysis was performed again. These results are in Table 13.

The relative strength and position of the efficacy variables in the synthetic variable for Function I is consistent across analyses with and without the INFL variables. Function I of the second analysis provided a similar interpretation across

analyses. The percentage of variance shared by the latent variables on the first function was reduced by 2.5%. On the second function, results were consistent with results where the INFL factored subscales were included. Again, lower levels of OCCEMT and higher levels on OCCPD, OCCNAF and OCCOOT are positively correlated with lower levels of self-efficacy (more so with CC and MFL) and higher levels of FCE. Again, WGE does not contribute substantially to this function as evidenced by the relative size of the function coefficient and the near zero structure coefficient. The change in the percentage of explained variance on the second function was a loss of 4.5%.

Table 13: Results of Canonical Correlation Analysis Between OCCUR Factored Subscales of the SOURCES and Teacher Self- and Collective Efficacy Variables (N=410).

Variable/	Function I				Function II				
Statistic	Func	r_s	r_{cross}	r_s^2	Func	r_s	r_{cross}	r_s^2	h^2
AID	.387	.737	.460	54.3%	.118	-.357	.109	12.7%	.670
CC	.049	.485	.303	23.5%	-.564	-.701	.214	49.1%	.726
MLR	-.072	.575	.359	33.1%	-.134	-.475	.145	22.6%	.557
MFL	-.013	.533	.333	28.4%	-.571	-.680	.208	46.2%	.746
WGE	.285	.880	.550	77.4%	-.133	-.027	.008	0.1%	.775
FCE	.539	.907	.568	82.3%	.755	.254	-.078	6.5%	.888
Adequacy				49.8%				22.9%	
R_d				19.5%				2.1%	
R_c^2				39.1%				9.3%	
R_d				16.5%				2.3%	
Adequacy				42.3%				24.8%	
OCCPD	.507	.800	.500	64.0%	.494	.408	.125	16.6%	.806
OCCNAF	-.389	-.527	-.329	27.8%	.269	.407	.124	16.6%	.444
OCCOOT	.338	.664	.415	44.1%	.318	.437	.133	19.1%	.632
OCCEMT	.286	.577	.360	33.3%	-.804	-.685	-.209	46.9%	.802

Research Question 3(a)

What relationship exists between the set of sources of efficacy information and teacher self-efficacy beliefs? Does this relationship differ between schools?

Results

The variables of interest are the eight SOURCES factors and the four self-efficacy variables from the TEBS-S. As in results from Research Question 3, separate analyses will be run with and without the INFL subscales to examine their usefulness.

Canonical correlation results are provided in Table 14 to examine the relationship between the factored subscales of the SOURCES and the factored subscales of the TEBS-S. A single function was determined to be interpretable based on the magnitude of the squared canonical correlation coefficient. The canonical correlation coefficient between the SOURCES synthetic variable and the self-efficacy synthetic variable is 0.56. Thus, approximately 31% of the variation in the self-efficacy canonical variate can be explained by the SOURCES canonical variate. The SOURCES latent variable is defined primarily by OCCEMT, INTS, and negatively by OCCNAF. All four of the TEBS self-efficacy variables provide substantial influence to the self-efficacy synthetic variable. Thus, the canonical correlation coefficient indicates there was a moderate positive correlation between the sources of efficacy information in the learning environment (particularly, occurrences of enactive mastery teaching experiences, the influence of these experiences and low levels of occurrences of negative affect) and teachers' beliefs about their ability in the four areas defined by this study.

Table 15 includes canonical correlation results between the SOURCES factors and the self-efficacy factors with the INFL factors omitted. When the INFL factored subscales are removed from the model, results are similar although the shared variation, 24.7%, is slightly smaller. Again, a latent self-efficacy variable primarily composed of

AID and secondarily by the other three factors is positively, but moderately, correlated with a latent SOURCES variable that is primarily defined positively by OCCEMT, negatively by OCCNAF and to a lesser extent, by OCCPD and OCCOOT.

Table 14: Canonical Correlation Analysis Between the Factored SOURCES Variables and the Self-Efficacy Variables of the TEBS-S (N=410).

Variable/ Statistic	Function I Func	r_s	r_{cross}	r_s^2
AID	.526	.900	.500	81.0%
CC	.366	.791	.440	62.6%
MLR	.169	.810	.450	65.6%
MFL	.130	.775	.431	60.1%
Adequacy				67.3%
R_d				20.8%
R_c^2				30.9%
R_d				7.7%
Adequacy				24.8%
OCCPD	.235	.515	.286	26.5%
OCCNAF	-.363	-.601	-.334	36.1%
OCCOOT	.228	.385	.214	14.8%
OCCEMT	.304	.686	.381	47.1%
INPSLO	.080	.483	.269	23.3%
INTS	.521	.670	.373	44.9%
INNAF	-.082	-.165	-.092	2.7%
INOOT	-.216	.170	.094	2.9%

To answer the second part of Question 2(a), only schools with more than 10 respondents were selected and used in the analyses. Eighteen of the 44 schools in this study met this criterion. A general linear model was developed with SOURCES variables as covariates and SCHOOL as a factor. The multivariate dependent variable was self- efficacy as defined by AID, CC, MFL and MLR. Results of this analysis (n=283) indicated that teachers' responses across schools did not differ ($p > 0.05$) in the relationships between the SOURCES variables and the self-efficacy variables of the TEBS.

Table 15: Canonical Correlation Analysis Between the Factored OCCUR Variables of the SOURCES and the Self-Efficacy Variables of the TEBS-S (N=410).

Variable/ Statistic	Function I Func	r_s	r_{cross}	r_s^2
AID	.672	.945	.470	89.3%
CC	.285	.728	.362	53.0%
MLR	.086	.772	.384	59.6%
MFL	.119	.765	.380	58.5%
Adequacy				65.1%
R_d				16.1%
R_c^2				24.7%
R_d				9.8%
Adequacy				39.8%
OCCPD	.308	.602	.299	36.2%
OCCNAF	-.503	-.671	-.334	45.0%
OCCOOT	.195	.459	.228	21.1%
OCCEMT	.513	.755	.376	57.0%

Research Question 3(b)

What relationship exists between the set of sources of efficacy information and teachers' perceptions of work-group collective efficacy beliefs? Does this relationship differ across schools?

Results

WGE and the eight elements of the SOURCES measure were included in a multiple regression model to determine the nature of the relationships between these variables. The relative information provided by the INFL subscales was examined by running analyses with and without these variables. As regression analyses are a subset method under canonical correlation analyses (Fan, 1996), results are presented in a similar manner to facilitate interpretation.

Results of a regression analysis of work-group efficacy beliefs (WGE) regressed on the factored SOURCES variables are presented in Table 16. Results showed that

31.1% of the variation in WGE is shared with the eight factored subscales of the SOURCES measure. OCCPD appears to provide the greatest amount of information to defining the regression equation with OCCOOT and OCCEMT providing just slightly less. Occurrences of negative affect and their influence both make negative contributions to the derived Y_{hat} variable in these results. Thus, higher levels of WGE are associated with lower levels of negative affect (occurrence and influence) and higher levels of all other SOURCES variables including occurrences of vicarious learning from other teachers, administrators, instructors, discussions, and reading, and occurrences of enactive mastery experiences in meeting the demands of teaching and being successful as a teacher of math, reading and science (OCCPD, OCCOOT and OCCEMT).

Table 16: Results of Regression Analysis Between Collective Efficacy Variables (WGE and FCE) and Factored Subscales of the SOURCES (N=410).

DV	WGE		FCE	
IV or Statistic	β	r_s	β	r_s
OCCPD	.276	.805	.300	.824
OCCNAF	-.149	-.462	-.183	-.449
OCCOOT	.173	.652	.214	.708
OCCEMT	.167	.616	.069	.471
INPSLO	.021	.538	.032	.608
INTS	.078	.369	.110	.403
INNAF	-.048	-.159	-.004	-.056
INOOT	.008	.339	.012	.432
R^2	.311		.343	
Adjusted R^2	.297		.330	

Note: $r_s = r_{xy}/R$

When the factored INFL subscales are removed from the model, the proportion of variation in WGE that is explained by the variables in the model was reduced to 30.4% Table 17 provides a summary of the regression results with the INFL factors omitted. Again, the INFL variables only account for a small amount of unexplained

variance. Relationships between OCCUR factored subscales and WGE are similar to results described above.

Table 17: Results of Regression Analysis Between Collective Efficacy Variables (WGE and FCE) and the Factored OCCUR Subscales from the SOURCES Measure (n=410).

DV	WGE		FCE	
IV or Statistic	β	r_s	β	r_s
OCCPD	.287	.813	.319	.844
OCCNAF	-.173	-.467	-.195	-.460
OCCOOT	.177	.659	.224	.726
OCCEMT	.193	.623	.104	.483
R^2	.304		.327	
Adjusted R^2	.298		.320	

Note: $r_s = r_{xy}/R$

To answer the second part of this research question, SCHOOL was added as a factor to the above models. When teachers are aggregated to the school level for those schools meeting the inclusion criterion of at least 10 respondents, schools did not differ substantially ($p>.05$). Thus, the relationships described above, on average, are not school specific.

Research Question 3(c)

What relationship exists between the set of sources of efficacy information and teacher faculty collective efficacy beliefs? Does this relationship differ among schools?

Results

Multiple regression analyses were used to correlate the factored subscales of the SOURCES with teachers' perceptions of faculty collective efficacy beliefs (FCE). As with other subparts of Research Question 3, analyses were performed with and without the INFL variables to assess their usefulness in explaining variation in efficacy beliefs of teachers. Tables 16 and 17 present the results of the two regression analyses for the

regression of FCE on all SOURCES factors and the regression of FCE on all OCCUR factors, respectively.

The SOURCES variables explained approximately 34% of the variation in FCE. For the most part, the individual relationships between the SOURCES variables and FCE were similar to the results for WGE. However, occurrences of observation of other teachers, the influence of professional successes and learning opportunities, the influence of the observation of other teachers, and the influence of teaching success appeared to play a more substantial role in explaining variation in FCE than in WGE. Also, occurrences of enactive mastery teaching experiences were less related to FCE than to WGE. Regardless, occurrences of professional development experiences involving interactions with other teachers, administrators, experts and literature outside of the classroom were the primary contributors to the shared variation between the SOURCES latent variable and FCE.

When the INFL factored subscales are removed, regression analysis results (see Table 17) indicated that occurrences of vicarious experiences primarily outside the classroom (OCCPD), and secondarily, inside the classroom (OCCOOT) were substantially associated with the SOURCES latent variable which shared about 33% of the variation with teachers' perceptions of faculty collective efficacy beliefs.

To examine whether these relationships differed across schools, SCHOOL was included as a factor in the general linear model. SCHOOL was a statistically significant effect ($p < .05$; $eta^2 = .120$) when included as a factor in this model. Sample size issues preclude running individual multiple regressions for each of the 18 schools included in the analysis. However, there were several options available to exam how teachers'

responses differed at these 18 schools. Bivariate correlations provided some insight into the relationships between FCE and each of the SOURCES variables at each school. However, these correlations do not allow for simultaneous consideration of the multivariate relationship between the SOURCES variables and FCE. Although bivariate correlations are discussed below, additional insight into the nature of the differences across schools was provided by the results of Research Questions 3(d) and 3(e) below.

To investigate how the relationship between the sources of efficacy information and faculty collective efficacy beliefs played out between schools, the factored subscales were examined in two ways. First, school means (n=18) were calculated for each of the factored subscales of the SOURCES and for FCE. Subsequently, bivariate correlation coefficients were calculated on the school means for these variables and are included in Table 18. Additionally, for each school with at least ten respondents, bivariate correlations between FCE and each of the factored subscales of the SOURCES were calculated within schools (see Table 18). For each of the SOURCES variables, there was a large amount of variation in the correlation coefficients obtained within schools when compared to the correlations obtained between each SOURCE factor and FCE for school means. Thus, aggregating data to school means to investigate these relationships may not be appropriate because a large amount of variation in teachers' individual scores exists within schools.

Nonetheless, faculty collective efficacy beliefs are a school-level variable. Therefore, the mean FCE scores were regressed on the school mean levels of the SOURCES factored variables. The results are presented in Table 19. These results are

Table 18: Bivariate Correlations Between FCE and the Factored Subscales of the SOURCES Measure by School and by Using Schools Means.

SOURCE	OCC1	OCC2	OCC3	OCC4	INF1	INF2	INF3	INF4
SCHOOL								
1	.054	-.034	.561	.070	-.119	.281	.117	.187
2	.282	-.057	.408	.353	.576	.262	.104	.581
8	.510	-.553	.539	.109	.385	.356	.030	.069
101	.101	-.176	.280	.434	.312	.431	.059	-.006
105	.857	-.629	.463	.180	.798	.657	.273	.836
106	.254	.349	.082	.316	.218	.682	.173	.238
107	.685	.018	.503	-.042	.726	.162	-.001	.354
201	.683	-.117	.566	.412	.451	.232	-.454	.556
204	.720	-.190	.177	.238	.262	.085	.170	.238
206	.271	-.063	.113	.211	.043	.329	-.492	-.044
301	.567	-.078	.470	.058	-.036	-.433	-.472	-.023
402	.728	-.700	.761	.738	.219	.064	-.730	.167
501	.245	.174	.208	.518	-.227	.209	-.128	-.366
504	.727	-.124	.492	.388	.375	.017	.315	.233
505	.594	-.318	.136	-.229	-.055	-.073	-.448	.230
508	.580	-.344	.575	.225	.668	.098	.483	.544
509	.298	-.409	-.311	-.010	.226	-.023	.109	-.150
603	.671	-.594	.491	.300	.231	.118	.004	.054
r [a]	.688	-.696	.583	.679	.668	.586	.034	.567

[a] Bivariate correlation of the school means for FCE with each SOURCE factor.
Note. OCC1=OCCPD; OCC2=OCCNAF; OCC3=OCCOOT; OCC4=OCCEMT; INF1=INPSLO; INF2=INTS; INF3=INNAF; INF4=INOOT.

powerful given the small sample size; however, all of the SOURCES variables were influential in explaining 81% of the variation in faculty collective efficacy beliefs aggregated to the school level. These results may be indicative of the "wash-out" effect of masking variability that exists within schools by aggregating teachers' responses to school level.

From these results, it can be concluded that all SOURCE factors, except for INNAF, are strongly related to FCE. Thus, low levels of OCCNAF and high levels of all other variables (expect INNAF) were associated with high levels of FCE. Several factors had low beta weights with large structure coefficients indicating an overlap of

explained variance. Research Questions 3(d) and 3(e) provide additional insight into these school differences.

Table 19: Regression of FCE on the Factored SOURCES Subscales Using School Means as the Unit of Analysis (N=18).

DV	FCE With all SOURCES Factors		FCE With OCCUR Factors Only	
IV or Statistic	β	r_s	β	r_s
OCCPD	.639	.761	.326	.808
OCCNAF	.252	-.770	-.302	-.817
OCCOOT	.325	.620	.338	.684
OCCEMT	.404	.751	.137	.797
INPSLO	-.497	.739		
INTS	.530	.648		
INNAF	-.283	.038		
INOOT	.211	.627		
R^2	.817		.852	
Adjusted R^2	.655		.640	

Research Question 3(d)

According to individual teachers, what characteristics of teachers' professional learning environment enhance (or weaken) efficacy beliefs of individuals or faculty members to accomplish required tasks or goals?

Results

Teachers were asked to respond to four open-ended questions on the Open-ended Sources Questionnaire (OSQ) available in Table A.6 (see Appendix A). In each question, teachers were asked to list important elements of their working and learning environment that enhance (or weaken) belief in their (or their faculty's) ability to be successful as teachers (or faculty members). Written responses from all subjects responding to the questionnaire (n=281) were examined and responses coded and counted. Emergent themes within and across schools were noted and are discussed in

Research Question 3(e). An independent researcher with expertise in teacher education and self-efficacy theory provided a check of data categorization and thematic definitions. Final counts from categories in the data were presented in Table 20.

Question 1 from the OSQ was addressed first, and these results are contained in Table 20. In assigning categories to elements that enhance teachers' self-efficacy beliefs, typically responses were related to characteristics or relationships with students, other teachers, administrators, the self, parents and /or the community, and other resources. These sources of efficacy information are listed in order of importance in terms of the number of times each was mentioned by teachers. The category most often mentioned was characteristics of students or resultant behaviors and attitudes due to the teachers' ability to be successful as a teacher. Other teacher characteristics or relationships that were important to teachers included help and support in the form of teamwork and collaboration, such as sharing of ideas and knowledge among teachers in their school. Grade-level planning groups were often mentioned as an important element in the working and learning environment that enhanced teachers' beliefs in their ability to be successful as a teacher with their students.

Teachers mentioned administrator characteristics, such as support, strength, encouragement, praise and innovativeness. Particularly, general statements about the positive effects of supportiveness and encouragement from the principal were common. Self-related characteristics provided some information to teachers as regards their abilities to be successful in teaching. Teachers cited their willingness to learn and attend workshops, seminars and classes as an important source in enhancing their self-efficacy beliefs about teaching. Many teachers recognized that parent support and

encouragement were important in making them feel able to be successful as a teacher. In addition, physical resources such as materials, curriculum, computers, teacher aides, adequate and safe space, etc. were important elements of the learning environment for some teachers.

Table 20: Important Sources in Teachers' Learning Environments that Enhance Self- and Faculty Collective Efficacy Beliefs (N=283).

Sources that Enhance	Self	Faculty
Other Teacher Related		
General Characteristics (dedicated, open-minded, encouraging, motivated, enthusiastic, etc.)	11	37
Work well together/united/cohesive	7	50
Help/support/teamwork/work hard	38	64
Open communication	0	9
Student-oriented	0	11
Praise/feedback	13	4
Share ideas/materials	9	26
Set/share goals/vision	5	22
Reach shared goals	0	11
Plan together	2	14
Faculty stability and indoctrination	0	5
Resilience/persistence	4	5
Teacher/Administrator relations	0	9
Grade-level teacher group	13	17
Plan/set goals	5	9
Share materials/knowledge	7	2
Provide feedback	2	1
Team leader support	0	3
Mentoring	0	1
Administration/Principal Related		
Stong/tries hard	13	10
Helpful/supportive	54	25
Encouragement	6	9
Praise/feedback	23	6
Ideas/informed/innovative	3	7
Shared decision-making	1	5

Table 20 (continued)

Self or Faculty Related		
Experience	5	2
Try new things/willing to learn	11	8
Knowledge/ability/education	13	5
Attend workshops/seminars/classes	22	20
Believe any child can learn	10	2
Autonomy	2	2
Positive feelings/response to teaching	22	2
Parent Related		
Communication	5	3
Support	24	12
Feedback/praise	16	2
Parent/Teacher Association	1	2
Resources Related		
General	0	5
Materials/supplies/books/equipment	25	5
Computers/technology	10	1
Other teachers' aides/help	8	3
Methods/curriculum/program	15	1
Learning environment	23	6
Scheduling	3	0
Class Size	8	0
Student Related		
General results	19	6
Achievement/grades/test scores	24	0
Standardized test scores	6	16
Behavior	12	1
Attitudes	25	2
Resultant Classroom Environment	21	0
Feedback/praise	12	0
Student prior ability/discipline	9	0
Other Related		
Shared high expectations	5	8
Community assistance/feedback	2	4
Productive/open faculty meetings	0	5
Treated as professional	1	3
Recognition from state/district/media	0	12
District/state guidelines and standards	2	2
Miscellaneous	5	3

As noted earlier, many experiences or important elements in the learning environment may contain multiple sources of efficacy information. However, teachers noted most often that enactive mastery experiences of positive student outcomes (achievement, behaviors, attitudes, classroom conduct, etc.) were an important source of efficacy information. Positive feedback (in various forms) was a notable element for many teachers as well. Particularly, positive feedback from administrators was mentioned often, followed secondarily by other teachers, parents and students. Most teachers did not mention positive physiological and/or emotional responses to teaching; however, a few mentioned the pleasures of teaching and the feelings associated with successful teaching experiences. Quite often, teachers mentioned sharing information, knowledge, ideas, etc. with other teachers and administrators. Additionally, many mentioned attending workshops and seminars to further their professional development. In each of these contexts vicarious learning was probably involved (as well as other sources of efficacy information).

Question 3 from the OSQ (see Appendix A) asked that teachers provide important elements of the working and learning environment that enhance their faculty's collective beliefs in their ability to accomplish required tasks/goals. When asked what elements of the working and learning environment are important in enhancing their faculty's collective beliefs in their abilities to accomplish their goals, teachers overwhelmingly mentioned the ability of the faculty to work together as a united group or team. Teachers described characteristics of other faculty members such as being dedicated, encouraging, motivated, competent, etc. Teachers pointed out the importance of shared vision and goals as well as the ability of the faculty to have

worked together in the past to reach other goals. Sharing information and ideas, planning together, and being willing to learn (e.g., attending workshops, etc.) were also mentioned as being important to help enhance faculty members' beliefs in their abilities to be successful in accomplishing required tasks. Grade-level groups and the planning, sharing, and support associated with these groups was mentioned occasionally as well.

