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Meta-Analysis of the Relationship Between Collective Teacher Efficacy and Student Achievement

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META-ANALYSIS OF THE RELATIONSHIP BETWEEN

COLLECTIVE TEACHER EFFICACY AND STUDENT ACHIEVEMENT

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been hijacked. As Lucy might put it: Cheers to my little family, who sits in chairs in my heart forever.

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ABSTRACT

Collective teacher efficacy is an emergent school level variable reflecting a faculty's collective belief in its ability to positively affect students. It has been linked in the literature to school achievement. This meta-analysis systematically synthesized results from 26 component studies, including dissertations and published articles, which reported at least one correlation between collective teacher efficacy and school achievement.

The research questions addressed the distribution of effect sizes for the relationship and the moderator variables that could explain any variance found among the studies. It was hypothesized that collective teacher efficacy would be strongly associated with subsequent student achievement, and that certain moderator variables would be able to explain differences among studies.

The various meta-analyses conducted yielded weighted average effect sizes ranging from 0.537 to 0.628. Collective teacher efficacy was found to be strongly and positively correlated with student achievement. This held true for all subject areas measured, and regardless of timing of measurement. Moderator analysis revealed that both university affiliation and instrument used to measure collective efficacy were able to explain the variance found among studies.

This research has implications for schools, teacher education programs, and education policy. Using social-cognitive theory as a framework, this study highlights the importance of teachers' beliefs about their collective ability. Having a faculty that believes that it can accomplish great things is vital for the health of a school. Because of the dynamic nature of school functioning, wherein school achievement acts as both antecedent and consequence of collective teacher efficacy, interventions designed to improve the efficacy beliefs of teachers and a faculty as a whole can be a starting point for positive change within the school system.

CHAPTER 1

INTRODUCTION

This chapter first describes school functioning from a social cognitive

perspective, so that the topic of collective teacher efficacy and its connection to

student achievement can be introduced in context. It then states the problem that

prompted this study and explains how the current literature has not yet addressed

this problem. The final section of this chapter details how this study fills that gap in

the research, and is followed by a section that provides defintions of key terms.

Imagine two different schools. One has a faculty that feels that, as a group,

they are able to accomplish great things for their students: They have the resources

available, they have experienced success in the past, they feel valued and supported

by their adminstration, and they hold high expectations for the success of their

students. Having been recognized as an excellent school by governing bodies, they

continued to be well-funded. The other school has had their funding cut because of

consistently low performance on standardized testing, they lack necessary

resources, they feel no connection to decisions-makers, they experience high rates

of teacher burnout and turnover, and they feel unsupported by the school families.

These teachers may hold lower expectations of student success, and they might not

feel that they can make a difference because the odds are stacked against them. The

first school may continue to promote high achievement and successful outcomes,
while the faculty of the second school may find itself trapped, knowing that things
need to improve, but feeling that they cannot do much to make those improvements.
Many schools will fall somewhere in between these two extremes, working to
determine what they can and cannot control, and estimating their potential for
success.

Since the federal government, under George W. Bush, enacted the No Child
Left Behind Act of 2001, there has been increased emphasis on school accountability
and student achievement. Formalized methods have been developed to provide
feedback to schools about their relative success or failure. Under Barack Obama, the
administration is continuing this emphasis on teacher accountability, in the hopes
that schools in the United States will be filled with good teachers who are capable of
producing positive outcomes for students. Of education, WhiteHouse.gov states,
"Teachers are the single most important resource to a child's learning. President
Obama will ensure that teachers are supported as professionals in the classroom,
while also holding them more accountable. He will invest in innovative strategies to
help teachers to improve student outcomes, and use rewards and incentives to keep
talented teachers in the schools that need them the most" (whitehouse.gov, n.d,
Reform and Invest in K-12 Education section, para. 2).

As the United States seeks to define what is essential to the health and
success of our schools, a host of variables must be examined: student level variables,

such as demographics and motivation; teacher level variables, such as certification and teaching skills; and school level variables, such as administrative support, and availablity of resources. Certain factors, such as school location and student demographics, will be beyond the control of school personnel, while others could potentially be modified, like leadership style or teacher training. To illustrate the relationships among these variables, Bandura's model of triadic reciprocal determinism (1986) can be employed to descibe school functioning.

Triadic Reciprocal Determinism and School Functioning

Bandura (1986) described how personal factors, behavior, and environmental forces influence each other bidirectionally, all acting as co-determinants of human functioning. When this model is adapted to describe how schools operate (Figure 1.), environmental forces are those that are external to the school, and not easily controllable by school bodies, including school location, community demographics, government control, and/or availability of resources. At the school level, personal factors are forces internal to the organization. This includes organizational components such as school structure, climate, and social norms, as well as individual and collective beliefs and attitudes of students, teachers, and other school personnel. Finally, behavior at the school level is what the school does: how teachers communicate expectations, teach, and collaborate; how those in leadership interact with teachers and students; and how students respond to education, what expectations they hold, how they act, and what they

learn. All of these forces reciprocally act on each other to create a complex system of causation. Improving school functioning involves determining what elements within the system can be modified to trigger the most beneficial changes.

Figure 1. Triadic reciprocal determinism, as it applies to school functioning. Adapted from Bandura (1986).

BEHAVIOR
What a school does: expectations and behaviors of teachers, students, administration, staff

PERSONAL
Inside forces: structure, climate, norms, beliefs, attitudes, and efficacy at individual and collective levels

School Functioning

ENVIRONMENTAL
External forces: Community, demographics, government oversight, available resources
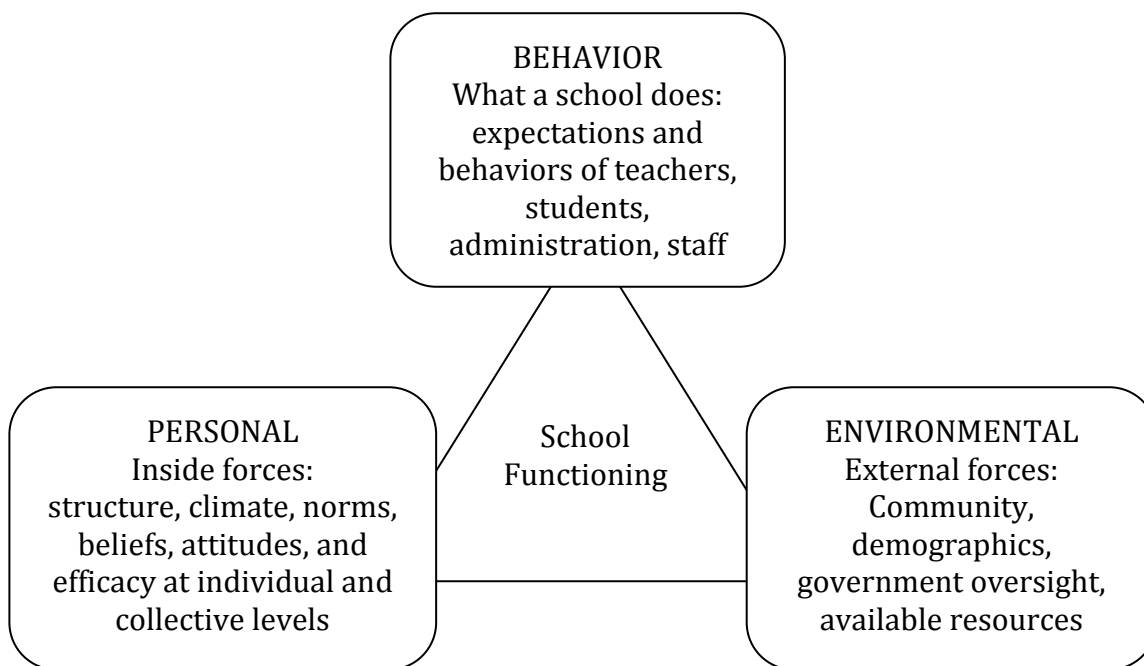
Efficacy in Schools

One challenge faced by struggling schools involves discovering ways to empower teachers so that they can determine what changes can be made within their particular context without becoming pessimistic about the limitations facing them. As teachers in a school feel empowered to do great things, great things

happen. If they feel powerless, and believe they cannot surmount the obstacles in front of them, they will be less likely to persist when challenged, and will not expend as much effort (Bandura, 1977, 1997, 1998, 2000; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998).

The efficacy beliefs of teachers can be categorized two ways. Individual teacher efficacy is a belief about one's own ability to promote positive change for students (Tschannen-Moran et al., 1998), while collective teacher efficacy is a group variable that reflects beliefs of a particular group of teachers about their collective ability to promote successful student outcomes within their school (Goddard, Hoy, & Woolfolk Hoy, 2000). Efficacy involves more than positive thinking or optimism. It is tied to the construct of agency (the ability to make things happen) and to action (Bandura, 1982, 1998, 2001). Efficacy develops as a person, or a group, experiences success, success is modeled, and/or encouragment and feedback are provided (Bandura, 1977, 1997). Highly efficacious teams or individuals will feel optimistic about success because they feel that they have the abilties needed to create that success. This engenders positive thinking, as limitations are seen as challenges rather than roadblocks, and the power of uncontrollable circumstances is weighed against that which can be controlled (Bandura, 2001).

Level of Analysis

This research examines the connection between collective teacher efficacy and student achievement. Because school functioning is complex and reciprocal, it is

not assumed that a direct and exclusive path can be drawn between the two variables. Instead, organizational variables such as school climate, school norms, and collective teacher efficacy set the stage for teacher functioning (efficacy beliefs, attitudes, expectations, and the resulting behavior) at the individual level. Those teacher variables affect individual student efficacy, attitudes, expectations, behavior, and ultimately learning, which then is measured as a part of the school's achievement. "The sense of collective efficacy in a school can affect teachers' self-referent thoughts and, hence, their teaching performance and student learning" (Goddard, Hoy, & Woolfolk Hoy, 2004, p. 8).

In organizations such as schools, the individual executes the work of the collective, so collective teacher efficacy results in diffential teacher behavior, just as school wide achievement is calculated by measuring the learning of individual students. This moving from group to individual level and back again presents a statistical challenge for researchers, as it becomes difficult to measure relationships across levels. For that reason, most current studies addressing the relationship between teacher efficacy and student achievement do so at the group level, measuring collective teacher efficacy and school achievement.

Problem Statement

Research on the connection between collective teacher efficacy (CTE) and student achievement began with Bandura's (1993) article linking CTE, achievement and socio-economic status (SES), and continued, with a bulk of published research

coming out of Ohio State University in the last twelve years. Much of the research is moving on and considering new constructs, taking the CTE-achievement link as a given. While the construct of collective teacher efficacy has been explored in the literature during the last two decades, knowledge about the relationship may be limited because the number of published studies is relatively small, and many have used samples from the same geographic area. Additionally, comparison of results is not always straightforward for three reasons: some early studies employed multi-level analysis instead of the more frequently used group level analysis; a variety of statistical analyses have been used; and collective teacher efficacy has been measured in multiple ways.

Systematically synthesizing results from numerous studies, meta-analysis has been used to examine social-cognitive career theory (Brown et al., 2008; Sheu et al., 2010), self-efficacy and work-related performance (Stajkovic & Luthans, 1998), self-efficacy and academic outcomes (Multon, Brown, & Lent, 1991), teacher efficacy (Shahid & Thompson, 2001) and the measurement of teacher efficacy (Henson, Kogan, & Vacha-Haase, 2001). Gully, Incalcaterra, Joshi, & Beaubien (2002) used meta-analysis to examine the relationship between collective efficacy in the workplace (called team-efficacy by the authors) and its relationship with team performance, but no study to date has used meta-analysis to investigate the connection between collective teacher efficacy and achievement.

Research Questions

This study fills this gap in the literature by analyzing results from research concerned with the relationship between collective teacher efficacy and student achievement. Meta-analysis was used to synthesize various studies, producing a big picture of the relationship. The existing published research was limited and somewhat localized, but meta-analysis offered a way to broaden the search, examining all available studies (published and unpublished) at once, so that an overall effect size could be calculated, and potential moderators could be teased out. This meta-analysis addressed the following questions:

1. What is the distribution of the effect sizes measuring the relationship between collective teacher efficacy and student achievement in the literature?

2. How do the effect sizes of this relationship vary based on certain moderator variables, such as school level, school location, type of study, instruments used, or the researchers involved?

Hypotheses

The hypotheses for this study were derived from a review of the current literature.

1. Collective teacher efficacy (CTE) will be strongly associated with student achievement: The beliefs that teachers hold about the ability of the school as

a whole to promote positive outcomes will be predictive of positive learning outcomes for their students.

2. Between studies variance will be explained by moderator variables, including school level, location of study, type of study, university affiliation, and instrument used to measure collective teacher efficacy.

Conclusion

This research synthesized all available and relevent studies to reveal an effect size quantifying the correlation between CTE and student achievement, while considering other variables that might moderate individual results.

Definitions of Terms

<u>Social Cognitive Theory</u> is "a view of human functioning that accords a central role to cognitive, vicarious, self-regulatory, and self-reflective processes in human adaptation and change. People are viewed as self-organizing, proactive, self-reflecting and self-regulating rather than as reactive organisms shaped and shepherded by environmental forces or driven by concealed inner impulses" (Pajeres, 2002, para. 2).

<u>Triadic Reciprocal Determinism</u> is a "transactional view of self and society [in which] internal personal factors in the form of cognitive, affective, and biological events; behavior; and environmental events all operate as interacting determinants that influence one another bidirectionally" (Bandura, 1997, p. 6).

<u>Human Agency</u> refers to the human capability to act intentionally, controlling personal behavior and external environment. "To be an agent is to intentionally make things happen by one's actions" (Bandura, 2001, p. 2).

<u>Self-efficacy</u> "refers to beliefs in one's capabilties to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p.3).

<u>Teacher Efficacy</u> refers to "the extent to which teachers believe that they have the capacity to affect student performance" (Ashton, Webb, & Doda, 1983, p. 9).

<u>Collective Efficacy</u> refers to "a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainment" (Bandura, 1997, p. 477).

<u>Collective Teacher Efficacy</u> is an emergent group level property referring to "the perceptions of teachers in a school that the faculty as a whole will have a positive effect on the students" (Goddard, Hoy, & Woolfolk Hoy, 2000).

CHAPTER 2

LITERATURE REVIEW

This chapter describes the theoretical background of collective efficacy,

tracing the history of its development, so that the reader understands how this

current study fits into the literature. As can be seen from Figure 2, collective teacher

efficacy has its roots primarily in social cognitive theory, with influences from social

learning theory, specifically locus of control. This meta-analysis synthesizes the

available research; the predominant theoretical framework employed in that

research is social cognitive theory, so this literature review uses the same.

First, social cognitive theory is introduced, and the concepts of triadic

reciprocal causation and agency are highlighted. The next section details self-

efficacy, one of the principle components of social cognitive theory. The explanation

of how efficacy develops and what impact it has prepares the reader for the

following section, in which one specific type of efficacy, teacher efficacy, is

examined. This third section discusses the development, measurement, and study of

teacher efficacy, providing a description of how it is currently understood. In section

four, concepts of efficacy in schools are explored at the organizational level, and

collective teacher efficacy (CTE) is defined in light of what was learned in the

previous sections. This section explores how CTE is conceptualized, measured, and

Figure 2. Heritage of the collective teacher efficacy construct.
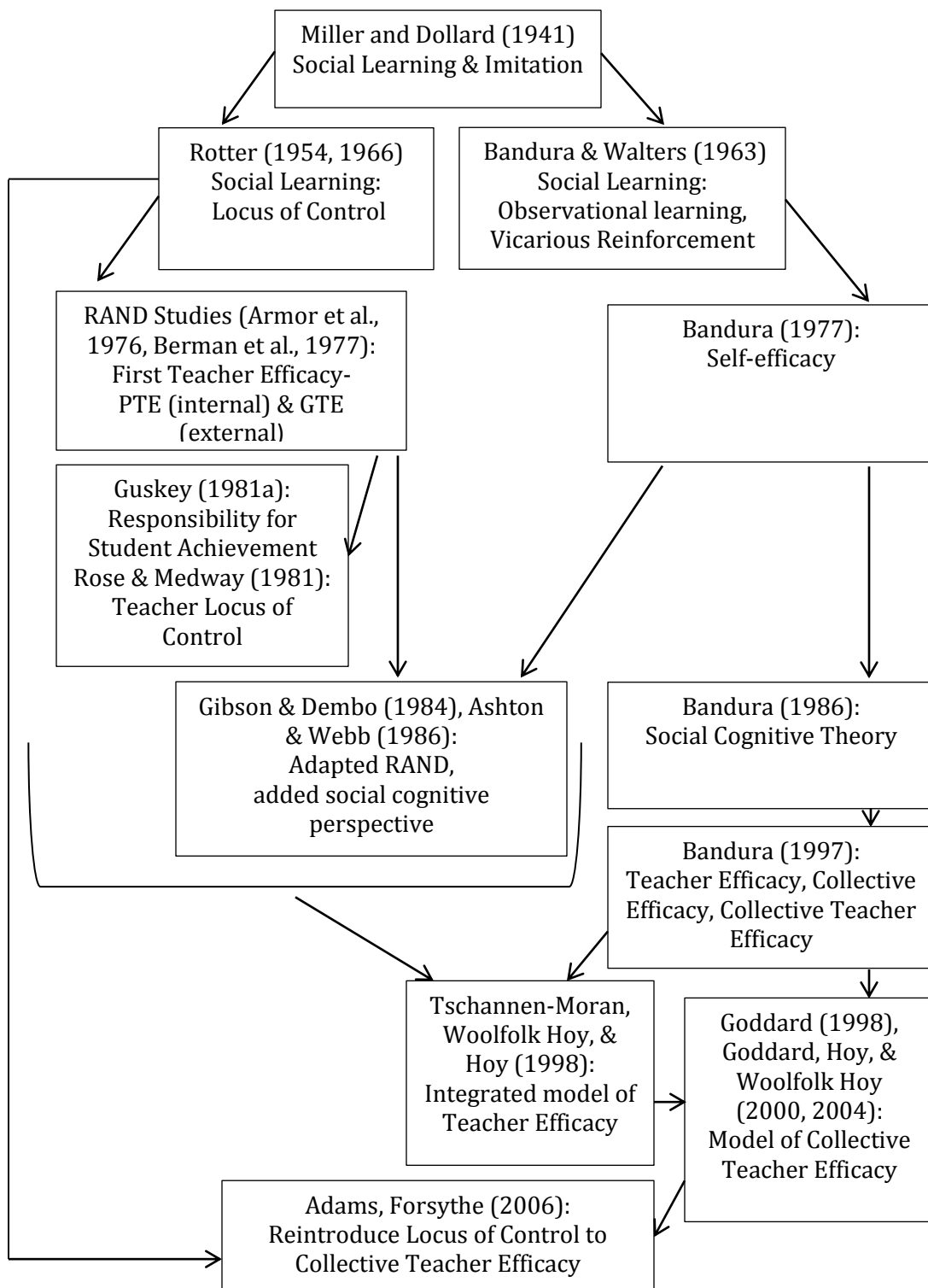
studied, as well as how it develops and what affect it has on school functioning, specifically, student achievement. The chapter concludes with a rationale for the current study, discussing how this research addresses what is currently missing from the literature.

Social-Cognitive Theory

Beginning with Miller and Dollard (1941), social learning theorists questioned the adequacy of behaviorist and psychoanalytical theories when explaining complex and imitative behaviors. Julian Rotter's (1954) social learning theory focused on expectancies: People behave as they do because of expectations about possible future consequences. Rotter's notion of locus of control (1966) delineates those things that are under a person's control and those that are externally controlled, positing that a person's motivation for behavior depends quite a bit on that person's perception of outcome controllability. Albert Bandura and Richard Walter (1963) presented a conception of social learning theory that highlighted social, self-regulatory, and vicarious influences on behavior. Bandura added the key component of self-beliefs to his theory with his study about self-efficacy (1977), beginning the shift away from social learning theory to his next iteration, social cognitive theory.

Social cognitive theory, as detailed in Bandura's Social Foundations of Thought and Action (1986), describes the human experience as one of action, forethought, intentionality, and choice. The complexities of human functioning

cannot be sufficiently explained by the influence of external forces (such as reinforcers or punishers), internal drives (such as libido) or biological factors (how the human brain and body have evolved). The emergence of social cognitive theory brought attention to the influence of observational learning, vicarious experience, and self-beliefs on human behavior. Central to this theory is the idea that human functioning is the product of multiple influences that interact dynamically (Pajares, 2002).

<div align="center">Triadic Reciprocal Causation</div>

Bandura's model of the determinants of human functioning is one of triadic reciprocal causation. Personal factors, behavior, and environmental forces bidirectionally influence each other (Bandura, 1986). Personal factors include cognitive, affective and biological information. Everyone carries beliefs and emotions about their own abilities and functioning, as well as ideas about the importance or likelihood of any particular outcome in a situation. People also possess personal physical assets and limitations. Behavior refers to a person's actions and choices, and environmental influences are those events and forces outside of a person. Each of these three components shape and are shaped by the others. A person's beliefs about a specific ability (personal) will be shaped by previous experience (behavior) and feedback about performance (environmental), and in turn, will influence what behaviors will be attempted in the future, as well as what environments will be selected. Consider the following illustration: I have

never been downhill skiing. This is partly because I've always doubted my ability to

ski, so I've not been motivated to try. If I were to attempt this sport, I may discover

that this skill is attainable, and I might be reinforced by praise and encouragement

from those around me, prompting me to return to the mountain and try again, and

altering my beliefs about my abilities and the outcomes of my actions. The choices

we make, and the people we become are determined by the interactions among our

beliefs and attitudes, our actions and experiences, and the information that we

receive from those around us. Triadic reciprocal causation describes human

functionality that is dynamic and active, which leads to another central concept in

social cognitive theory: agency.

<div align="center">Agency</div>

Agency is the capacity to act and effect change. "To be an agent is to

intentionally make things happen by one's actions" (Bandura, 2001, p. 2). Whereas

behaviorist theories focus on responses to external stimuli, and theories from

evolutionary psychology offer adaptive and genetic explanations of behavior,

Bandura emphasizes the importance of introspection and an active, conscious mind

in the decision to act. Agency involves the ability to act differently than

environmental influences or enticing situations would dictate. It removes the

inevitability of action, and allows freedom to choose one's actions (Bandura, 1997).

The main features of agency are intentionality, forethought, self-regulation, and self-

reflectiveness.

Agency involves intentionality. Making something happen accidentally is not agency because it involves no intention. Likewise, an intentional act can have unforeseen consequences, but that does not negate the agency. Intentions precede acts, and are mental representations of and commitment to courses of action (Bandura, 2001). This is also related to forethought. Planning for outcomes that are temporally distant serves to direct action. Foresightful behavior "enables people to transcend the dictates of their immediate environment and to shape and regulate the present to fit a desired future" (p. 7).

Once the plans have been made, the agent is one who is able to sustain motivation and efforts to accomplish the task in question. Self-regulation-monitoring progress, shifting course, and correcting performance- is central to agency (Bandura, 1986), as is self-reflectiveness, which involves the ability to examine the adequacy of one's own functioning. This metacognitive process allows one to judge how one's thinking and behavior are related to the outcomes produced, comparing personal performance to that of others, and considering what others believe. In this process, one forms efficacy beliefs, which will be discussed in the following section.

There are three distinct modes of human agency: personal, proxy, and collective. Personal agency refers to acts that a person does intentionally. People cede personal control for responsibilities to proxy agency when they believe that another person has better ability, or if the task at hand seems particularly difficult

or onerous and they don't want the responsibility. When responsibility is shared

with others, in the belief that, as a group, they can make desired progress toward a

common goal, collective agency emerges (Bandura, 2001).

Agency reflects personal power over outcome. The focus of this literature

review will now narrow to examine more closely how the personal factors within

the model of triadic reciprocal causation, specifically cognitive features, exert

influence on human functioning (Figure 3). The cognitive component is comprised

of "personal aspirations, outcome expectancies, perceived opportunity structures

and constraints, and conceptions of personal efficacy" (Bandura, 1997, p. 10). Self-

efficacy involves cognitions about agency, ability, and success, and is the focus of the

next section.

<div align="center">**Self- Efficacy**</div>

"Perceived self-efficacy refers to beliefs in one's capabilities to organize and

execute the courses of action required to produce given attainments" (Bandura,

1997, p.3). It is one's estimation of the potential for success, and since the

introduction of the concept, it has become a powerful way to explain differences in

human performance.

In 1977, Albert Bandura wrote an article placing self-efficacy at the center of

a theoretical framework for analyzing behavior change, and asserting its importance

in human functioning. The article was written from a clinical perspective, with

Figure 3. Triadic Reciprocal Determinism, with further description of the cognitive component of the personal factors. Adapted from Bandura (1986).

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                        ┌──────────────┐
                        │   Behavior   │
                        └──────────────┘
                          ↗          ↖
           ┌──────────────┐      ┌──────────────┐
           │  Personal    │◄────►│ Environmental│
           │  Factors     │      │   Factors    │
           └──────────────┘      └──────────────┘
          ┌──────┴──────┬───────────┐
   ┌───────────┐ ┌─────────┐ ┌────────────┐
   │ Cognition │ │ Affect  │ │ Biological │
   │           │ │         │ │   Events   │
   └───────────┘ └─────────┘ └────────────┘
```

Capabilities:

- Symbolization, forethought, vicarious learning, self-regulation, self-reflection
- Knowledge/skills learned

Motivation

Beliefs:

- Personal aspirations, outcome expectancies, perceived opportunity structures and constraints, and conceptions of **PERSONAL EFFICACY** (Bandura, 1997, p10)
- beliefs about ability in general, beliefs about agency

beliefs and behavior having been studied in the treatment of defensive and/or dysfunctional behavior. Self-efficacy was presented as a common cognitive mechanism activated in both cognitive-based and performance-based modes of treatment. This common mechanism could account for learning and change that can happen even in the absence of successful performance, and also explain how mastery of a task is the most powerful way to effect psychological change. Either form of treatment, Bandura said, changes a person's self-efficacy, and, assuming that a person has the skills needed and the right incentives, "efficacy expectations are a major determinant of people's choice of activities, how much effort they will expend, and of how long they will sustain effort in dealing with stressful situations" (Bandura, 1977, p. 194).

Since the writing of that article, self-efficacy became a central tenet of social cognitive theory, addressing nearly all aspects of human functioning (Pajares, 2002). Within the model of triadic reciprocal determinism, personal factors are afforded as much influence on human functioning as environmental influences and behavior, so one's personal beliefs about ability and power to effect change have an impact on every behavior choice a person makes. "Efficacy beliefs are the foundation of human agency" (Bandura, 2001, p.10). Without the belief that we exert control over our circumstances, there is no agency, and therefore, no power to act. Our self-efficacy beliefs provide the lens through which we view our options and ultimately choose to act, even if our choices appear to be out of concert with external reality. "People's

level of motivation, affective states, and actions are based more on what they believe than on what is objectively true" (Bandura, 1997, p.2). Humans are not bound solely to environmental control of behavior; rather a person's active, purposeful cognitions interact with environmental stimuli to influence behavior. The behaviorist would say that external reinforcement of a certain behavior leads to increased frequency of that behavior. Bandura posited that reinforcement is a motivational device, and it works because of a person's beliefs about reinforcement (1977). Self-efficacy beliefs are part of the human element in the control and direction of behavior.

<div align="center">Dimensions</div>

Efficacy expectations can vary according to magnitude, generality and strength, and, instead of being considered a global personality trait, self-efficacy is specific to ability and situation (Bandura, 1977, 1986, 1997). This means that a person will feel differing levels of efficacy for different situations, and those efficacy beliefs can vary depending on the context and the goal. Some teachers feel perfectly at ease speaking in front of groups of children, but their efficacy for public speaking decreases when addressing adults. Although public speaking efficacy might generalize somewhat between contexts, there are changes in magnitude (which refers to task difficulty) and strength (referring to persistence) (Bandura, 1977). A high school social studies teacher may feel the greatest efficacy for teaching history to sophomores, less so for teaching economics to juniors, and no efficacy at all for teaching calculus to seniors. Likewise, a person might feel a general sense of efficacy

for teaching (I am good at helping people learn and understand) that may not relate

to all subject areas (I am able to teach kids algebra, but I'm not as confident that I

could teach grammar) or grade levels (I can teach middle schoolers, but I don't think

I would be as effective with second graders). General versus specific efficacy for

teaching will be discussed again later.

<div align="center">Distinctions among Similar Concepts</div>

This section will explore how efficacy differs from other similar ideas. The

first part looks at self-referential variables (self-concept, self-esteem), the second

deals with issues of outcome and control (expectancies, locus of control, and learned

helplessness), and the final part addresses self-regulation.

Self-referential Variables

Self-efficacy differs from self-concept and self-esteem in its specificity and

predictive ability (Bandura, 1997). As these three variables appear to be similar, it

is important to illustrate how self-efficacy is conceptually distinct.

Self-efficacy beliefs are formed by asking questions about what a person can

or cannot do, while self-concept beliefs come from answering questions about being

(Who am I?) or feeling (How do I feel about myself as…?) (Pajares & Schunk, 2001).

Self-concept is global, a composite view of the self, and is less predictive of behavior

than self-efficacy, which varies according to domain and circumstances (Bandura,

1997).

Self-efficacy reflects beliefs about capability, while self-esteem reflects beliefs about self-worth. Sometimes these beliefs appear in concert with one another, as people develop skills in areas that make them feel good about themselves, and a job well done can raise self-esteem. However, they need not exist simultaneously. A person can feel inefficacious in a certain domain without any damage to self-esteem, and on the other hand, another person may believe in their ability to do something exceptionally well, even while believing himself/herself worthless. (Bandura, 1997). "People need much more than high self-esteem to do well in given pursuits…People need firm confidence in their efficacy to mount and sustain the effort required to succeed" (Bandura, 1997, p 11). Recent studies have echoed this idea: Jean Twenge (2006) points to a generation of students whose self-esteem has been artificially inflated after decades of self-esteem initiatives in schools. Those initiatives aimed to raise achievement by raising esteem, instead of building efficacy through authentic opportunities to be successful.

Outcome Expectations

When considering a task at hand, two types of expectations will influence behavior choice. Efficacy expectations reflect levels of certainty in one's ability to execute specific behaviors. Outcome expectations reflect what one believes will occur because of behavior, and they come in three major forms, each being either positive or negative: physical effects, social effects, and one's own reaction to and evaluation of personal behavior (Bandura, 1977, 1986, 1997).

Consider the parents who understand that controlling their children by intimidation is well within their capabilities, but who judge the outcomes of that type of domination to be undesirable and detrimental. These parents avoid such tactics, even though those methods could be easily employed. People make choices about the use of existing abilities because of anticipated outcomes.

Behavior produces performance, which brings about outcomes. For example, in schools, a letter grade is not an outcome, it is a performance indicator. For a student, the resulting positive or negative consequences of receiving a certain grade are the outcomes. Efficacy beliefs shape and are shaped by outcome expectations. "It is because people see outcomes as contingent on the adequacy of their performance, and care about those outcomes, that they rely on efficacy beliefs in deciding which course of action to pursue and how long to pursue it" (Bandura, 1997, p. 24). However, when factors outside of quality of performance can affect outcomes, or when outcomes are connected to an established minimum performance level such that work performance above that level is not rewarded differentially, then efficacy beliefs can only explain some of the variation in outcome expectations (Bandura, 1977, 1986, 1997). In a troubled economy, unstable financial situations can affect the outcomes of a person's job performance: work that might typically have been rewarded may not yield the same outcomes, as companies have to lay off workers. In classrooms, once a student determines what level of work will be enough to

secure the desired outcomes (praise, approval, rewards) that student may not be compelled to work harder than that.

Bandura's distinction between efficacy expectations and outcome expectations will become critical to an understanding of teacher efficacy and how it is conceptualized, and will be revisited in later sections of this literature review.

Locus of Control

The issue of control over outcomes leads to Rotter's (1966) social learning theory and locus of control. Rotter posited that people develop, through their reinforcement histories, generalized expectations about whether outcomes are determined by things outside of personal control, or are the results of behavior. Self-efficacy and locus of control must be distinguished, but they work together, because the way in which a person tends to attribute control informs that person's beliefs about their abilities (Bandura, 1977, 1986, 1997). Generally, those who believe that situations cannot be controlled or changed do not persist as long when a task is difficult, and it becomes easy to relinquish personal investment or responsibility in that situation. However, one who is highly efficacious yet existing in an environment over which there is little personal control may be motivated to change the system and protest the lack of control, while a person with low self-efficacy, in that same environment, may feel a sense of resignation or even apathy. In situations in which a person can feel a measure of control over outcomes, high self-efficacy brings

aspirations and satisfaction with efforts, while individuals with low self-efficacy confront their own shortcomings (Bandura, 1997).

It is important to note that Rotter's ideas about control were instrumental in the initial development of the concept of teacher efficacy, and will therefore be reexamined within the discussion of teacher efficacy.

Learned Helplessness

Maier and Seligman (1976) defined learned helplessness as when "an organism has learned that outcomes are uncontrollable by his responses and is seriously debilitated by this knowledge" (p.4). As it relates to self-efficacy, this is a problem of agency. One must be careful to make a distinction between the futility that arises when one is not able to successfully perform a task and the futility that comes from existing in an environment that is unreceptive or hostile to one's successful performance. "To alter efficacy-based futility requires development of competencies and expectations of personal effectiveness. By contrast, to change outcome-based futility necessitates change in prevailing environmental contingencies that restore the instrumental value of the competencies that people already possess" (Bandura, 1977, p. 205). When faced with an unresponsive environment, some people mistakenly attribute their lack of success to a supposed lack of ability, while others can maintain their efficacy, yet quit trying because they understand that their work will not pay off. Assessment of the futility or potential of

a situation contributes to the way in which a person cognitively processes information that leads to efficacy beliefs.

Self-Regulation

Self-regulation is considered separately from the other self-variables because it has to do with action and balance, as opposed to beliefs, judgments, or evaluations. It has already been addressed in this literature review as a main feature of agency, but is being revisited to further clarify distinctions.

Self-regulation involves the ways in which humans assess their beliefs, capabilities, and possible outcomes; set goals; and plan courses of action (Bandura, 1991). In Piaget's theory (1960, as cited in Bandura, 1997), self-regulation is triggered by the need for equilibration: A person experiences cognitive conflict and needs to make adjustments to restore balance. This idea is similar in structure to control systems theory (Powers, 1973), in which negative feedback acts as the regulator for behavior. Within a closed loop of cause and effect, when a person senses a disparity between desired and perceived outcome, he or she will work to make adjustments to achieve a set standard (Cziko, 1992). The understanding, from this perspective, is that what people do is guided not by external forces, but rather by their own effort to control what is sensed or perceived (Powers, 1973).

Bandura (1991, 1997) describes the differences between a social cognitive theory of self-regulation and the theories that utilize the negative feedback model by highlighting the proactive nature of forethought. In a negative feedback model, no

action is needed if performance matches the internal standard, or if no feedback is forthcoming. While correcting for a discrepancy is indeed a function of self-regulation, "self-regulation via negative discrepancy tells only half the story, and not necessarily the more interesting half" (Bandura, 1997, p. 131). The proactive self-regulator is able to produce as well as reduce discrepancies, creating disequilibrium for oneself. This is where self-efficacy comes into play: "After people attain the standard they have been pursuing, those who have a strong sense of self-efficacy generally set a higher standard for themselves" (Bandura, 1991, p.260).

As self-regulation directs action, self-efficacy influences self-regulation. Self-efficacy affects goal setting, perceptions of success and failure, persistence, and how activities are valued (Bandura 1991). The results of self-regulation and action can then further inform self-efficacy.

<div style="text-align:center">Sources of Self-efficacy</div>

Efficacy in a particular domain can develop in four ways: through mastery experiences, vicarious experiences, social persuasion, and physiological affect/arousal (Bandura, 1977, 1986, 1997). It is from these sources that individuals gather information about their particular capabilities to perform a given task.

Mastery Experiences

The first and strongest source of efficacy is the collection of mastery experiences. When people attempt and practice tasks, they discover that the task is

one that is attainable and can be perfected, thus strengthening self-efficacy, or they conclude, after struggles and failures, that they cannot succeed, weakening efficacy beliefs. As a person works to develop new skills, access to success is crucial. In schools, job training environments, and therapeutic environments, novices are not tasked with the most complex problems first. After starting with the most rudimentary components to be learned, difficulty is increased as tasks are mastered. In this way, successful performance provides the efficacy needed to attempt the next task. Generally, children don't learn to read using novels, new employees aren't asked to run a company, and clients with snake phobias aren't immediately asked to hold pythons. Attainable successes are presented, along with appropriate feedback and support, so that confidence in ability increases. After efficacy has been established, then occasional failure will no longer be a threat, and may serve to strengthen persistence (Bandura, 1977). Conversely, success that comes too easily brings an expectation of quick results, and when failures happen, easy discouragement. "A resilient sense of efficacy requires experience in overcoming obstacles through perseverant effort. By sticking it out through tough times people emerge more able and stronger from adversity" (Bandura, 1998, p. 54).

Vicarious Experiences

Efficacy that is gained by observation is acquired vicariously. Observing another person perform a task successfully can influence personal beliefs about the ability to do the same. This source of efficacy information is less dependable than

mastery experiences, but is most beneficial when the observer can identify with the model, when the behavior modeled has clear outcomes, and when a variety of models demonstrate successful performance (Bandura, 1977, 1986, 1997). A learner can become convinced of the potential for accomplishment by seeing other people in similar situations execute tasks successfully. Children watch their peers and learn what activities to try. Teachers observe how their colleagues handle challenges and are inspired to do the same. Vicarious experience leads people to say, "I can do that, too."

Social Persuasion

When a trustworthy and credible source offers encouragement by expressing confidence in a learner's abilities to succeed, self-efficacy can be increased. Social persuasion alone produces weak efficacy expectations that can be quickly disconfirmed, but when used along with corrective feedback and other assistance to achieve success, can encourage greater effort (Bandura, 1977, 1986, 1997). As those who motivate carefully structure opportunities for a leaner to both be successful and observe others being successful, they also offer pep talks to encourage persistence and increase motivation (Bandura, 1988).

Physiological Affect/Arousal

Finally, the body itself is a source of information about perceived ability. When confronted with a task, physiological cues, such as fear, anger, and sorrow, contribute to a person's sense of personal competency, as that person relies on

bodily cues to warn them of vulnerability and anxiety. People come to expect success when they feel low arousal, while high anxiety inhibits confidence in abilities (Bandura, 1977, 1986, 1997).

Effect on Human Functioning

The sources of self-efficacy provide information that must be processed cognitively before that information shapes self-efficacy. If a person believes that success was fortuitous and not a reflection of ability, then beliefs about capabilities may remain unchanged. Likewise, if a person does not believe the verbal persuasion being offered, cannot identify with the model being observed, or cannot trust their gut, self-efficacy will not increase. The sources must be perceived to be authentic (Bandura, 1977, 1986, 1997). When information from the four sources is deemed credible, it combines to shape efficacy beliefs which influence functioning through cognitive, affective, motivational and selective processes (Bandura, 1977, 1986, 1997). "It is partly on the basis of efficacy beliefs that people choose what challenges to undertake, how much effort to expend in the endeavor, how long to persevere in the face of obstacles and failures, and whether failures are motivating or demoralizing" (Bandura, 2001, p. 10).

Changes in Efficacy

Since self-efficacy influences behavior, those people whose job it is to motivate must work to simultaneously employ the four sources of efficacy so that efficacy can be maximized. "Efficacy builders do more than convey positive

appraisals. They structure situations for others in ways that bring success and avoid placing them, prematurely, in situations where they are likely to fail" (Bandura, 1998, p. 54). Teachers, trainers, and therapists set up opportunities for success while providing models of behavior and words of encouragement that are specific and meaningful as well as advice about how to handle the anxiety and stress of trying something that is a challenge.

As a way to enhance personal beliefs so that organizational functioning can be improved, Bandura suggests guided mastery modeling, which involves demonstrating a skill, providing guided practice with feedback and encouragement for skill perfection, and then allowing opportunities to use the skill successfully in authentic and increasingly challenging situations. This builds confidence in one's capabilities (Bandura, 1988). This technique, in school settings, is referred to as scaffolding, and comes from Vygotskian theory. Scaffolding involves organizing a task so that effort is rewarded by success, modeling actions and strategies, pointing out results of actions, and providing assistance and feedback as a learner gains skills. Learning is therefore a social interaction between a less experienced novice and someone with a higher level of expertise. Successful scaffolding leads to learner confidence in efforts, willingness to learn from mistakes, and greater persistence in the face of difficulties (Meadows, 1998).

Just as increases in self-efficacy can improve functioning, when self-efficacy is weakened, either temporarily or more permanently, performance may be