Administrative support, encouragement, feedback, etc. were not mentioned as often for enhancing faculty collective efficacy beliefs as they were for enhancing teacher self-efficacy beliefs. Also, student results were less important for enhancing faculty collective efficacy beliefs except that standardized test scores and district/state/media recognition as regards the schools' performance were mentioned occasionally. Resources, such as materials, curricula, computers, etc. were rarely mentioned in response to this question.

Research Question 3(e)

What variables (self-efficacy beliefs or professional learning environment characteristics) differentiate between schools where average faculty collective efficacy beliefs are high versus those schools where average faculty collective efficacy belief scores are low?

Results

Teachers' responses from the OSQ (see Appendix A) regarding enhancing and weakening faculty collective efficacy beliefs were used to differentiate schools where the mean level of faculty collective efficacy beliefs is stronger from schools where the mean level of faculty collective beliefs is lower. Schools (n=18) with at least 10

respondents to the survey questionnaire were included in this analysis and are the same schools used in the analysis for the previously answered research questions.

Teachers' responses to the two faculty-related questions of the OSQ were submitted to within school analyses and were recorded by school in Table 21. An across-schools comparison was performed for both question 3 and question 4 from the OSQ to enable comparison of important factors that enhance faculty collective efficacy beliefs and important factors that weaken faculty collective efficacy beliefs for faculties with higher average collective efficacy beliefs and faculties with lower average collective efficacy beliefs. Schools with mean FCE less than 36.4 (25^{th} percentile) were labeled Low FCE schools. Schools with mean FCE greater than 41.8 (75^{th} percentile) were labeled High FCE schools.

Table 22 presents the results of the across schools comparison for the extreme 4 High FCE schools and the 4 Low FCE Schools. There was little in the comparison of qualitative responses from teachers at High FCE schools to teachers at Low FCE schools that differentiated between the high and low FCE schools. One minor difference appeared in the language used by teachers in their responses. Teachers in the Low FCE schools used the words "most teachers" when describing attributes of their faculty members. For the High FCE schools, teachers did not distinguish between elements of the faculty, but rather described positive attributes without qualifications. Although one High FCE school indicated divisiveness as an issue which weakened the faculty's collective efficacy beliefs, 2 out of the 4 Low FCE schools indicated similar problems. Two of the Low FCE schools did not provide any themes that were common among the respondents at these schools.

Table 21: Common Themes Within Schools (N=18) About Important Elements of the Learning Environment that Enhance or Weaken Faculty Collective Efficacy Beliefs.

School Number	Faculty Collective Efficacy Beliefs	
	Enhance	Weaken
1 9/11/21[a]	Teachers work together Share same philosophy Grade level meetings Planning	N/A
2 (HIGH) 11/15/25	Collaboration Past student success	Some divisiveness-faculty
8 (LOW) 15/20/29	Most faculty dedicated Hard working Knowledgeable Willing to learn Principal support/praise	Some teachers bad attitudes Administration Favoritism for some
101 17/22/53	Team involvement Share knowledge/materials Set goals Administrative support Involvement Parent/teacher relations	Some teachers not on board Class size Lack of time
105 8/11/50	United teamwork Share knowledge/planning Work hard	Lack of cohesiveness in past
106 8/11/26	Team Collaboration Shared ideas/materials Shared leadership Opportunities to learn Try new things Receive encouragement Administrators Other teachers Resources available	Paper work Meetings cut planning time

Table 21 (continued)

School Number	Faculty Collective Efficacy Beliefs	
	Enhance	Weaken
107	Team	Student characteristics
21/34/52	Work together	Lack support
	Set/accomplish goals	Parents
	Learn and share	Some admin (favoritism)
	Administration	District/region
	Outstanding & supportive	
	Positive feedback	
201	Work toward shared goals	Divisiveness between
6/13/33	Willing to learn	Faculty and
	Plan	Administration
204	Administrative support	Testing pressures
9/12/41	Shared faculty goals	Bonuses divide faculty
	Supportive faculty	
206 (HIGH)	Work together	Testing
13/18/36	Find ways to achieve goals	
	Administrative support	
	Parent support	
301 (LOW)	Team atmosphere	Some divisiveness
8/26/27		
402 (LOW)	Other teachers	N/A
7/13/48	Support	
	Approval	
	Learning	
	Sharing	
	Test scores	
501	Most work together	Cliques
6/12/40		
504	Other teachers support	Favoritism by administration
9/12/16	Share ideas	
	Learning	
505 (HIGH)	Recognition and Past Success	Blaming among faculty
12/16/28	District rating	Grading of schools
	Principal	
	Work hard together	

Table 21 (continued)

School Number	Faculty Collective Efficacy Beliefs	
	Enhance	Weaken
508	Other teachers team	Paperwork
11/17/21	Support	Physical plant problems
	Share	
	Get along	
509 (HIGH)	Other teachers	Class size
11/15/26	Collaboration	Demands (i.e. paperwork)
	Competence	
	Standards	
603 (LOW)	Faculty works hard	N/A
8/14/42	Cohesive	

[a] Number of OSQ respondents/Number of survey respondents/Number of K-5 faculty

An examination of the variation in FCE scores provided evidence of a pattern such that High FCE schools have less variation in individual faculty members' FCE scores (with the exception of school 603). Although a small amount of evidence was provided that High and Low FCE schools differ in the amount of divisiveness and cohesiveness regarding FCE scores, this evidence was not conclusive.

Additionally, scores from the four subscales of the self-efficacy measure (TEBS-S) were averaged to the school level and converted to z-scores for comparison across schools. Teachers' mean scores for each of the four self-efficacy factors are lower for the teachers at the Low FCE schools than for teachers at the High FCE schools. Particularly, z-score means were much lower for beliefs about abilities to maintain a positive classroom climate (CC) than for the other three factors although MLR and MFL are relatively low as well.

Research Question 4

What is the strength of relationships between omnibus measures of teacher self-efficacy beliefs and task-specific assessments of teacher self-efficacy beliefs?

Results

Bivariate correlations were calculated between several omnibus (e.g., "Right now in my present teaching situation, the strength of my personal beliefs in my ability to teach effectively ...") and subject-specific measures (e.g., "Right now in my present teaching situation, the strength of my personal beliefs in my ability to successfully teach math to all of my students...") of teacher self-efficacy beliefs about teaching. Additionally, for the subject-specific measures, teachers were asked to rate their beliefs in their ability to successfully teach various types of students (higher and lower ability students) in reading and math. Bivariate correlations were calculated for these variables as well and are presented in Table 23. Items in the correlation matrix can be located in Table A.3 (see Appendix A) for cross-referencing.

Item 3 represented a general question regarding teachers' beliefs in their abilities to teach successfully while Item 8 asks the same question with regard to teaching all students in the teachers' classrooms. These items (3 and 8) were only moderately correlated with subject-specific beliefs about ability to teach reading (Item 13) and math (Item 16) to all students in teachers' classes. Items 16, 26 and 34 relate specifically to teaching math to all students, higher ability students and lower ability students, respectively. These item correlations indicated an interesting pattern. Teachers were more likely to share stronger beliefs in their abilities to teach all of their students and lower ability students. Teachers were less likely to believe strongly in both their ability

to reach all students (or lower ability students) in math and successfully teach math to higher ability students. However, means for these items indicated that teachers believed more strongly in their abilities to teach higher ability students on average than lower ability students.

Table 22: Comparison of Schools with High and Low Mean Faculty Collective Efficacy Beliefs.

Faculty Collective Efficacy Beliefs								
	High				Low			
Source	2	206	505	509	8	301	402	603
M	42.218	43.588	43.438	43.534	32.789	34.287	35.02	32.182
SD	7.364	6.641	5.416	5.755	9.825	9.771	9.86	5.307
Elements that Enhance FCE								
	Work together/collaborate Find ways to get things done Past Success/Recognition Principal Recognition Competent faculty Standards Administrative Support Parent Support				Most faculty Team atmosphere Work hard Dedicated Competent Support Approval Willing to learn Sharing Test scores Principal support/praise			
Elements that Weaken FCE								
	Testing pressures School grading pressures Class size Demands of teaching Paperwork Projects Activities Some Divisiveness				Divisiveness Perceived favoritism by Administration			
Z-score Means for Self-Efficacy Beliefs								
School	2	206	505	509	8	301	402	603
AID	.22	.30	.56	.30	.06	-.03	-.62	-.34
CC	.26	.19	.30	.09	-.10	-.34	-.91	-.65
MFL	.17	.17	.36	.19	.11	-.18	-.40	-.42
MLR	.19	.57	.55	.14	.12	-.31	-.70	-.36

Items 13, 27 and 33 ask teachers about their beliefs in their abilities to successfully teach reading to all of their students, their higher ability students, and their lower ability students, respectively. Correlations between these items indicate a similar pattern as described above for the math items. There is a weaker positive relationship between teachers' ratings of self-efficacy beliefs as regards teaching reading to higher ability students and self-efficacy beliefs about teaching reading to all students and lower ability students than there is between the latter two variables. Teachers appeared to weight their judgements about their abilities to teach all students by their beliefs in their abilities to be successful with lower ability students in both subject areas.

Table 23: Bivariate Correlations Between Omnibus and Subject-Specific Measures of Teacher Self- and Collective Efficacy Beliefs (N=410).

Item	3	8	13	16	26	27	33	34
8	.607							
13	.517	.661						
16	.532	.577	.619					
26	.487	.386	.379	.555				
27	.486	.440	.492	.335	.647			
33	.521	.599	.616	.534	.410	.495		
34	.522	.589	.549	.680	.497	.448	.828	
AID	.627	.637	.563	.547	.516	.595	.668	.665
CC	.494	.512	.435	.458	.379	.386	.409	.407
MFL	.548	.512	.515	.491	.530	.611	.591	.547
MLR	.691	.562	.507	.480	.495	.522	.504	.479
WGE	.418	.397	.441	.404	.330	.428	.409	.411
FCE	.310	.316	.302	.288	.241	.321	.335	.336
Item Means (SD)	3.57 (.60)	3.18 (.76)	3.25 (.75)	3.34 (.73)	3.47 (.65)	3.51 (.63)	3.20 (.82)	3.22 (.81)

Supplementary Research Question 1

What is the relationship between measures of teachers' situation and task-specific self- and collective efficacy beliefs and a question based on the RAND items?

Results

Two RAND items were included in a single question in the survey packet as a continuum. RAND Item 1 was the anchor at 1 and RAND Item 2 was the anchor at 7 (see Appendix A). Teachers' responses to this item were correlated with the self-efficacy factors, AID, CC, MFL and MLR, the collective efficacy factors, FCE and WGE, as well as with the omnibus and subject-specific assessments of self-efficacy (Items 3, 8, 13, 16, 26, 27, 33 and 34) in Research Question 4. Correlations between the RAND continuum and each of these measures ranged between .162 and .289 with most above .200. Thus, little evidence of a meaningful relationship between the RAND continuum and the measures of self and collective efficacy beliefsin this study was substantiated.

Supplementary Research Question 2

For teachers as the unit of analysis, what is the relationship between teacher experience, SES of students and teachers' perceptions of self- and faculty collective efficacy beliefs? For faculty collective efficacy beliefs averaged to school level, do these relationships differ using schools as the unit of analysis?

Results

Teachers were asked to report the proportion of students in their classes who were on free/reduced cost lunch and the number of years they have worked as a professional educator (see Appendix A). These reported variables were used as proxy measures of student SES and teacher EXPERIENCE level.

In a regression analysis in which self-efficacy factors were regressed on SES and EXPERIENCE, the results indicated that together SES and EXPERIENCE only

explained about 5% of the variance in the self-efficacy variable. Neither SES or EXPERIENCE appeared to be useful as correlates of self-efficacy, although a small relationship was determined to exist between SES and maintaining a positive classroom climate (CC). Additionally, EXPERIENCE was found to be weakly related to accommodating individual differences (AID).

Individuals' faculty collective efficacy beliefs scores (FCE) were regressed on SES and EXPERIENCE as well. These results indicated a medium effect size of .06. SES was found to be most useful in explaining variation in individuals' perceptions of faculty collective efficacy beliefs.

An additional regression analysis at the school-level (n=18) was performed such that mean levels of FCE were regressed on student characteristics (SES), teacher personal factors (self-efficacy beliefs as measured by AID, CC, MFL and MLR), and environmental characteristics (as measured by the OCCUR factors of the SOURCES) averaged to the school level. Only schools with at least 10 respondents were included. Results from these analyses indicated that 84% of the variation in mean levels of faculty collective efficacy beliefs was explained by these variables. In addition, important relationships were found to exist between these variables. Teachers' beliefs in their abilities to maintain a positive classroom climate was more influential in explaining variation in mean levels of FCE. However, several other variables were important as well. These included SES and occurrences of professional development experiences, observation of other teachers and enactive mastery teaching experiences.

A final regression analysis was run entering SES last in the procedure to assess the additional variance explained by this important variable. When SES was removed,

approximately 82% of the variation in mean levels of faculty collective efficacy beliefs was explained by variation in average self-efficacy factors (particularly CC) and sources of efficacy information in the teachers' professional learning environments (especially OCCPD, OCCOOT, and OCCEMT). Thus, when SES was included in the model, there was only a 2% increase in the amount of variation explained. Again in this model, beliefs in abilities to maintain a positive classroom climate as well as opportunities to learn vicariously through observation of and interaction with other teachers were important in explaining variation in FCE mean levels.

Chapter Summary

This chapter provided a summary of the results of each of the research questions posed in this study. Supplementary research questions were also addressed and the results provided. Chapter 5 provides a discussion of the major findings of the study, implications of the findings in the study and recommendations for further research.

CHAPTER 5: MAJOR FINDINGS, CONCLUSIONS AND IMPLICATIONS

Chapter 5 presents the major findings of the study and conclusions drawn from these findings. Implications for theory, research and practice are discussed. Finally, recommendations are made regarding directions for future research.

Study Summary

One of the purposes of this study was to develop sound measures of the sources of efficacy information in teachers' professional learning environments and teachers' self-, work-group collective and faculty collective efficacy beliefs. Additionally, this study attempted to examine issues of generality, level and specificity in measuring teachers' self-efficacy beliefs. Another purpose of the study was to examine relationships between teachers' self and collective efficacy beliefs. A final purpose was to examine relationships between sources of efficacy information available in teachers' professional learning environments and teachers' self- and collective efficacy beliefs.

As presented in the review of the literature accompanying this study, there were several problems evident in past conceptualizations, measurement and analysis of teachers' efficacy beliefs at both the self and collective levels. Additionally, none of the studies reviewed systematically examined teachers' self- and collective efficacy beliefs in relation to the sources of efficacy information available in teachers' professional learning environments. This study addressed both the literature in the study of learning environments as regards teachers' professional learning environments as well as studies of teacher efficacy and teacher self-efficacy beliefs. In this study a distinction was made between *teacher efficacy*, or teacher sense of efficacy, and *teachers' self-efficacy beliefs* (see Figure 2). This conceptual distinction guided development of context and

task-specific measures of teacher self-efficacy beliefs about capability to perform teaching tasks that have been linked to effective teaching and learning in classrooms.

Bandura's model of triadic reciprocal causation (see Figure 1), a dynamic model of behavior or learning in which person factors such as self-efficacy beliefs interact reciprocally with environmental and behavioral elements, framed the work presented here. As efficacy beliefs are context-specific and environmental factors are theoretically linked to efficacy beliefs, an attempt was made to investigate possible sources of efficacy information available to teachers in their professional learning environments.

A correlational design was used with both quantitative and qualitative analyses employed to inform the study results. Factor analytic methods were used to obtain information about underlying structure of the data from the study measures. The study measures included the Sources of Efficacy Information in Professional Learning Environments (SOURCES) and the three-part Teachers' Efficacy Beliefs System (TEBS) which included the Teacher Self-Efficacy Beliefs Scale (TEBS-S), the Teacher Work-Group Collective Efficacy Beliefs Scale (TEBS-WG) and the Teacher Faculty Collective Efficacy Beliefs Scale (TEBS-F). Qualitative responses were obtained from the Open-ended Sources Questionnaire (OSQ) and were used to provide depth to the study and evidence of validity for interpretations made from the SOURCES measure.

The sample for this study consisted of 410 K-5 elementary school teachers employed in two school districts in two southern states. The districts differed greatly in size and in some demographic characteristics; however they did not differ substantially on any of the study variables. The teachers at 44 schools were asked to respond to a

lengthy survey. Thirty-three percent of the teachers at these schools provided responses.

Correlational methods such as canonical correlation and regression were employed to analyze data from subjects in the study. The findings pertinent to each of the research questions addressed by this study are presented in the following sections. In the final section of this document, research findings are discussed and implications for theory, research, practice and policy are presented.

Major Findings and Conclusions for Research Question 1

What is the structure and reliability of responses obtained from the measures developed for this study including the SOURCES and the three sections of the TEBS?

Major Findings

The SOURCES

The SOURCES contained 50-items designed to elicit responses about sources of efficacy information in teachers' professional learning environments. The four sources of efficacy information are believed to be enactive mastery experiences, vicarious experiences, and experiences of social persuasion and physiological and emotional states (Bandura, 1997). The SOURCES measure in this study consisted of two scales. One scale was designed to measure teachers' personal perceptions of the frequency of occurrence (OCCUR) of each of 50 experiences stated on the SOURCES while the second scale required teachers to rate the influence (INFL) that each of these events had on strengthening beliefs in their ability to be successful as a teacher.

Separate factor analyses of the OCCUR and INFL scales resulted in four correlated factors for each scale. Subscale scores for each of the OCCUR and INFL

scales of the SOURCES were computed by summing items loading on each of four subscales determined from factor analysis results on both the OCCUR and INFL scales.

The four factored OCCUR subscales were similar in meaning to the INFL factored subscales. However, some additional items loaded on the INFL subscales. In particular, the influence of successful professional experiences was grouped with the influence of learning from others outside of the classroom (INPSLO), whereas on the occurrence scale, only vicarious learning experiences loaded on the related OCCUR factor (OCCPD). As well, items which indicated the influence of teaching success and positive affect were included with items that measured the influence of enactive mastery experiences in the classroom (INTS); however, only the occurrence of these enactive mastery experiences (OCCEMT) were included in the related OCCUR subscale.

The Teachers' Efficacy Beliefs System (TEBS)

All three parts of the TEBS were subjected to a factor analysis. All items of the Teacher Self-Efficacy Beliefs Scale (TEBS-S) loaded on one factor while all of the collective efficacy items (TEBS-WG and TEBS-F) loaded on another factor. Subsequently, only the items from the Teacher Work-Group Collective Efficacy Beliefs Scale (TEBS-WG) and the Teacher Faculty Collective Efficacy Beliefs Scale (TEBS-F) were included in a factor analysis. Results indicated that items loaded appropriately onto the two measures.

When the individual scales from the TEBS were factor analyzed, four correlated subscales were formed from items on the TEBS-S to represent teachers' self-efficacy beliefs about teaching tasks linked to effective teaching and learning. These four subscales were defined as Accommodating Individual Differences (AID), Maintaining a

Positive Classroom Climate (CC), Monitoring and Feedback for Learning (MFL) and Managing Learning Routines (MLR).

Teachers' work-group collective efficacy beliefs were defined by a single factor (WGE) derived from the sum of all items on the TEBS-WG. Also, teachers' faculty collective efficacy beliefs were represented by a single factor (FCE) derived from the sum of all items on the TEBS-F.

The two measures of teachers' collective efficacy beliefs were strongly correlated, though distinguishable through factor analysis. Bivariate correlations between the subscales of the TEBS-S and each of the collective efficacy factors, FCE and WGE, were weak to moderate in strength. Reliabilities for data on all efficacy-related factors were satisfactory.

Conclusions for Research Question 1

This study indicated that teachers' beliefs about their abilities to perform specific sub-tasks within a domain a functioning generalize to beliefs about abilities to perform more broadly defined skills. Factor analysis results and reliability estimates for data from the self-efficacy factors in this study provided strong evidence of these relationships.

According to the theory of self-efficacy, self and collective efficacy beliefs should be independent if teachers' individual work is autonomous and unrelated to work of other work-group or faculty members. Teachers' self-efficacy beliefs were distinguishable from an overall collective efficacy factor. Teachers' perceptions of work-group collective efficacy beliefs were distinguishable from teachers' perceptions of faculty collective efficacy beliefs. However, bivariate correlations between self-

efficacy subscales, work-group collective efficacy beliefs (WGE) and faculty collective efficacy beliefs (FCE) indicated a positive weak relationship between self-efficacy factors and FCE, but a somewhat stronger positive relationship between the self-efficacy factors and WGE. According to the results of this study, the practice of averaging self-efficacy beliefs of group members to ascertain a measure of collective efficacy would seem questionable as these measures are only weakly correlated. These findings also provided evidence that teachers, on average, share a weak to moderate level of interdependence.