undermined. Circumstances can alter a person's mindset such that he or she doesn't exercise all capabilities available. These circumstances include a rigidity of thought; attention only to what is novel about a task; assignment to subordinate roles; gender and racial stereotyping; and the offering of help when it isn't needed (Bandura, 1988, 1997). For this reason, Pajares and Schunk (2001) call for schools to go beyond solely academic preparation to equip individuals with necessary skills, confidence in those skills, and an environment that values their contributions, so that they are ready to pursue personal ambitions.

Consider the student who is capable of high achievement in school, but does not perform well. That student may be underperforming because of perceptions that high achievement is unattainable, undesirable, or unappreciated. Perhaps that student belongs to a social or cultural group that is stereotyped as low performing, and has been underserved, ignored, or pitied, thereby removing opportunities to build self-efficacy. Perhaps that student is susceptible to anxiety about performance, and cannot cope with demands to demonstrate skill. Perhaps this student does not view the outcomes of high achievement as important enough to justify the expended effort. Performance isn't always about skill, and those who assist and evaluate the learning of new behaviors must pay attention to personal expectations that can undermine success.

Generality vs. Specificity

Through a series of experiments, in which self-efficacy was manipulated through vicarious influence, bogus peer norms, and arbitrary reference points, Bandura found that self-efficacy independently contributes to both motivation and performance (Bandura, 1997). Self-efficacy's effect on motivation can affect actions generally, as it contributes to a sense of tenacity. Emotional states are regulated by efficacy beliefs- how we assess threat, regulate stress, control thoughts, and work to change our environments (Bandura, 1998). "It is the resiliency of self-belief that counts" (Bandura, 1988, p. 282). Those with strong beliefs in their own abilities persevere through occasional failure, focusing on task mastery, and not succumbing to self-doubt. Young children tend to overestimate their own abilities, and this confidence grants them access to a variety of experiences. "Human accomplishments and positive well-being require an optimistic sense of personal efficacy to override the numerous impediments to success" (Bandura, 1998, p. 56).

Self-efficacy influences can be specific to performance in various life domains, as well. For example, Lent, Brown, and Hackett (1994) developed a Social Cognitive Career Theory (SCCT) that explored how self-efficacy affects career choices when perceptions of ability, or lack thereof, are more powerful than actual ability. A stronger sense of efficacy leads to more career options considered, greater interest in those options, better educational preparation, and greater staying power.

Another specific application, self-efficacy for teaching, has been explored

extensively, because of the implications for schools and student performance. The

next section will present the growth of that construct.

Teacher Efficacy

Teacher efficacy, as it is currently understood, reflects beliefs about a

teacher's ability to effectively help students learn. Over the past 40 years, teacher

efficacy has been explored, redefined, and measured in a variety of ways, and its

connections to other school variables have been well-established.

History of the Construct

The study of teacher efficacy grew out of two theoretical frameworks. The

first conception of teacher efficacy was based on Rotter's social learning theory and

locus of control (1966). After Bandura's conception of self-efficacy (1977) was

presented, teacher efficacy became more closely aligned with social cognitive

theory. The following sections explain the history of the teacher efficacy construct,

detailing how researchers have shaped the concept as they developed instruments

for its measurement.

RAND Studies

In the late seventies, the RAND organization conducted two studies of school

functioning: One examined factors contributing to reading success for inner city

children (Armor et al., 1976), the other identified factors contributing to the

continuation of innovative programs (Berman et al., 1977). These studies are

important because, based on Rotter's 1966 article about internal versus external

control, they included two items on the questionnaires used that would measure

teacher efficacy.

> Our measure of teachers' sense of efficacy was based on two questions. One
> asked whether the teacher felt that "when it comes right down to it, a teacher
> can't really do much [because] most of a student's motivation and
> performance depends on his or her home environment." The other asked
> whether the teacher thought that "if I try really hard, I can get through to
> even the most difficult or unmotivated students." Responses to these two
> questions were combined into a single measure of efficacy—the extent to
> which the teacher believed he or she had the capacity to affect student
> performance. (Berman et al., 1977, p 159-160)

Both of these studies found that teacher efficacy was related to student

performance, and the Berman et al. study found connections between teacher

efficacy and both higher goal achievement and continuation of projects after federal

grants are removed. Since the publication of these two studies, the construct

measured by the first RAND item has come to be known as general teaching efficacy

(GTE) and it reflects that which is beyond a teacher's control. The second RAND

item measures what is known as personal teaching efficacy (PTE) and it reflects

elements under a teacher's control.

The RAND studies sparked an interest in teacher efficacy, and the years

following saw multiple adaptations and expansions of the RAND items as

researchers sought to more fully explore the construct. Guskey (1981a) published

the Responsibility for Student Achievement Questionnaire (RSA), which asked

respondents to decide how much of a given (positive or negative) situation was

caused by the teacher and how much was outside the teacher's control. He found

that teachers perceived greater responsibility for positive events and less for

negative events (Guskey, 1981b). Rose and Medway (1981) developed the Teacher

Locus of Control Scale (TLC) to measure perceived internal or external control of

classroom events. The scale was found to be more predictive of teacher behavior

than Rotter's Internal-External Locus of Control (I-E) Scale (1966), and teachers in

high SES schools who perceived internal control of classroom successes had

students who were more frequently participating in self-directed activities.

Ashton and Webb

Beginning in the early eighties, Patricia Ashton, Rodman Webb, and various

colleagues worked to more fully explore the concept of teacher efficacy, developing

a conceptual framework (Ashton, Webb, & Doda, 1983; Ashton & Webb, 1986). They

expanded the RAND work by incorporating social cognitive theory, and Bandura's

self-efficacy, instead of focusing solely on internal or external control, as did the

previous studies. Their model of teacher efficacy was multidimensional, examining

how generalized beliefs about outcome-response relationships influence (and are

influenced by) both generalized beliefs about self-efficacy and teaching efficacy,

which both influence (and are influenced by) a sense of personal teaching efficacy,

which reflects the teacher's beliefs about personal ability to teach in a particular

context (Figure 4). Teachers with low teaching efficacy don't feel that teachers, in

general, can make much of a difference in the lives of students, while teachers with

low personal teaching efficacy don't feel that they, personally, affect the lives of the students (Ashton & Webb, 1986).

Figure 4. Teachers' Sense of Efficacy: The Multidimensional Construct (Ashton & Webb, 1996, p. 5).
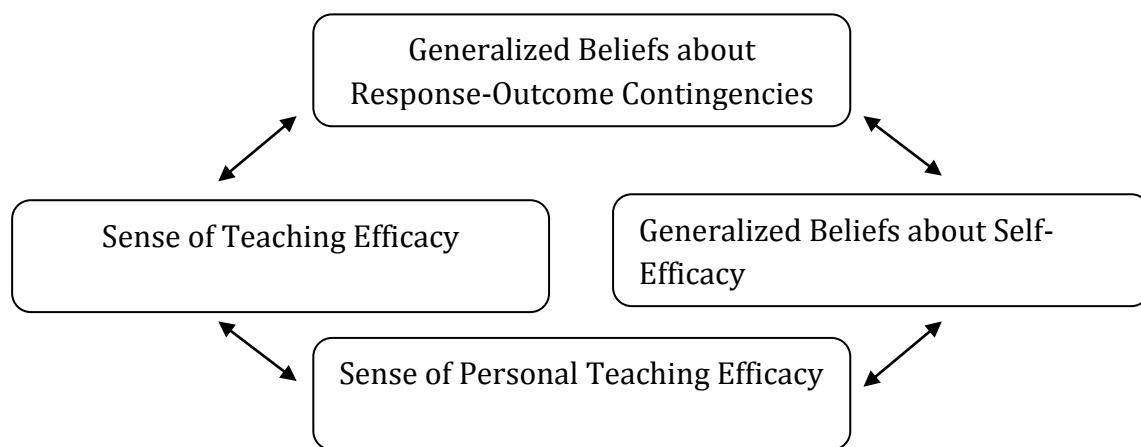
They found that teachers differ in efficacy levels, and the differences show up in teacher behaviors and student performance; that efficacy beliefs are not permanent and they can be influenced from without, by a variety of forces; and that feelings of efficacy can be difficult to maintain (Ashton & Webb, 1986). Efficacy is "negotiated daily" (Ashton et al., 1984, p. 380) and can be either threatened or supported by contextual factors. Efficacy is related to achievement, positive

classroom climate, organizational structures, and high academic expectations

(Ashton et al., 1984).

For these studies, two additional measures were developed to measure

efficacy (Ashton & Webb, 1986) in addition to the RAND items. The Webb efficacy

measure included seven items, for which the participant would need to agree with

one of a pair or contradicting statements: "A. A teacher should not be expected to

reach every child…B. Every child is reachable…" (Ashton et al., 1982, p. 36). The

second measure, the Ashton Vignettes (as they have come to be known) exist in long

(50 items) and short (15 items)forms and ask participants to rate their own

predicted effectiveness in hypothetical situations such as the following:

> A new student has been assigned to your class. Her records indicate that she
> never does her homework and does not seem to care about education. Her IQ
> score is 83, and her achievement scores have been below the 30th percentile.
> How effective would you be in increasing her achievement test score?
> (Ashton et al., 1982, p. 47).

Both of these measures were designed to address more complexity than the RAND

items could, situating the construct in more specific contexts. In 1984, Ashton, Buhr,

and Crocker found that the vignette items correlated with RAND items when they

are written so that they ask a teacher to compare their effectiveness to other

teachers.

Gibson and Dembo

While Ashton & Webb were doing their work, Sherri Gibson and Myron H.

Dembo developed a 30 item instrument (Teacher Efficacy Scale, or TES) to measure

General Teaching Efficacy (GTE, reflected RAND item 1) and Personal Teaching

Efficacy (PTE, similar to RAND item 2). The framework for this assessment was

social-cognitive theory: GTE reflected outcome expectancy and PTE reflected self-

efficacy (Gibson & Dembo, 1984). They predicted that teachers with high GTE and

high PTE would demonstrate high levels of persistence and confidence, providing

more instructional time, a strong academic focus, and quality feedback, while low

scoring teachers would give up easily in the face of failure.

This measure became popular among researchers, and has been modified to

suit various research purposes. Hoy and Woolfolk (1990) found that during the

professional semester, student teachers' sense of PTE improved, while GTE

declined. Witcher et al. (2002) found that among preservice teachers, a

transmissive viewpoint, in which the teacher dispenses knowledge to students, was

moderately associated with lower GTE. Woolfolk, Rosoff, and Hoy (1990) separated

GTE and PTE and found that teachers with higher PTE used more humanistic

approaches to classroom discipline. Ross (1992) and da Costa (1995) both found a

positive relationship between PTE and pupil achievement. Allinder (1995) adapted

the TES for special education teachers, finding that teachers with high teaching

efficacy set student goals that were more ambitions, and increased the year-end

goals more often. Lamorey and Wilcox (2005) used an adapted TES to find that

higher early intervention practitioner efficacy scores were associated with more

years of experience in early intervention.

Guskey and Passaro (1993) modified Gibson and Dembo's instrument, adding alternate forms of questions because they believed PTE was actually measuring an internal orientation, and GTE an external orientation, specifically reflecting external constraints. The questions were rewritten so that every PTE item and every GTE item were phrased in two ways, reflecting both internal and external orientation. They found that GTE dimension of Gibson and Dembo really measures external attribution of student failure. This modification would show up again when Goddard (1998) created his scale to measure collective teacher efficacy.

Bandura

Twenty years after his first article about self-efficacy, Bandura published *Self-Efficacy: The Exercise of Control* (Bandura, 1997), in which he addressed both teacher efficacy and collective teacher efficacy, and the impact that efficacy beliefs can have on the classroom: "Evidence indicates that teachers' beliefs in their instructional efficacy partly determine how they structure academic activities in their classrooms and shape students' evaluations of their intellectual capabilities" (p. 240). This book began a shift in teacher efficacy research back to social cognitive theory, with less of a focus on locus of control and Rotter's social learning theory. In order to properly measure teacher efficacy, Bandura called for scales to be expanded to reflect the multifaceted nature of the construct. Instead of focusing on general teaching efficacy (which seemed to be a measure of outcome expectancy rather than efficacy expectation), the focus should be more specific, measuring

content-area efficacy. In this way, scales can more precisely determine how a

teacher's sense of efficacy is related to student performance. To that end, he created

his own unpublished Teacher Self- Efficacy Scale (as cited in Tschannen-Moran,

Woolfolk Hoy, & Hoy, 1998) that measures efficacy for various contexts

(disciplinary efficacy, instructional efficacy, efficacy to influence decision making,

etc.). A newer version of this scale accompanies an article he wrote concerning how

to construct self-efficacy scales (Bandura, 2006).

Tschannen-Moran, Woolfolk Hoy, and Hoy

In 1998, Tschannen-Moran, Woolfolk Hoy and Hoy brought together the

existing lines of research, proposing an integrated model (Figure 5) that shows that

teacher efficacy has a cyclical nature. The sources of efficacy information (mastery

experience, vicarious experience, social persuasion, physiological arousal) inform

cognitive processes, which are used to both analyze the teaching task (which

involves outcome expectancies) and assess personal teaching competence. This

information informs a sense of teaching efficacy, which leads to certain teacher

behaviors and attitudes that affect performance, providing new sources of efficacy

information.

Rather than delineate GTE and PTE, this model describes teacher efficacy as

informed by consideration of the teaching task and context (constraints and

resources alike) and consideration of personal strengths and weaknesses in the

particular context. While GTE measures beliefs about teaching in general, this model

specified the context of a teaching task, considering the arena in which teaching will

occur, moving closer to that optimal balance between being too general to have

predictive meaning and too specific to be able to generalize (Bandura, 1997).

Assessment of self-perception of teaching competence is a measure of current

performance, and is similar to PTE.

Figure 5. "The cyclical nature of teacher efficacy" (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998, p. 228).
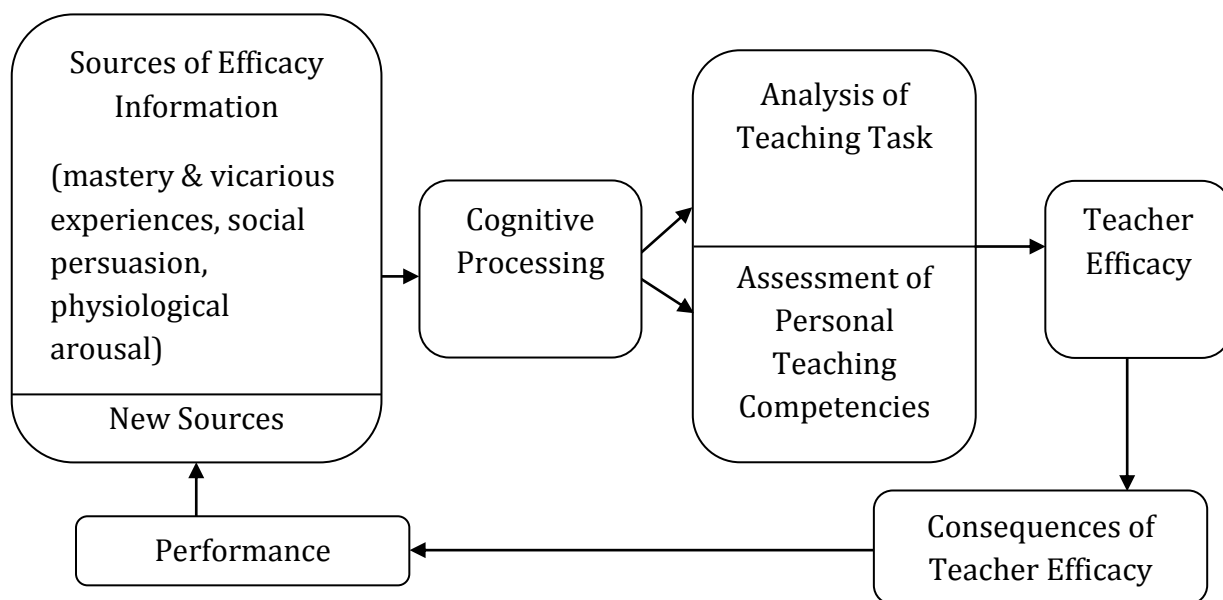
Based on the integrated model developed in 1998, Tschannen-Moran &

Woolfolk Hoy (along with a seminar of students) developed an instrument to

measure teacher efficacy that would improve on the existing measures. They started

with Bandura's unpublished teacher-efficacy measure, selecting items that were

most relevant and adding more, then narrowing down the collected pool and field

testing varying formats. The result was the OSTES (Ohio State Teacher Efficacy

Scale), which is now called the Teachers' Sense of Efficacy Scale (TSES), in long (24

items) or short form (12 items). This scale sought to better capture both internal

and external components that make up teacher efficacy, making the measure

optimally specific to actual teaching (Tschannen-Moran & Woolfolk Hoy, 2001).

Teacher efficacy is studied so that educators and researchers can discover

ways to improve school functioning. This model and measure defines the current

understanding of teacher efficacy, so the remainder of this section will elaborate on

components within that model, focusing on the development and effects of teacher

efficacy.

Sources of Teacher Efficacy

Within the context of education, the four sources of self-efficacy (mastery

experiences, vicarious experiences, social persuasion, and physiological arousal),

contribute to teacher efficacy as well, and can be seen in the ways the teachers are

prepared for, introduced to, and supported within their professional work. The

cognitive processing of information from these sources influences how teachers

perceive both task demands and personal competencies (Tschannen-Moran et al.,

1998). Teacher education programs are built to provide as much efficacy-building

information as possible before professional service, so that novice teachers are as

prepared and as confident as they can be. For this reason, the descriptions of the

four sources will be framed within the context of teacher preparation.

Mastery Experiences

It is by teaching that a person understands how learned skills and behaviors

affect the instructional setting. Strengths and weaknesses can be weighed according

to their use in practice, so mastery experience is the most powerful source of

efficacy information (Tschannen-Moran et al., 1998). For preservice teachers, time

spent in the classroom and in teaching settings, assisting, tutoring, and managing

while receiving support and scaffolding, adds to the collection of mastery

experiences. However, it is not until student teaching and initial professional

teaching that a teacher is able to accumulate authentic, meaningful experiences.

> Efficacy beliefs are strengthened substantially when success is achieved on
> difficult tasks with little assistance or when success is achieved early in
> learning with few setbacks; however, not all successful experiences
> encourage efficacy. For example, efficacy is not enhanced when success is
> achieved through extensive external assistance, relatively late in learning, or
> on an easy and unimportant task (Tschannen-Moran et al., 1998).

This implies that education majors should get into classrooms as soon as possible,

and those classrooms should be diverse, representing a wide range of experiences,

so that they can collect supported, easy successes that will give them the confidence

to open themselves up to a variety of teaching situations. Teachers in the field

develop efficacy in their particular contexts by applying their capabilities to the task

at hand and then experiencing the impact of those skills (Tschannen-Moran et al., 1998).

Emotional and Physiological Cues

Another reason to collect as many preservice experiences as possible is to get comfortable in situations that are initially perceived as stressful or threatening.   A person's physiological response to experiences informs their beliefs about capabilities. Information from the body, such as increased heart rate, sweaty palms, nausea, shallow breathing, trembling, and a fluttering stomach, can be perceived positively or negatively, and this cognitive processing contributes to a teacher's beliefs about capability and functioning. Some teachers feel comfortable in front of a classroom full of fourth graders, but ill at ease with adults. Likewise, a high school teacher may be terrified at the thought of being in charge of kindergarteners. Teachers who have never had experience in inner city schools may believe the teaching task too stressful or threatening, and so avoid it, just as a teacher who is afraid of confrontation may avoid positions of leadership and oversight. Clients in therapy may work to overcome fear responses through exposure therapy, in which a client experiences a feared object in increasingly interactive ways, while in a safe and relaxing environment, thereby building efficacy as anxiety is reduced or managed (Bandura, 1977). In the same way, teachers learn to lessen or manage their own physiological responses by experiencing stressful situations, monitoring their levels of anxiety, and seeing if they can overcome their own emotional

responses and be successful. When teacher candidates experience challenging

situations before they are actually responsible for teaching, they are able to lessen

their fear responses, enabling them to gradually take on more responsibilities.

Vicarious Experiences

Within the preservice experience, teacher candidates begin to build mastery

and interpret physiological cues while observing professionals in action. These

observations provide vicarious experience, so that a person comes to identify with

the teacher role, imagining life as an educator.

> Models of successful teachers are the basis for deciding that the teaching task
> is manageable and that situational and personal resources are adequate.
> Watching others teach in skillful and adept ways- especially observing
> admired, credible, and similar models-can affect the observer's personal
> teaching competence (Tschannen-Moran et al., 1998, p. 230).

In order to build teacher efficacy before authentic mastery experiences are

available, it is important for candidates to begin to see themselves as successful

teachers. Watching others succeed can build efficacy beliefs, which can then impact

a candidate's willingness to try and therefore collect mastery experiences and

reduce anxiety levels. Tschannen-Moran and her colleagues point out, however, that

vicarious experience helps a candidate assess a teaching task, but does not influence

self-perceptions of teaching competence as much (1998).

Social Persuasion

Because of the vicarious nature of teacher preparation programs, it is crucial

to supplement observational learning with as many authentic experiences as

possible, all the while providing specific and helpful feedback about strengths and weaknesses. Just as a coach provides encouragement and feedback to refine athletic performance, experts, supervisors, and peers can provide valuable information about how a teacher's capabilities match contextual demands (Tschannen-Moran et al., 1998). Out of context, social persuasion is not as powerful because it can seem contrived or false, but when capable others talk honestly about a candidate's potential for success, that feedback can serve to build the efficacy needed to attempt increasingly challenging tasks. Within schools, encouragement, support, and feedback from administrators, mentors, and peers can bolster teacher efficacy, especially when challenging situations threaten a teacher's beliefs about personal capability, or the demands of a teaching task seem difficult to surmount.

<center>Cognitive Processing of Efficacy Information</center>

Information from the four sources must be cognitively processed, and the resulting perceptions of that information will influence how the teaching task is analyzed and how personal capabilities are assessed (Tschannen-Moran et al., 1998). How a person weighs and considers efficacy information will depend on personal variables, such as biases, attention, perceived control, and levels of optimism, which act as filters, making some messages about capability more salient than others. For example, watching another teacher successfully interact with a group of students may not provide the vicarious experience that can build efficacy if the observer doesn't feel that his or her context is similar enough. Similarly, if a

person carries biases concerning the behavior of certain groups of students, that teacher's own physiological or emotional signals may obscure the potential for success. On the other hand, overconfidence in one's abilities as a teacher may lead a person to disregard negative feedback or constructive criticism. Also, as a teacher progresses through a career, the sources take on changing levels of significance.

> When a task is seen as routine...there is little active analysis of the task, and efficacy is based on memories of how well the task has been handled in the past. Prospective or inexperienced teachers, however, rely more heavily on their analysis of the task and on vicarious experience (what they believe other teachers could do) to gauge their own likely success, that is, their efficacy in the given situation (Tschannen-Moran et al., 1998, p. 234).

Once established, teaching efficacy appears to be fairly stable, but efforts to increase efficacy can be successful and beneficial. Tschannen-Moran and colleagues (1998) suggest the following ways to build efficacy in teachers:

- Warn teachers that implementation of innovation seems to initially weaken efficacy, but as teachers adjust to changes, and begin to see improvements in student learning, efficacy improves once again (Ross, 1998).

- Provide specific feedback about performance and opportunities to develop new skills.

- Teachers should work collaboratively to analyze their task requirements, identifying needed skills and components.

- Those in leadership need to help teachers feel more control over their professional lives by highlighting the effort and planning that led to positive results.

The Sources as Antecedents in Research

Numerous studies have examined how the sources of efficacy information combine to act as antecedents to teacher efficacy. The use of microteaching (teaching a mini-lesson to peers) for preservice post-graduate teachers in Australia increased personal teacher efficacy and teacher efficacy in classroom management (Mergler & Tangen, 2010). Research examining the effects of student teaching have found that while GTE decreases during the internship (Parker & Guarino, 2001), beliefs about personal teaching efficacy increase (Knoblauch & Woolfolk Hoy, 2008). This increase in efficacy can be followed by a significant decrease during the first professional year, perhaps warranting an increase in social persuasion (Woolfolk Hoy & Spero, 2005). Novice teachers, who have not yet collected many mastery experiences, rely on contextual factors (resources and support) to inform self-efficacy beliefs (Tschannen-Moran & Woolfolk Hoy, 2006). Professional efficacy is nurtured when teachers are provided with an organization design that affords teachers some control and a supportive social system (Hemric, Eury, & Shellman, 2010), and when provided with appropriate professional development and coaching (Cantrell & Hughes, 2008).

Effects on Functioning

In the same way that self-efficacy influences human functioning, teacher efficacy has an influence on what goes on in the classroom. It has been connected to student achievement (Armor et al., 1976; Berman et al., 1977; Ashton et al., 1983;

Ross, 1992; da Costa, 1995;), teaching approaches (Woolfolk & Hoy, 1990; Witcher

et al., 2002), classroom and school decision making (Moore & Esselman, 1992),

teacher burnout (Skaalvik & Skaalvik, 2007), professional commitment (Ross &

Gray, 2006; Ware & Kitsantas, 2007),and collective teacher efficacy (Fives & Looney,

2009; Skaalvik & Skaalvik, 2007).

Teacher efficacy has also been connected to grade level (Moore & Esselman,

1992), which could be considered a contextual variable. The desire to connect

efficacy to other contextual and school level variables, such as socioeconomic status

and leadership in a school, required consideration of the unit of analysis. Even the

connection between teacher efficacy and student achievement presents problems,

as it is challenging to talk about a school's achievement in terms of individual

teachers' efficacy. This led to the study of collective teacher efficacy. The next

sections will explain collective efficacy in general terms, and then apply the concept

to school functioning.

<center>**Collective Efficacy**</center>

Rooted in self-efficacy, collective efficacy is "a group's shared belief in the

conjoint capabilities to organize and execute the courses of action required to

produce given levels of attainment" (Bandura, 1997, p. 477). It is an emergent

group-level property, reflecting the belief in the group's power to accomplish its

goals (Bandura, 1997, 2001). It is predictive of group performance (Bandura, 1993)

in a variety of settings, including schools, athletic teams, and organizations

(Bandura, 1997).

Together, people can accomplish that which one person cannot. Social action

depends on the belief that a group can effect change. Collective efficacy helps people

realize their shared destiny, enabling agency at the group level. (Bandura, 1997,

2000).

<div align="center">Measurement</div>

There are two conceptually different ways to measure perceived collective

efficacy: aggregation of individuals' beliefs about their own personal efficacies to

accomplish group goals, or aggregation of members' beliefs about the group's ability

to accomplish group goals (Bandura, 1997, 2000). If the collective activity consists

of the sum of independent successes, as it does for a track and field team, then it is

preferable to measure and aggregate the personal efficacies of the actors. When an

entire group must interact, like a basketball team would, and collective activity is

the product of cooperative work, then it makes more sense to measure group

members' beliefs about what the team can accomplish. In either case, the dynamics

of a group and the efficacies of individuals share an interdependence. This can

create an analytical challenge, as "individual-level controls can inadvertently

remove most of the emergent social properties" (Bandura, 1997, p. 479).

Nevertheless, when measuring group level functioning, it is wise to employ group

level variables.

Influences on Human Functioning

Collective efficacy develops as self-efficacy does, and has similar effects. Shared beliefs about collective efficacy influence the kinds of future outcomes sought through collective action, resource use, amount of effort expended, endurance in the face of difficulty, and level of vulnerability (Bandura, 1997, 1998, 2000). When a group feels that success is attainable through their collective efforts, then performance improves, while organizations that lack efficacy are met with less success. As our society changes, collective efficacy is challenged- it becomes difficult to envision that the human race, together, can accomplish collective goals when people are split into factions, global problems seem insurmountable, and decision making power, ceded by proxy to leaders, seems too far out of reach (Bandura, 2001). "Social efforts to change lives for the better require merging diverse self-interests in support of common core values and goals. Disagreements among different constituencies create additional obstacles to successful collective action" (Bandura, 1998, p. 68).

Gully, Incalcaterra, Joshi, & Beaubien (2002) used meta-analysis to examine the relationship between collective efficacy in the workplace (called team-efficacy by the authors) and its relationship with team performance, finding that team efficacy was positively related to performance, with stronger effect sizes at the team rather than individual level and when interdependence was high.

Numerous studies of the effects of naturally developed collective efficacy

have been conducted in educational systems, business organizations, athletic teams,

combat teams, and urban neighborhoods. "The findings taken as a whole show that

the higher the perceived collective efficacy, the higher the groups' motivational

investment in their undertakings, the stronger their staying power in the face of

impediments and setbacks, and the greater their performance accomplishments"

(Bandura, 2000, p. 78). When groups believe that they can achieve great things, they

are spurred to action, and can be a powerful force for change in companies,

communities, and schools.

Collective Teacher Efficacy

When efficacy is considered at the school level, it is an organizational

property reflecting beliefs about the capability of the school to achieve its goals.

Since teachers interact and collaborate within schools with varying degrees of

success, it is valuable to examine efficacy at both the individual and collective levels.

Groundwork

As the construct of teacher efficacy was being explored, some researchers

began to examine the organizational properties of schools, realizing that individual

teacher beliefs and behaviors were not enough to satisfactorily explain school level

functioning. Chubb (1988) called for a school level focus, saying,

> School performance is unlikely to be significantly improved by any measure
> or set of measures that fails to recognize that school are institutions-

complex organizations composed of independent parts, governed by well-established rules and norms of behavior, and adapted for stability. Their influence on learning does not depend on any particular educational practice, on how they test or assign homework or evaluate teaching, but rather on their organization as a whole, on their goals, leadership, followership, and climate (p. 29).

His research found that high and low performance schools differed very little in classroom practices, and formal structures were very similar. Distinctions were evident in student bodies and informal organization: when leadership is strong, expectations are high, and authority is delegated to the classroom, students perform at higher levels. In 1989, Newmann, Rutter, and Smith found that teacher efficacy, aggregated to the collective level, is influenced by school organizational features, such as responsiveness of administrators, teacher collaboration, encouragement of innovation, and orderly student behavior. Tschannen-Moran et al. (1998) recognized the contagiousness of a low sense of efficacy in schools and the resultant demoralization.

Schools where teachers' conversations dwell on the insurmountable difficulties of educating students are likely to undermine teachers' sense of efficacy. Schools where teachers work together to find ways to address the learning, motivation, and behavior problems of their students are likely to enhance teachers' feelings of efficacy (p 221).

The literature on teacher efficacy demonstrates a connection to student achievement, so the next step was to explore how collective teacher efficacy helps explain the effect of schools on student achievement, contributing to our understanding of the ways in which schools differ (Goddard, 1998).

Bandura (1993, 1997), recognizing that academic progress in a school is not only a reflection of the sum of individual contributions, but also comes from the ways in which the teachers work together, measured faculty belief in the ability of the school to achieve success. This "intermediate level of independence" (Bandura, 1997, p. 248) comes from the collective responsibility for education and hierarchical building of new learning on that from previous grades. Bandura conducted a path analysis and found that a collective sense of efficacy among a faculty contributes significantly to academic achievement (Figure 6). In fact, it was a more powerful predictor than socioeconomic status, and as powerful as prior academic achievement.

Figure 6. Bandura's 1993 "path analysis showing the role of perceived collective efficacy in the causal structure of school-level achievement in reading and mathematics" (p. 143).
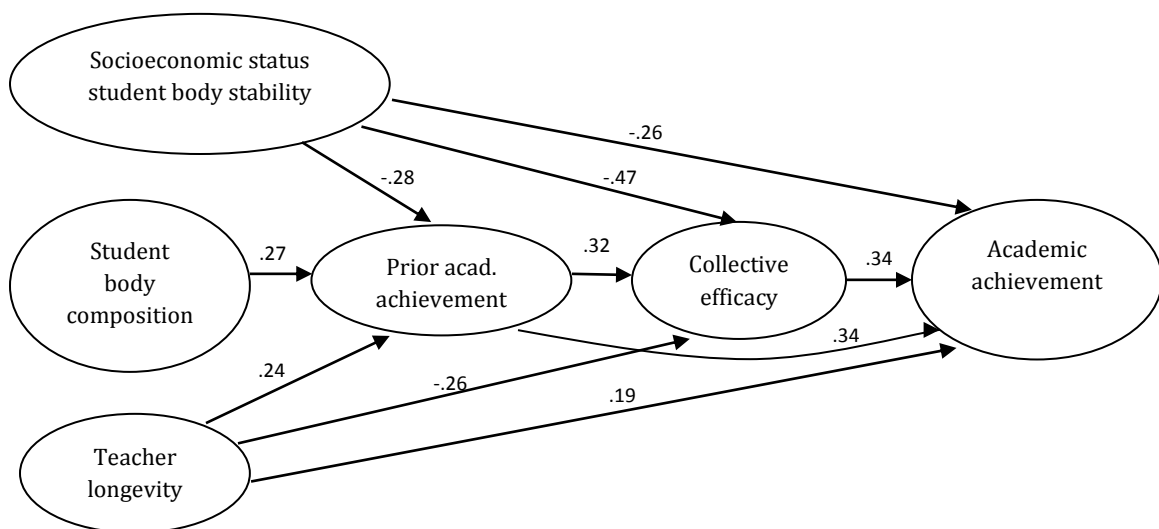
Bandura also found that collective efficacy changes across grade levels, starting low for kindergarten teachers, increasing in the primary grades, and then decreasing as children enter the middle grades (1997).

<div align="center">Definition of a Construct</div>

Building on Bandura's self-efficacy (1997) and teacher efficacy from Tschannen-Moran et al. (1998), Goddard and his colleagues (Goddard, 1998; Goddard, Hoy, & Woolfolk Hoy, 2000, 2004) explored how best to describe and measure collective teacher efficacy, as they investigated its connection with student achievement. Collective teacher efficacy (CTE) is an emergent group level property, a "product of the interactive dynamics of group members" (Goddard et al., 2000, p. 482). It represents a teachers shared perceptions about the functioning of the school as a whole, and is associated with persistence, level of effort, stress levels, tasks, shared thoughts, and group achievement (Goddard, 1998). At the school level, human agency becomes organizational agency, as "schools act purposively in pursuit of their educational goals" (Goddard et al., 2000, p. 483).

Operationalization

In order to operationalize the perceived collective efficacy of teachers, Goddard developed an instrument to measure CTE, based on Gibson and Dembo (1984), adapted to fit the theoretical model of teacher efficacy developed by Tschannen-Moran, Hoy and Woolfolk Hoy (1998), and further modified to address group, rather than individual orientation. The resulting measure included items that

assessed group competence (GC) and task analysis (TA) in both negative (-) and

positive (+) ways (Goddard, 1998; Goddard et al., 2000). Sample items include:

> Teachers in this school are well prepared to teach the subjects they are
> assigned to teach (GC+).
> Teachers here don't have the skills needed to produce meaningful student
> learning (GC-).
> The opportunities in this community help ensure that these students will
> learn (TA+).
> The lack of instructional materials and supplies in this school makes teaching
> very difficult (TA-). (Goddard et al., 2000, p. 488).

This represented a significant change, because, with the exception of Bandura's

1993 study, previous research aggregated individual teaching efficacy to the school

level and did not examine collective teacher efficacy. Later research by Goddard and

LoGerfo (2007) supported the decision to look to the collective, finding that

variability in group goal attainment is best described when group members are

asked questions about group processes, as opposed to aggregating beliefs about

personal ability. Additionally, the choice to word items both positively and

negatively improved upon Gibson and Dembo's instrument (1984), which only

included GC- or TA+ items (Goddard, 1998).

Pilot testing of the new instrument provided "evidence that collective teacher

efficacy is a single construct uniting the concepts of group competence and task

analysis" (Goddard, 1998, p. 78). Tests for criterion-related validity demonstrated

that the construct of collective teacher efficacy is negatively related to conflict in

schools and teacher powerlessness, but positively related to trust in colleagues and

teacher efficacy (Goddard, 1998; Goddard et al., 2000). A reliability of .96 was found for the final version of the collective teacher efficacy scale (Goddard, 1998).

Instead of aggregating student-level variables to the school level, Goddard's study used hierarchical linear modeling to analyze "only the portion of variance in student characteristics that occurs between schools" (Goddard et al., 2000, p. 498). He found that in the 47 elementary schools studied, CTE explained between one-half and two-thirds of the between schools variance in student achievement for math and reading, and that student achievement was affected more by collective efficacy beliefs than by race or SES (Goddard, 1998; Goddard et al., 2000).

A modified version of the CE SCALE was created by Goddard (2002b), and contained 12 items, instead of 21. In this more parsimonious version, all four categories (GC+, GC-, TA+, and TA-) are represented in equal proportion. In his validity testing, Goddard found that scores on the long and short versions were highly correlated (r=0.983), and that the short form positively predicts between-school variability for student achievement in math (Goddard, 2002b).

Model

In 2004, Goddard, Hoy, and Woolfolk Hoy developed a model to describe the development and power of collective efficacy in schools (Figure 7). The model, an adaptation of the teacher efficacy model (Tschannen-Moran et al., 1998), is cyclical and shows how collective efficacy has the potential to grow through use because of reciprocal causality.

Figure 7. "Proposed model of the formation, influence, and change of perceived collective efficacy in schools" (Goddard, Hoy, et al., 2004, p. 11).
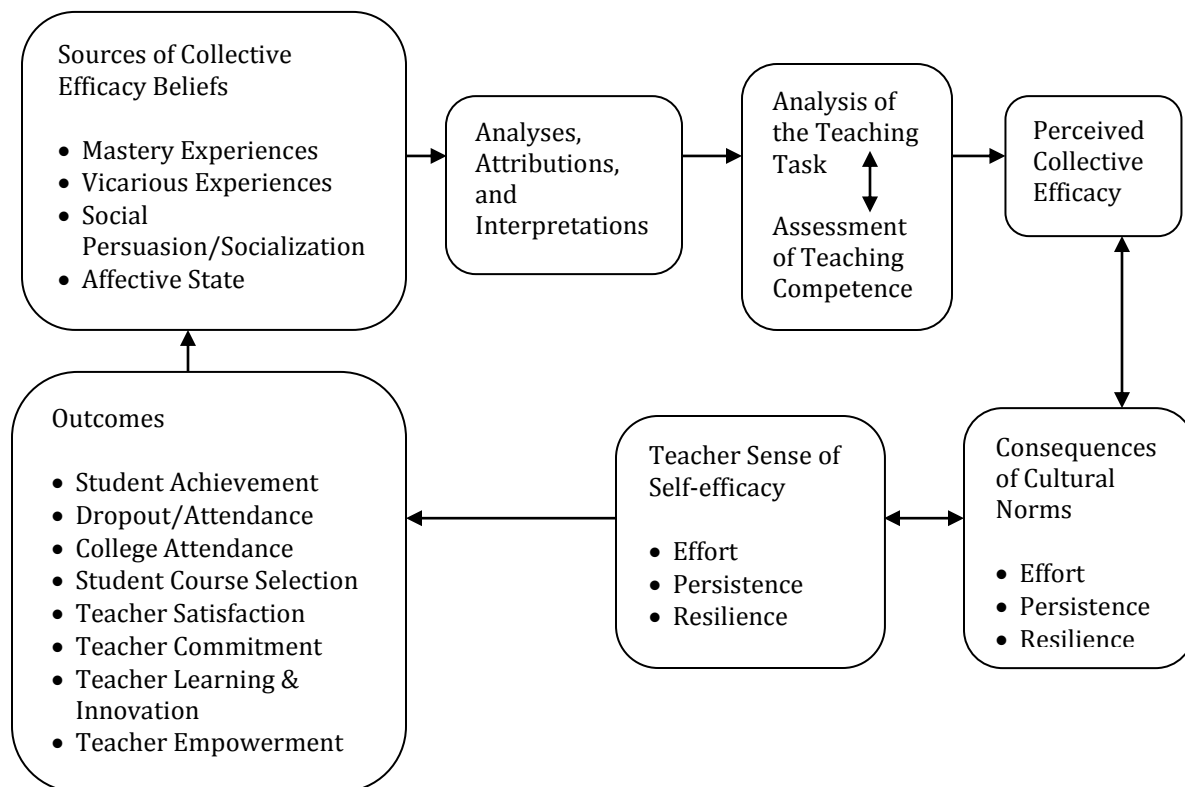
The sources of efficacy information are processed cognitively, subject to analyses, attributions, and interpretations. That information is considered along with teaching task analysis and teaching competence assessment, and perceived collective efficacy is built. These beliefs will influence, and are influenced by, collective cultural norms, which influence, and are influenced by, individual teacher efficacy and behavior. How a teacher approaches a classroom can affect numerous

outcomes, including student achievement and teacher behavior. These outcomes

then provide new sources of efficacy, so the cycle repeats.

<div align="center">Antecedents</div>

The cyclical nature of the model presented by Goddard, Hoy, et al. (2004)

suggests that CTE is malleable and can be influenced by previous events. Some of

the current CTE research examines antecedents to see what contributes to the

development of CTE. Bandura's four sources of efficacy still apply, this time at the

collective level (Goddard et al., 2000; Goddard, Hoy, et al., 2004).

Mastery experiences refer to success and failures that teachers feel as a

whole group. While failures can undermine CTE, resilience comes from persistent

effort to overcome challenges.

Vicarious experiences are provided when schools look to other schools as

examples of how to succeed, and when research about the characteristics of

exemplary schools provides models for schools that struggle.

Social persuasion takes the form of professional development, workshops,

feedback, etc. This also includes socialization into a faculty, as new faculty members

in a school with high collective efficacy learn that success is the norm, and that they

are expected to rise to that challenge. "Collective efficacy beliefs serve to encourage

certain actions and constrain others" (Goddard, Hoy, et al., 2004, p. 9).

Affective states at the organizational level are evident in a group's

interpretation of stress and challenge. "Efficacious organizations can tolerate

pressure and crises and continue to function without severe negative consequences; in fact, they learn how to adapt and cope with disruptive forces" (Goddard et al, 2000, p. 484), while less efficacious organizations respond dysfunctionally to stress.

A majority of the research examines the predictive power of these antecedents. It can be difficult to separate the effects of each of the four sources, and the research reflects that, often conceptualizing them together. Mastery experiences operationalized as prior academic achievement have been found to be predictive of CTE (Goddard, 2001; Goddard & Goddard, 2001; Goddard, LoGerfo, & Hoy, 2004; Ross, Hogaboam-Gary, & Gray, 2004). Ross, Hogaboam-Gray and Gray (2004) found that school processes designed to promote teacher ownership (addressing all four efficacy sources) was an even better predictor of CTE than prior academic achievement. Academic press, another combination of the four sources, was also found to contribute to CTE (Hoy, Sweetland, & Smith, 2002; Hoy, Smith, & Sweetland, 2002).

Some studies attempt to change collective efficacy. Cantrell & Hughes (2008) found that professional development (potentially addressing all four sources) and coaching (social persuasion) for teaching literacy improved CTE, but Zambo and Zambo (2008) found that mathematics professional development increased competence, but not CTE- despite improvements in their own skills, teachers' confidence in one another remain unchanged.

The 2004 model indicates that the four sources provide information from the past that is cognitively processed and brought to bear when a faculty analyzes the present teaching task and assesses teaching competence. Administrators can work to improve CTE by providing access to the four sources of efficacy and by addressing both task demands and personal competence (Goddard et al., 2000).

Contextual Variables

Adams and Forsythe (2006) labeled Bandura's four sources as remote efficacy sources and looked at task analysis and assessment of competence as proximate efficacy sources. Analyzing the teaching task includes consideration of present contextual variables of the teaching environment, such as availability of resources; student and faculty demographics; bureaucratic structures; physical conditions of schools; school size; and school level. These variables affect a teachers' ability to teach and students' ability to learn. While the four sources occurred in the past, these contextual conditions are ongoing in a teacher's present, influencing the teaching tasks. Adams and Forsythe suggest that a locus of control perspective be reintroduced into the social-cognitive understanding of efficacy sources, so that contextual variables that can hinder or enable efficacy are not overlooked. This return to the two strands of efficacy research would incorporate questions of internal and external control to the analysis of the teaching task. Their hypothesized model of perceived CTE has both remote and proximate sources of efficacy information cognitively processed to inform CTE (Figure 8).

Figure 8. "Hypothesized model of perceived collective teacher efficacy" (Adams & Forsythe, 2006, p. 639).