The factor analysis results on the SOURCES measure indicated that teachers distinguished between questions about the occurrence and influence of certain *types of experiences*. For instance, items on the occurrence scale which were designed to measure vicarious learning experiences from other teachers, administrators, outside experts, etc. separated into two factors. The first factor dealt with formal and informal vicarious learning experiences outside of the classroom (OCCPD), while a second factor was defined by vicarious learning experiences from observation of other teachers in the classroom (OCCOOT). Factor analysis results from the influence scale resulted in factors similar to the occurrence subscales. However, some additional experiences were considered similarly influential, but were not rated as occurring similarly.

Bandura (1997) provided evidence that sources of efficacy information are cognitively processed. This process should result in variable weights applied to experiences. As measured in this study, the covariation among teachers' responses to the influence of particular experiences was slightly different from the covariation patterns among occurrence ratings. However, it is important to note that all items that

loaded on the four OCCUR factors also loaded on the similar INFL factor. The findings from Research Question 3 were pertinent to completely address the import of this finding.

Major Findings and Conclusions for Research Question 2

What relationships exist between teacher self-efficacy beliefs and teacher collective (work-group and faculty) efficacy beliefs? Are these relationships consistent across domains of functioning? When self-efficacy beliefs are statistically controlled, are there schools differences in faculty collective efficacy beliefs?

Major Findings

Individual teachers' self-efficacy beliefs were not as highly related to either their ratings of work-group or faculty collective efficacy beliefs as these collective efficacy beliefs variables were with each other. Teachers' self-efficacy beliefs were more strongly related to their perceptions of work-group collective efficacy beliefs than to their perceptions of faculty collective efficacy beliefs.

Teachers' beliefs about their abilities to accommodate individual differences (AID) contributed most to explaining variation in collective efficacy beliefs (whether FCE or WGE). The contributions of teachers' beliefs about their abilities to monitor progress and provide feedback (MFL) were second to being able to accommodate individual differences of students (AID) while the management type subscales, maintaining a positive classroom climate (CC) and managing learning routines (MLR), were least related to FCE and WGE for individual teachers as the unit of analysis.

Teachers' perceptions of faculty collective efficacy beliefs were statistically adjusted for differences in teachers' self-efficacy beliefs. Even with this adjustment,

schools differed in the mean level of teachers' perceptions of faculty collective efficacy beliefs.

Conclusions for Research Question 2

Teachers' self-efficacy beliefs were more strongly related to their perceptions of the shared beliefs of their work-group to accomplish stated goals than to their perceptions of their faculty's shared beliefs about their abilities to accomplish similar goals. Differences in functional dependence and proximity between individual teachers and these two groups in which they work may be responsible for the additional shared variance between teachers' self-efficacy beliefs and work-group collective efficacy beliefs. It makes sense that teachers abilities to perform teaching tasks in their own classrooms might be more closely related to the shared beliefs of the work-group they work with most. Work-groups usually consist of fewer members than the entire faculty of schools. For example, elementary teachers might reference a grade level planning group, project committee, etc. Thus, a teacher's abilities may make a greater contribution proportionally to the work-groups' abilities than to the faculty's abilities. Teachers' perceptions of the abilities of teachers' work-groups may be more dependent upon individual teachers' abilities than perceptions of the abilities of the faculties within which these teachers work.

Teachers' perceptions of the shared beliefs of their functional work-groups and faculties were strongly correlated, but still distinguishable as determined by factor analysis results. As mentioned previously, work-groups are sub-groups (possibly overlapping sub-groups) of the faculty of a school. It is possible that teachers nearly equate their faculty's ability to accomplish stated goals with how capable teachers

perceive their work-group members are in accomplishing goals. As well, the relationship may be reversed. Participation in work-groups may provide sources of efficacy information about the faculty's beliefs in their abilities as well as self-beliefs about abilities to be successful in the classroom. However, for individual teachers, variation in self-efficacy beliefs explained only about a third of the variation in collective efficacy beliefs.

One possible explanation may be that the measures of self- and collective efficacy beliefs differed in the tasks upon which the efficacy beliefs were focused and in the context in which the assessments of efficacy beliefs were made. Items on the collective efficacy beliefs scales (TEBS-WG and TEBS-F) were more generalized tasks (e.g, create ways to improve the school environment) that could be considered outcomes (Maddux, 1999) or performance attainments (Bandura, 1995c). If these outcomes or performance attainments are valued, they are goals of the group. Goal structures are hierarchical (Bandura, 1997). Thus, an important goal of schooling, such as producing student achievement, consists of a complex array of successful completion of many sub-tasks or sub-goals. Additionally, this goal may be a sub-goal for a super-goal such as *positively impact students' lives*. For instance, the various subscales of the TEBS-S might qualify as sub-goals of the goal, producing student achievement. The specific items on each factor of the TEBS-S would qualify as sub-tasks or goals of the generalized domain. As a result, producing student achievement is a possible *outcome* of successfully accomplishing the sub-tasks and sub-goals of the TEBS-S. Bandura (1997) also points out that goal structures are not necessarily as linear as this discussion maintains.

Self-efficacy beliefs and outcome expectancy function within and between sub-goals and goals. Teachers' self-efficacy beliefs in this study were defined as teachers' beliefs about teaching abilities as regards tasks empirically linked to effective teaching and learning within teachers' current teaching situations. The measure developed for this study to assess teachers' self-efficacy beliefs differs from previously developed measures that focus on teachers' assessments of whether they can *affect student learning*. As stated previously in this document, beliefs about affecting or producing student learning confound beliefs about abilities to perform complex teaching tasks related to student learning as well as outcome expectations about the possible (valued or not valued) outcome, affect student learning. In measuring teachers' collective efficacy beliefs, specific classroom teaching tasks were not used as the focus of efficacy expectations. Instead, more general tasks/performance attainments/goals meaningful at the work-group or faculty level were used. This departure in item content may explain the moderate correlations between self- and collective efficacy beliefs.

However, it seems certainly possible, and plausible, that tasks contained in the TEBS-S are sub-tasks of some of the more general goals of the TEBS-WG and the TEBS-F. Additionally, teachers' ratings of work-group and faculty collective efficacy beliefs about these general goals factored into single factors. Thus, the relationships found in this study between measures of self-, work-group collective and faculty collective efficacy beliefs may be meaningful and not due to differences in item content.

Bandura (1997) discusses the difficulties of measuring the emergent properties of collective efficacy beliefs. Collective efficacy beliefs are sometimes assessed by averaging self-efficacy beliefs of group members, by having group members make the

judgement together, or by having individuals assess the shared beliefs of the group about their abilities to accomplish tasks (Bandura, 1997). This study used teachers' personal perceptions of the shared beliefs of group members (work-group or faculty) as a measure of collective efficacy beliefs about abilities to accomplish various teaching-related tasks.

The results of this study indicated teachers' perceptions of faculty collective efficacy beliefs about accomplishing various tasks were positively, but weakly, related to teachers' self-efficacy beliefs about teaching tasks within their classrooms that were linked to effective teaching and learning. Additionally, even when self-efficacy beliefs of teachers were statistically controlled, teachers' perceptions of faculty collective efficacy beliefs differed across schools. Therefore, teachers' perceptions of faculty collective efficacy beliefs, although related to their self-efficacy beliefs, are distinctly different, and, given the weak relationship between self- and faculty collective efficacy beliefs found in this study, aggregating teachers' self-efficacy beliefs to group levels may not provide an adequate proxy measure for faculty collective efficacy beliefs.

Although all four subscales of the self-efficacy beliefs measure (TEBS-S) were positively, but weakly, correlated with teachers' work-group and faculty collective efficacy beliefs, Accommodating Individual Differences (AID) and Monitoring and Feedback for Learning (MFL) were more strongly correlated with both teachers' perceptions of work-group and faculty collective efficacy beliefs than were Maintaining a Positive Classroom Climate (CC) and Managing Learning Routines (MLR) for individual teachers. Additionally, teachers rated their abilities to perform tasks on the CC and MLR subscales at a much lower level than the skills on the AID or MFL

subscales. These results indicated that teachers who believed more strongly in their abilities to meet students' individual needs and enable learning through monitoring of student progress and providing feedback also perceived stronger shared beliefs in their work-group and faculty's abilities to meet certain teaching-related goals. It is possible that regardless of teachers' beliefs in their abilities to manage learning routines and the classroom climate, teachers' beliefs in their abilities to meet the instructional needs of a wide variety of students are what are meaningful in providing information about personal perceptions of their work-groups' and faculty's collective efficacy beliefs.

Major Findings and Conclusions for Research Question 3

What multivariate relationship exists between the set of sources of efficacy information available in professional learning environments and the set of teacher self-efficacy beliefs, work-group collective efficacy beliefs and faculty collective efficacy beliefs?

Major Findings

Two canonical functions were used to describe the relationship between the set of sources of efficacy information and the set of teacher self- and collective efficacy beliefs. These functions were able to explain approximately 55% of the variation between these two sets of variables. The first function related two latent variables which shared about 42% of the variation between them. In this first function, the efficacy latent variable was primarily composed of collective efficacy beliefs (FCE and WGE) and self-efficacy beliefs about abilities to accommodate individual differences (AID) in the classroom with the other self-efficacy factors contributing less substantially. The sources latent variable on the first function appeared to consist of

occurrences of professional development experiences (OCCPD), observation of other teachers (OCCOOT), and successful teaching experiences (OCCEMT) and the influences of successful teaching experiences and positive affect (INTS), professional successes and learning opportunities outside of the classroom (INSPLO) and observation of other teachers in the classroom (INOOT).

The second function was more complex and consisted of a positive relationship between two latent variables that represented differences within each variable set. The first variable set, an efficacy latent variable, represented a contrast between FCE and the self-efficacy factors, especially Maintaining a Positive Classroom Climate (CC). The second variable set produced a latent variable that contrasted the occurrence and influence of vicarious experiences in the classroom (OCCPD and INPSLO) and the occurrence of vicarious learning opportunities outside the classroom (OCCOOT) against the occurrence and influence of enactive mastery experiences (OCCEMT and INTS) and the occurrence of negative affect (OCCNAF). This relationship represented 13% of the shared variance between the efficacy factors and the sources factors. This final function appeared to indicate that on average, teachers with low self efficacy scores, particularly weighted by low beliefs about abilities to maintain a positive classroom climate, CC, and high faculty efficacy scores rated certain elements of their professional learning environment similarly. These individuals perceived their professional learning environment as high in vicarious learning experiences both in (OCCOOT) and out (OCCPD) of the classroom, and high in negative affect (OCCNAF), but low in enactive mastery teaching experiences (OCCEMT). Additionally these teachers, on average, did not consider experiences of teaching

success to be influential in defining their beliefs about their ability to be successful as a teacher.

An interesting finding as regards measurement of the sources of efficacy information in teachers' professional learning environments is that, besides INTS, all of the INFL subscales have near zero function coefficients on the first function. However, the structure coefficients for INPSLO and INOOT are worth noting. Separate analyses were performed omitting the INFL subscales.

When INFL subscales were removed from the canonical correlation analysis, a slight drop (7%) in the variance explained by the canonical functions was incurred. These results indicated an initial function relating an efficacy latent variable composed primarily of collective efficacy and secondarily by self-efficacy factors and a sources latent variable composed primarily of occurrences of professional development experiences and opportunities to observe other teachers and secondarily by occurrences of enactive mastery experiences and, negatively by occurrences of negative affect.

The second canonical function in the analysis of the OCCUR factored subscales relates two canonical variates that are composed of differences within the variable sets. The interpretation of this second function was similar to the interpretation of the second function when the INFL variables were included. The canonical variate in the efficacy variable set contrasts faculty collective efficacy with self-efficacy factors (primarily beliefs about abilities to maintain a positive classroom climate and monitor and provide feedback for learning). The canonical variate in the sources variable set contrasts occurrences of vicarious learning opportunities in and out of the classroom (OCCPD

and OCCOOT) and negative affect (OCCNAF) with lack of occurrence of enactive mastery experiences (OCCEMT).

Conclusions for Research Question 3

Several conclusions as regards measurement of the sources of efficacy information can be drawn from the findings of Research Question 3. Bandura (1997) states that the four sources of efficacy information are cognitively processed and weighted before integration into efficacy beliefs. The SOURCES measure was an attempt to assess both the frequency of events that provide learning information for teachers and the influence of the events in strengthening teachers' beliefs in their abilities to be successful as teachers. It was intended that the influence ratings would provide a proxy measure of the cognitive processing of sources of efficacy information. However, according to the results of this study, teachers' ratings of the influence of experiences did not add substantial information as regards the relationship between efficacy beliefs (self- and collective efficacy beliefs) and the occurrence of sources of efficacy information. Not only was there a slight change in the proportion of variance explained in teachers' self- and collective efficacy beliefs when the influence factors were included, but interpretation of the canonical functions with and without these factors was similar.

Teachers' ratings of the frequency of occurrence of experiences on the SOURCES measure were adequate to explain almost half of the variation in teachers' self- and collective efficacy beliefs. It is possible that teachers' ratings of the frequency of occurrence of these experiences were already mediated or weighted by the teachers' cognitive processing of these events. However, although statistically the influence

factors contributed little, these factors did provide information as regards what types of experiences teachers considered influential.

Low self-efficacy beliefs, particularly about maintaining a positive classroom climate and enhancing learning, and strong beliefs about faculty collective efficacy were associated with certain types and levels of environmental opportunities for learning. Specifically, these were low levels of successful teaching experiences in specific subject areas, high occurrence of negative affective responses to teaching and high levels of vicarious learning experiences in and out of the classroom. Teachers who were not successful teaching in the areas of reading, math and science and were not successful in handling the daily demands of teaching have low self-efficacy beliefs despite high levels of occurrence of vicarious learning experiences. This may be so because teachers who fail at teaching and suffer adverse physiological and emotional responses to teaching might also feel less capable when exposed to models (other teachers, administrators, university instructors, etc.) that are successful.

Major Findings and Conclusions for Research Question 3(a)

What relationship exists between the set of sources of efficacy information and teacher self-efficacy beliefs? Do these relationships differ between schools?

Major Finding

As a group, the sources of efficacy information explained about 31% of the variation in teachers' self-efficacy beliefs. The primary contributor to defining the teachers' self-efficacy beliefs latent variable was belief in abilities to Accommodate Individual Differences (AID). The other three factors contributed to the self-efficacy latent variable as well, but less substantially. In defining the sources latent variable,

occurrences and influence of enactive mastery experiences as well as the influence of positive affect associated with these experiences (OCCEMT and INTS) were most strongly and positively related with the latent variable. Each of these variables had a weak to moderate positive relationship with the self-efficacy latent variable. The occurrence of negative affect was strongly and negatively related to the latent variable as well, and had a weak negative correlation with the self-efficacy latent variable.

The INFL subscales provided a small amount of additional information in terms of explaining variation in teachers' self-efficacy beliefs. When the INFL subscales were removed from the canonical correlation analysis, the squared canonical correlation coefficient was reduced by about 6%. Again, occurrences of enactive mastery teaching experiences (OCCEMT) were positively correlated with the self-efficacy latent variable and occurrences of negative affect (OCCNAF) were negatively correlated with the self-efficacy latent variable. Occurrences of professional development experiences outside the classrrom (OCCPD) and opportunities to observe other teachers (OCCOOT) were both positively, but weakly correlated with the self-efficacy canonical variate.

Results indicated that schools did not differ as regards the relationship between sources of efficacy information and teachers' self-efficacy beliefs about teaching tasks situated in their own classrooms.

Conclusions for Research Question 3(a)

Enactive mastery experiences are most influential in establishing strong beliefs about capabilities (Bandura, 1997). Although this study was not designed to provide evidence of a causal link between enactive mastery experiences and self-efficacy beliefs, for teachers in this study, enactive mastery experiences were strongly linked to

high levels of self-efficacy beliefs about accomplishing teaching tasks within teachers' current teaching situations. Enactive mastery experiences in coping with the daily demands of teaching and being successful as a teacher in the subject areas of math, reading and science were more strongly related to teachers' self-efficacy beliefs than were the other sources factors.

Positive and negative affect also play a role in explaining variation in individual teachers' self-efficacy beliefs. The influence of teaching success and positive affective responses to teaching were useful in explaining variation in self-efficacy beliefs for individuals. The occurrence of negative affect about teaching was negatively related to self-efficacy beliefs. These findings are consistent with Bandura's (1997) description of the possible role played by physiological and emotional states and how cognitive processing of these particular sources of efficacy information may enhance or diminish efficacy beliefs.

As shown in earlier results, for the most part the influence variables did not contribute significantly to explaining variation in self-efficacy beliefs. Again, this may be a function of how teachers' interpreted the occurrence and influence scales on the SOURCES. Items on the SOURCES were typically stated in terms of positive or successful experiences for each of the four sources of efficacy information. For social persuasion and physiological/emotional states items, some negative wording was included. As such, when teachers recorded the frequency of these events, their responses may have been internally processed and weighted before responding. Thus, asking teachers to rate the influence of the events may have been redundant. However, bivariate correlations between the occurrence and influence responses on each of the 50

items separately were not exceptionally high indicating teachers did vary their responses to each scale for an item.

Another viewpoint might be that the occurrence of these events was simply more important or useful than teachers' perceptions of the influence of the same events if one were to want to predict self-efficacy beliefs. This of course would not necessarily be inconsistent with the theory of self-efficacy, but would indicate that professional learning environment elements, as depicted in the triadic reciprocal causation model, were important in their relation to levels of self-efficacy beliefs (Bandura, 1997).

Major Findings and Conclusions for Research Question 3(b)

What relationship exists between the set of sources of efficacy information and teacher work-group collective efficacy beliefs? Does this relationship differ among schools?

Major Findings

In a regression of teachers' perceptions of work-group collective efficacy beliefs (WGE) on the SOURCES subscales, approximately one-third of the variation in WGE was shared by the SOURCES factors. The occurrence of professional development activities (OCCPD) and observation of other teachers (OCCOOT) were substantial contributors to explain variation in beliefs about work-group abilities. Also, occurrences of enactive mastery experiences (OCCEMT) were positively associated with WGE while occurrences of negative affect (OCCNAF) were negatively associated with WGE. The influence of professional successes and learning opportunities (INPSLO) was a substantial contributor to explaining variation in work-group efficacy beliefs.

As in analyses in Research Question 3 and 3(a), the influence (INFL) factors did not provide additional explanatory power as regards variation in work-group efficacy beliefs. In analysis with INFL factors removed, the relative strength and direction of relationships between the OCCUR factors and WGE were maintained. Additionally, schools did not differ in the relationship between the SOURCES factored subscales and teachers' work-group collective efficacy beliefs.

Conclusions for Research Question 3(b)

Vicarious learning experiences both in and out of the classroom were strongly related to teachers' perceptions of work-group collective efficacy beliefs. It seems reasonable that opportunities to learn from other teachers, observe other teachers and make comparisons to the self might provide information as to the abilities of a teacher's work-group. Self-efficacy theory maintains that enactive mastery experiences are most influential in forming efficacy beliefs. Although the occurrence of enactive mastery experiences was positively related to teachers' ratings of work-group collective efficacy beliefs, it was not as strongly linked to WGE as vicarious learning experiences outside of the classroom (OCCPD) and in the classroom (OCCOOT).

These results indicated that teacher work-group members may form efficacy beliefs about their groups' capabilities based on information learned from other teachers, administrators, workshop presenters and from watching other teachers teach. Whereas, occurrences of successful teaching experiences for individuals may not provide as much information as vicarious learning experiences. A possible explanation for this departure from theory is that the SOURCES measure did not assess group-level mastery experiences. Thus, it is unclear whether these relationships are a function of

measurement issues or that vicarious learning experiences are more useful to explain variation in teachers' perceptions of work-group collective efficacy beliefs than enactive mastery experiences in the classroom. Regardless, these results indicated that learning from others, particularly from other teachers, might be useful in predicting teachers' perceptions of work-group collective efficacy beliefs.

Major Findings and Conclusions for Research Question 3(c)

What relationship exists between the set of sources of efficacy information and teacher faculty collective efficacy beliefs? Does this relationship differ among schools?

Major Findings

The findings for this research question mirror the findings for research question 3(b) with one exception. Teachers' faculty collective efficacy beliefs appeared to be less related to occurrences and influence of successful teaching experiences than were teachers' work-group collective efficacy beliefs. Otherwise, the other SOURCES factors contributed to explaining variation in faculty collective efficacy beliefs in a similar manner as with WGE. Additionally, about one-third of the variation in FCE was shared with the SOURCES factors.

When the INFL factors were removed, results were consistent with the above explanation of findings. Occurrences of professional development and opportunities to observe other teachers were influential in defining the regression equation. Occurrences of enactive mastery teaching experiences (OCCEMT) and negative affect (OCCNAF) were less influential and the latter was negatively related to teachers' perceptions of faculty collective efficacy beliefs (FCE).

Schools did differ in relationships between the SOURCES variables and faculty collective efficacy beliefs. For schools with greater than 10 respondents, there was a statistically significant school effect. Bivariate correlations were calculated between the SOURCES factors and teachers' FCE score within schools, and correlations were calculated across schools by using school means for these variables. The correlation coefficients varied greatly within schools for each of the SOURCES factors when compared to the correlation coefficients based on the school means. Additionally, when school mean scores for FCE are regressed on the school means for the SOURCES variables, a regression model, explaining 82% of the variation in mean levels of faculty collective efficacy beliefs, was obtained. However, aside from INNAF (Influence of Negative Affect and Feedback), all of the SOURCES variables appeared to be almost equally related to mean levels of faculty collective efficacy beliefs.

Conclusions for Research Question 3(c)

Teachers' perceptions of faculty collective efficacy beliefs were even more strongly correlated than WGE was with occurrence ratings of vicarious learning experiences (OCCPD and OCCOOT). It makes sense that occurrences of successful teaching experiences would be further removed from perceptions of faculty collective efficacy beliefs than from perceptions of work-group collective efficacy beliefs. These findings and the findings regarding correlations between self-efficacy and collective efficacy beliefs lead to similar conclusions. Specifically, the occurrence of enactive mastery experiences was strongly related to self-efficacy beliefs and self-efficacy beliefs were differentially related to perceptions of work-group and faculty collective

efficacy beliefs just as enactive mastery experiences were differentially related to perceptions of work-group and faculty collective efficacy beliefs.

In addition, using individual teachers as the units of analysis, schools continued to differ even after the SOURCES variables were statistically controlled. Regression analysis of school mean levels of faculty collective efficacy beliefs on mean levels of the SOURCES factors indicated powerful, positive relationships between the sources of efficacy information and mean levels of FCE. However, sample size was small for these analyses (n=18). Qualitative and quantitative investigations in how these schools might differ in the sources of efficacy information available to teachers from the learning environment were completed in Research Question 3(e).

Major Findings and Conclusions for Research Question 3(d)

According to individual teachers, what characteristics of teachers' professional learning environments enhance (or weaken) efficacy beliefs of individuals or faculty members to accomplish required tasks or goals?

Major Findings

There were differences in the characteristics teachers considered important in their professional learning environment dependent upon whether the self or faculty was the focus of the question. As regards enhancing beliefs about personal ability to be successful as a teacher, respondents most often mentioned successful experiences and feedback from students in the form of student learning, grades, attitudes toward school work, etc. A second source cited by teachers was support and help and occasional feedback from administrators. Help and support from other teachers was also

mentioned as an important feature of the working and learning environment that enhanced teachers' beliefs in their personal abilities to be successful as a teacher.

Teachers were also asked what weakens their own beliefs in their ability to be successful as a teacher. For the most part, responses to this question dealt with elements outside the immediate influence of the teacher. For example, a common issue was a lack of parental involvement and support and/or poor parenting skills. Other issues raised by teachers were too large class sizes, excessive demands in the form of paperwork and testing pressures. Infrequently teachers reported student characteristics such as ability and motivation as elements that weaken their belief in their ability to be successful as a teacher.

When teachers were asked to describe important aspects of their working and learning environment that enhance their faculty's beliefs in their abilities to be successful, overwhelmingly teachers cited the quality of the relationships with fellow faculty members. Particularly, teachers described characteristics of their faculty, such as united, cohesive, helpful, supportive, dedicated, motivated, and hard working, that enhanced the faculty's beliefs in their abilities. Secondarily, teachers reported that sharing of goals and vision, as well as ideas and materials, among faculty members served to enhance their beliefs in their abilities. Help and support from administrators and opportunities to attend classes and workshops were mentioned occasionally as were results of standardized tests and district/state recognition.

Typically when teachers were asked what important elements of their learning environment weakens their faculty's beliefs in their abilities to be successful, they

reported that divisiveness, dissension and negativity among fellow faculty members was a key issue. Also, large class sizes were mentioned quite often in District B.

Conclusions for Research Question 3(d)

An important conclusion from these findings is that similar results were obtained when the SOURCES measures were correlated separately with self-, work-group collective and faculty collective efficacy beliefs. Enactive mastery experiences were primarily responsible for explaining variation in teachers' self-efficacy beliefs. As well, vicarious learning experiences from other teachers, administrators and other experts were most important in explaining variation in teachers' perceptions of faculty collective efficacy beliefs. Thus, these qualitative results affirmed the quantitative results and provided evidence of temporal ordering of exposure to sources of efficacy information and formation of efficacy beliefs.

Another important conclusion involves what elements teachers cited as weakening beliefs in the self to be successful as a teacher. Most teachers described elements that were beyond their immediate control. Often these elements were simply opposites of elements introduced as strengthening beliefs in capabilities. In contrast, teachers indicated divisiveness and dissension among faculty members as the primary source that weakens their faculty's collective efficacy beliefs. Otherwise, a wide array of factors was mentioned and generally included elements such as testing pressures, too large class size and excessive demands.

Individual teachers looked outside themselves for possible factors that weaken beliefs in their abilities. In the classroom, the teacher is usually solely responsible for organizing and executing courses of action to accomplish teaching tasks. However, for

shared beliefs at the faculty level, teachers looked to indicators of group cohesiveness (or lack thereof) to provide information about the group's abilities to get necessary goals accomplished.

The items on the OSQ that targeted teachers' perceptions of important environmental elements that enhance or weaken teachers' beliefs in their ability to be successful with their current students may have resulted in responses that were relevant to *teacher efficacy* and not just *teacher self-efficacy*. It was evident in some responses that teachers equated being a successful teacher with their current students with *affecting student performance*. Thus, the responses to questions 1 and 2 on the OSQ could provide information about outcome expectations for affecting student performance.

Major Findings and Conclusions for Research Question 3(e)

What variables (self-efficacy or professional learning environment characteristics) differentiate between schools where average faculty collective efficacy beliefs scores are high versus those schools where average faculty collective efficacy beliefs scores are low?

Major Findings

Teachers' open-ended responses from the OSQ were used to examine patterns in responses from schools with differing levels of faculty collective efficacy beliefs. Teachers at schools with high mean levels of faculty collective efficacy beliefs talked about finding ways to get things done and mentioned past success and recognition of the faculty as important elements of strengthening beliefs in their capabilities. Teachers at schools with low mean levels of FCE talked about the positive characteristics of *most* of

the faculty, but indicated divisiveness and negativity among faculty members weakened the faculty's shared beliefs in their ability to accomplish needed goals. Teachers at schools with higher mean levels of FCE described factors that weaken beliefs such as testing pressure, large class size and excessive demands.

The mean levels of self-efficacy beliefs were visibly different for schools with high and low FCE responses from teachers. Regression of average FCE scores on average scores for each of the self-efficacy factors indicated that at the school level, self-efficacy beliefs explain approximately 54% of the variation in FCE. Each of the self-efficacy factors is strongly related to the self-efficacy latent variable; however, maintaining a positive classroom climate contributes most substantially to the function. An examination of the means for each of the self-efficacy factors at the schools that were found to differ in FCE once statistically adjusted for differences in sources of efficacy information are consistent with this finding. Schools where teachers rated FCE high on average also have higher mean levels of self-efficacy, and schools with low average FCE had teachers who rated their self-efficacy beliefs low on average. The discrepancy is especially marked for maintaining a positive classroom climate (CC).

Conclusions for Research Question 3(e)

Schools differed in the mean level of faculty collective efficacy beliefs even when statistically adjusted for self-efficacy of individual teachers and perceptions of sources of efficacy information. Teachers' responses to the OSQ were examined across schools that were statistically different in levels of FCE. The results indicated that faculty cohesiveness was important to enhancing efficacy beliefs of faculty members. Bandura (1997) discusses the possible importance of cohesiveness of beliefs in

collective efficacy. Goddard (2000) found that variation in teachers' collective efficacy beliefs at the faculty level was not predictive of outcomes while mean levels of beliefs were. However, the results in this study, although sample size was small in these comparisons, provided evidence that indicated cohesiveness of perceptions of faculty collective efficacy beliefs may be important.

Another important finding is that teachers' self-efficacy beliefs averaged to the school level, particularly average beliefs about abilities to maintain a positive classroom climate (CC), are useful in explaining variation in mean levels of FCE. This finding is somewhat inconsistent with findings when the unit of analysis is the teacher. For individuals, self-efficacy beliefs about accommodating individual differences were most related to teachers' perceptions of faculty collective efficacy beliefs. However, at the school level, higher mean levels of beliefs in abilities to maintain a positive classroom climate (CC) accompanied by high mean levels for the other self-efficacy factors were associated with higher mean levels of FCE.

Major Findings and Conclusions for Research Question 4

What is the strength of relationships between omnibus measures of teacher self-efficacy beliefs and task-specific assessments of teacher self-efficacy beliefs at varying levels of difficulty?

Major Findings

Several items were included in the TEBS-S to investigate relationships between omnibus-type measures of teachers' beliefs about their abilities to teach and more content-specific measures. Additionally, several items were included to investigate these relationships when level of difficulty was varied. Bivariate correlations between

these items and the TEBS-S factors indicated interesting relationships. First, the general teaching self-efficacy items (Item 3 and Item 8) were strongly correlated. However, subject-specific (teach math to all my students and teach reading to all my students) general teaching self-efficacy items were more strongly correlated with Item 8 which reads, *successfully teach all of my students*, versus Item 3 which states, *teach effectively.*

Secondly, correlations between subject-specific items which varied in level (e.g., successfully teach reading to all my students, successfully teach reading to my lower ability students, etc.) indicated an interesting relationship. Responses to items for successfully teaching all students and successfully teaching lower ability students were more strongly correlated than either of these types of items were with those that ask about successfully teaching higher ability students. This relationship held for both math and reading subject areas. Teachers reported stronger beliefs in their abilities to teacher higher ability student than lower ability students or all of their students.

Correlations were strong and positive between teachers' responses on the AID self-efficacy factor and items that ask about successfully teaching lower ability students. The correlations were not as strong between AID and successfully teaching higher ability students. In addition, there was a weak relationship between teachers' beliefs about their abilities to maintain a positive classroom climate (CC) and teachers' beliefs about successfully teaching higher ability students. Finally, no specific pattern was evident in correlations between any of the items developed for this research question and collective efficacy belief factors (WGE and FCE).

Conclusions for Research Question 4

Item 3, which was developed to be the most general teaching self-efficacy item, was only moderately correlated with any of the other items or self-efficacy factors (with the exception of MLR). These results indicated the possibility that teachers consider indicators, such as effectively managing routines and procedures for learning tasks and clarifying directions for learning tasks, as gauges of general teaching ability.

Although Item 3 was among many items for which the context was stated to be the teacher's current teaching situation, Item 8, which referenced all students in the teacher's class, was not answered exactly the same as item 3. Instead, when the reference to all of the teacher's students was added, correlations were stronger between other items that specifically referenced students than between these same items and Item 3. This was not true, however, for items that specified teaching higher ability students. Teachers appeared to differentiate teaching higher ability students from teaching the rest of their students (all students and lower ability students). Thus, it is possible that when teachers consider all of their students, they more heavily weight the lower ability students. An examination of mean levels for these items indicated that teachers, on average, rated their abilities to teach higher ability students more strongly than for teaching lower ability students regardless of the subject area.

Overall, the patterns in the data appeared to follow self-efficacy theory in that correlations varied as expected when specificity and level of task were varied. None of the general or subject specific items showed any remarkably strong relationships with the self-efficacy factors from the TEBS-S although most were moderately correlated with these factors. In addition, moderately weak relationships and weak relationship

were demonstrated between the general and subject-specific items and measures of WGE and FCE, respectively. These types of self-efficacy items appeared to be related to the collective efficacy constructs (WGE and FCE) in a similar manner as the self-efficacy factors. This may provide evidence that these relationships (between self-efficacy and collective efficacy measures) are part of the hierarchical reality of efficacy beliefs for teachers and not due to measurement issues discussed earlier.

Major Findings and Conclusions for Supplementary Question 1

What is the relationship between measures of teachers' situation and task-specific self- and collective efficacy beliefs and a question based on the RAND items?

Major Findings

Bivariate correlation coefficients between each of the measures of self-, work-group collective and faculty collective efficacy beliefs and the RAND item continuum ranged between .16 and .29. These correlations indicate only a slight overlap in variance explained between the efficacy measures used in this study and the RAND item.

Conclusions for Supplementary Question 1

Responses to the RAND items, when presented as a continuum, have little relationship to the efficacy measures used in this study. Based on the theory of self-efficacy, this result was expected. Neither end of the RAND item continuum assesses teachers' self-, work-group collective or faculty collective efficacy beliefs. Both RAND items have little face validity as measures of self-efficacy. Additionally, RAND Item 2 which reads, "If I really try hard, I can get through to even the most difficult or unmotivated students", might actually be an indication of low self-efficacy beliefs. This

item stresses the need to try really hard, which for some is an indication that one does not have what it takes to do the task (Bandura, 1997). These results certainly indicate that self- and collective efficacy beliefs as measured in this study are different from what is measured by the RAND items.

Major Findings and Conclusions for Supplementary Question 2

For teachers as the unit of analysis, what is the relationship between teacher experience, SES of students and teachers' perceptions of self- and faculty collective efficacy beliefs? For faculty collective efficacy beliefs, do these relationships differ using schools as the unit of analysis?

Major Findings

SES of students was determined by having teachers report the proportion of students in their class who were on free/reduced cost lunch. There were weak negative relationships between SES of students in teachers' classrooms and teachers' ratings of self-efficacy beliefs (specifically beliefs about abilities to maintain a positive classroom climate and manage learning routines) and faculty collective efficacy beliefs. Additionally, weak positive relationships were found between the number of years experience for teachers and their rating of self-efficacy beliefs on accommodating individual differences, monitoring and providing feedback for learning and managing learning routines.

When scores are aggregated to the school level, SES explained approximately 46% of the variation in mean levels of faculty collective efficacy beliefs. Average years experience of teachers was not related to levels of FCE at the school level. Additional analyses investigated whether SES was able to explain additional variation in FCE once

teacher personal characteristics, in the form of average self-efficacy beliefs, and environmental characteristics, in the form of perceived occurrences of sources of efficacy information, were included in the model. When all variables were included in the model, 84% of the variation was explained. Although SES was still strongly correlated with FCE mean levels, its role was diminished. Results indicated that beliefs about abilities to maintain a positive classroom climate (CC) and occurrences of observation of other teachers and opportunities for informal and formal learning with others (OCCOOT and OCCPD) explained more of the variation in FCE. Additionally, when SES was removed from the model, mean levels of self-efficacy beliefs and occurrence of sources of efficacy information still explained 82% of the variation in faculty collective efficacy beliefs.

Conclusions for Supplementary Question 2

The results of Supplementary Question 2 indicated that SES of students may play a small role as regards individual teachers' self- and faculty collective efficacy beliefs. Bandura's (1983) study of faculty collective efficacy beliefs found a moderate negative relationship between these average self-efficacy beliefs and average SES level of students in schools. When data for the present study were averaged to the school level, a substantial relationship between FCE and SES was found. However, when differences in average self-efficacy beliefs of teachers and differences in environmental sources of efficacy information were statistically controlled, SES did not make a major contribution to explaining variation in FCE. Thus, average levels of sources of efficacy information and average levels of self-efficacy beliefs were able to explain nearly as

much of the variation in average levels of faculty collective efficacy beliefs as when SES was included.

Individual teachers' years of experience were weakly, but positively associated with beliefs in abilities to accommodate individual differences of students, manage learning routines and monitor and provide feedback for learning. Several studies reviewed in Chapter 2 found substantial and sometimes curvilinear relationships between teacher efficacy and experience. However, no curvilinear relationships between AID, MLR, MFL and years of experience were found to exist in the present study. Only small positive linear relationships were noted. One possible explanation for the difference in findings might be that the reviewed studies focused on teacher efficacy or affecting student achievement, whereas AID, MLR and MFL focus on beliefs about performing specific teaching behaviors with a teacher's current students.

Discussion and Implications

This final section of Chapter 5 is an attempt to bring the findings and conclusions together, and address the implications of these results. Results from this study had implications for theory, research and measurement, practice and further research. Because this study represented first attempts at several endeavors, a discussion of these attempts was presented. Next, findings concerning relationships among the efficacy variables in this study are presented, followed by results concerning relationships between the sources of efficacy information in professional learning environments and teachers' self-, work-group collective and faculty collective efficacy beliefs. Several measurement-related issues are discussed and implications for supplementary findings are presented.

This study was the first known study to acknowledge the distinction between *teachers' self-efficacy beliefs about context-specific teaching behaviors* and *teacher efficacy* and tie this distinction to the existing theory and research literature. Also, this study represented a first attempt to measure teachers' self-, work-group collective and faculty collective efficacy beliefs and to do so in the context of teachers' current teaching situations.

The measure of teacher self-efficacy beliefs developed for this study was the first known attempt to use behaviors that have been shown to be indicators of effective teaching and learning to assess teachers' self-efficacy beliefs about teaching. No attempt was made to include all possible teaching behaviors in this measure, and no claim was made that these are the most important teaching behaviors. Rather, these were a sample of behaviors that have been linked to effective teaching and student learning.

This study presented a new measure called the Sources of Efficacy Information in Professional Learning Environments Scale (SOURCES). This measure was a first known attempt to measure sources of efficacy information available from teachers' professional learning environments. As this study was a first attempt at several endeavors, it was exploratory in nature and no causal inferences were made.

Measurement of Study Variables

Teachers' Efficacy Beliefs System (TEBS)

Factor analysis results from the TEBS indicated that self- and collective efficacy beliefs were distinguishable. As well, when only collective efficacy items were included, teachers' perceptions of work-group collective efficacy were distinguishable

from teachers' perceptions of faculty collective efficacy. Additionally, items representing group-level tasks loaded onto single factors on both collective efficacy beliefs measures.

The TEBS-S factored into four subscales said to measure beliefs about abilities to Accommodate Individual Difference (AID), Manage Learning Routines (MLR), Maintain a Positive Classroom Climate (CC) and Enhance Learning (EL). Data obtained from each of these measures were reliable. Evidence of content validity was demonstrated through review of theory and related literature and through a thorough item development process. Criterion-related validity was also evident in the relationships demonstrated between these measures and measures of sources of efficacy information in professional learning environments. These measures were developed to improve upon existing measures (Pajares & Miller, 1995; Bandura, 1997; Pajares, 1992) by following self-efficacy theory more closely in that items were context and task specific behaviors that were associated with effective teaching and learning and by prefacing these behaviors with an item stem that asks about beliefs in abilities.

The Teachers' Efficacy Beliefs System was shown to be a useful measurement system to assess and distinguish between self- and collective efficacy beliefs of teachers. Data for all parts of the Teachers' Efficacy Beliefs System were reliable and items from various parts of the measurement system factored into their respective latent constructs.

Sources of Efficacy Information in Professional Learning Environments (SOURCES)

The SOURCES measure offered insight into the types of experiences teachers rated similarly. Vicarious experiences that involved informal/formal learning (OCCPD)

and that involved observation of other teachers (OCCOOT) formed two of the occurrence scales. Enactive mastery experiences teaching reading, science and math and successful experiences dealing with the daily demands of teaching (OCCEMT) represented another factor on this measure. Occurrences of negative affect (OCCNAF) represented the final occurrence factor. Four influence factors that were similar in content (INPSLO, INTS, INNAF, INOOT) to the occurrence factors were also represented by the data. These factors were somewhat different from the occurrence factors in that a few additional items were on some of the factors. The influence factors did not provide much information in terms of explaining variation in efficacy beliefs in the analyses performed in this study. However, their interpretation for some analyses did provide some information about what teachers considered influential in terms of fostering efficacy beliefs. The study results indicated that the influence scale may be unnecessary and simply provided redundant information. Additionally, a large amount of missing data was present in the influence scale. Thus, when mean replacement of missing values was performed, substantial changes in item means and standard deviations were present.

Whether the influence scale provided useful information could transcend into the theoretical realm. The question becomes if at the point of assessing the occurrence of events, had teachers already processed or weighted these events cognitively and thus only recorded those that were influential. Or, from a more behavioral perspective, is the simple occurrence of events enough to impact the formation of efficacy beliefs. This explanation leaves teachers' cognitive processes out of the loop; however, the strong

relationship between some of the influence variables and efficacy beliefs variables preclude ignoring these variables without further investigation.

Data from all eight factors of the SOURCES were reliable although the negative affect factors produced the least reliable data. Regardless, development of this instrument represents a milestone in the study of teachers' professional learning environments. This measure is a first attempt at conceptualizing and examining the learning environment of teachers from the perspective of social cognitive theory and its sub-theory, self-efficacy theory.