```
┌─────────────────────────────┐
│ Remote Sources of Efficacy  │
│ Information                 │
│                             │                              ┌──────────────┐
│  • Mastery Experience       │                              │  Perceived   │
│  • Vicarious Experience     │      ┌────────────┐          │  Collective  │
│  • Verbal/Social Persuasion │      │ Cognitive  │─────────▶│   Efficacy   │
│  • Affective/Physiological  │─────▶│  Process   │          │              │
│    State                    │      └────────────┘          └──────────────┘
└─────────────────────────────┘

┌─────────────────────────────┐
│ Proximate Sources of        │
│ Efficacy Information         │
│                             │
│  • Analysis of the Teaching │
│    Task                     │
│  • Assessment of Teacher    │
│    Competence               │
└─────────────────────────────┘
```
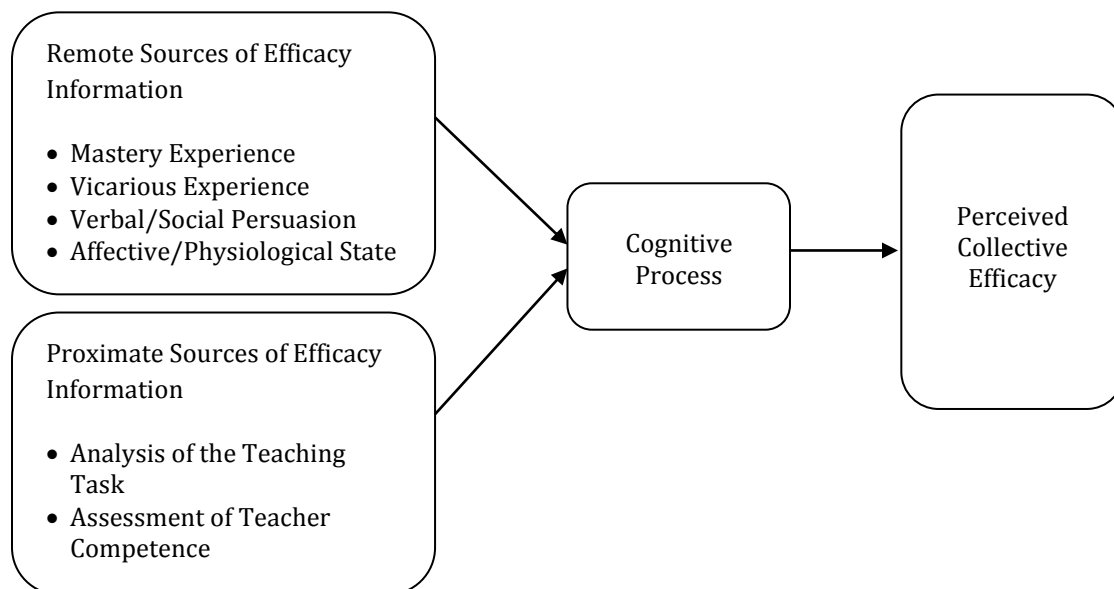
They found that contextual variables (SES, school level, and enabling school structure) influence CTE, accounting for 20% of the variance over and above prior academic performance (over 53% of the variance). They also found that school level and SES were inversely related to CTE, such that high poverty schools and schools that teach higher grade levels "possess embedded features that could potentially hinder efficacy perceptions" (Adams & Forsythe, 2006, p. 640). However, school structure, which is controllable, accounted for more of the variance than level or SES. They suggest that working to develop enabling school structures (Hoy &

Sweetland, 2000, 2001) can improve the CTE of a school by promoting the kinds of social interactions that can provide efficacy information.

Other researchers have found connections between CTE and what could be called proximate sources of efficacy. The inverse relationship between CTE and SES is well-established (Bandura, 1993; Parker, 1994; Goddard & Goddard, 2001; Goddard, LoGerfo, et al., 2004), but not inevitable: Goddard and Skrla (2006) found that in the particular urban school they studied, percentage of minority students and rate of poverty were not related to CTE, instead teachers' race and years of experience were important. They suggest that perhaps researchers should examine how school leaders can "create conditions that counter institutionalized deficit thinking" (p. 231). Tschannen-Moran & Barr (2004) also found no correlation between CTE and SES in their study of Virginia schools.

The leadership style of administrators contributes to the environment of a school, and thus would be considered within the analysis of the teaching task. Schools with transformational leadership, in which members are intellectually stimulated and valued, and a vision is identified and sustained (Ross & Gary, 2006a) tend to have higher levels of CTE (Ross & Gray, 2006a, 2006b; Dussault, Payette, & Leroux, 2008).

School culture and context are often a reflection of cultural norms of a nation or country. For this reason, CTE needs to be researched internationally. Schecter and Tschannen-Moran (2006) worked to develop an Israeli version of the Collective

Teacher Sense of Efficacy Scale (Tschannen-Moran & Barr, 2004), and two very

recent studies are exploring cross-cultural differences in collective teacher efficacy

(Chong et al. 2010; Klassen et al., 2010).

<div align="center">Bidirectionality</div>

In the 2004 model, the relationship between perceived collective efficacy and

the consequences of cultural norms is bidirectional. CTE influences cultural norms

when belief leads to action: "We believe we can be successful, so we behave this

way." Cultural norms influence CTE when action transforms belief: "We behave this

way, therefore, we believe we will be successful." The collective beliefs of teachers

about the potential for successfully functioning at their school create a climate of

high expectations at one end, or futility at the other.

If a faculty holds high expectations for success, then their behavior will

reflect that. Teachers will be more likely to put forth extra effort, persist in the face

of challenges, and show resilience to occasional failure. New faculty will be

introduced into an environment in which certain behaviors are expected. When the

norms for teacher behavior at a certain school call for certain courses of action that

lead to success, then CTE will increase.

A faculty that holds little confidence in their ability to promote successful

outcomes will not be as motivated to persist through difficulty, will show little

resilience when faced with failure, and will be less likely to put in extra effort in the

classroom. New faculty will see the behaviors of the existing faculty and may simply

conclude that since little is being done to promote achievement, there is little that can be done, adopting the jaundiced view of the faculty's collective efficacy.

The consequences of cultural norms at a school are also related reciprocally to individual teacher efficacy. As teachers are socialized, learning a school's norms and expectations, they begin to see how they fit into the broad scheme. Do their abilities measure up? Do they believe that they can achieve the kind of success that the school expects? "The sense of collective efficacy in a school can affect teachers' self-referent thoughts and, hence, their teaching performance and student learning" (Goddard, Hoy, et al., 2004, p. 8). Collective and personal efficacy beliefs affect the normative environment of a school as much as the environment affects beliefs.

The connection between collective and individual teacher efficacy has been explored in the literature. A school's success depends on both individual and group efforts, and accomplishments in one may lead to accomplishments in the other. Since collective mastery experiences come from successes of individual teachers, the two constructs may vary together (Goddard et al., 2000). Individual and collective efficacies have been found to be related and sometimes independent (Parker, 1994). There are significant correlations between teacher efficacy and collective teacher efficacy (Kurz & Knight, 2004; Fives & Looney, 2009). CTE is predictive of teacher efficacy for management and enhancing social relationships between students (Lev & Koslowsky, 2009), and predicts variation in teacher efficacy better than SES and achievement (Goddard & Goddard, 2001).

Outcomes

The final component in the cycle describes the outcomes of the cycle of efficacy. Remote and proximate sources of information inform a school's CTE, which affects the cultural norms of a school. This influences individual teacher efficacy, and it is because of this efficacy that teachers exhibit certain behaviors, leading to specific outcomes. These outcomes include teacher variables, such as commitment, satisfaction, empowerment, and innovation, as well as student variables like achievement attendance and college attendance.

Teacher Variables

According to the model, CTE works indirectly on these outcomes through cultural norms and teacher efficacy (Goddard, Hoy, et al., 2004). Still, exploring organizational level variables helps to better understand how schools differ. The literature connecting CTE and teacher variables shows that the collective efficacy at a school positively predicts teachers' involvement in school decision making (Goddard, 2002) and teacher commitment (Ware & Kitsantas, 2007), and correlates with goal consensus/vision (Kurz & Knight, 2004) and leadership capacity (Olivier & Hipp, 2006). When considering affective states of teachers, Klasseen (2010) found that teachers' collective efficacy may lower stress attributed to student behavior, and multiple researchers have found that CTE is related to job satisfaction (Caprara, Barbaranelli, Borgogni, & Steca, 2003; Skaalvik & Skaalvik, 2007; Klassen, Usher, & Bong, 2010). Both personal and collective teacher efficacies were found to

be related to levels of implementation of content literacy programs, with high

implementers demonstrating high efficacy and persistence to overcome barriers

(Cantrell & Callaway, 2008).

Student Achievement

The outcome of interest for this study is student achievement. Since

Coleman's seminal study of schools (Coleman et. al, 1966) found that social factors,

such as socioeconomic status, were more influential than school characteristics on

student achievement, educators and researchers have been looking for ways to

reclaim control, working to overcome the educational challenges presented by

poverty and community. Efficacy studies are conceptually a good fit for research

about student achievement, since they address varying beliefs about ability and

control. Self-efficacy can be linked to personal accomplishment (Bandura, 1977,

1986, 1997; Multon et al., 1991)), and teacher efficacy can be linked to student

achievement (Armor et al., 1976; Berman et al., 1977; Ashton et al., 1983; Ross,

1992; da Costa, 1995;), but since schools operate as a collective, with many

individuals contributing to the success or failure of a school, we look to collective

efficacy beliefs to understand school-level functioning.

Since the initial exploration of the connection by Bandura (1993) established

that CTE has a bigger impact on achievement than does SES, other researchers have

been examining the relationship as well. Bandura employed path analysis, using

school level-variables. When Goddard began his line of research with his

dissertation in 1998, he chose to use hierarchical linear modeling, so that he could examine multi-level variables. He found that CTE explained between one-half and two-thirds of the between schools variance in student achievement for math and reading, and that student achievement was affected more by collective efficacy beliefs than by race or SES (Goddard, 1998; Goddard et al., 2000). The next study lent support to these findings: CTE was positively and significantly related to between school differences in achievement (Goddard, 2001).

Subsequent studies have focused on school-level variables. Hoy, Sweetland, and Smith (2002) used correlation and path analysis to determine that CTE was more important than SES when explaining achievement. Tschannen-Moran and Barr (2004), using the 12 item Collective Teacher Belief Scale, an adaptation of the Teacher Sense of Efficacy Scale (Tschannen-Moran & Woolfolk-Hoy, 2001), found that CTE significantly correlated with eighth grade math, writing, and English achievement, accounting for 18%, 28%, and 14% of the variance, respectively. When controlling for SES, CTE made a significant independent contribution to writing, but not math or English achievement. Using structural equation modeling, two studies found that CTE significantly positively predicts achievement, even when other aspects of school context are controlled. (Goddard, LoGerfo, et al., 2004; Cybulski, Hoy, & Sweetland, 2005). Hoy, Tarter, and Woolfolk Hoy (2006) and Smith and Hoy (2007) explored the construct of academic optimism, of which CTE is the cognitive aspect, finding that academic optimism is directly related to achievement.

While research support for the relationship between CTE and achievement is strong, one potential limitation involves location and sample. The majority of the published research exploring this relationship has been conducted in Ohio schools, since the primary researchers (Cybulski , Goddard, Hoy, LoGerfo, Woolfolk-Hoy , Smith, Sweetland, and Tschannen-Moran) have had affiliations with Ohio State University. While this makes for a vibrant research base, it can potentially limit the generalizability of results. Fortunately, research is continuing in other parts of the country and world. Tschannen-Moran and Barr (2004) conducted their study in Virginia. John Ross (2004) and his colleagues (Ross et al., 2004; Ross & Gray, 2006a, 2006b) have studied the CTE- achievement connection in Canadian schools, and Parker, Hannah, and Topping (2006) examined CTE in the UK. Evidence is growing, but the application of this research to schools in a diversity of cultures remains to be seen.

Rationale

This meta-analysis will synthesize the evidence for a correlation between CTE and student achievement in order to look at the bigger picture, clarifying the extent of the relationship.

Meta-analysis is sometimes criticized for comparing studies that are too different- the "apples and oranges" problem (Lipsey & Wilson, 2001, p.2). However, it is through meta-analysis that one can examine the differences between studies to explore why results might diverge. Moderator analysis will be employed to

investigate those factors that might explain variations. In this particular study, a

review of the literature reveals that multiple measures are used to assess CTE, and

that a majority of the research has been conducted in Ohio schools. Through meta-

analysis, one is able to determine if these variations do indeed make a difference in

effect size. Is this phenomenon exclusive to Ohio schools? Is it only apparent when

using a certain measure or when studied by certain researchers? Is the construct

conceptualized differently in the various studies? When these questions have been

answered, implications may emerge that can direct future research; influence

teacher education and mentoring; and provide suggestions about school structures

and leadership.

This study will synthesize various studies in order to provide an overall

effect size that quantifies the correlation between CTE and student achievement,

and will explore moderator variables that might affect that relationship. It will

analyze the current research, so that future directions may be determined.

Conclusion

In this chapter, the construct of collective teacher efficacy has been

introduced. From the theoretical framework of social cognitive theory, efficacy was

defined and then related to teachers so that it could then be understood as an

organizational property in schools. Collective beliefs about a school's ability to

promote successful outcomes for students are powerful, in that they shape social

norms, and influence individual teacher as well as team behavior. When a school

demonstrates high levels of collective efficacy, students benefit, as their teachers

hold high expectations for success, persist in the face of difficulty, put in extra effort,

and show resilience. These teacher behaviors and the resulting school climate lead

to high student achievement. As the United States seeks to improve schools, and

increase achievement, part of the focus must be on collective teacher efficacy. It is

one of the biggest influences on student achievement, and, unlike school

demographic variables, such as student SES or neighborhood, which do not change

very easily, it can be influenced and changed, making it a potential key to school

improvement.

Having reviewed the pertinent literature, this chapter has provided the

background needed to conduct research that will clarify the relationship between

CTE and student achievement by meta-analyzing the results of all appropriate,

available studies.

CHAPTER 3

METHODS

After a brief introduction to the technique, and a reiteration of the research

questions, this chapter describes the methods for conducting the meta-analysis.

Following the guidelines for systematic review developed by the Campbell

Collaboration, this chapter will explain the following:

a. Criteria for inclusion and exclusion of studies in the review

b. Search strategy for identification of relevant studies

c. Description of methods used in the component studies

d. Criteria for determination of independent findings

e. Details of study coding categories

f. Statistical procedures and conventions

g. Treatment of qualitative research

(The Campbell Collaboration, 2001, p. 2).

Meta-Analysis

Beginning in the 1970s, meta-analysis has been used to synthesize research

results, using existing data to uncover patterns of findings in studies that purport to

assess the same or similar constructs (Lipsey & Wilson, 2001). Using meta-analysis,

this study synthesized data from all available studies that meet the inclusion

criteria, so that the relationship between collective teacher efficacy and student achievement can be more fully understood.

Thorough and detailed procedures are explained so that the reader is aware of how studies were selected, coded, and statistically analyzed. This systematic approach is essential for conducting a meta-analysis that includes all available and relevant information but does not muddy the waters with an overabundance of data points that cannot be compared.

Research Questions

This meta-analysis addressed the following questions:

1. What is the distribution of the effect sizes measuring the relationship between collective teacher efficacy and student achievement in the literature?

2. How do the effect sizes of this relationship vary based on certain moderator variables, such as school level, school location, type of study, instruments used, or the researchers involved?

Hypotheses

The hypotheses for this study were derived from a review of the current literature.

1. Collective teacher efficacy (CTE) will be strongly associated with student achievement: The beliefs that teachers hold about the ability of the school as

a whole to promote positive outcomes will be predictive of positive learning outcomes for their students.

2. Between studies variance will be explained by moderator variables, including school level, location of study, type of study, university affiliation, and instrument used to measure collective teacher efficacy.

Criteria for Inclusion and Exclusion of Studies in the Review

This study examined correlations between collective teacher efficacy and student achievement. The preliminary eligibility criteria included the following:

1. Studies were included that focus on teachers and students involved with compulsory education (K-12). The decision to include all compulsory grades was made so that all available studies could be used. Any studies conducted at the post-secondary level were excluded, since a college education is not compulsory, and the student population is comprised of self-selected individuals.

2. Studies were included that report school level variables of collective teacher efficacy and student achievement. Studies that do not aggregate the variables to the school level were excluded, so that comparisons could be made. For example, Goddard, et al. (2000) did not aggregate student achievement to the school level, so it is excluded even though it examined the relationship of interest. Collective teacher efficacy is typically measured through self-report survey of teachers and then aggregated, so that the school yields one score.

School achievement is typically measured with standardized tests, but
studies that use other measurements were included if the achievement
variable is quantifiable on a continuous scale, as was the case for Parker et al.
(2006), who used percentage of students attaining or exceeding minimum
national benchmark levels, as assessed by teacher observation.

3. Studies were included that report a Pearson product-moment correlation
between CTE and student achievement. This is typically reported as a
descriptive statistic. Studies that ultimately consider other relationships
were included as long as the desired correlation was reported. For example,
Ross and Gray (2006) were interested in indirect leadership effects, but
reported the correlations needed. On the other hand, Hoy et al. (2006)
discussed how CTE, as part of Academic Optimism, affects achievement, but
they did not report a correlation between CTE and achievement. When the
relationship is considered, but correlations are not reported, authors were
contacted to see if that data was available.

4. Studies conducted in any country were included if the report was available in
English.

Relevance decisions were made by the researcher, and initial screening was
conducted by examining article titles and abstracts and recording information on an
initial screening spreadsheet (Appendix A). Potential articles were further screened

by reading full reports. Final selection was made during the coding process, with the input of multiple coders.

Search Strategy for Identification of Relevant Studies

In order to retrieve all available studies that meet the criteria, several strategies were used. First, keyword searches of computerized databases were conducted. In order to identify variants of words, wildcard characters were initially used (e.g. efficac* to locate efficacy and efficacious). Preliminary searches revealed that using the following combinations yielded the most helpful results: "collective teacher efficacy"; "collective efficacy" and "teacher"; "collective teacher efficacy" and "achievement"; and "collective efficacy", "teacher", and "achievement". Searches were performed using ERIC, Academic Search Premiere, PsycINFO, JSTOR, Wilson Web, Dissertations and Theses: Proquest, and Google Scholar. Searches of other available databases did not yield any additional potential articles. Figure 9 details the database search process.

Next, key authors were contacted (Bandura, Goddard, Hoy, Ross, Tschannen-Moran), and finally, reference lists of previous meta-analyses, literature reviews, and collected articles were examined by the researcher.

Studies with titles and/or abstracts that appeared promising were collected electronically, if available. Articles that could not be electronically accessed were collected from hardcopy journals and books at university libraries, via interlibrary loan, or directly requested from author(s). References for potential articles were

entered into RefWorks, an online program designed to store and organize

bibliographic information.

Figure 9. Database search process, arranged chronologically.

Database	Keywords	Results
ERIC	Collective Teacher Efficacy	23 results, 23 unique,5 potential
ERIC	Collective Efficacy AND Teacher	57 results, 34 unique, 8 potential
Academic Search Premiere	Collective Teacher Efficacy	12 results, 2 unique, 1 potential
Academic Search Premiere	Collective Efficacy AND Teacher	39 results, 11 unique, 0 potential
PsycINFO	Collective Teacher Efficacy	37 results, 27 unique, 6 potential
PsycINFO	Collective Efficacy AND Teacher	65 results, 35 unique, 3 potential
Wilson Web	Collective Teacher Efficacy	4 results, 1 unique, 1 potential
Wilson Web	Collective Efficacy AND Teacher	9 results, 1 unique, 0 potential
JSTOR	Collective Teacher Efficacy	19 results, 12 unique, 1 potential
JSTOR	Collective Efficacy AND Teacher AND Achievement	72 results, 56 unique, 0 potential
Dissertations & Theses: Proquest	Collective Teacher Efficacy AND Achievement	30 results, 18 unique, 13 potential
Dissertations & Theses: Proquest	Collective Efficacy AND Teacher AND Achievement	46 results, 16 unique, 9 potential
Google Scholar	Collective Teacher Efficacy	39 results, 11 unique, 2 potential

Collected studies that met the three criteria for inclusion were saved, and in

some cases, printed, for further coding. If studies met the first two criteria, but did

not report a correlation between CTE and achievement, the lead author was

contacted, where possible, to see if the correlation was calculated, but not reported.

Figure 10. Selection process for study inclusion in preliminary meta-analysis.

452 records identified through database searching

248 records after duplicates removed

198 initially excluded after a review of titles and abstracts:
77 did not address CTE
98 of the remaining did not address student achievement
12 of the remaining did not address a correlation between CTE and student achievement
10 of the remaining were not quantitative studies
1 of the remaining could not be obtained.

50 potentially relevant records were obtained

19 excluded after secondary full text review:
11 used statistical methods incompatible with this meta-analysis
8 didn't directly address the necessary variables

31 records remained.

Author search yielded 2 additional records.

33 records coded.

7 were excluded after coding:
2 missing key variables
4 eliminated due to sample overlaps
1 measured CTE after an intervention

26 studies included in meta-analysis

The selection process was documented with a flow chart, in order to illustrate how the inclusion criteria were applied to the available studies, and how the final studies were selected. Figure 10 documents the inclusion and exclusion process for the preliminary study.

Description of Methods Used in the Component Studies

Since the statistic of interest for this meta-analysis was the Pearson product-moment coefficient, many types of study designs were acceptable, as long as the correlation between CTE and some measure of student achievement was reported.

The studies examined utilized path analyses, correlation, regression, and general linear modeling. For some, the CTE-achievement correlation was the focus of the study, while others examined a number of additional variables as well, or even reported the correlation as part of overall descriptive statistics and explored something else entirely. Partial correlations, regression coefficients, and correlations from within models were not used, as they factor in other variables.