Relationships Among Efficacy Variables and Sources Variables

Self-efficacy beliefs as measured by the four factors of the TEBS-S were related differently to work-group collective efficacy beliefs and faculty collective efficacy beliefs with the stronger association between self- and work-group collective efficacy beliefs. Teachers' self-efficacy beliefs about performing teaching tasks related to effective teaching and learning were able to explain about a third of the variation in teachers' perceptions of work-group collective efficacy and about a quarter of the variation in teachers' perceptions of faculty collective efficacy beliefs. It was suggested that this may be a measurement artifact, however, responses to the extra items added to the TEBS-S to measure global teaching self-efficacy and subject-specific teaching efficacy were also related to work-group collective efficacy beliefs (WGE) more strongly than to responses to faculty collective efficacy beliefs (FCE). It seems plausible that differing levels of functional dependence might be responsible for these relationships. Additionally, the ordering of the magnitude of the relationships indicates a hierarchical relationship.

Self-, work-group collective and faculty collective efficacy beliefs were differentially associated with the SOURCES factors. Enactive mastery experiences were more strongly associated with self-efficacy beliefs factors while vicarious learning experiences were more strongly associated with the collective efficacy factors. Even in teachers' qualitative responses about elements of their learning environments that enhance self or faculty collective efficacy beliefs, these relationships held. Although the issue was raised that faculty-level enactive mastery experiences were not assessed by the SOURCES measure, teachers only occasionally mentioned enactive mastery experiences such as higher test scores or achieving group goals as sources of efficacy information that enhance shared beliefs in the faculty's abilities to accomplish group tasks and goals.

An interesting finding was that the set of SOURCES factors was able to explain over half of the variation in an *efficacy beliefs* latent variable composed of self-efficacy beliefs factors, work-group collective efficacy beliefs and faculty collective efficacy beliefs. When correlated separately, the set of SOURCES factors was only able to explain about a third of the variation in each of the efficacy variables. This result implied that characteristics of the learning environments of teachers were more strongly related to higher levels of teachers' perceptions of self- *and* collective efficacy beliefs than these elements are to individuals perceptions of high levels of self-efficacy beliefs *or* collective efficacy beliefs.

Additionally, differences at the school level for faculty collective efficacy beliefs were examined. These differences existed even when self-efficacy beliefs were statistically controlled. Bandura (1997) states that this is an indication of an emergent

factor, or collective efficacy beliefs. However, differences in self-efficacy beliefs, averaged to the school level, played an important role in explaining variation (over half) in faculty collective efficacy beliefs. Particularly, high levels of self-efficacy beliefs about maintaining a positive classroom climate (CC) and managing learning routines (MLR) were shown to differentiate schools with high FCE beliefs from schools with low FCE beliefs. Canonical correlation results of individual teachers' responses may have provided early indication of this relationship when a secondary function juxtaposed high FCE beliefs against low CC beliefs as being related to an environment high on vicarious learning (OCCPD and OCCOOT) and negative affect (OCCNAF) and low on enactive mastery experiences (OCCEMT).

Certainly, given relationships between average faculty collective efficacy beliefs and indicators of schools outcomes such as achievement scores, etc. (Bobbett, 2001; Olivier, 2001; Bandura, 1993), it would be important to examine whether certain combinations of self- and faculty collective efficacy beliefs lead to greater gains in outcomes. Additionally, it would be important to investigate the types of learning opportunities or the sources of efficacy information that are useful in predicting strong individual self- *and* collective efficacy beliefs. The role of variation in teachers' self- and collective efficacy beliefs should be addressed as well in future research. Variation in teachers' FCE scores within schools seemed to be associated with the level of FCE; however, this was inconclusive given the number of schools examined.

Implications

Implications from these results extended to theory, measurement, research and practice. First, the efficacy constructs were distinguishable as measured, and self-efficacy

beliefs did not appear to be adequate proxies for either of the collective efficacy constructs. Proximity and contribution of the individual to group performance is offered as a possible explanation for the order and magnitude of correlations between self-, work-group collective and faculty collective efficacy beliefs (Bandura, 1997).

Second, self-efficacy theory contends that enactive mastery experiences are most influential in forming beliefs about capabilities (Bandura, 1997). However, results from this study indicated that for individuals perceptions of collective efficacy, particularly at the faculty level, vicarious experiences were most important. Sources of efficacy information functioned differently for perceptions of collective efficacy for individuals. This finding has implications for theory as no such delineation is given in self-efficacy theory. Possibly teachers in work-groups, and particularly as members of school faculties, are not regularly exposed to group-level enactive mastery experiences. Nonetheless, an attempt should be made to try to measure group-level enactive mastery experiences (and other sources of efficacy information) so as to evaluate each of these possibilities.

A final implication for theory and further research is that the results of this study indicated the possible existence of a super-efficacy construct composed primarily of faculty collective efficacy beliefs and secondarily by self-efficacy beliefs. There is some evidence that at the school level, self-efficacy beliefs are useful in predicting faculty collective efficacy beliefs. Examination of the interactions between self- and collective efficacy beliefs at the school level might provide promising information as to predicting school-level outcomes.

Investigation of Theory-Related Measurement Issues

Relationships between omnibus measures of teachers' self-efficacy beliefs and more subject-specific measures of self-efficacy beliefs were investigated. Correlations were ordered as expected based on the theory of self-efficacy. Varying the subject area and the level of ability of the student resulted in similar findings across subject areas.

However, teachers' ratings of beliefs about teaching all their students and beliefs about teaching lower ability students were strongly correlated. Teachers' ratings of beliefs about teaching all students and beliefs about teaching higher ability students were less strongly correlated. These results appeared to indicate the possibility that teachers reference lower ability students rather than higher ability students when asked about teaching all of their students. Teachers also rated their beliefs about teaching higher ability students at a higher level than for lower ability students on average. Results from these analyses have implications for research and practice. Research on teachers' self-efficacy beliefs may need to distinguish between beliefs about abilities to teach different types or ability levels of students so as to represent fully the variation in these beliefs. Practice related implications were also noted. Teachers who rated themselves as having strong beliefs in being able to teach lower ability students also rated themselves as having strong beliefs in their abilities to accommodate individual differences in students. Additionally, beliefs about abilities to accommodate individual differences were positively correlated with occurrences of enactive mastery experiences in teaching math, science and reading to students and in dealing with the daily demands of teaching. Thus, it is possible that providing opportunities for teachers to have

successful teaching experiences may enhance their beliefs in their abilities to meet the needs of individual students, particularly those perceived as lower ability students.

Results from these investigations appeared to follow theory in that varying the generality and level of the efficacy item resulted in predictable variations in relationships. Thus, attention should be given to these issues when measuring efficacy beliefsas the use of global, decontextualized measure may be inappropriate.

Implications of Supplementary Findings

Experience of teachers was not substantially associated with self-, work-group collective or faculty collective efficacy. Some very weak, but practically unimportant relationships were found. The range of teaching experience was large. No evidence was found for any type of curvilinear relationship between experience and the efficacy variables. These results are not consistent with theory that suggested that experience might afford teachers more opportunities to learn about and develop their abilities through exposure to sources of efficacy information. However, it may be that more experience as a teacher did not necessarily mean more enactive mastery experiences, for example.

Socio-economic status of the students in a teacher's class was determined by teachers' self-reports of the proportion of students in class on free/reduced cost lunch. This variable was negatively, but weakly associated with self-efficacy and faculty collective efficacy beliefs responses for individual teachers. However, when teachers' faculty collective efficacy beliefs responses were aggregated to the school level, SES explained over a third of the variation in faculty collective efficacy beliefs. Additional analyses using mean levels of self-efficacy factors and the sources factors as well as

SES to predict faculty collective efficacy resulted in diminished importance of SES in explaining variation in faculty collective efficacy beliefs. Rather, beliefs in abilities to maintain a positive classroom climate and manage learning routines and vicarious learning opportunities in and out of the classroom were more important in explaining variation in mean levels of faculty collective efficacy across schools. Olivier (2001) found bivariate relationships between average levels of self-efficacy beliefs about classroom management and maintaining a positive classroom climate, mean levels of faculty collective efficacy and measures of school performance (past performance). Nonetheless, an important practical implication is that providing sources of efficacy information that foster high levels of self-efficacy beliefs about maintaining a positive classroom climate and managing learning routines as well as opportunities for vicarious learning including observation of other teachers might diminish some of the negative impact that poverty has on teachers' shared beliefs in their abilities to accomplish goals as a faculty.

Final Comments

This study made contributions to extend theory in the areas of self-efficacy and in studies of learning environments as well as to contribute to literature as regards change in schools

The review of the literature in this study attempted to further understanding of the theoretical complexities involved in studies of teachers' self-efficacy beliefs and to acknowledge and hopefully clear up some conceptual confusion evident in studies in this area. *Teacher efficacy* research is in its third decade. Research on teacher efficacy or a teacher's belief in his or her ability to affect student performance has provided

important evidence of relationships between teachers' beliefs and student performance outcomes. However, this construct also perpetuates input-output treatments of schooling. In other words, teacher efficacy links teachers' beliefs to producing student outcomes. Thus, the components of these beliefs are shielded in a black box created by the definition of teacher efficacy.

This study sought to open the box and examine the nature of teachers' beliefs about their abilities to perform prerequisite tasks that have been linked empirically to student achievement. This study did not try to predict teaching behaviors or address the role of outcome expectations in this belief system; however, others (Maddux, 1999; Kirsch, 1995; Bandura, 1997) indicate that outcome expectancy is an important element in this process. This study did acknowledge the (continuing) confusion related to specification of tasks. Although Bandura (1995c; 1997) contends that performance attainments, such as getting an A in a course, can be considered tasks, Kirsch (1995) and Maddux (1999) argue strongly that performance attainments are outcomes and that this introduces inconsistencies in self-efficacy theory. Additionally, Kirsch (1995) argues that there are two types of outcome expectations and that self-efficacy theory does not adequately include these distinctions. Finally, this study provided evidence of the hierarchical structure of tasks and/or goals, and that efficacy beliefs about accomplishing hierarchically arranged task structures are related, but not perfectly so. As such, not adhering to Bandura's (1995c) way of thinking, and opening the Pandora's box related to task specification, one can consider that *teacher self-efficacy beliefs about task and situation specific teaching behaviors* and *teacher efficacy*, as defined, are not different types of efficacy, but are self-efficacy beliefs about different

complexities of behavior specification. However, various issues, such as the fact that few researchers ever considered the context specificity of efficacy beliefs and measures of teacher efficacy were not firmly grounded in self-efficacy theory, preclude direct comparisons of these two constructs.

This study makes a substantial contribution to advancing measurement of teachers' self- and collective efficacy beliefs in the context in which those beliefs are formed. Also, development of a measure of the sources of efficacy information in teachers' professional learning environments contributed to studies of learning environments and to understanding what environmental factors were associated with various levels of efficacy beliefs.

This study presented evidence that environmental opportunities for learning about efficacy beliefs were differentially related to teachers' beliefs about their individual abilities to accomplish tasks and teachers' shared beliefs about group members' abilities to accomplish tasks. These results have implications for professional development activities in schools and for change in schools. Fullan (1993) contends that teachers need to value learning to effect change in schools. As mentioned previously, learning and ability may not be enough as person's beliefs in their ability mediate between knowledge and action (Bandura, 1997; Bouffard-Bouchard, Parent & Larivee, 1991). These results imply that for individual teachers to believe strongly in their abilities to successfully accomplish various teaching-related tasks, they primarily needed to have, attend to, and feel positively about enactive mastery experiences. Secondarily, individual teachers needed learning opportunities such as workshops, discussions with other teachers, observations of other teachers, etc. Bandura (1997)

posited that efficacy beliefs mediate relationships between learning and action. Given this empirically demonstrated relationship, specific experiences for teachers that might enhance their self-efficacy beliefs should be examined.

It was also noted in this study that high mean levels of faculty collective efficacy beliefs were strongly associated with high mean levels of self-efficacy beliefs, especially in the area of classroom management in combination with high levels of vicarious learning opportunities, both in the classroom and out of the classroom, high levels of enactive mastery experiences in the classroom and low levels of negative affect. From a practical perspective, information about environmental factors associated with higher levels of self- and/or collective efficacy beliefs was important given linkages found between self- and faculty collective efficacy beliefs and school outcomes (Bobbett, 2001; Olivier, 2001; Bandura, 1993; Goddard et al., 2000). Further investigations of the interactive relationships between self- and collective efficacy beliefs are warranted. It may be that high mean levels of faculty collective efficacy beliefs without high mean levels of self-efficacy beliefs are inadequate to explain variation in school outcomes.

These results are indicative of a possible *super efficacy* effect such that combinations of mean levels of faculty collective and self-efficacy beliefs produce differentially effective groups in accomplishing tasks that lead to important outcomes. Zaccaro et al. (1995) provided insight as to how disparities between self- and collective efficacy beliefs may affect group performance. Investigations into this possible effect should also examine whether relationships between faculty collective efficacy beliefs and teachers' self-efficacy beliefs are reciprocating beliefs in nature, or is the

relationship a top-down, one way effect as alluded to by Goddard et al. (2000). As well, whether variation in faculty collective efficacy beliefs is an important predictor of group performance should be examined.

The combination of findings regarding relationships between self-efficacy beliefs and sources of efficacy information and mean levels of faculty collective efficacy beliefs and sources of efficacy information provides an important avenue of inquiry. As Eisner (1995) noted, we need to understand "how we can provide teachers the kind of professional opportunities that will afford the best among them opportunities to continue to grow through a lifetime of work" (p. 764). However, it is important to acknowledge whether enhanced efficacy beliefs of individuals or groups or both are the goal as different types of opportunities are related to efficacy beliefs of individuals and groups differently. Thus, learning opportunities and experiences in schools could be developed to attempt to enhance efficacy beliefs of individuals and individuals functioning in groups.

Chapter Summary

Chapter 5 provided a review of the major findings in the study as well as a discussion of these findings. Implications for theory, research, and practice were presented.

Dissertation Summary

This study was an exploratory study to examine relationships between sources of efficacy information as provided by teachers' professional learning environments and teachers' self-, work-group collective and faculty collective efficacy beliefs. The

sample for this study consisted of survey responses from 410 elementary school teachers from 44 schools in two school districts.

Two new measurement systems were developed and used in this study. These included the Sources of Efficacy Information in Professional Learning Environments (SOURCES) and the Teachers' Efficacy Beliefs System (TEBS) which consisted of the Teacher Self-Efficacy Beliefs Scale (TEBS-S), Teacher Work-Group Collective Efficacy Beliefs Scale (TEBS-WG) and the Teacher Faculty Collective Efficacy Beliefs Scale (TEBS-F).

Major findings from the study included:

1. The study measures adequately represented the theoretical complexities of the constructs measured. Data from these measures were reliable.
2. Relationships between teachers' perceptions of collective and self-efficacy beliefs indicated a hierarchical structure and faculty collective efficacy beliefs were an emergent property of groups of teachers.
3. At the school level, teachers' perceptions of faculty collective efficacy beliefs were strongly related to the sources of efficacy information and to teachers' perceptions of self-efficacy beliefs.
4. Teachers' perceptions of self- and collective efficacy beliefs were related differently to the sources of efficacy information in the learning environment.
5. According to teachers, school learning environments differed qualitatively in the sources of efficacy information that were considered important to enhance or diminish self- and faculty collective efficacy beliefs.

6. Omnibus measures of teacher self-efficacy beliefs about teaching were systematically related to more specific (context and task) measures of self-efficacy beliefs as predicted by theory.
7. SES of students in schools was a strong predictor of mean levels of faculty collective efficacy beliefs, but this relationship was diminished when the sources of efficacy information provided by the schools professional learning environment and teachers' self-efficacy beliefs about accomplishing teaching-related tasks were included.

Finally, implications of these findings were presented and recommendations for further research were included.

REFERENCES

Allinder, R.M. (1994). The relationship between efficacy and the instructional practices of special education teachers and consultants. Teachers Education and Special Education, 17, 86-95.

Allinder, R.M. (1995). An examination of the relationship between teacher efficacy and curriculum-based measurement and student achievement. Remedial and Special Education, 16, 247-254.

Anderson, R.N., Greene, M.L. & Loewen, P.S. (1988). Relationships among teachers and students' thinking skills, sense of efficacy, and student achievement. The Alberta Journal of Educational Research, 34, 148-165.

Armor, P., Conry-Oseguera, P., Cox, M., King, N., McDonnell, L., Pascal, A., Pauly, E. & Zellman, G. (1976). Analysis of the school preferred reading program in selected Los Angeles minority schools (Los Angeles Unified School District). Santa Monica, CA: RAND.

Ashton, P.T. & Webb, R.B. (1986). Making a difference: Teachers' sense of efficacy and student achievement. New York: Longman.

Ashton, P.T., Buhr, P. & Crocker, L. (1984). Teachers' sense of efficacy: A self-or norm-referenced construct? Florida Journal of Educational Research, 26, 29-41.

Ashton, P. (1984a). Teacher efficacy: A motivational paradigm for effective teacher education. Journal of Teacher Education, 35, 28-32.

Ashton, P. (1984b). Motivation and the teacher's sense of efficacy. In C. Ames & R. Ames (Ed.), Research on Motivation in Education, v. 2: The Classroom Milieu. Orlando: Academic Press.

Ashton, P.T., Webb, R.B., & Doda, N. (1983). A study of teacher's sense of efficacy (National Institute of Education, Contract No. 400-79-0075). Gainesville, FL: University of Florida.

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: W.H. Freeman.

Bandura, A. (1995a). Self-efficacy in changing societies. New York: Cambridge University Press.

Bandura, A. (1995b). Manual for the construction of self-efficacy scales. Available from Albert Bandura, Department of Psychology, Stanford University, Stanford, CA 94305-2130.

Bandura, A. (1995c). On rectifying conceptual ecumenism. In J. Maddux (Ed.), Self-Efficacy, Adaptation, and Adjustment: Theory, Research and Application. New York: Plenum.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. Educational Psychologist, 28, 117-148.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1982). Self-efficacy mechanism in human agency. American Psychologist, 37, 122-147.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84, 191-215.

Benz, C.R., Bradley, L., Alderman, M.K. & Flowers, M.A. (1992). Personal teaching efficacy: Developmental relationships in education. Journal of Educational Research, 85, 274-285.

Berman, P. & McLaughlin, M.W. (1977). Federal programs supporting educational change, Vol III: Factors affecting implementation & continuation (Report No. R-1589/7 HEW). Santa Monica, CA: RAND Corporation.

Bhushan, V. (1986). Relationships between teachers' attitudes and classroom learning environment. In B. Fraser (Ed.), The Study of Learning Environments. Salem, Oregon: Assessment Research.

Biddle, S. (1999). Motivation and perceptions of control: Tracing its development and plotting its future in exercise and sport psychology. Journal of Sport & Exercise Psychology, 21, 1-23.

Bobbett, J.J. (2001). School culture, teacher efficacy and decision-making in demonstrably effective and ineffective. Unpublished Doctoral Dissertation, Louisiana State University, Baton Rouge, Louisiana.

Bobbett, J.J., Dellinger, A.B., Ellett, C.D. & Olivier, D.F. (2000). Teacher Efficacy Belief Scale (TEBS), currently under development in the Department of Educational Leadership, Research & Counseling, Louisiana State University, Baton Rouge, LA.

Bobbett, J.J., Olivier, D.F., Ellett, C.D., Rugutt, J., & Cavanagh, R. (1998). Cross-cultural replication of a multi-dimensional measure of teacher perceptions of elements of school culture. Paper presented at the annual meeting of the Southwest Educational Research Association, Houston, TX.

Bouffard-Bouchard, T., Parent, S., & Larivèe, S. (1991). Influence of self-efficacy on self-regulation and performance among junior and senior high-school age students. International Journal of Behavioral Development, 14(2), 153-164.

Campbell, J. (1996). A comparison of teacher efficacy for pre and in-service teachers in Scotland and America. Education, 117(1), 2-10.

Cavanagh, R.F., Dellar, G.B., & Ellett, C.D. (1998). Changing the context of learning environment research. Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.

Cavanagh, R.F., & Dellar, G.B. (1997). Towards a model of school culture. Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.

Chester, M. D. & Beaudin, B.A. (1996). Efficacy beliefs of newly hired teachers in urban schools. American Educational Research Journal, 33(1), 233-257.

Clarke, J.S. (1997). Personal and organizational structure correlates of receptivity and resistance to change and effectiveness in institutions of higher education. Unpublished Doctoral Dissertation, Louisiana State University, Baton Rouge, Louisiana.

Colardarci, T. & Breton, W.A. (1997). Teacher efficacy, supervision, and special education resource-room teacher. The Journal of Educational Research, 90, 230.

Colardarci, T. (1992). Teachers' sense of efficacy and commitment to teaching. Journal of Experimental Education, 60, 323-337.

Collins, D. (1998). Organizational Change: Sociological perspectives. New York: Rutledge.

Cousins, J.B. (1998). Intellectual roots of organizational learning. In K. Leithwood & K. Seashore Louis (Eds.), Organizational learning in schools. Exton, PA: Swets & Zeitlinger.

Cuban, L. (1990). Reforming again, again, and again. Educational Researcher, 19(1), 3-13.

da Costa, J.L. (1995). Teacher collaboration: A comparison of four strategies. The Alberta Journal of Educational Research, XLI (4), 407-420.

Davis, D. (2000). PACES literature review: A review of educational research on teaching and learning, teacher assessment, and teacher professional development in support of PACES processes and teaching and learning components. Miami, FL: Miami-Dade County Public Schools.

Deemer, S.A. & Minke, K.M. (1999). An investigation of the factor structure of the Teacher Efficacy Scale, The Journal of Educational Research, 93(1), 3-10.

Dellinger, A.B., Bobbett, J.J., Oliver, D.F., & Ellett, D. (2001). An initial attempt at developing a theory-based measure of teacher self-efficacy beliefs. Paper presented at the 2001 Annual meeting of the Southwest Educational Research Association, New Orleans, LA.

Dembo, M.H. & Gibson, S. (1985). Teachers' sense of efficacy: An important factor in school improvement. The Elementary School Journal, 86(2), 173-183.

De Mesquita, P.B. & Drake, J.C. (1994). Educational reform and the self-efficacy beliefs of teachers implementing nongraded primary school programs. Teaching & Teacher Education, 10, 291-302.

Denham, C.H. & Michael, J.J. (1981). Teacher sense of efficacy: A definition of the construct and a model for further research. Educational Research Quarterly, Spring, 39-63.

Eisner, E.W. (1995). Standards for American schools: Help or hindrance. Phi Delta Kappan, 76(10), 758-764

Ellett, C.D. (1999). Professional Assessment and Comprehensive Evaluation System (PACES). Manual for the assessment of teaching and learning.

Ellett, C.D. (1997). Classroom-based assessments of teaching and learning. In James Stronge (Ed.), Evaluating teaching: A guide to current thinking and best practice. Thousand Oaks, CA: Corwin Press.

Ellett, C.D. (1986). Conceptualizing the study of learning environments. In B. Fraser (Ed.), The study of learning environments: Volume 1, Research monograph of the Study of Learning Environments Special Interest Group of the American Educational Research Association. Perth, Western Australia: Curtin University of Technology.

Ellett, C.D., Hill, F.H., Loup, K.S., & Lakshmann, A. (1997, March). Professional learning environment and human caring correlates of teacher efficacy. Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.

Ellett, C.D., Hill, F.H., Liu, X., Loup, K.S., & Lakshmanan, A. (1997). Professional learning environment and human caring correlates of teacher efficacy. Paper Presented at the annual meeting of the American Educational Research Association, Chicago, IL.

Emmery E.T. & Hickman, J. (1991). Teacher efficacy in classroom management and discipline. Educational and Psychological Measurement, 51, 753-765.

Enoch, G. L., Scharmann, L. C., & Riggs, I. M. (1995). The relationship of pupil control to preservice elementary science teacher self-efficacy and outcome expectancy. Science Education, 79(1), 63-75.

Evans, D.E. & Tribble, M. (1986). Perceived teaching problems, self efficacy, and commitment to teaching among preservice teachers. Journal of Educational Research 80(2), 81-96.

Fan, X. (1996). Canonical correlation analysis as a general analytic model. In B. Thompson (Ed.), Advances in Social Science Methodology. Greenwich, CT: JAI Press.

Fish, L.J. (1988). Why multivariate methods are usually vital. Measurement and Evaluation in Counseling and Development, 21, 130-137.

Fisher, D.L., Fraser, B.J., Wubbels, T., & Brekelmans, M. (1993). Associations between school learning environment and teacher interpersonal behaviour in the classroom. In D.L. Fisher (Ed.), The Study of Learning Environments v. 7. Perth, Western Australia: Curtin University of Technology.

Fisher, D.L. & Fraser, B.J. (1981). Validity and use of My Class Inventory. Science Education, 65, 145-156.

Fraser, B.J. (1986). Two decades of research on perceptions of classroom environment. In B.J. Fraser (Ed.), The study of learning environments. Salem, Oregon: Assessment Research.

Fraser, B.J. (1992). Developments and changes in the study of learning environments: looking back , sideways, and forward. In H.C. Waxman & C.D. Ellett (Eds.), The study of learning environments: Volume 5, Research monograph of the Study of Learning Environments Special Interest Group of the American Educational Research Association. Houston, TX: College of Education, University of Houston.

Fritz, J. J., Miller-Heyl, J., Kreuzer, J. C., & Mac Phee, D. (1995). Fostering personal teaching efficacy through staff development and classroom activities. The Journal of Educational Research, 88, 200-208.

Fuller, B., Wood, K., Rapoport, T. & Dornbusch, S.M. (1982). The organizational context of individual efficacy. Review of Educational Research, 52 (1), 7-30.

Fullan, M. (1993). Change forces: Probing the depths of educational reform. New York, NY: Falmer Press.

Fullan, M. (1999). Change forces: The sequel. Philadelphia: Falmer Press.

Ghaith, G., & Shaaban, K. (1999). The relationship between perceptions of teaching concerns, teacher efficacy and selected teacher characteristics. Teaching and Teacher Education 15, 487-496.

Ghaith, G. & Yaghi, H. (1997). Relationships among experience, teacher, efficacy, and attitudes toward the implementation of instructional innovation. Teaching and Teacher Education, 13, 451-458.

Gibson, S. & Dembo, M. (1984). Teacher efficacy: A construct validation. Journal of Educational Psychology, 76, 569-582.

Goddard, R.D. (2000). Collective efficacy: A neglected construct in the study of schools and student achievement. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.

Goddard, R.D. & Goddard, Y.L. (2001). A multilevel analysis of the relationship between teacher and collective efficacy in urban schools. Paper presented at the annual meeting of the American Educational Research Association, Seattle.

Goddard, R. D., Hoy, W. K., & Woolfolk Hoy, A. (2000). Collective teacher efficacy: It's meaning, measure and impact on student achievement. American Educational Research Journal, 37, 479-507.

Goddard, R.D., Hoy, W.K. & Woolfolk Hoy, A. (1999). Collective teacher efficacy: Its measure, meaning, and impact on student achievement. The Ohio State University, unpublished working paper.

Gorrell, J. & Suk Hwang, Y. (1995). A study of efficacy beliefs among preservice teachers in Korea. Journal of Research and Development in Education, 28(2), 101-105.

Greenwood, G. E., Olejnik, S. F., & Parkay, F. W. (1990). Relationships between four teacher efficacy belief patterns and selected teacher characteristics. Journal of Research and Development in Education, 23(2), 102-106.

Guskey, T.R. & Passaro, P.D. (1994). Teacher efficacy: A study of construct dimensions. American Educational Research Journal, 31, 627-643.

Guskey, T.R. (1989). Attitude and perceptual change in teachers. International Journal of Educational Research, 13, 439-453.

Guskey, T.R. (1988). Teacher efficacy, self-concept, and attitudes toward the implementation of instructional innovation. Teaching & Teacher Education, 4(1), 63-69.

Guskey, T. R. (1987). Context variables that affect measures of teacher efficacy. Journal of educational Research, 81 (1), 41-47.

Guskey, T.R. (1984). The influence of change in instructional effectiveness upon the affective characteristics of teachers. American Educational Research Journal, 21, 245-259.

Guskey, T. R. (1982). Differences in teachers' perceptions of personal control of positive versus negative student learning outcomes. Contemporary Educational Psychology 7, 70-80.

Guyton, E., Fox, M. C., & Sisk, K. A. (1991). Comparison of teaching attitudes, teacher efficacy, and teacher performance of first year teachers prepared by alternative and traditional teacher education programs. Action in Teacher Education, 13 (2), 1-9.

Henson, R.K., Bennett, D.T., Sienty, S.F., & Chambers, S.M. (2000). The relationship between means-end task analysis and content specific and global self-efficacy in emergency certification teachers: Exploring a new model of teacher efficacy. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.

Henson, R.K., Kogan, L.R., & Vacha-Haase, T. (2000). A reliability generalization study of teacher efficacy scale and related instruments. Paper presented at the annual meeting of the American Educational Research Association, New Orleans, LA.

Hipp, K. A. (1997). The impact of principals in sustaining middle school change. Middle School Journal, 28, 42-45.

Hoover-Dempsey, K.V., Bassler, O.C., & Brissie, J.S. (1992). Explorations in parent-school relations. Journal of Educational Research, 85, 287-294.

Hoover-Dempsey, K. V., Bossler, O. C., & Brissie, J. S. (1987). Parent involvement: Contributions of teacher efficacy, school socio-economic status, and other school characteristics. American Educational Research Journal, 24, 417-435.

Housego, B. E. J. (1992). Monitoring student teachers' feelings of preparedness to teach, personal teaching efficacy, and teaching efficacy in a new secondary teacher education program. The Alberta Journal of Educational Research, 38(1), 49-64.

Hoy, W. K. & Miskel, C. G. (1982). Educational administration: Theory, research, and practice (2nd ed.). New York: Random House.

Hoy, W. K. & Woolfolk, A. E. (1993). Teachers' sense of efficacy and the organizational health of schools. The Elementary School Journal, 93, 355-372.

Hoy, W.K. & Woolfolk, A.E. (1990). Socialization of student teachers. American Educational Research Journal, 27, 279-300.

Hunt, K.L. (1999). Exploring the role of teachers' perceptions of self-and organizational efficacies in enhancement of learning environments for teachers and students in elementary and middle schools. Paper presented at the annual meeting of the American Educational Research Association, Montreal, Canada.

Johnson, S.E. (1999). College choice: Psychological factors influencing postsecondary aspirations and expectations of ninth-grade students. Unpublished Doctoral Dissertation, Louisiana State University, Baton Rouge, Louisiana.

Kirsch, I. (1995). Self-efficacy and outcome expectancies. In J. Maddux (Ed.), Self-Efficacy, Adaptation, and Adjustment: Theory, Research and Application. New York, Plenum.

Knight, S.L. & Waxman, H.C. (1991). Students' cognition and classroom instruction. In H.C. Waxman & H.J. Walberg (Eds.), Effective Teaching: Current Research. Berkeley, CA: McCutchan.

Kuhn, T.S. (1996). The structure of scientific revolutions. Chicago: University of Chicago Press.

Lee, V.E., Dedrick, R.F., & Smith, J.B. (1991). The effect of the social organization of schools teachers' efficacy and satisfaction. A Journal of the American Sociological Association, 64(3), 190-208.

Leithwood, K. & Jantzi, D. (personal communication, 1999). Teacher Self-Efficacy.

Leithwood, K. & Seashore Louis, K. (1998). Organizational learning in schools: An introduction. In K. Leithwood & K. Seashore Louis (Eds.), Organizational Learning in Schools. Exton, PA: Swets & Zeitlinger.

Lewin, K. (1947). Frontiers in group dynamics. Human Relations, 1, 5-41.

Lewin, K. (1936). A dynamic theory of personality. New York: McGraw-Hill.

Lipham, J.M. (1988). Getzel's Models in Educational Administration. In N. Boyan (Ed.), Handbook of Research on Educational Administration. New York: Longman, Inc.

Lorsbach, A.W. & Jinks, J.L. (1999). Self-efficacy theory and learning environment research, Learning Environments Research, 2, 157-167.

Loup, K.S. (1994). Measuring and linking school professional learning environment characteristics, teacher self and organizational efficacy, receptivity to change, and multiple indices of school effectiveness. Unpublished Doctoral Dissertation, Louisiana State University, Baton Rouge, Louisiana.

Loup, K.S., Ellett, C.D., Chauvin, S.W., Lofton, G., Evans, L. & Hill, F. (1993). Student perception, student engagement and student achievement correlates of a comprehensive, classroom-based learning environment assessment system. In D.L. Fisher (Ed.), The Study of Learning Environments: Volume 7. Perth, Western Australia: Curtin University of Technology.

Loup, K.S., Ellett, C.D., Park, H.S. & Naik, N.S. (1994). An exploration of school professional learning environment characteristics, teacher self and organizational efficacy, receptivity to change, and organizational effectiveness. In D.L. Fisher (Ed.), The Study of Learning Environments Volume 8, Perth, Western Australia: Curtin University of Technology.

Maddux, J.E. (1999). Expectancies and the social-cognitive perspective: Basic principles, processes, and variables. In I. Kirsch (Ed.), How Expectancies Shape Experience. Washington, DC: American Psychological Association.

Maddux, J.E. (1995). Self-efficacy theory: An introduction. In J.E. Maddux (Ed.), Self-efficacy, adaptation, and adjustment: Theory, research, and application. New York: Plenum Press.

Meijer, C. J. W. & Foster, S. F. (1988). The effect of teacher self-efficacy on referral chance. The Journal of Special Education, 22, 378-385.

Midgely, C., Feldlaufer, H. & Eccles, J. S. (1989). Change in teacher efficacy and student self-and task-related beliefs in mathematics during the transition to junior high school. The Journal of Educational Psychology, 81, 247-258.

Moos, R.H. (1987). Learning environments in context: Links between school, work, and family settings. In B.J. Fraser (Ed.), The Study of Learning Environments: Volume 2. Perth, Australia: Curtin University of Technology.

Moos, R.H. (1981). Manual for Work Environment Scale. Palo Alto, CA: Consulting Psychologists Press.

Moos, R.H. (1980). Evaluating classroom learning environments. Studies in Educational Evaluation, 6, 239-252.

Mumaw, C. R., Sugawara, A. I. & Pestle, R. (1995). Teacher efficacy and post experiences as contributors to the global attitudes and practices among vocational home economics teachers. Family and Consumer Sciences Research Journal, 24(1), 92-109.

Newman, E.J. (1999). In the trenches: Increasing competency of teachers-in training by having them conduct individualized interventions. Journal of Instructional Psychology, 26, 36-41.

Newmann, F.M., Rutter, R.A., & Smith, M.S. (1989). Organizational factors that affect school sense of efficacy, community, and expectations. Sociology of Education, 62, 221-238.

O'Conner, R. & Korr, W. S. (1996). A model for school social work facilitation of teacher self-efficacy and empowerment. National Association of Social Workers, Inc., 18(1), 45-51.

Olivier, D. (2001). Teacher personal and school culture characteristics in effective schools: Toward a model of a professional learning community. Unpublished Doctoral Dissertation, Louisiana State University, Baton Rouge, Louisiana.

Olivier, D., Bobbett, J.J., & Ellett, C. (1999). Teacher and administrator perceptions of actual and preferred dimensions of school culture: New perspectives on learning environments. Paper presented at the annual meeting of the Southwest Educational Research Association, San Antonio, TX.

Pajares, F. (1997). Current directions in self-efficacy research. In P.R. Pintrich & M. Maehr (Eds.), Advances in motivation and achievement: Volume 10. Greenwich, CT: JAI Press.

Pajares, F. (1996). Self-efficacy beliefs in academic settings. Review of Educational Research, 66, 543-578.

Pajares, F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. Review of Educational Research, 62,(3), 307-332.

Pajares, F., Hartley, J., & Valiante, G. (2000). Response format in writing self-efficacy assessment: Greater discrimination increases prediction. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.

Pajares, F. & Miller, M. D. (1995). Mathematics self-efficacy and mathematics performances: The need for specificity of assessment. Journal of Counseling Psychology, 42, 109-198.

Parameswara, G. (1998). Incorporating multi-cultural issues in educational psychology classes using field experiences. Journal of Instructional Psychology, 25, 9-13.

Parkay, F. W., Greenwood, G., Olejnik, S., & Proller, N. (1988). A study of the relationship among teacher efficacy, locus of control, and stress. Journal of Research and Development in Education, 21(4), 13-22.

Petrie, T.A., Hartrauft, F. & Lutz, K. (1995). The relationship between teacher efficacy and administrative perceptions of effectiveness. The High School Journal, 73-77.

Pigge, F.L. & Marso, R.N. (1994). Outstanding teacher's sense of teacher efficacy at four stages of career development. The Teacher Educator, 29.

Pintrich, P.R. & Schunk, D.H. (1996). Motivation in Education. Englewood Cliffs, NJ: Prentice Hall.

Podell, D.M. & Soodak, L.C. (1993). Teacher efficacy and bias in special education referrals. Journal of Educational Research, 86, 247-254.

Poole, G.M. & Okeafor, K.R. (1989). The effects of teacher efficacy and interactions among educators on curriculum implementation. Journal of Curriculum and Supervision, 4(2), 146-161.

Raudenbush, S.W., Rowan, B., & Cheong, Y.F. (1992). Contextual effects on the self-perceived efficacy of high school teachers. Sociology of Education, 65(2), 150-167.

Reames, E.H. & Spencer, W.A. (1998). Teacher efficacy and commitment: Relationships to middle school culture. A paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.

Rich, Y., Lev, S. & Fisher, S. (1996). Extending the concept and assessment of teacher efficacy. Educational and Psychological Measurement, 56, 1015-1025.

Riggs, I.M. & Enochs, L.G. (1990). Toward the development of an elementary teacher's science teaching efficacy belief instrument. Science Education, 74, 625-637.

Ross, J.A., McKeiver, S. & Hogabonne-Gray, A. (1997). Fluctuations in teacher efficacy during implementation of destreaming. Canadian Journal of Education, 22, 283-296.

Ross, J.A. (1992). Teacher efficacy and the effects of coaching on student achievement. Canadian Journal of Education, 17(1), 51-65.

Ross, J.A. (1994). The impact of an inservice to promote cooperative learning on the stability of teacher efficacy. Teaching and Teacher Education, 10, 381-394.

Ross, J.A. (1995). Strategies for enhancing teachers' beliefs in their effectiveness: Research on a school improvement hypothesis. Teachers College Record, 97, 227-251.

Ross, J.A., Cousins, J.B. & Gadalla, T. (1996). Within-teacher predictors of teacher efficacy. Teaching and Teacher Education, 12, 385-400.

Ross, J.A. (1998). The antecedents and consequences of teacher efficacy. Advances in Research on Teaching, 7, 49-73.

Rotter, J.B. (1966). Generalized expectancies for internal versus external control of reinforcement. Psychological Monographs: General and Applied, 80(1), 1-28.

Saklofske, D.H., Michayluk, J.O. & RANDhawa, B.S. (1988). Psychological Reports, 63, 407-414.

Sarason, S.B. (1993). The case for change: Rethinking the preparation of educators. San Francisco: Jossey-Bass.

Sarason, S.B. (1997). How schools might be governed and why. New York: Teachers College Press.

Schwarzer, R., Schmitz, G.S. & Daytner, G.T. (1999). Teacher Self-Efficacy and Collective Teacher Self-Efficacy. Department of Health Psychology, Freie Universitat Berlin.

Scribner, J.P. (1998). Teacher efficacy and teacher professional learning: What school leaders should know. Paper presented at the annual convention of the University Council for Educational Administration, St. Louis, MO.

Senge, P.M. (1990). The fifth discipline: The art and practice of the learning organization. New York: Doubleday Currency.

Skinner, E.A. (1996). Personality processes and individual differences: A guide to constructs of control. Journal of Personality and Social Psychology, 71, 549-570.

Smylie, M.A. (1988). The enhancement function of staff development: Organizational and psychological antecedents to individual teacher change. American Educational Research Journal, 25(1), 1-30.

Soodak, L.C. (1997). Efficacy and experience: Perceptions of efficacy. Journal of Research and Development in Education, 30, 214-221.

Soodak, L.C. & Podell, D.M. (1996). Teacher efficacy: Toward the understanding of multi-faceted construct. Teaching and Teacher Education, 12, 401-411.

Soodak, L.C. & Podell, D.M. (1993). Teacher efficacy and students problem as factors in special education referral. The Journal of Special Education 27, 66-81.

Soodak, L.C., Podell, D.M. & Lehman, L.R. (1998). Teacher, student, and school attributes as predictors of teachers responses to inclusion. The Journal of Special Education, 31, 480-497.

Soto, G. & Goetz, L. (1998). Self-efficacy beliefs and the education of students with severe disabilities. The Association for Persons with Severe Handicaps, 23(2), 134-143.

Stanovich, P.J. & Jordan, A. (1998). Canadian teachers' and principals beliefs about inclusive education as predictors of effective teaching in heterogeneous classrooms. The Elementary School Journal, 98(3), 1-23.

Starko, A.J. & Schack, G.D. (1989). Perceived need, teacher efficacy, and teaching strategies for the gifted and talented. Gifted Child Quarterly, 33(3), 118-122.

Stein, M.K. & Wang, M.C. (1988). Teacher development and school improvement: The process of teacher change. Teaching and Teacher Education, 4, 171-187.