Initially, the articles were to be confined to those that reported a correlation between CTE and subsequent student achievement. However, study coding and contact with authors revealed that many studies that examined this relationship did not adhere to these time constraints. Many (eight dissertations, one published article) used student achievement data that was measured at some point before CTE, without conceptualizing that achievement as antecedent to CTE. Seven of the

studies did not clearly describe the timing of the measurements, leaving ten studies that specifically state that CTE was measured before achievement.

Criteria for Determination of Independent Findings

When a study reported more than one of the required correlations for a single sample, the correlated variables were examined, and all appropriate correlations were coded. Multiple measures of CTE for the same sample were coded, as were all measures of student achievement within the same sample. For each study, a mean correlation was determined by finding the average of all reported correlations between CTE and achievement. A spreadsheet was compiled containing columns for the calculated mean correlation, and correlations between CTE and subject specific achievement (math, reading, writing, English, social studies, science) as well as overall achievement. When a study reported more than one subject-specific correlation, then those correlations were averaged to yield one data point per column. For example, Pearce (2007) measured math, reading, and writing achievement for third, fourth, and fifth grades, so for each subject area, the average of the three correlations for CTE and achievement was reported as one correlation. These calculations were necessary for six studies (Fancera, 2009; Garcia, 2004; Jackson, 2010; McCoach & Colbert, 2010; Pearce, 2007; and Washburn, 2006).

None of the usable studies reported correlations for more than one independent sample, so there were no cases in which one study yielded two correlations for one meta-analysis.

Details of Study Coding Categories

The coding sheet and manual (Appendix B) were developed as Excel spreadsheets, and documented the following: characteristics of the study, the setting, and the subjects; study design; outcome measures (collective teacher efficacy, and student achievement); relevant statistics; and additional information that may prove helpful. All studies were coded by the author. Two additional coders were trained and they coded six of the studies, so that interrater reliability could be evaluated.

The literature review indicated that variables that can influence CTE include prior academic achievement (Goddard, 2001; Goddard & Goddard, 2001; Goddard, LoGerfo, & Hoy, 2004; Ross, Hogaboam-Gary, & Gray, 2004), SES (Bandura, 1993; Parker, 1994; Goddard & Goddard, 2001; Goddard, LoGerfo, et al., 2004), administrative leadership style (Ross & Gray, 2006a, 2006b; Dussault, Payette, & Leroux, 2008), school level, and school structure (Adams & Forsythe, 2006). These variables were coded as possible moderators. Of these potential moderators, only school level was reported consistently enough to perform moderator analysis.

A preliminary meta-analysis of only published studies (Eells, 2010) found that instrument used to measure CTE was a moderator of the between-study variance. Additionally, Tschannen-Moran and Barr (2004) have raised questions concerning the adequacy of the CE SCALE in challenging environments. For these reasons, CTE measure was coded for moderator analysis.

The preliminary study (Eells, 2010) also found that location of the study was a significant moderator, and that schools in Ohio showed a higher effect size. The number of studies included in that analysis (N=9) was small, so that relationship needed further investigation; thus, state was also coded as a possible moderator.

Examination of the studies revealed that many of the authors were affiliated with Ohio State University at some point, or someone with ties to Ohio State University sat on the author's dissertation committee. For that reason, university affiliation was also coded as a potential moderator. Additionally, since this meta-analysis included both published and unpublished studies, coding included an indication of study type (dissertation or article) to be examined as a potential moderator.

The coding process revealed similarities between several pairs of studies. The study for the dissertation by Barr (2002) was continued and expanded by Tschannen-Moran and Barr (2004). M. Tschannen-Moran (personal correspondence, November 22, 2010) confirmed that the published study included the sample from the dissertation, so Barr(2002) was eliminated, while Tschannen-Moran and Barr (2004) remained. The dissertation by Cybulski (2003) became a published article (Cybulski, Hoy, and Sweetland, 2005), reporting duplicate sample sizes and correlations, so the dissertation remained in the analysis, and the published article was removed. W. Hoy (personal communication, March 4, 2010) confirmed that the studies by Goddard, LoGerfo, and Hoy (2004) and Hoy,

Sweetland, and Smith (2002) used the same dataset. It was decided that the

Goddard et al. (2004) study would remain, since it reported more usable

correlations than did Hoy et al. (2004). The dissertations by Jackson (2010) and

Kirby (2010), both from the College of William and Mary, reported identical sample

sizes and correlations; it is assumed that they used the same dataset. The decision to

use Jackson's study was made because Jackson's study (2010) addressed the

relationship between CTE and achievement directly, while Kirby (2010) explored

Academic Optimism (of which CTE is a part). For the preliminary study, Ross

(2004) was included, but further examination revealed that Ross's reported

correlation was measured after a running-records assessment intervention. Since

none of the other studies employed an intervention, this study was excluded.

Statistical Procedures and Conventions

The primary effect of interest was the predictive relationship between

measured CTE and subsequent student achievement, both continuous variables, as

measured by the Pearson product-moment correlation coefficient (r). These

coefficients needed no further calculation from study results, since the correlation

coefficient, as reported, is the effect size. Statistics were calculated using

Comprehensive Meta-analysis software (Borenstein et al., 2005), which required the

input of correlation, sample size, and effect direction (positive or negative) as well

as moderator information.

Recognizing that data can be deceptive (Schmidt, 2010), procedures to correct sampling and measurement error were conducted where possible. To correct for sampling error, calculations were conducted after the effect size (*r*) was transformed using Fisher's Z_r –transform (Lipsey & Wilson, 2001), which is a variance stabilizing transformation. Instead of simply comparing correlations across studies with varied sample sizes, meta-analysis weights each effect size based on the standard error. In this way, studies with small sample sizes will not artificially alter the overall effect size. In one of the component studies, Sidhu (2006) reported a sample size of 6, with a CTE-math achievement correlation of .375. Since this component study has a very small sample size, its confidence intervals is very wide, indicating room for a lot of possible error. The component study with the largest sample size (205) was Ross and Gray (2006a), with a CTE- overall achievement correlation of 0.58. Stabilizing the variance in this way allows for more accurate comparison.

The correction for measurement error employs the reliabilities of each measure used (Schmidt, 2010). For this meta-analysis, this correction could not be conducted because the component studies did not employ the same tools to measure CTE and achievement, and did not always report the reliabilities of the measures used.

Various strategies were employed to address the potential effects of publication bias. First, the search process included both published and unpublished

studies, as well as studies that addressed different relationships but reported the correlation of interest, and efforts were made to locate studies from other countries. Second, this group of studies contained one outlier, so analysis was conducted both with and without the outlier. Third, the decision was made to include studies that measured achievement before CTE, as long as the study addressed the influence of CTE on achievement in some way. Adhering to a stricter timing policy would have reduced the sample size by more than half. Finally, data were examined using a funnel plot to look for asymmetry, which would indicate the presence of publication bias.

The software used calculates both fixed and random effects models. For each meta-analysis run, the a priori assumption was that the effect sizes would not come from the same population, necessitating random-effects analysis, and there would therefore be variance that needed to be explained through moderator analysis. Cooper (2010) defends this method when moderator choices are theoretical and/or practical. However, the calculations for the homogeneity statistic (Q) came from fixed-effects calculations, because random-effects calculations assume between sample variance, distorting Q.

After homogeneity testing, random-effects procedures were used to calculate weighted mean effect sizes, and moderator analysis was employed to determine what may account for any variance that existed in the effect sizes. The moderator analyses included both categorical, ANOVA-type models and meta-regression, and

began by examining the following variables: university affiliation, state, and instrument used to measure CTE.

Treatment of Qualitative or Excluded Research

Studies which do not provide the needed correlation coefficient have been addressed as part of the literature review, but were not analyzed systematically.

Conclusion

This chapter reiterated the research questions and hypotheses, briefly described meta-analysis, and detailed the procedures and methods that were used to conduct this study. The systematic search procedures increased the chances that all available studies appropriate for conclusion were located and coded so that the results could be analyzed, yielding an effect size that quantifies the nature of the relationship between CTE and student achievement, while considering moderator variables that may be significant. With clearly defined procedures in place, the meta-analysis was careful, detailed, and thorough, with explicit documentation throughout.

CHAPTER 4

RESULTS

This chapter will report the results of the analyses conducted. It will begin

with a report about interrater reliability before presenting a description of the

sample, detailing the characteristics of the component studies. Next, the initial meta-

analysis is described and results reported. This is followed by a description of the

twelve additional meta-analyses run and their results. Finally, moderator analysis is

explained in depth.

Interrater Reliability

The quality of the coding document was analyzed in the preliminary study

(Eells, 2010), so for this study, double coding was used to check the reliability of the

researcher's coding. Two graduate students were trained to code six of the

published articles. The agreement rates (for document items) between the

researcher and the first additional coder ranged from 0.67 to 1.00, with an average

AR of 0.93. In additional to discussion and reexamination of the texts, the coding

completed by the second additional coder was used for comparison purposes to

resolve any disagreements.   The disagreements were clerical in nature, and did not

reveal any problems with the quality of the coding document. The final data set

used the coding completed by the researcher.

Description of Studies

Table 1 provides sample characteristics for the 26 studies that were included. The dates of publications for the nine studies that appeared in journals (seven) or a book (one) ranged from 1994 to 2010, with a median of 2004, and triple modes of 2002, 2004, and 2006. The seventeen dissertations were completed between 2003 and 2010, with a median year of 2007, and a mode of 2010. All were written in English.

Five of the studies were conducted in Ohio schools by authors with an affiliation to Ohio State University. Five of the studies were conducted in Virginia schools, four of which were authored by those with affiliations to The College of William and Mary. This is noteworthy, since the bulk of the research concerning teacher efficacy, both at the individual and collective level, finds its heritage at Ohio State, with Wayne Hoy, Anita Woolfolk Hoy, Roger Goddard, and Megan Tschannen-Moran (Tschannen-Moran & Woolfolk Hoy, 1998; Goddard, et al., 2000). Two of the four 2010 dissertations came from The College of William and Mary, where Tschannen-Moran is a current faculty member. The other two were from the University of Alabama, where C. John Tarter is currently a faculty member. Tarter, who collaborated with Hoy and Woolfolk Hoy to study Academic Optimism (Hoy, Tarter, & Woolfolk Hoy, 2006) was dissertation chair for one of the Alabama dissertations and both of the dissertations from St. John's University in Jamaica, NY.

Three studies were conducted in other countries- Canada, Nigeria, and the United

Kingdom.

Table 1. Characteristics of component studies.

Study	Author Affiliation (Diss. Chair)	Location	Setting	Level	CTE measure	Achievement Measure	Timing of CTE measure
Adams, Forsyth (2009)	Univ. of Oklahoma	Midwestern state	NA	E,M,H	CE-SCALE (short)	Academic Performance Index	before and after
Antonelli (2005)	St. John's Univ. (Tarter)	New Jersey	U,S	E	CE-SCALE (short)	New Jersey's Elementary School Proficiency Exam or Terra Nova	after
Bevel (2010)	Univ. of Alabama (Rucinski)	Alabama	U,R	E	CE-SCALE (short)	Alabama Reading and Math Test (reading)	after
Cooper (2010)	Univ. of Alabama (Tarter)	Alabama	NA	H	CE-SCALE (short)	Alabama standardized high school assessment	after
Cybulski (2003)	Ohio State Univ. (Hoy)	Ohio	U,S,R	E	CE-SCALE (short)	Ohio proficiency exams in reading, math	before and after
Fancera 2009	Rutgers (Bliss)	New Jersey	NA	H	CE-SCALE (short)	New Jersey high school proficiency assessment,	after

Study	Author Affiliation (Diss. Chair)	Location	Setting	Level	CTE measure	Achievement Measure	Timing of CTE measure
Garcia (2004)	Loyola (Cuneen)	Chicagoland	NA	H	CE-SCALE (long)	Prairie State Achievement Exam, (reading, math)	before
Goddard (2002a)	Ohio State Univ.	Ohio	U	E	CE-SCALE (long)	Math achievement data	not clear
Goddard, LoGerfo, Hoy (2004)	Ohio State Univ.	Large Midwestern State (Ohio)	U,S,R	H	CE-SCALE (short)	State content area assessments	before and after
Hoy, Smith & Sweetland (2002)	Ohio State Univ., Univ. of Michigan	Ohio	R	H	CE-SCALE (short)	Math proficiency test	not clear
Jackson (2010)	College of William and Mary (DiPaola)	Virginia	U	E	CTBS (short)	Virginia Standards of Learning	before
McCoach, Colbert (2010)	Univ. of Connecticut	Connecticut	NA	E,M,H	CE-SCALE (long)	Latent variable from standardized tests	not clear
Nicholson (2003)	Ohio State University (Hoy)	Ohio	U,S,R	E	CE-SCALE (short)	Standardized proficiency exams	before and after
Omolade (2007)	St. John's University, (Tarter)	Nigeria	U	E	CE-SCALE (short)	Standardized state test	not clear

Study	Author Affiliation (Diss. Chair)	Location	Setting	Level	CTE measure	Achievement Measure	Timing of CTE measure
Parker, Hannah, & Topping (2006)	Univ. of Dundee, UK	UK, Scotland	NA	E	CTBS	National benchmark assessments (reading, writing, math)	not clear
Parker (1994)	Stanford Univ.	US	U	E	Experimenter made	California Test of Basic Skills (reading, language, math)	before and after
Pearce (2007)	Univ. of Colorado at Denver (Muth)	Colorado	U,S,R	E	CE-SCALE (short)	Colorado Student Assessment Program	not clear
Pennycuff (2010)	College of William and Mary (DiPaola)	Virginia	U	E	CTBS	Virginia Standards of Learning (reading)	before
Ross & Gray (2006)	Univ. of Toronto	Canada, Ontario	U	E	CE-SCALE (long)	standardized performance assessment	before and after
Schumacher (2009)	Western Illinois Univ. (Kilmer)	Eastern Iowa	U,R	E	CE-SCALE (short)	Iowa Test of Basic Skills	after
Shepard (2005)	Univ. of Mississippi (Smothers)	Mississippi	NA	E	CE-SCALE (long)	School Performance Classification	after

Study	Author Affiliation (Diss. Chair)	Location	Setting	Level	CTE measure	Achievement Measure	Timing of CTE measure
Sidhu (2006)	Alliant Intl. Univ. (Fu)	Fresno, CA	U	E	TSES (both TE and CTE)	California Standards Test	not clear
Solomon (2008)	Univ. of Missouri-Columbia (Valentine)	Missouri	NA	M	CE-SCALE (short)	Missouri Assessment Program	after
Tschannen-Moran & Barr (2004)	College of William and Mary	Virginia	U,S,R	M	CTBS	Virginia Standards of Learning (math, writing, English)	after
Wagner (2008)	College of William and Mary (DiPaola)	Virginia	NA	H	CE-SCALE (short)	Virginia Standards of Learning	before
Washburn (2006)	Univ. of Virginia (Ball)	Virginia	U,S,R	E	CE-SCALE (short)	Virginia Standards of Learning	after

Note: Study refers to author(s) and year of publication. Author Affiliation refers to the author(s)' current professional or graduate school affiliation, and names in parentheses served as dissertation chair. Location refers to school location, including state or country, if not in the United States. Setting refers to urban (u), suburban (s), rural (r), or not available (NA). Level refers to elementary school (E), middle school (M, or high school (H). CTE Measure refers to the method(s) for assessing Collective Teacher Efficacy. CE-SCALE (short) is Goddard's (2002b) 12 item scale. CE-SCALE (long) is the 21-item scale from Goddard, Hoy, and Woolfolk Hoy (2000). CTBS is the Collective Teacher Beliefs Scale, developed by Tschannen-Moran and Barr (2004). TSES is the Teacher Self-Efficacy Scale (Tschannen-Moran & Woolfolk Hoy, 2001). Achievement Measure refers to the method(s) for assessing student achievement, including type of test and content area, if reported. Timing of CTE measure indicates whether CTE was measured before or after achievement, or if the study was not clear about timing.

Sixteen studies were conducted at the elementary school level, two at the middle school level, and six in high schools. Two studies included all grade levels. With the exception of the Nigeria study, all of the schools were public. The Nigerian schools were a combination of public and private.

In all studies, CTE was measured using self-report, likert scale surveys, typically administered during regularly scheduled faculty meetings. 20 of the studies used the Collective Efficacy Scale (CE-SCALE) developed as a 21 item instrument by Goddard and his colleagues (Goddard, et al., 2000), and later modified to become a short form by Goddard (2002b). Five of the 20 studies used the long form of the CE-SCALE and 15 used the short form. Four studies measured CTE with the Collective Teacher Belief Scale, or CTBS (Tschannen-Moran & Barr, 2004). One study used the Teacher Self-Efficacy Scale (Tschannen-Moran & Hoy, 2001), measuring both teacher efficacy and collective efficacy, and one study used an experimenter-made instrument.

Achievement, in all cases, was measured with state-mandated standardized assessments, and obtained from the governing bodies. The samples were independent, even when the studies were conducted in the same state, and achievement data was obtained from the same governing body. In cases of potential overlap, authors were contacted to confirm independence, and if needed, studies were eliminated.

It was the intent of the meta-analyst to only include studies that measured

CTE before achievement, since the bulk of the published work addressing the

relationship between CTE and achievement conceptualizes prior achievement as an

antecedent to CTE, such that information about achievement influences a school's

collective efficacy beliefs (Goddard, LoGerfo, et al., 2004; Ross et al., 2004). Coding

revealed, however, that this conceptual chain was not built into all of the study

designs. Nine of the studies measured achievement at some point after measuring

CTE; ten of the studies used achievement scores from before the time when CTE was

measured; and seven of the studies did not clearly describe the timing of the

measures. When asked about this issue, Tschannen-Moran (personal

correspondence, November 22, 2010) suggested that collective efficacy is fairly

stable over time, barring some shock to the system, so eliminating studies that

measure achievement before CTE might exclude some important evidence. A search

through the literature showed that a related concept, school climate, shows stability

over time (Hoy, Hannum, & Tschannen-Moran, 1998; Kallestad, 2010). Tschannen-

Moran et al. (1998) asserted that teacher efficacy, once established was fairly stable,

but could be influenced. Evidence of that stability in CTE research was less obvious.

Studies that clearly explored the influence of prior achievement, conceptualized as

antecedent, were excluded, but if the stated goal of any study examined factors that

could influence achievement, it was included.

Table 2. Sample sizes and effect sizes (reported and calculated) for each study in the meta-analysis.

		Calculated	Reported Effect Sizes						
Authors	*N*	*r* mean	*r* over-all	*r* math	*r* read.	*r* writ.	*r* Eng	*r* SS	*r* sci
Adams, Forsyth	79	0.720	0.72						
Antonelli	39	0.040		0.04					
Bevel	29	0.704			0.704				
Cooper	45	0.576		0.573	0.578				
Cybulski	145	0.739		0.723	0.754				
Fancera	53	0.781		0.775	0.79	0.79	0.77		
Garcia	9	0.841	0.842	0.862	0.818				
Goddard	45	0.670		0.67					
Goddard et al.	96	0.556		0.63	0.54	0.52		0.54	0.55
Hoy et al.	55	0.611		0.611					
Jackson	35	0.470		0.47	0.47				
McCoach, Colbert	44	0.602	0.602						
Nicholson	146	0.732		0.719	0.745				
Omolade	51	0.553	0.57	0.58			0.51		
Parker	19	0.470		0.29	0.61		0.51		
Parker et al.	15	0.546		0.404	0.596	0.639			
Pearce	25	0.566		0.541	0.603	0.553			
Pennycuff	45	0.490			0.49				
Ross, Gray	205	0.580	0.58						
Schumacher	56	0.492		0.547	0.436				
Shepard	30	0.611	0.611						
Sidhu	6	0.373		0.375			0.37		
Solomon	138	0.619		0.638			0.6		
Tschannen-Moran, Barr	66	0.427		0.41		0.5	0.37		
Wagner	36	0.458			0.45	0.37		0.43	0.58
Washburn	31	0.623		0.595			0.633	0.635	0.63

Note. N=sample size; r= correlation family effect size

The correlation between CTE and achievement was defined in numerous ways. Table 2 shows the sample sizes and Pearson product-moment correlations reported for each article. Sample sizes ranged from six to 205, with a mean sample size of 59.35, and correlations ranged from 0.37 to 0.862, with the exception of one outlier (0.04). Each reported correlation was recorded as a separate effect size (r). For each study, r-mean was calculated by averaging all of the reported effect sizes for each study. The rest of the effect sizes were recorded as reported for math, reading, writing, English, science, and social studies. Reported correlations ranged from one to five per study.

In addition to grouping correlations by subject area, separate meta-analyses were run for the three groups that differed according to the timing of the CTE measure (CTE first, achievement first, timing unsure).

The funnel plot of precision by Fisher's Z provides information about possible publication bias. The plotted values in Figure 11 are roughly symmetrical, but heavier on the left side, with one outlier. This would indicate little publication bias. Figure 12 shows the result of Duval and Tweedie's trim and fill methods (2000) with imputed studies. The new funnel plot indicates that, in the absence of bias, the effect size may be slightly higher than is reported.

Figure 11. Funnel plot of precision by Fisher's *Z*.
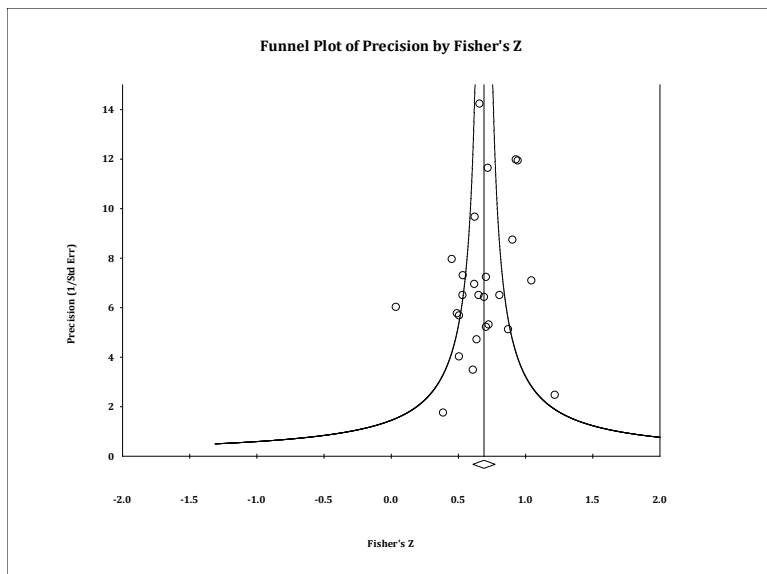
Figure 12. Funnel Plot of Precision by Fisher's *Z*, with imputed values added after Duvall and Tweedie's trim and fill. Open shapes are the observed random-effects effect sizes, closed shaped are imputed effect sizes.
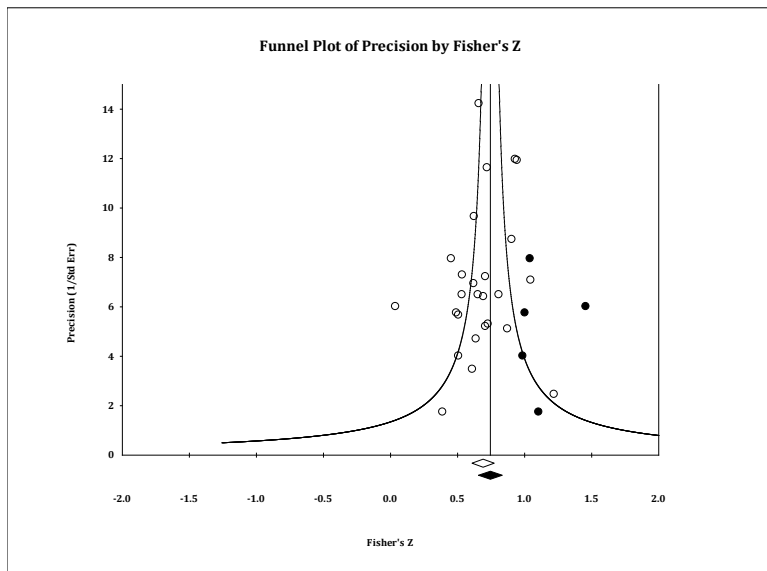
One study was treated as an outlier. It was a dissertation that addressed school effectiveness, with CTE as one variable measured. Since the CTE-achievement correlation reported was so low (0.04), the author was contacted. She indicated that the correlation in question was not a major component of the study, so its low value was not explored further, and the author could offer no explanation about possible reasons for the value (L. Antonelli, personal communication, December 4, 2010).

Meta-Analyses One and Two: *r*-mean

Examination of the forest plot of the effect sizes for *r*-mean (Figure 13) provides a visual analysis of the data. Two studies have confidence intervals that contain zero, and one of those studies reports a correlation so different from the others that it will be treated as an outlier. A line cannot be drawn that intersects all confidence intervals. This suggests heterogeneity in the sample.

The null hypothesis for the test of homogeneity is that all effect sizes come from the same population (H_0: $\rho_1 = \rho_2 = \ldots \rho_3$). The Q statistic measures the variance within the sample, and in this case, $Q=55.114$ ($df=25$, $p<.001$). This means that there are significant differences within the sample, and the effect sizes are not coming from the same population: The null hypothesis is rejected, and random-effects modeling is most appropriate, confirming the a priori assumption. The remainder of the meta-analyses will utilize random-effects modeling to yield a weighted average effect size, and moderator analyses to explain any variance found. If homogeneity testing