Tashakkori, A. & Teddlie, C. (1998). Mixed methodology: Combining qualitative and quantitative approaches. Thousand Oaks, CA: Sage.

Taylor, C.E. (1992). Teacher and principle perceptions of personal efficacy. The High School Journal, 76(1), 60-66.

Templeton, R.A. & Jensen, R.A. (1993). How exemplary teachers perceive their school environments. In D.L. Fisher (Ed.), The Study of Learning Environments: Volume 7. Perth, Western Australia: Curtin University of Technology.

Thompson, B. (1999, April). Common methodology mistakes in educational research, revisited, along with a primer on both effect sizes and the bootstrap. Invited address presented at the annual meeting of the American Educational Research Association, Montreal.

Thompson, B. & Borrello, G.M. (1985). The importance of structure coefficients in regression research. Educational and Psychological Measurement, 45, 203-209.

Thompson, B. & Vacha-Haase, T. (2000). Psychometrics is datametrics: The test is not reliable. Educational and Psychological Measurement, 60(2), 174-195.

Trentham, L., Silvern, S. & Brogdon, R. (1985). Teacher efficacy and teacher competency ratings. Psychology in the Schools, 22, 343-352.

Tschannen-Moran, M. (2000). The development of a new measure of teacher efficacy. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.

Tschannen-Moran, M., Woolfolk Hoy, A., & Hoy, W.K. (1998). Teacher efficacy: Its meaning and measure. Review of Educational Research, 68(2), 202-248.

Vacha-Haase, T. (1998). Reliability generalization: Exploring variance in measurement error affecting score reliability across studies. Educational and Psychological Measurement, 58(1), 6-20.

Vacha-Haase, T., Ness, C., Nilsson, J., & Reetz, D. (1999). Practices regarding reporting of reliability coefficients: A review of three journals. The Journal of Experimental Education, 67(4), 335-341.

Walberg, H.J. (1968). Teacher personality and classroom climate. Psychology in the Schools, 5, 163-169.

Warren, L.L. & Payne, B.D. (1997). Impact of middle grades' organization on teacher efficacy and environmental. The Journal of Educational Research, 90, 1-15.

Waxman, H.C. & Duschl, R.A. (1987). Using student perception data to improve preservice teachers' instruction and classroom environment. In B. Fraser (Ed.), The Study of Learning Environments Volume 2. Western Australia: Curtin University of Technology.

Webb, R.B. & Ashton, P.T. (1987). Teacher motivation and the conditions of teaching. In S.Walker & L. Barton (Eds.), Changing policies, changing teachers: New directions for schooling? (pp. 22-40). Philadelphia, PA: Open University Press.

Wittrock, M.C. (1986). Students' thought processes. In M.C. Wittrock (Ed.), Handbook of Research on Teaching: 3rd Edition. London: Macmillan.

Woolfolk Hoy, A.E (2000). Changes in teacher efficacy during the early years of teaching. Paper presented a the annual meeting of the American Research Association, New Orleans, LA.

Woolfolk, A.E. & Hoy, W.K. (1990). Prospective teachers' sense of efficacy and beliefs about control. Journal of Educational Psychology, 82(1), 81-91.

Woolfolk, A.E., Rosoff, B. & Hoy, W.K. (1990). Teachers' sense of efficacy and their beliefs about managing students. Teaching and Teacher Education, 6, 137-148.

Zaccaro, S.J., Blair, V., Peterson, C. & Zazanis, M. (1995). Collective efficacy. In J. Maddux (Ed.), Self-Efficacy, Adaptation, and Adjustment: Theory, Research and Application. New York: Plenum.

APPENDIX A: STUDY MEASURES

Table A.1: Demographic Information Survey.

School Number *(three digit number pre-coded values 100-699)*

1. Gender
   a. Female
   b. Male

2. Ethnicity:
   1. Asian
   2. Black
   3. Hispanic
   4. White
   5. Other: _____

3. Type of teaching situation in which you are currently working:
   1. Regular education classroom (self-contained, teach almost all subjects to same children)
   2. Regular education classroom (departmentalized, teach certain subjects to different children)
   3. Special education classroom
   4. Other: _____

4. Content area in which you primarily teach:
   1. Elementary education (all areas)
   2. Special education
   3. Reading
   4. Mathematics
   5. Social studies
   6. Science
   7. Art/music
   8. Physical education
   9. Other:_____

5. In your classroom, the percentage of students on free/reduced lunch is:

   (3 digit choice for 0 to 100%)

6. Your first or native language is:
   1. English
   2. Spanish
   3. Other (please specify)
      _____

7. Total number of years as a professional educator (including this year) is: (2 digit choice up to 50 years

8. Total number of years working at your current school (including this year) is:
   (2 digit choice up to 50 years)

9. Highest degree completed:
   1. Bachelor
   2. Master
   3. Master + 30/Specialist
   4. Doctorate (Ph.D. or Ed.D.)

RAND Continuum

Please circle the number on the scale below which corresponds to your beliefs:

1	2	3	4	5	6	7
Believe strongly that when it comes 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.			Neutral			Believe strongly that if I try really hard, I can get through to even the most difficult or unmotivated students.

Table A.2: Sources of Efficacy Information in Professional Learning Environments (SOURCES).

Thank you for participating in this study. This part of the survey asks you to rate experiences you have had as a faculty member at your present school. Please read each of the items listed below in the chart. For each item, please indicate:

a) **How frequently have you had each *particular experience* since being employed by your school.**
   1=Never Happens
   2=Rarely Happens
   3=Occasionally Happens
   4=Regularly Happens

b) **How influential are these experiences in strengthening your beliefs in your ability to be a successful teacher?**
   1=Not Influential
   2=Somewhat Influential
   3=Influential
   4=Extremely Influential

An Example:
Since being employed by my school, I have had experiences of successfully working with disabled children on a few occasions, but feel this is rare, I would code a '2=Rarely Happens' in the first column. ***Even though these experiences are rare, I may feel that these experiences are quite influential in making me feel like a good teacher and enhance my beliefs in my ability to be a successful teacher; therefore, I would choose and code '3=Influential'*** in the second column.

Please consider only those experiences since being employed by your present school.
Thanks again for your time in completing this survey.

	Experiences of...	Since being employed by your present school, how frequently have you had these experiences?				How influential are these experiences in strengthening your beliefs in your ability to be a successful teacher?			
		Never Happens	Rarely Happens	Occasionally Happens	Regularly Happens	Not Influential	Somewhat Influential	Influential	Extremely Influential
1	Success in teaching your students.	1	2	3	4	1	2	3	4
2	Successfully collaborating with fellow teachers to accomplish various goals.	1	2	3	4	1	2	3	4
3	Success in managing behavior of students.	1	2	3	4	1	2	3	4
4	Success in managing behavior of other students not in your class.	1	2	3	4	1	2	3	4
5	Success in practicing newly learned instructional techniques.	1	2	3	4	1	2	3	4
6	Success in practicing newly learned classroom management techniques.	1	2	3	4	1	2	3	4
7	Successfully participating in school-level decision making.	1	2	3	4	1	2	3	4
8	Successfully participating in classroom-level decision making.	1	2	3	4	1	2	3	4
9	Successfully meeting school improvement goals.	1	2	3	4	1	2	3	4
10	Observing colleagues at my school being successful as teachers.	1	2	3	4	1	2	3	4
11	Observing non-faculty members (e.g. outside experts such as university faculty, district personnel, consultants) successfully using instructional techniques.	1	2	3	4	1	2	3	4
12	Imagining yourself successfully teaching your students.	1	2	3	4	1	2	3	4

Table A.2 (continued)

13	Learning about effective teaching techniques from other faculty members.	1	2	3	4	1	2	3	4
14	Learning about effective teaching techniques from administrators in your school.	1	2	3	4	1	2	3	4
15	Learning about effective teaching techniques from sources outside of your school.	1	2	3	4	1	2	3	4
16	Attending workshops, inservices, video courses, etc. where successful demonstration of teaching-related tasks were observed.	1	2	3	4	1	2	3	4
17	Talking with other teachers at your school to learn how to be better at teaching.	1	2	3	4	1	2	3	4
18	Reading about teaching techniques in literature available at your school.	1	2	3	4	1	2	3	4
19	Reading about teaching techniques in professional journals.	1	2	3	4	1	2	3	4
20	Hearing about successful teaching practices at faculty meetings.	1	2	3	4	1	2	3	4
21	Using self-reflection as a means to improve your teaching.	1	2	3	4	1	2	3	4
22	Receiving encouragement from other teachers about your teaching ability.	1	2	3	4	1	2	3	4
23	Receiving encouragement from administration about your teaching ability.	1	2	3	4	1	2	3	4
24	Receiving awards such as certificates, grants, recognition, etc. for your teaching.	1	2	3	4	1	2	3	4
25	Receiving praise from media such as newspapers, radio, television, etc. about the teaching ability of the teachers at your school.	1	2	3	4	1	2	3	4
26	Being reprimanded for my teaching practices.	1	2	3	4	1	2	3	4
27	Receiving praise about the success of my teaching from evaluators.	1	2	3	4	1	2	3	4
28	Receiving self-encouragement about your abilities as a teacher.	1	2	3	4	1	2	3	4
29	Receiving positive feedback about the successfulness of your teaching abilities from students.	1	2	3	4	1	2	3	4
30	Receiving positive feedback about the successfulness of your teaching from your students' standardized test scores.	1	2	3	4	1	2	3	4
31	Stress-reduction because you learned ways to improve your teaching.	1	2	3	4	1	2	3	4
32	Self-satisfaction when teaching your students.	1	2	3	4	1	2	3	4
33	Frustration when teaching your students.	1	2	3	4	1	2	3	4
34	Hopelessness when teaching your students.	1	2	3	4	1	2	3	4

Table A.2 (continued)

35	Uncomfortable physical sensations (e.g. elevated blood pressure, sweats, increased heart rate) when teaching your students.	1	2	3	4	1	2	3	4
36	Pleasure when doing your job as a teacher.	1	2	3	4	1	2	3	4
37	Excitement when successfully reaching difficult students.	1	2	3	4	1	2	3	4
38	Success in teaching your most difficult students.	1	2	3	4	1	2	3	4
39	Watching other teachers successfully teach difficult students.	1	2	3	4	1	2	3	4
40	Success in teaching above average students.	1	2	3	4	1	2	3	4
41	Successfully communicating with parents about students' progress.	1	2	3	4	1	2	3	4
42	Successfully managing the daily demands of a teacher.	1	2	3	4	1	2	3	4
43	Attending workshops, inservices, video courses, etc. where you successfully demonstrated newly learned teaching-related tasks.	1	2	3	4	1	2	3	4
44	Observing other teachers successfully teaching.	1	2	3	4	1	2	3	4
45	Observing other teachers successfully teaching math.	1	2	3	4	1	2	3	4
46	Observing other teachers successfully teaching reading.	1	2	3	4	1	2	3	4
47	Successfully teaching math to my students.	1	2	3	4	1	2	3	4
48	Successfully teaching reading to my students.	1	2	3	4	1	2	3	4
49	Successfully teaching science to my students.	1	2	3	4	1	2	3	4
50	Observing other teachers successfully teaching science.	1	2	3	4	1	2	3	4

Table A.3: Teacher Self-Efficacy Beliefs Scale (TEBS-S)

Directions: This part of the survey requests that you make judgments about the **strength of your personal beliefs** in your abilities to successfully carry out teaching tasks in your school. In assessing the strengths of your personal beliefs about each task, consider your abilities within the context of your current school and classroom. Consider job roles and responsibilities, available resources and support, current policies, help from colleagues and so on. For each item, use the scale provided below and circle one of the corresponding numbers that best reflects the strength of your personal beliefs about your abilities to accomplish each teaching task.

STRENGTH OF BELIEFS SCALE:
1 = *Weak Beliefs* (WB) in my ability:
2 = *Somewhat Strong Beliefs* (SSB) in my ability:
3 = *Strong Beliefs* (SB) in my ability:
4 = *Very Strong Beliefs* (VSB) in my ability:

	Right now in my present teaching situation, the strength of my *personal beliefs* in my ability to . . .	**WB 1**	**SSB 2**	**SB 3**	**VSB 4**
1.	plan activities that accommodate the range of individual differences among my students...	1	2	3	4
2.	plan evaluation procedures that accommodate individual differences among my students...	1	2	3	4
3.	teach effectively...	1	2	3	4
4.	use allocated time for activities that maximize learning...	1	2	3	4
5.	effectively manage routines and procedures for learning tasks...	1	2	3	4
6.	clarify directions for learning routines...	1	2	3	4
7.	maintain high levels of student engagement in learning tasks...	1	2	3	4
8.	successfully teach all of my students...	1	2	3	4
9.	redirect students who are persistently off task...	1	2	3	4
10.	maintain a classroom climate of courtesy and respect...	1	2	3	4
11.	maintain a classroom climate that is fair and impartial...	1	2	3	4
12.	communicate to students the specific learning outcomes of the lesson...	1	2	3	4
13.	successfully teach reading to all of my students...	1	2	3	4
14.	communicate to students the purpose and/or importance of learning tasks..	1	2	3	4
15.	successfully maintain a positive classroom climate...	1	2	3	4
16.	successfully teach math to all of my students...	1	2	3	4
17.	implement teaching methods at an appropriate pace to accommodate differences among my students...	1	2	3	4
18.	utilize teaching aids and learning materials that accommodate individual differences among my students...	1	2	3	4
19.	provide students with opportunities to learn at more than one cognitive and/or performance level...	1	2	3	4
20.	communicate to students content knowledge that is accurate and logical...	1	2	3	4
21.	clarify student misunderstandings or difficulties in learning...	1	2	3	4
22.	provide students with specific feedback about their learning...	1	2	3	4
23.	provide students with suggestions for improving learning...	1	2	3	4
24.	actively involve students in developing concepts...	1	2	3	4

Table A.3 (continued)

25.	solicit a variety of questions throughout the lesson that enable higher order thinking...	1 2 3 4
26.	successfully teach math to my higher ability students...	1 2 3 4
27.	successfully teach reading to my higher ability students...	1 2 3 4
28.	actively involve my students in critical analysis and/or problem solving...	1 2 3 4
29.	monitor students' involvement during learning tasks...	1 2 3 4
30.	adjust teaching and learning activities as needed...	1 2 3 4
31.	successfully teach math to my average ability students...	1 2 3 4
32.	manage student discipline/behavior...	1 2 3 4
33.	successfully teach reading to my lower ability students...	1 2 3 4
34.	successfully teach math to my lower ability students...	1 2 3 4
35.	involve students in developing higher order thinking skills...	1 2 3 4
36.	motivate my students to perform to their fullest potential...	1 2 3 4
37.	provide a learning environment that accommodates students with special needs...	1 2 3 4
38.	improve the academic performance of my students, including those with learning abilities...	1 2 3 4
39.	provide a positive influence on the academic development of my students...	1 2 3 4
40.	maintain a classroom environment in which students work cooperatively...	1 2 3 4
41.	successfully teach reading to my average ability students...	1 2 3 4

Note: Items 38-41 were omitted from analyses.
Items 3, 8, 13, 16, 26, 27, 31, 33, 34 are added items.

Table A.4: Teacher Work-Group Collective Efficacy Beliefs Scale (TEBS-WG)

Directions: Before answering questions on this part of the survey, please think about a group of teachers in your school that you work with most (for example, grade-level curriculum planning groups, school improvement team, etc.). This survey requests that you make judgments about the **strength of your work- group's beliefs** in their abilities to successfully carry out work tasks. Assess the strengths of group members' beliefs, consider the group's "collective" abilities within the context of your ***current*** school. Consider job roles and responsibilities, available resources and support, current policies, help from colleagues and so on. Considering the work-group you work with most in your school, for each item, use the scale provided below and circle one of the corresponding numbers that best reflects your view.

STRENGTH OF WORK-GROUP BELIEFS SCALE:

1 = *Weak Beliefs* (WB) in our abilities:
2 = *Somewhat Strong Beliefs* (SSB) in our abilities:
3 = *Strong Beliefs* (SB) in our abilities:
4 = *Very Strong Beliefs* (VSB) in our abilities:

The strength of our WORK-GROUP'S *collective beliefs* in our abilities to . . .		**WB 1**	**SSB 2**	**SB 3**	**VSB 4**
1.	carry out decisions and plans designed for school wide improvement ...	1	2	3	4
2.	make instructional decisions ...	1	2	3	4
3.	create ways to improve the school environment ...	1	2	3	4
4.	maintain effective communication with parents...	1	2	3	4
5.	support each other in addressing new policies, rules, and regulations ...	1	2	3	4
6.	maintain a school environment in which students feel good about themselves ...	1	2	3	4
7.	provide input in making important school decisions ...	1	2	3	4
8.	produce high levels of learning in mathematics ...	1	2	3	4
9.	produce high levels of learning in reading ...	1	2	3	4
10.	communicate effectively with the school administration ...	1	2	3	4
11.	work with difficult students ...	1	2	3	4
12.	manage student misbehavior ...	1	2	3	4

Table A.5: Teacher Faculty Collective Efficacy Beliefs Scale (TEBS-F).

Directions: This part of the survey requests that you make judgments about the collective strength of beliefs of faculty members at your school in their capabilities to organize and successfully carry out work tasks. Assess the strength of faculty beliefs, consider the faculty's "collective" abilities within the context of your *current* school. Consider job roles and responsibilities, available resources and support, current policies, help from colleagues and so on. Considering the faculty in your school as a whole, for each item, use the scale provided below and circle one of the corresponding numbers that best reflects your view.

STRENGTH OF FACULTY COLLECTIVE BELIEFS SCALE:

1 = *Weak Beliefs* (WB) in our capabilities:
2 = *Somewhat Strong Beliefs* (SSB) in our capabilities:
3 = *Strong Beliefs* (SB) in our capabilities:
4 = *Very Strong Beliefs* (VSB) in our capabilities:

	The strength of our faculty's *collective beliefs* in our abilities to . . .	**WB 1**	**SSB 2**	**SB 3**	**VSB 4**
1.	carry out decisions and plans designed for school wide improvement ...	1	2	3	4
2.	produce high levels of learning with our students ...	1	2	3	4
3.	create ways to improve the school environment ...	1	2	3	4
4.	maintain effective communication with parents...	1	2	3	4
5.	support each other in addressing new policies, rules, and regulations ...	1	2	3	4
6.	maintain a school environment in which students feel good about themselves ...	1	2	3	4
7.	provide input in making important school decisions ...	1	2	3	4
8.	communicate effectively with the school administration ...	1	2	3	4
9.	work with difficult students ...	1	2	3	4
10.	produce high levels of achievement in reading with our students...	1	2	3	4
11.	produce high levels of achievement in mathematics with our students...	1	2	3	4
12.	manage student misbehavior ...	1	2	3	4

Table A.6: Open-ended Sources Questionnaire (OSQ)

1) What are some important things about your working and learning environment that enhance your belief in your ability to be successful as a teacher with your current students?
2) What are some important things about your working and learning environment that weaken your belief in your ability to be successful as a teacher with your current students?
3) What are some important things about your school's working and learning environment that enhance the beliefs of your school's faculty in their ability to be successful as a group in accomplishing their goals?
4) What are some important things about your school's working and learning environment that weaken the beliefs of your schools faculty in their ability to be successful in accomplishing the group's goals?

APPENDIX B: DESCRIPTIVE STATISTICAL TABLES

Table B.1: District Characteristics.

Characteristic		Statistic
Average Class Size		
(K-5 elementary classrooms)		
	District A[a]	52.8% with 1-20 students
		36.1% with 21-26 students
		11.0% with 27 or more students
	District B[b]	27.2 students/class on average
Student Population Served		
(K-5 Elementary populations only)		
	District A	8,451
	District B	167,327
Teachers with Advanced Degrees		
	District A	34.4%
	District B	43.2%
Teachers' Average Years of Experience		
	District A	unavailable
	District B	12.1 years
% Students on Free/Reduced Lunch		
	District A	44.0%
	District B	70.1%
Per Pupil Expenditures		
	District A	$4,752
	District B	$5,334

[a] Data from 1998-1999 school year.
[b] Data from 1999-2000 school year.

Table B.2: Demographic Characteristics by District of Participating Schools.

Characteristic	Mean	Standard Deviation
Class Size Average		
District A[a]	48.9% with 1-20 students	18.0%
	46.3% with 21-26 students	18.5%
	4.9% with ≥ 27 students	8.5%
District B[b]	24.9	3.7
Number of Students Served		
District A	468.0	75.3
District B	914.0	304.5
Teachers with Advanced Degrees		
District A	36.0%	10.6%
District B	44.2%	9.2%
Teachers Average Years Experience		
District A	unavailable	
District B	12.1 years	3.8 years

[a] (n=8)
[b] (n=36)

Table B.3: Sample Demographic Characteristics Overall and by District (n=431).