Figure 13. Forest Plot of *r*-mean effect sizes (*N*=26), including random effects weighted average effect size.

Study name	Statistics for each study			Correlation and 95% CI
	Correlation	Lower limit	Upper limit	
Adams, Forsyth	0.720	0.593	0.812	
Antonelli	0.040	-0.279	0.351	
Bevel	0.704	0.455	0.851	
Cooper	0.576	0.339	0.743	
Cybulski	0.739	0.654	0.805	
Fancera	0.781	0.648	0.868	
Garcia	0.841	0.399	0.966	
Goddard	0.670	0.469	0.805	
Goddard, LoGerfo, Hoy	0.556	0.400	0.681	
Hoy, Smith, Sweetland	0.611	0.413	0.754	
Jackson	0.470	0.162	0.694	
McCoach, Colbert	0.602	0.372	0.763	
Nicholson	0.732	0.646	0.799	
Omolade	0.553	0.328	0.719	
Parker	0.470	0.020	0.762	
Parker, Hannah, Topping	0.546	0.047	0.827	
Pearce	0.566	0.219	0.785	
Pennycuff	0.490	0.229	0.685	
Ross, Gray	0.580	0.481	0.664	
Schumacher	0.492	0.263	0.668	
Shepard	0.611	0.322	0.796	
Sidhu	0.373	-0.629	0.909	
Solomon	0.619	0.504	0.712	
Tschannen-Moran, Barr	0.427	0.206	0.606	
Wagner	0.458	0.152	0.683	
Washburn	0.623	0.345	0.801	
	0.598	0.542	0.649	

-1.00   -0.50   0.00   0.50   1.00

reveals that there is not significant variance in the sample, then the fixed effect and random effects calculations will yield the same effect size.

Using random-effects modeling, which assumes significant between-study variance, the weighted average effect size for r-mean is 0.598, with a 95% confidence interval of 0.542 - 0.649. When the same meta-analysis was repeated with the outlier (Antonelli, 2005) removed, homogeneity testing indicated that there was less variance to explain: Q=38.198 (df=24, p<0.03). The weighted average effect size of r-mean (outlier removed) was 0.617, with a 95% confidence interval of 0.571 - 0.659.

Meta-Analyses Three through Thirteen

While r-mean compared all available information, studies were also grouped by type of achievement measured and by timing of measurement to see if this would alter the results.

Figure 14 presents the forest plot of effect sizes for all meta-analyses conducted, and Table 3 presents all the relevant statistics. All of the confidence intervals overlap. The tests of heterogeneity revealed that eight of the thirteen analyses showed significant variance within their samples, further confirming the need for random-effects modeling. The five analyses with a non-significant Q all examined 8 or fewer studies.

Figure 14. Effect sizes for all meta-analyses conducted, with 95% confidence intervals.
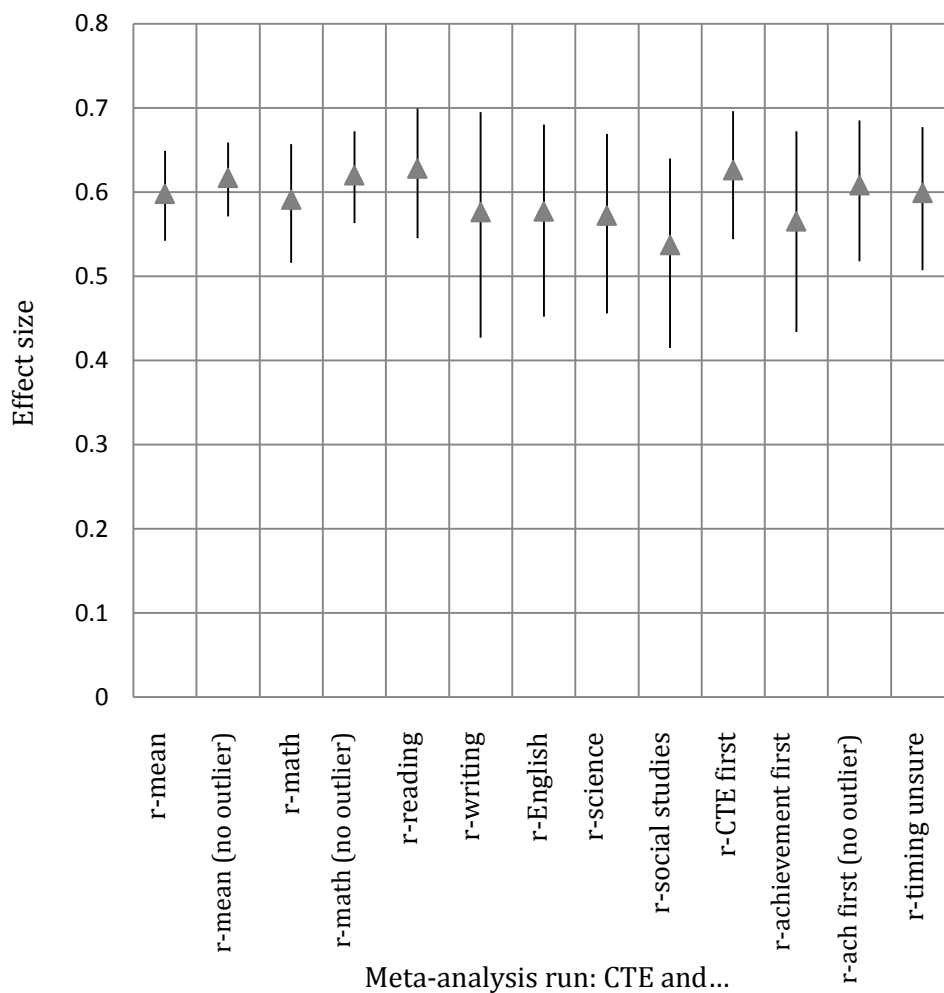
The effect sizes ranged from 0.537 (*r*-social studies) to 0.628 (*r*-reading). When grouped according to timing, the effect sizes did not differ dramatically, although studies that measured achievement at some point after CTE showed a higher average effect size.

Table 3. Homogeneity statistics and random effects weighted average effect sizes for all meta-analyses.

Analyses (CTE by…)	Test of Homogeneity		Weighted Average Effect Size	
	Q	*df*	*r*	95% *CI*
r-mean	55.114***	25	0.598	0.542-0.649
r-mean (outlier removed)	38.198*	24	0.617	0.571-0.659
r-math	46.274***	18	0.591	0.516-0.657
r-math (outlier removed)	28.611*	17	0.620	0.563-0.672
r-reading	32.523**	13	0.628	0.545-0.699
r-writing	12.434*	5	0.576	0.427-0.695
r-English	12.321	6	0.577	0.452-0.680
r-science	0.332	2	0.572	0.456-0.669
r-social studies	1.277	2	0.537	0.415-0.640
r-CTE before achievement	23.189**	9	0.626	0.544-0.696
r-achievement before CTE	26.704***	8	0.565	0.434-0.672
r-achievement before CTE (outlier removed)	12.204	7	0.608	0.518-0.685
r-timing unsure	1.241	6	0.599	0.507-0.677

*Note: Q= homogeneity statistic; df= degrees of freedom; r=weighted average effect size; CI= confidence interval; *=p<.05; **=p,.01; ***=p<.001*

Moderator Analysis

In an effort to explain the variance found in the sample, five variables were examined as potential moderators: university affiliation, CTE measure, state (study location), school level (elementary, middle high school, all), and study type (dissertation or published study). Since all of these variables were categorical, the ANOVA-like mixed effect model was used. Meta-regression was not appropriate, because there were a small number of studies, and because the variables were categorical rather than continuous.

The analyses were conducted using r-mean (outlier removed). This effect size was used because it included all of the studies (minus the outlier), so it would have the potential to yield the most meaningful results.

Neither school level nor study type was a significant moderator: Neither could explain any of the variance between groups. The moderator, state, was eliminated from consideration because of confound with another moderator variable, as will be explained. The two moderators that had significant associations with effect size were university affiliation, and CTE measure. The following sections describe these moderator analyses in further detail. A table with results from both the significant and non-significant moderators can be found in Appendix C

Cross-tabulation of Moderators

State was a categorical variable with four groups (Alabama, Ohio, other, and Virginia) describing the location of the study. However, coding revealed a confound between this variable and university affiliation. All of the OSU studies were all of the Ohio studies; both of the UA studies were also both of the Alabama studies; and all of the WM studies were conducted in Virginia schools. There was one Virginia study from another university. Table 4 illustrates this overlap.

Table 4. Cross-tabulation of moderators: University affiliation and state.

	OSU	Other	UA	WM	
Ohio	5				5 (20%)
Other		13			13 (52%)
Alabama			2		2 (8%)
Virginia		1		4	5 (20%)
	5 (20%)	14 (56%)	2 (8%)	4 (16%)	25 (100%)

Since there was not enough variety in the groupings, state was eliminated as a moderator. The decision to retain university affiliation was based on the literature: Much of the CTE research has come out of Ohio State University, or from researchers who had previous affiliations there. One of those researchers is now

working out of the College of William and Mary, and has taken a somewhat different

approach to CTE research.

Table 5. Cross-tabulation of moderators: University affiliation and CTE measure

	OSU	Other	UA	WM	
CE Long	1	4			5 (20%)
CE Short	4	7	2	1	14 (56%)
CTBS		1		3	4 (16%)
Other		2			2 (8%)
	5 (20%)	14 (56%)	2 (8%)	4 (16%)	25 (100%)

This leads to the third moderator of interest: CTE measure. There was a

possibility of confound between CTE measure and university affiliation, since

researchers at OSU developed both forms of the CE-Scale, and researchers at WM

developed the CTBS. However, as Table 5 shows, it is not the case that the CE SCALE

(either form) was only used at OSU, or the CTBS was only used at WM. The use of

those scales by other universities allows us to consider their moderating effects.

There is sufficient variety in the groupings to proceed with analysis of CTE measure

as a moderator, albeit with caution.

Moderator: University Affiliation

Figure 15. Forest plot of *r*-mean effect sizes, grouped by moderator: University affiliation.

Group by	Study name	Statistics for each study			Correlation and 95% CI
Univ. Affiliation		Correlation	Lower limit	Upper limit	
OSU		0.687	0.636	0.731	
other		0.617	0.570	0.660	
UA		0.629	0.464	0.752	
WM		0.457	0.330	0.567	
Overall		0.626	0.593	0.656	

-1.00   -0.50   0.00   0.50   1.00
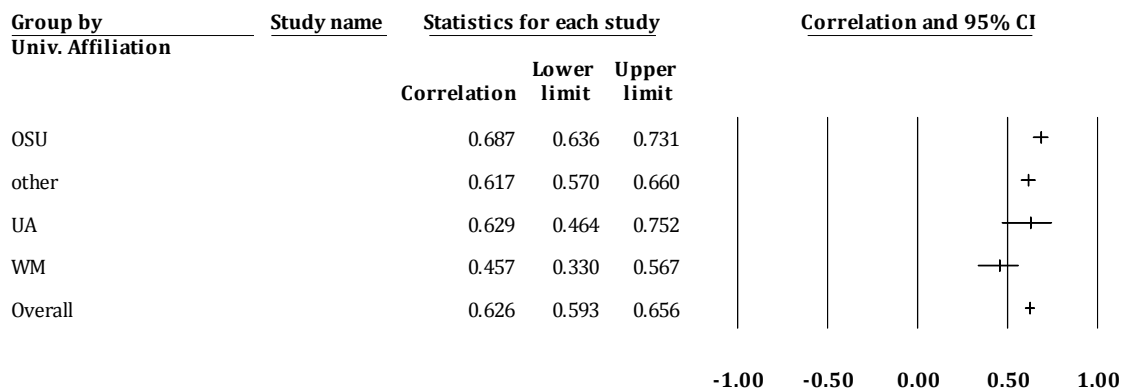
University affiliation was a categorical variable with four groups: OSU (those researchers affiliated with Ohio State University), WM (those researchers affiliated with The College of William and Mary), UA (those researchers affiliated with the University of Alabama) and other (all the remaining studies). This moderator explained the variance well: There was significant variance between studies ($Q_{between}$=15.434, *df*=2, *p*<.001), but not within studies (Q_{within}=22.764, *df*=22, *p*=0.415) or within groups. The average effect size for the OSU studies was 0.676. Other universities yielded an average effect size of 0.617. The two studies from UA had an average effect size of 0.629. The WM studies had an average effect size of

0.457. Figure 15 shows that the confidence interval of the WM effect size doesn't overlap with the confidence intervals of OSU studies or studies from other universities. The confidence interval for the UA effect size is rather large, since the sample size was two.

<center>Moderator: CTE Measure</center>

Figure 16. Forest plot of *r*-mean effect sizes, grouped by moderator: CTE measure.

Group by CTE measure	Study name	Statistics for each study			Correlation and 95% CI
		Correlation	Lower limit	Upper limit	
CE long		0.605	0.531	0.670	
CE short		0.645	0.590	0.695	
CTBS		0.464	0.329	0.581	
other		0.455	0.042	0.736	
Overall		0.604	0.562	0.642	

<center>-1.00   -0.50   0.00   0.50   1.00</center>
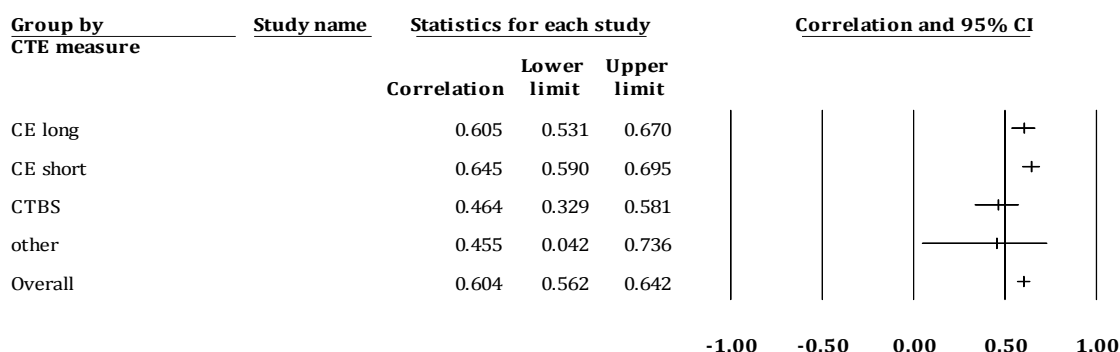
CTE measure was a categorical variable analyzed with three groups: CE short (used the 12 item version of CE-SCALE), CE long (used the 21-item version of the CE-SCALE), and other (used any other measure). The analysis explained the variance in the scores well: There was significant variance between studies ($Q_{between}$=12.047, df=3, p<.01), but not within studies (Q_{within}=26.151, df= 21, p= 0.201). The within groups Q was not significant for CE long, CTBS, or other, but was significant for CE short. Studies that used the long version of the CE-SCALE had an

average effect size of 0.605; studies that used the short version of the CE-SCALE had an average effect size of 0.645; studies that used the CTBS had an average effect size of 0.464; and studies that used some other measure (*N*=2) had an effect size of 0.455, and a large confidence interval. There was no overlap between the confidence intervals for studies that used the short form of the CE-SCALE and studies that used the CTBS. Figure 16 shows these confidence intervals.

Conclusion

The meta-analyses conducted for this sample demonstrate a strong positive effect size for the relationship between CTE and achievement. As collective teacher efficacy increases in a school, so does achievement. This holds true for all subject areas measured, and regardless of timing of measurement.

Moderator analysis revealed that, compared to the rest of the sample, studies that were affiliated with the College of William and Mary tended to have lower average effect sizes, and studies that were affiliated with Ohio State University tended to have higher average effect sizes. Another important moderator was the tool used to measure collective teacher efficacy. Studies that used the short form of the CE-SCALE (Goddard, 2002b) yielded higher effect sizes than studies that used the CTBS (Tschannen-Moran & Barr, 2004).

CHAPTER 5

DISCUSSION

In this chapter, a summary of findings is presented, including both effect size

and moderator analysis. Next, the relevance of the findings is explored, so that the

study can be viewed in the larger context of the field. The third section describes the

limitations of this study, and finally, implications for future research are presented.

Summary of Findings

This meta-analysis demonstrated that collective teacher efficacy and student

achievement are strongly related. The strength of this relationship exists across

subject areas, when using varied instruments, and in multiple locations. This is the

first meta-analysis to address this relationship.

Effect Sizes

The first research question addressed the distribution of the effect sizes

measuring the relationship between collective teacher efficacy and student

achievement. The related hypothesis was supported: Collective teacher efficacy

(CTE) was strongly and positively associated with student achievement. In the

multiple meta-analyses conducted, the effect sizes for this relationship varied from 0.537 to 0.628, and the confidence intervals for these effect sizes overlapped, showing similarity. The largest effect size was found for CTE and reading achievement and the lowest was for CTE and social studies achievement. When all correlations within a single study were averaged to r-mean, and the outlier was removed, the effect size was 0.617. With the outlier included, the relationship was still strong, with an effect size of 0.598.

Since these effect sizes are based on correlational research, the predictive nature of this relationship can only be established when the measurement of CTE preceeds the measure of achievement. The studies that measured CTE before measuring achievement yielded an effect size of 0.626. Since a number of the component studies used archival achievement data, this time-order structure was not consistent. The studies that measured CTE and used historical achievement data yielded an effect size of 0.565, and when the outlier was removed, the effect size rose to 0.608. The studies that didn't clearly describe the timing of the measures yielded an effect size of 0.599. The confidence intervals of all three of these conditions overlap.

Regardless of timing, the effect sizes are strong. Their similarity may suggest stability over time. In fact, the possibility that CTE is a relatively stable trait was an explanation given for the timing variation in at least two of the studies (M. Tschannen-Moran, personal correspondence, November 22, 2010). A slightly

different rationale was offered as well: "The distinction may be an artifact of research methods as opposed to genuine differences in antecedents versus consequences" (M. Tschannen-Moran, personal correspondence, November 23, 2010). Neither of these explanations is satisfactory for this analysis, however, because the purpose of this study and of many of the component studies was to clearly quantify the effect size between CTE and subsequent achievement. This muddies the waters, as it becomes difficult to delineate the predictive power of prior achievement on CTE from the predictive power of CTE on subsequent achievement.

An alternative explanation may find its roots in the reciprocal nature of efficacy: As conceptualized in Bandura's model of triadic reciprocal determinism (1986), personal factors, behavior, and external factors all work bidirectionally, influencing each other within human functioning. So in a particular context (school), beliefs (personal factors) will influence achievement (behavior), and achievement will influence beliefs. The model of teacher efficacy from Tschannen-Moran et al. (1998) and the model of collective teacher efficacy from Goddard, Hoy, and Woolfolk Hoy (2004) added directionality within a loop, such that achievement affects effficacy, which affects achievement, and so on. Under this framework, the results of this study could be interpreted thus: Using the model proposed by Goddard, Hoy, and Woolfolk Hoy (2004), perceived collective efficacy was strongly correlated with subsequent achievement ($r = 0.626$), and prior acheivement was

strongly correlated with subsequent perceived collective efficacy (r = 0.608). The assumption made, however, is that all of the studies that measured achievement before CTE can be reconceptualized as antecedent studies. Since this was not the original intent, that assumption may be unsupported.

Reexamination of the data revealed that five of the six largest component sample sizes (*N* ranging from 79 to 205) were from studies that measured CTE before achievement. The diversity represented in these five studies make the results generalizable. They were conducted in urban, suburban, and rural areas, with a range of socioeconomic status, and some ethnic diversity (see Table 6). Because these studies utilized the desired time-order, and were conducted with large, diverse samples, they provide important evidence that CTE is related to subsequent acheivement within a variety of environments and that the relationship may be causal.

These results are consistent with the findings of the component studies, as well as studies that were not included in the meta-analysis. Bandura's path analysis of the causal structure of school achievement (1993) showed that the effect of collective efficacy on achievement was greater than the effect of SES on achievement. Goddard, Hoy, and Woolfolk Hoy (2000) used hierarchical linear modeling and found that collective teacher efficacy explained 53.27% of the between-school variance in mathematics, and 69.64% of the same for reading.

Goddard, LoGerfo, and Hoy (2004) found that CTE significantly and positively

predicted achievement, even when other aspects of school context were controlled.

Table 6. Measures of diversity for the large-sample studies that measured CTE before achievement.

Study	Sample size	Location	Setting	SES	Ethnicity
Adams, Forsyth (2009)	79	Midwestern state (Oklahoma)	NA	47% eligible FRL	63% White, 18% Native American, 13% Black, 5% Hispanic, 2% Asian
Cybulski (2003)	145	Ohio	U,S,R	28% receiving FRL	NA
Goddard, LoGerfo, Hoy (2004)	96	Large Midwestern State (Ohio)	U,S,R	State-maintained standardized (M=0, SD=1) variable: SES=-0.04 (-1.21 to 3.59)	proportion of minority students: 0.09 (0.00-0.96)
Nicholson (2003)	146	Ohio	U,S,R	28% receiving FRL	NA
Ross & Gray (2006)	205	2 school districts in Ontario, Canada	U	School family income mean= 52,007; SD= 12,121 (Canadian dollars)	smaller district: 2% ESL, <1% born outside Canada; larger district: 6% ESL, 6% born outside of Canada

Note: Study refers to author(s) and year of publication. Location refers to school location, including state or country, if not in the United States. Setting refers to urban (u), suburban (s), rural (r), or not available (NA). SES refers to measurement of socioeconomic status, FRL refers to free and/or reduced price lunch, M refers to mean, and SD refers to standard deviation. Ethnicity refers to measurement of ethnic diversity, and ESL refers to students who are learning English as a second language.

In order to interpret effect sizes, it is important to understand relative strength. Cohen (1988) proposed general benchmarks for evaluating the strength of an effect size. For correlational research, Cohen labeled an effect size as small if $r = 0.10$, medium if $r = 0.30$, and large if $r = 0.50$. Since Cohen chose these quantities to provide only a general yardstick for the behavioral sciences, caution must be exercised in interpretation (Valentine & Cooper, 2003). To provide points of comparison, a search for other meta-analyses examining the correlational effect of various factors on school achievement was conducted. Bulris (2009) found that school culture had a strong moderate effect ($r = 0.349$) on student achievement. Waters and Marzano (2006) found a positive correlation ($r = 0.24$) between district leadership and school achievement. Sirin (2005) examined the effect size for the relationship between socioeconomic status and school achievement. At the individual level, the effect was moderate ($r = 0.27$), and at the collective level, the effect was strong ($r = 0.67$). Within educational research, there is a likelihood of smaller effect sizes (Valentine & Cooper, 2003), so the effect sizes from this study can confidently be considered strong. The beliefs that teachers hold about the ability of the school as a whole to promote positive outcomes were predictive of positive learning outcomes for their students.

Moderator Analysis

The second research question addressed moderator variables, considering possible explanations of the variance between studies. As hypothesized, researcher affiliation and CTE instrument both explained some of the variance. The possible interaction of these moderators made the analysis complex, and the hypothesized moderator, state, was eliminated from analysis because the available studies did not provide enough variety to ascertain any moderating effect that could be distinct from university affiliation (all of the studies conducted in Ohio were all of the studies affiliated with Ohio State University, and four out of the five Virginia studies were conducted out of the College of William and Mary).

Studies from Ohio State University had significantly higher effect sizes that studies from the College of William and Mary, and there was no overlap in their confidence intervals. This indicates that there is something that distinguishes research at one institution from research at another.

Perhaps the distinction has to do with the population being sampled: All of the OSU studies sampled Ohio schools, and all of the WM studies sampled Virginia schools. This study doesn't not provide enough evidence to explore this further. The only data point that could be relevant to that discussion is the one study conducted in Virginia schools not affiliated with WM (Washburn, 2006), which had a higher effect size than the other Virginia studies.

Another potential reason for the distinction may be found in the study designs. Qualitative study may reveal patterns in the types of statistics used, methodologies, or assumptions about CTE. The core of CTE research began at OSU, and included Tschannen-Moran, who is currently on the faculty at The College of William and Mary. She did her graduate work at Ohio State University, along with Goddard, Cybulski, and Tarter (who supervised three of the component dissertations), working with faculty members Hoy and Woolfolk Hoy. As she has carried this line of research with her to the College of William and Mary, perhaps that she has taken a slightly different, more cautious approach to CTE research.

The second significant moderator was CTE measure: Studies that used the CE-SCALE (Goddard, et al., 2000; Goddard, 2002b), had higher average effect sizes than studies that used the CTBS (Tschannen-Moran & Barr, 2004). In fact, there was no overlap in the confidence intervals of the effect sizes from studies that used the short form of the CE-SCALE (Goddard, 2002b) and studies that used the CTBS.

The CE-SCALE includes items that address task analysis and group competence (Goddard et al., 2000). Tschannen-Moran and Barr (2004) developed the CTBS (with subscales for instructional strategies and student discipline) because of concerns that the CE-SCALE "artificially drives down the collective efficacy scores of schools in more challenging environments by its explicit measure of task difficulty" (Tschannen-Moran & Barr, 2004, p. 199). Both of these instruments can be found in Appendix D.

If the CE-SCALE does indeed drive scores down, then challenging schools would have lower scores than less challenging schools. If a challenging school is one in which achievement is low, then there would be a pattern of high correlation between CTE and achievement. Perhaps this is why studies that used the CE-SCALE yielded a higher effect size.

There was not enough data to examine such moderators as socioeconomic status or adminstrative leadership style. Perhaps that sort of information could help to further explain the variance, and help to operationalize what it means to call a school a challenging environment.

Relevance

This meta-analysis adds to existing evidence about the connection between CTE and achievement. The connection between collective teacher efficacy and student achievement is particularly salient now, as the United States considers the role of teachers in schools. At the time of this writing, a controversial piece of legislation moving through the Wisconsin legislature would remove collective bargaining rights from public unions, including teachers' unions (Maher & Brat, 2011); the Florida Senate has passed a bill that institutes a merit pay system that is based on student achievement, as measured by standardized tests, and creates one year contracts for all teachers, eliminating tenure (March & Silvestrini, 2011); and in his 2011 Annual Letter, Bill Gates describes the goals of the Bill and Melinda Gates Foundation to study and invest in ways to improve teacher effectiveness (Gates,

2011). Philanthropists and politicians are involved in the nation's conversations

about education and what is necessary for high achieving schools, and much of what

is being proposed conveys an underlying message that teachers just aren't doing a

good enough job. Education historian Diane Ravitch (2010) describes the Obama

administration's Race to the Top program as a continuation of the overemphasis on

testing that No Child Left Behind brought. This is demoralizing to teachers, and puts

the focus on the wrong things, she says: "By its words and actions, the

administration seems to assume that the school gets low scores because it has a bad

principal or bad teachers. But the staff may be heroic in the face of daily challenges;

they may be operating with fewer resources than schools in affluent neighborhoods.

Absent individual evaluations, it seems unfair to conclude that the staff is failing"

(Ravitch, 2010, ¶ 17). Commenting on Chicago mayor Richard Daley's claim that

teachers only work six hours a day (Pearson, 2011), educator and author Greg

Michie says, "The 'new reformers' have been so successful in framing the debate

around public education that teachers and their advocates are left spending way too

much time on the defensive. And that causes us all to take our eyes off the things

that need attention if we really want to work toward equal opportunities and

outcomes for all children" (Michie, 2011, ¶ 8). The current antagonism toward