Characteristic	Frequency	Percent of Total
Gender		
Male	23	5.3
District A	1	1.5
District B	22	6.1
Female	393	91.4
District A	67	98.5
District B	326	90.1
Ethnicity		
Asian	3	0.7
District A	0	0.0
District B	3	0.7
Black	83	19.3
District A	3	4.4
District B	80	22.1
Hispanic	161	37.4
District A	0	0.0
District B	161	44.5
White	164	38.1
District A	64	94.1
District B	100	27.6
Other	13	3.0
District A	1	1.5
District B	12	3.3
Current Teaching Situation		
Self-contained regular education	333	77.4
District A	48	70.6
District B	285	78.7
Departmentalized	77	17.9
District A	18	26.5
District B	59	16.3
Special Education	3	0.7
District A	0	0.0
District B	3	0.8
Other	16	3.7
District A	2	2.9
District B	14	3.9
Primary Content Area		
All areas-elementary education	360	83.7
District A	53	77.9
District B	307	84.8

Table B.3 (continued)

Reading	26	6.0
District A	7	10.3
District B	19	5.2
Mathematics	13	3.0
District A	3	4.4
District B	10	2.8
Other	11	2.5
District A	2	3.0
District B	9	2.5
Native Language		
English	292	67.9
District A	67	98.5
District B	225	62.2
Spanish	122	28.4
District A	0	0.0
District B	122	33.7
Other	8	1.9
District A	0	0.0
District B	8	2.2
Highest Degree Completed		
Bachelor	203	47.2
District A	45	66.2
District B	158	43.6
Masters	157	36.5
District A	13	19.1
District B	144	39.8
Masters + 30 or Specialist	38	8.8
District A	5	7.4
District B	33	9.1
Doctorate	3	0.7
District A	0	0.0
District B	3	0.8
	Mean	Standard Deviation
Teacher report of % of Students in Class on Free/Reduced Lunch	64.6	31.3
District A (n=45)	47.3	22.3
District B (n=290)	67.2	31.7
Total years as a Professional Educator	15.0	10.6
District A (n=67)	15.5	9.1
District B (n=357)	14.9	11.0

Table B.3 (continued)

	Mean	Standard Deviation
Years at Current School	10.3	8.3
District A (n=68)	10.5	7.5
District B (n=360)	10.6	10.4
RAND Items Continuum	5.5	1.4
District A (n=68)	5.4	1.1
District B (n=352)	5.5	1.6

APPENDIX C: STATISTICAL TABLES FOR STUDY MEASURES

Table C.1: Principal Components Factor Analysis Results for All Items on the Teachers' Efficacy Beliefs System (TEBS).

Item	Initial Solution Extraction Communality	Rotated Factor Pattern and Structure Coefficients (Direct Oblimin, δ=0) Factor I Factor Pattern	Factor I Structure r_s	Factor II Factor Pattern	Factor II Structure r_s
SE1	.394	.671	.684	-.025	-.370
SE2	.374	.621	.652	-.060	-.379
SE3	.431	.767	.744	.045	-.349
SE4	.391	.624	.661	-.073	-.393
SE5	.385	.741	.710	.061	-.320
SE6	.316	.722	.665	.110	-.261
SE7	.410	.755	.729	.052	-.336
SE8	.448	.766	.751	.028	-.365
SE9	.435	.643	.691	-.094	-.424
SE10	.308	.650	.629	.039	-.294
SE11	.310	.581	.600	-.037	-.336
SE12	.381	.594	.643	-.096	-.401
SE13	.417	.722	.717	.009	-.362
SE14	.327	.695	.660	.069	-.288
SE15	.350	.670	.661	.018	-.327
SE16	.416	.690	.703	-.025	-.379
SE17	.492	.722	.752	-.058	-.429
SE18	.414	.666	.691	-.049	-.391
SE19	.412	.679	.696	-.033	-.382
SE20	.338	.674	.656	.034	-.312
SE21	.482	.714	.744	-.058	-.424
SE22	.350	.652	.653	-.002	-.337
SE23	.407	.675	.692	-.033	-.379
SE24	.422	.720	.719	.003	-.367
SE25	.396	.677	.688	-.020	-.368
SE26	.343	.713	.676	.072	-.294
SE27	.390	.689	.690	-.001	-.355
SE28	.442	.762	.747	.029	-.362
SE29	.349	.640	.647	-.014	-.343
SE30	.390	.646	.671	-.048	-.380
SE31	.459	.647	.704	-.111	-.443
SE32	.302	.622	.614	.016	-.303
SE33	.444	.725	.732	-.012	-.384
SE34	.454	.716	.732	-.031	-.399

Table C.1 (continued)

SE35	.414	.626	.674	-.092	-.414
SE36	.398	.737	.715	.043	-.335
SE37	.424	.635	.682	-.092	-.418
WG1	.431	.148	.472	-.629	-.706
WG2	.440	.141	.472	-.646	-.718
WG3	.512	.137	.503	-.713	-.783
WG4	.447	.183	.494	-.606	-.700
WG5	.389	.087	.424	-.657	-.701
WG6	.501	.092	.478	-.753	-.800
WG7	.486	.117	.483	-.712	-.772
WG8	.565	.275	.586	-.606	-.747
WG9	.516	.236	.548	-.608	-.730
WG10	.417	.000	.399	-.778	-.778
WG11	.533	.240	.557	-.619	-.742
WG12	.466	.159	.492	-.649	-.731
F1	.401	-.085	.354	-.855	-.812
F2	.483	-.057	.405	-.899	-.870
F3	.415	-.106	.352	-.892	-.837
F4	.420	-.030	.388	-.814	-.798
F5	.449	-.097	.372	-.913	-.863
F6	.452	-.063	.388	-.879	-.846
F7	.401	-.108	.344	-.881	-.825
F8	.367	-.147	.310	-.890	-.815
F9	.486	.000	.431	-.841	-.840
F10	.436	-.091	.369	-.895	-.848
F11	.485	.010	.435	-.829	-.834
F12	.464	-.017	.414	-.839	-.830
Eigenvalues		25.575		7.339	
% Variance Explained		41.926		12.130	
Correlation Between Factor I and Factor II			-.513		

Table C.2: Principal Components Factor Analysis Results for Collective Efficacy Items in the Teachers' Efficacy Beliefs System (TEBS).

	Initial Solution	Rotated Factor Pattern and Structure Coefficients (Direct Oblimin, δ=0)			
		Factor I		Factor II	
Item	Extraction Communality	Factor Pattern	Structure r_s	Factor Pattern	Structure r_s
WG1	.654	-.031	.585	.832	.808
WG2	.733	-.148	.564	.960	.850
WG3	.736	.033	.651	.833	.858
WG4	.571	.093	.601	.684	.753
WG5	.640	-.062	.565	.845	.799
WG6	.728	.103	.677	.774	.850
WG7	.641	.169	.664	.667	.792
WG8	.688	.058	.640	.786	.828
WG9	.675	.001	.610	.821	.822
WG10	.626	.273	.694	.567	.770
WG11	.698	-.023	.609	.852	.835
WG12	.650	.023	.609	.789	.806
F1	.717	.856	.847	-.012	.623
F2	.804	.906	.897	-.012	.660
F3	.765	.914	.874	-.055	.623
F4	.700	.835	.837	.002	.622
F5	.769	.819	.875	.076	.684
F6	.747	.821	.863	.057	.666
F7	.714	.808	.844	.049	.649
F8	.750	.909	.865	-.058	.616
F9	.752	.816	.866	.068	.673
F10	.776	.876	.881	.062	.656
F11	.743	.832	.862	.040	.657
F12	.740	.861	.860	-.002	.637
Eigenvalues		15.008		2.008	
% Variance Explained		62.532		8.365	
Correlation Between Factor I and Factor II		.742			

Table C.3: Item Means and Standard Deviations for the Teacher Self-Efficacy Beliefs Scale (TEBS-S) Before and After Mean Replacement of Missing Values.

	Complete Data Only (n=381)		Mean Replacement of Missing Data (n=410)	
Item	Mean	Standard Deviation	Mean	Standard Deviation
1	3.22	0.73	3.23	.72
2	3.14	0.77	3.15	.77
4	3.41	0.66	3.40	.68
5	3.50	0.63	3.50	.64
6	3.58	0.58	3.58	.57
7	3.46	0.63	3.47	.64
9	3.43	0.66	3.41	.66
10	3.66	0.54	3.65	.54
11	3.73	0.48	3.72	.49
12	3.54	0.56	3.54	.57
14	3.55	0.59	3.55	.58
15	3.69	0.52	3.68	.52
17	3.36	0.67	3.34	.69
18	3.41	0.68	3.40	.69
19	3.46	0.66	3.45	.68
20	3.62	0.53	3.62	.53
21	3.52	0.59	3.52	.58
22	3.53	0.59	3.54	.58
23	3.53	0.61	3.53	.61
24	3.38	0.70	3.36	.70
25	3.48	0.64	3.47	.65
28	3.43	0.66	3.42	.66
29	3.56	0.58	3.56	.58
30	3.58	0.56	3.56	.57
32	3.59	0.62	3.56	.65
35	3.44	0.63	3.44	.64
36	3.55	0.62	3.56	.61
37	3.33	0.71	3.31	.74

Table C.4: Item Means and Standard Deviations for the Teacher Work-Group Collective Efficacy Beliefs Scale (TEBS-WG) Before and After Mean Replacement of Missing Data.

	Before Mean Replacement (n=399)		After Mean Replacement (n=310)	
Item	Mean	Standard Deviation	Mean	Standard Deviation
1	3.18	0.79	3.19	0.79
2	3.27	0.78	3.27	0.79
3	3.09	0.85	3.08	0.85
4	3.35	0.71	3.35	0.71
5	3.30	0.78	3.32	0.78
6	3.39	0.73	3.38	0.74
7	3.03	0.89	3.02	0.90
8	3.26	0.76	3.25	0.76
9	3.31	0.75	3.32	0.74
10	3.24	0.83	3.23	0.82
11	3.18	0.81	3.16	0.82
12	3.26	0.78	3.27	0.77

Table C.5: Item Means and Standard Deviations for the Teacher Faculty Collective Efficacy Beliefs Scale (TEBS-F) Before and After Mean Replacement of Missing Data

	Before Mean Replacement N=399		After Mean Replacement N=410	
Item	Mean	Standard Deviation	Mean	Standard Deviation
1	3.20	0.80	3.20	0.79
2	3.24	0.77	3.24	0.76
3	3.19	0.79	3.20	0.78
4	3.30	0.72	3.29	0.71
5	3.22	0.79	3.22	0.78
6	3.36	0.72	3.35	0.71
7	3.02	0.89	3.01	0.89
8	3.15	0.84	3.13	0.85
9	3.14	0.77	3.12	0.78
10	3.27	0.75	3.26	0.75
11	3.27	0.75	3.27	0.74
12	3.20	0.76	3.18	0.76

Table C.6: Item inter-correlations for the Teacher Self-Efficacy Beliefs Scale (n=381)

Item	1	2	4	5	6	7	9	10	11	12	14	15	17	18	19
2	.796														
4	.488	.409													
5	.456	.371	.677												
6	.424	.415	.500	.598											
7	.471	.431	.508	.456	.532										
9	.428	.412	.502	.511	.488	.553									
10	.290	.306	.419	.428	.422	.537	.493								
11	.261	.235	.379	.416	.419	.477	.441	.732							
12	.383	.369	.464	.483	.448	.433	.417	.380	.499						
14	.448	.453	.407	.373	.423	.502	.444	.456	.403	.507					
15	.277	.268	.431	.457	.399	.500	.483	.647	.633	.458	.455				
17	.580	.569	.536	.517	.435	.496	.545	.428	.427	.434	.512	.452			
18	.523	.504	.434	.479	.437	.456	.447	.346	.324	.386	.433	.408	.677		
19	.405	.416	.420	.462	.489	.493	.468	.427	.427	.508	.501	.435	.562	.648	
20	.409	.372	.434	.453	.509	.441	.397	.444	.438	.428	.445	.462	.423	.492	.558
21	.420	.393	.452	.485	.514	.491	.511	.435	.443	.485	.512	.532	.514	.465	.585
22	.395	.378	.324	.382	.406	.425	.402	.308	.409	.488	.409	.399	.456	.432	.482
23	.437	.361	.329	.420	.337	.448	.404	.351	.418	.544	.449	.424	.462	.419	.474
24	.450	.433	.431	.418	.361	.535	.439	.368	.367	.447	.451	.446	.533	.474	.511
25	.397	.430	.443	.423	.462	.471	.423	.397	.403	.458	.548	.449	.452	.478	.550
28	.439	.470	.476	.508	.434	.435	.489	.381	365	.455	.459	.436	.520	.491	.507
29	.386	.381	.441	.462	.438	.422	.402	.307	.381	.461	.320	.423	.422	.380	.392
30	.453	.460	.422	.408	.357	.443	.389	.307	.379	.463	.406	.397	.538	.470	.447
32	.282	.264	.379	.499	.382	.410	.483	.490	.506	.428	.340	.513	.402	.291	.337
35	.391	.428	.451	.434	.354	.458	.445	.367	.388	.455	.454	.406	.449	.493	.502
36	.424	.431	.388	.428	.393	.485	.430	.501	.464	.405	.483	.511	.471	.470	.446
37	.565	.526	.459	.439	.407	.457	.457	.392	.289	.330	.503	.388	.587	.545	.442

Table C.6 (continued)

Item	20	21	22	23	24	25	28	29	30	32	35	36
21	.556											
22	.446	.638										
23	.370	.567	.730									
24	.421	.607	.506	.576								
25	.434	.546	.438	.446	.522							
28	.510	.514	.493	.465	.506	.589						
29	.459	.470	.495	.481	.460	.470	.536					
30	.421	.522	.476	.494	.499	.418	.461	.666				
32	.317	.423	.396	.475	.370	.334	.446	.484	.418			
35	.439	.497	.389	.400	.497	.678	.653	.526	.476	.414		
36	.331	.465	.394	.496	.528	.536	.503	.471	.505	.471	.589	
37	.392	.471	.449	.442	.467	.435	.484	.368	.471	.389	.488	.548

Table C.7: Inter-item Correlations for the Teacher Work-Group Collective Efficacy Beliefs Scale (n=399).

Item	1	2	3	4	5	6	7	8	9	10	11
2	.713										
3	.721	.737									
4	.602	.383	.650								
5	.616	.685	.644	.579							
6	.624	.661	.690	.677	.671						
7	.632	.658	.700	.534	.583	.660					
8	.606	.612	.646	.585	.578	.638	.621				
9	.582	.626	.618	.568	.610	.658	.599	.830			
10	.581	.608	.642	.527	.575	.640	.649	.597	.614		
11	.607	.622	.671	.560	.599	.678	.621	.687	.665	.636	
12	.538	.616	.612	.587	.575	.681	.567	.617	.602	.636	.792

Table C.8: Inter-item correlations for the Teacher Faculty Collective Efficacy Beliefs Scale (n=399).

Item	1	2	3	4	5	6	7	8	9	10	11
2	.763										
3	.774	.815									
4	.674	.751	.716								
5	.749	.734	.743	.727							
6	.676	.763	.750	.757	.776						
7	.728	.671	.726	.653	.740	.664					
8	.703	.717	.716	.678	.755	.714	.817				
9	.684	.739	.706	.681	.719	.726	.756	.730			
10	.692	.800	.712	.679	.753	.706	.693	.735	.737		
11	.658	.791	.698	.668	.727	.691	.677	.702	.735	.929	
12	.652	.763	.725	.712	.715	.751	.657	.718	.790	.740	.735

Table C.9: Item Means and Standard Deviations Before and After Mean Replacement for the OCCUR Scale of the SOURCES.

Item	Complete Data Only (n=315)		After Mean Replacement (n=410)	
	M	SD	M	SD
1	2.87	.35	2.87	.37
2	2.58	.61	2.59	.62
3	2.85	.40	2.85	.42
4	2.19	.68	2.19	.70
5	2.62	.52	2.60	.54
6	2.43	.62	2.42	.64
7	1.77	.84	1.78	.85
8	2.63	.63	2.61	.65
9	2.64	.58	2.63	.57
10	2.08	.93	2.07	.92
11	1.65	.90	1.61	.91
12	2.71	.56	2.71	.58
13	2.32	.71	2.31	.72
14	1.90	.89	1.91	.88
15	2.10	.74	2.09	.75
16	2.35	.68	2.32	.70
17	2.29	.76	2.28	.77
18	1.85	.86	1.88	.86
19	1.84	.85	1.84	.85
20	2.08	.80	2.10	.80
21	2.64	.57	2.66	.56
22	2.22	.74	2.20	.75
23	2.11	.85	2.11	.84
24	1.57	.92	1.53	.92
25	1.15	.99	1.11	.98
26	.50	.76	.47	.73
27	2.18	.86	2.18	.83
28	2.27	.73	2.29	.72
29	2.40	.76	2.40	.76
30	2.12	.87	2.13	.85
31	1.92	.85	1.92	.86
32	2.69	.51	2.69	.52
33	1.77	.78	1.76	.76
34	1.04	.94	1.00	.89
35	.79	.90	.77	.88
36	2.66	.59	2.67	.58
37	2.58	.62	2.59	.60
38	2.31	.63	2.32	.64

Table C.9 (continued)

Item	M	SD	M	SD
39	1.70	.93	1.66	.94
40	2.52	.72	2.50	.73
41	2.62	.56	2.59	.59
42	2.60	.63	2.58	.64
43	1.93	.91	1.92	.90
44	1.51	.98	1.48	.98
45	1.32	1.00	1.29	1.00
46	1.41	.98	1.40	.99
47	2.62	.67	2.58	.71
48	2.60	.67	2.60	.68
49	2.48	.75	2.45	.78
50	1.25	1.01	1.21	1.00

Table C.10: Item Means and Standard Deviations Before and After Mean Replacement for the Influence Scale of the SOURCES.

Item	Complete Data Only (n=280)		After Mean Replacement (n=410)	
	M	SD	M	SD
1	2.60	.64	2.60	.62
2	2.32	.76	2.30	.76
3	2.57	.63	2.56	.65
4	1.80	.88	1.81	.87
5	2.34	.68	2.32	.69
6	2.23	.78	2.21	.76
7	1.84	.88	1.85	.84
8	2.41	.69	2.41	.68
9	2.20	.80	2.22	.77
10	2.03	.89	2.05	.88
11	1.67	.97	1.67	.96
12	2.42	.76	2.45	.73
13	2.26	.75	2.27	.74
14	1.89	.93	1.91	.91
15	2.09	.83	2.08	.80
16	2.25	.80	2.26	.78
17	2.21	.82	2.23	.79
18	1.75	.87	1.76	.89
19	1.71	.88	1.71	.89
20	1.74	.93	1.76	.89
21	2.42	.70	2.44	.67
22	2.26	.79	2.26	.78
23	2.33	.82	2.34	.81
24	1.92	.99	1.92	.98
25	1.58	1.13	1.56	1.10
26	1.36	1.22	1.34	1.20
27	2.40	.83	2.37	.82
28	2.37	.71	2.37	.68
29	2.60	.63	2.60	.63
30	2.17	.87	2.18	.84
31	2.18	.90	2.16	.89
32	2.68	.54	2.69	.53
33	1.74	.95	1.74	.95
34	1.32	1.09	1.31	1.09
35	1.19	1.15	1.16	1.12
36	2.66	.62	2.65	.63
37	2.71	.57	2.43	.70
38	2.61	.62	2.41	.73

Table C.10 (continued)

Item	M	SD	M	SD
39	1.99	.90	2.49	.67
40	2.45	.69	2.02	.94
41	2.41	.73	1.88	.94
42	2.51	.63	1.74	1.00
43	2.05	.95	1.88	.95
44	1.93	.91	2.51	.71
45	1.79	.99	2.57	.66
46	1.92	.94	2.41	.76
47	2.51	.72	1.68	1.02
48	2.53	.71	2.70	.55
49	2.40	.76	2.60	.62
50	1.76	1.02	1.95	.94

VITA

Amy Marie Barrilleaux Dellinger is the daughter of Julien and Julia Barrilleaux, is married to James Michael Dellinger and has two children, Jules Victor and Alyeska Patricia. She began teaching mathematics in 1985 after receiving her bachelor of science degree from the University of New Orleans. Six years later, Ms. Dellinger completed the master of applied statistics program at Louisiana State University. Amy Dellinger has been a teacher at the secondary and post-secondary levels. She has taught at the university level for approximately seven years at this writing, and has worked as a research methods and statistics consultant during the last nine years. She will receive the degree of Doctor of Philosophy at the August 2001 commencement.

DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Amy Marie Barrilleaux Dellinger

Major Field: Educational Leadership and Research

Title of Dissertation: A Study of the Measurement and Sources of Teachers' Self and Collective Efficacy Beliefs in Professional Learning Environments

Approved:

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

Date of Examination:

09 May 2001