schools and teachers has the potential to corrode any sense of collective efficacy

that has been built in our schools.

CTE-achievement research suggests that in order to improve schools, teachers must feel empowered to do so, instead of feeling blamed for things beyond their control. In 2010, 51.1% of Illinois public schools did not make adequate yearly progress (AYP) (Illinois State Board of Education, Data Analysis and Progress Reporting Division, 2010). CTE research suggests that working to bolster faculty efficacy in Illinois schools could have a positive effect on student achievement in the future. The trouble is that schools that don't make AYP are at risk of increased deterioration of collective efficacy. In situations such as these, when the failure of mastery experiences lowers efficacy, administrators may need to bolster efficacy through social persuasion or vicarious experiences. This means that efforts for school reform must be proactive, rather than reactive: Resources should be focused on supporting, empowering, and encouraging faculties, as opposed to stripping away power, threatening job security, or basing pay on test scores.

Collective efficacy is a group attribute, and groups are made of individuals. Collective efficacy can be threatened or strengthened by an influential few (Bandura, 2000). Administrators would do well to note the ways in which a powerful but vocal minority can influence collective beliefs. Low efficacy beliefs are contagious, and can influence willingness to try. If teachers don't feel that their efforts will lead to success, they are, potentially, less likely to dedicate the energy needed in order to make a positive impact. However, confidence in collective ability can also be contagious. If break room chatter revolves around successes,

overcoming obstacles, and opportunities to make a difference, the social norms of a

faculty may be established such that new faculty members realize that optimism,

dedication, and resilience characterize the school. This reveals the social-cognitive

nature of the construct: Together, a faculty builds efficacy.

The future of education depends on capable faculties who feel that their hard

work can lead to positive outcomes. Currently, teachers in the United States are

encountering increased opposition and discouragement. A strong sense that as a

group, a faculty can do great things in a school can be protective. "People's beliefs in

their collective efficacy influence the type of futures they seek to achieve; how well

they use their resources; how much effort they put into their group endeavor; their

staying power when collective efforts fail to produce quick results or meet forcible

opposition; and their vulnerability to discouragement" (Bandura, 1998, p 65).

An understanding of the importance of collective teacher efficacy can

influence teacher preparation, recruitment, and retention. Perhaps the educational

system needs to re-envision teaching effectiveness, with a focus on encouraging and

sustaining beliefs that educators and schools can make a difference, rather than

simply asking for high test scores. Perhaps school accountability has more to do

with the beliefs and attitudes that the school collectively holds about its potential

for success than was previously considered. President Obama has said that "he will

push to end the use of ineffective, 'off-the-shelf' tests, and support new, state-of-the-

art assessment and accountability systems that provide timely and useful

information about the learning and progress of individual students"
(whitehouse.gov, n.d, Reform and Invest in K-12 Education section, para. 2). While
the progress of the students is the end goal, it should not be the only variable
measured. If the Obama administration is serious about moving away from sole
reliance on high stakes testing, perhaps it should consider how collective efficacy
research can provide one of many starting points for positive change in the school
system.

Limitations

There are some limitations inherent in meta-analysis. Conducting a meta-
analysis involves methodical steps and procedures, with many possible choices
along the way. Clarity of methods is intended to address the choices made, but there
is always the possibility that varying the inclusion/exclusion criteria, the coding
categories, or the statistical procedures would produce different results. A related
concern is the apples and oranges issue: the mix of studies synthesized may be too
dissimilar to yield meaningful overall results (Lipsey and Wilson, 2001). Within this
meta-analysis, this problem became apparent when examining how the variables
were defined. Student achievement was operationalized in numerous ways, and
CTE, in a few ways. Additionally, there was some discrepancy concerning the timing
of the measures. As previously stated, although the component studies addressed
the correlation between CTE and achievement, some were clearer when
distinguishing prior achievement from subsequent achievement. This posed a

problem because that inconsistency reduces the certainty of any conclusions drawn about how CTE can predict achievement.

Another limitation for this meta-analysis was the small number of studies sampled. This line of research is less than 20 years old, and relies on a handful of studies to demonstrate the relationship in question. Many of the lead researchers, having determined that there is a positive correlation between CTE and achievement, have gone on to explore other related areas. Of the original studies located, a number had to be excluded because they did not report the simple correlation, even though they explored the relationship. Further study could seek to include these results in some way.

Correlational research can only go so far. The effect size for this meta-analysis came from Pearson product-moment correlations, which quantify the strength of a relationship. While there will always be a correlation between cause and effect, correlation is not sufficient to determine causation. This research makes it clear that CTE and school achievement vary together: They are strongly and positively correlated, but this study is limited because it cannot address causation. Researchers are looking to uncover what other variables affect CTE and student achievement. These relationships can be explored in more complex ways, and it may not be sufficient to just talk about correlation.

One limitation of CTE research, in general, is the level of analysis problem. The measures of collective efficacy beliefs used in the component studies aggregate

individual beliefs about the functioning of the collective. While this is an improvement over measures that would simply aggregate individual teacher efficacy scores, it still relies on individuals to make judgments about collective functioning (Bandura, 1997, 2000). Bandura (2000) suggests another option for measuring perceived collective efficacy, wherein group members deliberate to arrive at a consensual judgment. This method, Bandura goes on, is severely limited, as groups can be subject to social persuasion and the influence of a powerful few. So while the existing measures are the most sound, one still must remember that measuring beliefs of the collective always involves individual perception.

The confounding of moderator variables was a particular limitation for this study. Nothing could be said about the location of the studies, since that variable was confounded with the university affiliation of the authors. It remains to be seen if schools in Virginia are somehow different enough from schools in Ohio to impact the relationship between collective teacher efficacy and student achievement. Additionally, although university affiliation and CTE measure were both able to explain the between-groups variance, those two variables may not be completely independent of one another, as the two main CTE measures were developed in the two main universities studied.

Implications for future research

This meta-analysis can provide a starting point for further study that can clarify some of the limitations.

Since CTE research so far has been carried out primarily by researchers with ties to Ohio State University, and since university affiliation was an effective moderator, systematic qualitative study could seek to uncover patterns in research design and methodology. Studies conducted out of various universities could add to the literature as well, and it would be interesting to revisit this meta-analysis in ten or twenty years, to see where the research has moved.

Future research should continue to examine the various measures of CTE, to determine predictive power in a variety of settings and types of schools. Taken together, Tschannen-Moran and Barr's reservations about the CE-SCALE (2004) and the results of the moderator analysis concerning CTE instrument suggest that instruments should be compared and examined for potential limitations with challenging populations. Ideally, this could be studied within one diverse state, wherein all schools use the same measure of achievement, and yet, there is a wide range of school functioning and health (more challenging to less challenging environments).

In order to investigate collective efficacy in schools around the country, studies could be designed that use an achievement measure that is standardized across states, so that regional diversity could be more completely represented.

Another reason to conduct more CTE-achievement research in a variety of school systems is to see how CTE makes a difference in schools that face considerable challenges and potential restructuring. Since the socioeconomic status

of a neighborhood cannot be easily changed, it become important to find variables in

the system that can manipulated in order to foster school improvement. Research

in this area could have important implications for our country's attempts to improve

schools. This type of research can also seek to define what is considered to be a

challenging population. Perhaps schools can be grouped by measures of adequate

yearly progress (AYP). In Illinois, the AYP performance target for 2010 was at least

77.5% Meeting/Exceeding standards for all students and each subgroup in

mathematics and reading (Illinois State Board of Education, 2010). Since AYP is a

federally mandated measure of school success, this may be a viable way to

determine what constitutes a challenging population.

The issue of timing in CTE research needs to be addressed more clearly, so

that distinctions can be made between antecedent and consequence. The cyclical

nature of efficacy makes this a challenge. Longitudinal studies examining year to

year changes in CTE, achievement, and school contextual variables may reveal

patterns that are not evident in short-term research. This could lead to exploration

of an alternative approach to the teaching profession, one in which a more fluid

career is encouraged. Perhaps teachers need to feel that they can alternate between

more challenging and less challenging environments, building efficacy, then taking it

to the schools that need it the most. When teachers are full of optimism and passion

for the field, they can, together, raise collective efficacy and create school climates in

which teachers are setting high expectations and displaying the resilience needed to

overcome obstacles. When collective efficacy begins to slip, perhaps it's time for a change: Those teachers that are burned out and feeling less efficacious can transition to less challenging schools to rebuild CTE. Perhaps these shifts can occur within a school building: sharing responsibility, changing classrooms, not remaining in a rut. An approach like this must be carefully considered, as it could have far-reaching ramifications.

In order to assist schools as they seek to build collective efficacy, research should look at antecedents of efficacy as possible intervention points. Future studies could consider how to set up mastery experiences so that faculties have access to opportunities to feel success. Studies could examine the effects of vicarious experiences as faculties examine other similar schools and programs that are successful. Examination of schools that work could provide a template of success and bolster feelings of perceived control. Research could focus on the ways that administrators take advantage of the potential positive effects of social persuasion. Like a coach giving a pep talk, leaders in school can work to combat pessimism and hopelessness among the faculty by encouraging passion and commitment, and reminding teachers of their power of their profession, the strength of their preparation, and their commitment to excellence. Affective states can be felt at the school level (Goddard, Hoy, & Woolfolk Hoy, 2000), and research can help faculties acknowledge the ways that they deal with stressors, so that coping methods are not dysfunctional. This may involve considering how the group reacts to certain stimuli

(like student demographics), and how perceptions about success or failure are shaped by the environment.

Since CTE research has been firmly planted within the framework of social cognitive theory, future research could build bridges to other theoretical perspectives. As Adams and Forsyth (2006) suggest, perhaps a reintroduction of locus of control theory would be beneficial, examining not only the four sources of efficacy information, but also contextual variables that influence efficacy. This connection may help to explain why the correlation between CTE and achievement is lower for some schools- perhaps contextual variables exert more influences in some environments. Another connection to a different perspective becomes possible when examining the model of collective efficacy from Goddard, Hoy, and Woolfolk Hoy (2004) in light of control systems theory. The model of collective efficacy in schools can be viewed as a closed loop, which is described as a system in which perception influences response and response influences perception (Cziko, 1992). If, as has been suggested, the difference between antecedents and consequences is difficult to parse, examination of this process within a feedback loop may be illuminating.

Conclusion

The research presented in this dissertation fills a gap in the literature by systematically analyzing studies of collective teacher efficacy and achievement. This meta-analysis is the first to assemble the studies of this nature, present an average

effect size, and consider what variables moderate the differences between studies. The results show that collective teacher efficacy is strongly related to achievement in schools. The strength of that relationship was moderated in this study by instrument used to measure efficacy and researcher affiliation. This study is relevant because it speaks to a possible change point in the educational system. Social cognitive theory espouses a model of triadic reciprocal determinism in which beliefs affect behavior and environment, and environment and behavior have an effect on beliefs. At the collective level, the beliefs that teachers hold about their school's ability to affect achievement are important to the success of that school. Intervention efforts can be directed at building efficacy, so that teachers approach their schools ready, willing, and able to be effective.

APPENDIX A

INITIAL SCREENING SPREADSHEET

Date	Database (search terms)	Author (s)	Year	CTE	stud ach	CTE-Ach rela	Quan study	print	
9/29/10	ERIC 1 (Collective Teacher Efficacy)								
	ERIC 1	Viel-Ruma, Houchins, Jolivette	2010	Y	n	n	Y	n	job satis.
23 results	ERIC 1	Fives, Looney	2009	Y	n	n	Y	n	college
23 unique	ERIC 1	Skaalvick, Skaalvick	2007	Y	n	n	Y	n	burnout
5 potential	ERIC 1	Skaalvick, Skaalvick	2010	Y	n	n	Y	n	burnout
	ERIC 1	McCoach, Colbert	2010	Y	y	y	Y	y	
	ERIC 1	Brinson, Steiner	2007	Y	y	y	N	n	brief
	ERIC 1	Chan	2008	Y	n	n	Y	n	self-efficacy
	ERIC 1	Adams, Forsyth	2006	Y	n	n	Y	n	sources
	ERIC 1	Kurz, Knight	2004	Y	n	n	Y	n	TE/CTE/goal
	ERIC 1	Ware, Kitsantas	2007	Y	n	n	Y	n	Prof. comm.
	ERIC 1	Ross, Gray	2006 June	Y	n	n	Y	n	leadership
	ERIC 1	Ross, Hogaboam-Gray, Gray	2004	Y	n	n	Y	n	antecedent
	ERIC 1	Schechter, Tschannen-Moran	2006	Y	n	n	Y	n	Israeli TE/CTE
	ERIC 1	Rivard, Follo, Walsh	2004	Y	n	n	Y	n	Empower-ment
	ERIC 1	Ross, Hogaboam-Gray, Gray	2003	Y	n	n	Y	n	antecedent

	ERIC 1	Tschannen-Moran, Barr	2004	Y	y	y	Y	y	
	ERIC 1	Goddard, Hoy, Woolfolk-Hoy	2004	Y	y	y	N	n	overview
	ERIC 1	Knoblauch, Woolfolk-Hoy	2008	Y	n	n	Y	n	student teachers
	ERIC 1	Goddard, Goddard	2001	Y	y	?	Y	y	TE-CTE
	ERIC 1	Goddard, Hoy, Woolfolk-Hoy	2000	y	y	y	Y	y	
	ERIC 1	Ross, Gray	2006	y	y	y	Y	y	
	ERIC 1	Howley, Riffle	2002	y	n	n	Y	n	school capacity
	ERIC 1	Ross	2004	y	y	y	Y	y	
10/19/10	ERIC 2 (Collective Efficacy AND teacher)								
57 results	ERIC 2	Klassen, Usher, Bong	2010	y	n	n	Y	n	stress
34 unique	ERIC 2	Zambo, Zambo	2008	y	n	n	Y	n	prof dev
8 potential	ERIC 2	Klassen	2010	y	n	n	Y	n	stress
	ERIC 2	Chong, Klassen, Huan	2010	y	?	?	Y	y	Prior?
	ERIC 2	Evans	2009	y	y	y	N	n	(review)
	ERIC 2	Parks, Solomom, Lee	2007	n	n	n	Y	n	PE
	ERIC 2	Goddard, Skrla	2006	y	n	n	Y	n	antecedent
	ERIC 2	Leithwood, Jantzi	2008	?	y	?	Y	y	(leader)
	ERIC 2	Cybulski, Hoy,	2005	y	y	y	Y	y	

		Sweetland							
	ERIC 2	Henderson, Jones, Self	2008	n	n	n	Y	n	Comm. CE
	ERIC 2	Goddard, LoGerfo, Hoy	2004	y	y	y	Y	y	
	ERIC 2	Olivier, Hipp	2006	y	n	n	Y	?	
	ERIC 2	Klassen, Foster, Rajani	2009	y	n	n	Y	n	stress in yukon
	ERIC 2	Caprara, Barbaranelli, Borgogni	3 2003	y	n	n	Y	n	attitudes
	ERIC 2	Manthey	2006	y	y	y	N	n	brief
	ERIC 2	Cantrell, Callaway	2008	y	n	n	Y	n	Implement-ation
	ERIC 2	Knobloch, Whittington	2002	y	n	n	Y	n	student teacher TE
	ERIC 2	Appalachia EL at ED	2005	y	?	?	N	n	brief
	ERIC 2	Ciani, Summers, Easter	2008	y	n	n	Y	n	antecedent
	ERIC 2	Goddard	2001	y	y	y	Y	y	
	ERIC 2	Leithwood, McAdie	2007	n	n	n	N	n	working conditions
	ERIC 2	Goddard	2002	y	y	y	Y	y	
	ERIC 2	Caprara, Barbaranelli, Borgogni	12 2003	y	n	n	Y	n	job satis.
	ERIC 2	Loup, Clarke, Ellett	1997	?	n	n	?	n	motivation
	ERIC 2	Leithwood, Strauss, Anderson	2007	?	n	n	N	n	school leaders, qualitative
	ERIC 2	Losee	2000	?	n	n	?	n	SE
	ERIC 2	Klassen, Chong, Huan	2008	y	n	n	Mixed	n	motivation

	ERIC 2	Somech, Drach-Zahavy	2000	y	n	n	Y	n	extra-role behavior
	ERIC 2	Goddard, LoGerfo	2007	y	n	n	Y	n	Org. properties
	ERIC 2	Sorlie, Ogden	2007	y	?	?	Y	y	
	ERIC 2	Smith, Birney	2005	n	n	n	Y	n	bullying
	ERIC 2	Hoy, Miskel	2002	y	y	y	Y	n	book w/Hoy, Smith, Sweetland study
	ERIC 2	Health Ed Monograph Series	1996	n	n	n	Y	n	collection of papers
	ERIC 2	Tshannen-Moran	2001	y	n	n	Y	n	Conflict mgmt
9/29/10	Academic Search Premier 1 (collective teacher efficacy)								
12 results	ASP 1	Parker	1994	y	y	y	Y	y	
2 unique	ASP 1	Monk	2004	y	y	y	N	n	Intro.
1 potential									
10/20/10	Academic Search Premier 2 (collective efficacy AND teacher)								
39 results	ASP 2	Chan	2008	?	n	n	Y	n	novice
11 unique	ASP 2	Dussault, Payette, Leroux	2008	y	n	n	Y	n	leadership

	ASP 2	Barchia, Bussey	2010	n	n	n	Y	n	Victimi-zation
	ASP 2	Fallon	2007	?	?r	n	N	n	nexus
	ASP 2	LoGerfo, Goddard	2007	y	n	n	Y	n	Operation-alization
	ASP 2	Leithwood, Wahlstrom	2008	?	?	n	?	n	Leadership
	ASP 2	Elias, MacDonald	2007	n	y	n	Y	n	college efficacy
	ASP 2	Wang, Lin	2007	?	?	n	Y	n	group motivation
	ASP 2	Collom, Mitchell	2005	n	n	n	?	n	home schooling
	ASP 2	Browning, Leventhal, Brooks-Gunn	2005	n	n	n	?	n	sexual initiation
	ASP 2	Browning, Leventhal, Brooks-Gunn	2004	n	n	n	?	n	sexual initiation
9/29/10	PsycINFO 1 (KW collective teacher efficacy)								
	PsycINFO 1	Jackson	2010	y	y	y	Y	y	
37 results	PsycINFO 1	McDowell	2010	y	n	n	Y	n	AP
27 unique	PsycINFO 1	Kirby	2010	?	y	?	Y	y	
6 potenial	PsycINFO 1	Brown	2010	y	n	n	Y	n	Antecedent
	PsycINFO 1	Pangallo	2010	y	n	n	Y	n	PLC
	PsycINFO 1	Calcasola	2010	y	n	n	Y	n	PLC
	PsycINFO 1	Lewis	2010	y	n	n	Y	n	Collabor-ation
	PsycINFO 1	Burcham	2009	y	?	y	Y	y	
	PsycINFO 1	Schumacher	2009	y	y	y	Y	y	

	PsycINFO 1	Shepard	2005	y	y	y	y	y	
	PsycINFO 1	Swackhamer	2009	y	n	n	y	n	Antecedent
	PsycINFO 1	Bowers	2009	y	n	n	y	n	Leadership
	PsycINFO 1	Liederbach	2009	y	?	?	n	n	Qualitative
	PsycINFO 1	Donald	2009	?	?	n	y	n	TE
	PsycINFO 1	Beard	2009	n	n	n	y	n	academic optimism
	PsycINFO 1	Bremer	2008	y	n	n	y	n	info use
	PsycINFO 1	Petersen	2008	y	n	n	y	n	Trust
	PsycINFO 1	Prelli	2008	y	n	n	y	n	trans. Leadership
	PsycINFO 1	Pryor	2008	y	n	n	y	n	Implement-tation
	PsycINFO 1	Rentz	2007	y	n	n	y	n	supports
	PsycINFO 1	Willis	2007	y	n	n	y	n	comm. Patterns
	PsycINFO 1	Knobloch	2007	y	n	n	y	n	decision making
	PsycINFO 1	Mcguigan	2005	?	?	?	y	y	
	PsycINFO 1	Dale	2005	y	n	n	y	n	Collabor-ation, trust
	PsycINFO 1	Allen	2003	y	n	n	y	n	Antecedent
	PsycINFO 1	Kurz	2002	y	n	n	y	n	TE, goal consensus
	PsycINFO 1	Wheatley	2002	y	n	n	?	n	Doubts
10/21/10	PsycINFO 2 (KW collective efficacy AND teacher)								

65 results	PsycINFO 2	Pennycuff	2010	y	y	?	Y	y	RtI
35 unique	PsycINFO 2	Meisinger	2010	y	n	n	Y	n	Antecedent
3 potential	PsycINFO 2	Eginli	2010	y	n	n	Y	n	teacher commit.
	PsycINFO 2	De Smet, Van Keer, De Wever, Valcke	2010	n	n	n	Y	n	tutor efficacy
	PsycINFO 2	LeDuc	2010	y	n	n	Y	n	Feedback
	PsycINFO 2	Woolfolk-Hoy, Hoy, Davis	2009	y	y	y	N	n	book chapter-TE
	PsycINFO 2	Hobbie	2009	y	n	n	Y	n	Cath. Sch. Identity
	PsycINFO 2	Bradford	2009	y	n	n	Y	n	high stakes, PLC
	PsycINFO 2	Filbin	2009	y	y	n	Y	n	Antecedent
	PsycINFO 2	Petrillo, Donizzetti	2008	y	n	n	Y	n	Respon-sibility
	PsycINFO 2	Mcarthur	2008	y	n	n	Y	n	Retention
	PsycINFO 2	Solomon	2008	y	y	y	Y	y	
	PsycINFO 2	D'Amico	2008	y	n	n	Y	n	AP antecedent
	PsycINFO 2	Grider	2008	n	n	n	Y	n	TE- PLC
	PsycINFO 2	Cantrell, Hughes	2008	y	n	n	Y	n	Coaching
	PsycINFO 2	Crocker	2008	y	n	n	Y	n	Climate
	PsycINFO 2	Keck-Centeno	2008	y	n	n	N	n	case study
	PsycINFO 2	Warnke	2008	y	n	n	Y	n	emotional intell.
	PsycINFO 2	Mattingly	2008	y	n	n	Y	n	Turnover
	PsycINFO 2	Milleman	2008	n	n	n	Y	n	TE
	PsycINFO 2	Leahy	2008	y	y	?	Y	y	

	PsycINFO 2	Graham	2007	y	n	n	y	n	leadership
	PsycINFO 2	Crews	2007	y	n	n	y	n	Strain
	PsycINFO 2	Lynch	2007	y	n	n	y	n	TE novice
	PsycINFO 2	Benton-Borghi	2007	y	n	n	y	n	Technology
	PsycINFO 2	Gibbs	2007	y	n	n	n	n	Inclusion
	PsycINFO 2	Matthews, Kitsantas	2007	n	n	n	y	n	CE-music ensemble
	PsycINFO 2	Hongyun, Lei, Qingmao	2005	y	n	n	y	n	TE
	PsycINFO 2	Hongyun, Qingmao, Lei	2004	y	n	n	y	n	Stress
	PsycINFO 2	Torsheim, Samdal	2004	y	n	n	y	n	Facilitation
	PsycINFO 2	Barbaranelli, Fida	2004	y	n	n	y	n	job satis.
	PsycINFO 2	Caprara, Barbnaranelli, Borgogni, Petitta, Rubinacci	2003	y	n	n	y	n	attitudes toward school
	PsycINFO 2	Olivier	2001	y	n	n	y	n	Effective-ness
	PsycINFO 2	Mackenzie	2001	y	n	n	y	n	Collabo-ration
	PsycINFO 2	Schwarzer, Schmitz	1999	y	n	n	y	n	Burnout
10/26/10	Wilson Web (KW: "Collective Teacher Efficacy")								
4 results	WW 1	Adams, Forsyth	2009	y	y	?	y	y	
1 unique									
1 potential									

10/26/10	Wilson Web (KW: "Collective Efficacy" and teacher)								
9 results	WW 1	Leithwood	2007	n	y	n	N	n	Leadership
1 unique									
10/26/10	JSTOR 1 (Collective Teacher Efficacy)								
19 results	JSTOR 1	van den Berg	2002	?	n	n	N	n	Ed practice
12 unique	JSTOR 1	Weiner	2003	n	?	n	N	n	Mgmt.
1 potential	JSTOR 1	DiPaola, Hoy	2005	n	n	n	Y	n	Org. citizenship
	JSTOR 1	Hoy, Tarter, Woolfolk Hoy	2006	y	y	?	Y	y	
	JSTOR 1	Rimm-Kaufman, Sawyer	2004	n	n	n	Y	n	responsive classroom
	JSTOR 1	Griffith	2003	n	y	n	Y	n	Org. models
	JSTOR 1	Strahan	2003	n	y	n	case study	n	Collabo-ration
	JSTOR 1	Mulford	2002	n	n	n	N	n	PISA
	JSTOR 1	Palardy, Rumberger	2008	n	y	n	Y	n	Attitudes
	JSTOR 1	Geijsel et al	2009	n	n	n	Y	n	TE
	JSTOR 1	Tschannen-Moran, Hoy	2000	y	y	n	N	n	review: trust
	JSTOR 1	Lubienski et al	2008	n	y	n	Y	n	school type

10/27/10	JSTOR 2 (Collective Efficacy AND teacher AND achieveme nt)								
72 results	JSTOR 2	Samson, Morenoff, Earls	1999	n	n	n	y	n	CE for children
56 unique	JSTOR 2	Tschannen-Moran, Woolfolk Hoy, Hoy	1998	n	n	n	y	n	TE
	JSTOR 2	Darlling-Hammond et al	1983	?	n	n	n	n	review-evaluation
	JSTOR 2	Sanbonmat su et al	2006	?	y	n	y	n	urban housing
	JSTOR 2	Deemer, Minke	1999	n	n	n	y	n	TES
	JSTOR 2	Lewis et al.	2006	n	n	n	n	n	lesson study
	JSTOR 2	Jacob	2007	n	y	n	n	n	urban schools
	JSTOR 2	MacFarland	2001	n	n	n	n	n	Defiance
	JSTOR 2	Milner	2002	n	n	n	n	n	TE case study
	JSTOR 2	Crosnoe	2004	n	y	n	y	n	social capital
	JSTOR 2	Sullivan, Tobias, McDonough	2006	?	y	n	n	n	math ach.
	JSTOR 2	Taylor et al	2005	n	y	n	?	n	school reform
	JSTOR 2	Brooks-Gunn et al	2000	?	?	n	n	n	data collection
	JSTOR 2	Blau et al	2001	n	y	n	y	n	Neighbor-hood
	JSTOR 2	Hickey	2003	n	y	n	?	n	Motivation
	JSTOR 2	Johnson, Pajares	1996	n	n	n	y	n	decision making

	JSTOR 2	Pappamihie l	2002	n	y	n	Y	n	language anxiety
	JSTOR 2	Schutz	1999	n	n	n	N	n	school spaces
	JSTOR 2	Hoy, Smith, Sweetland	2003	n	n	n	Y	n	Trust
	JSTOR 2	Leithwood	2004	?	n	n	N	n	Intl. Tests
	JSTOR 2	Foote	2005	?	y	n	N	n	Review
	JSTOR 2	Pajares	1996	n	y	n	N	n	review SE
	JSTOR 2	Kowaleski-Jones	2000	?	?	n	Y	n	risk taking
	JSTOR 2	Alverman, Reinking	2005	n	n	n	N	n	Ed: stat sig
	JSTOR 2	Horn	2003	n	n	n	?	n	hidden curriculum
	JSTOR 2	Shamir, House, Arthur	1993	n	n	n	N	n	Leadershi p
	JSTOR 2	Madhere	1991	n	y	n	?	n	self-esteem
	JSTOR 2	Burton, Jarrett	2000	n	n	n	N	n	urban neighbor-hood
	JSTOR 2	Horner, Shwery	2002	n	y	n	N	n	Reading
	JSTOR 2	Garcia Coll, Szalacha	2004	n	y	n	N	n	middle childhood
	JSTOR 2	Kelehear, Heid	2002	n	n	n	N	n	art mentor
	JSTOR 2	Frank	1998	n	n	n	N	n	methods chapter
	JSTOR 2	Gibson	2001	n	n	n	Y	n	Nursing
	JSTOR 2	Crosnoe, Cavanaugh, Elder	2003	n	n	n	Y	n	adol. Friendship
	JSTOR 2	Gladden	2002	n	n	n	?	n	school violence
	JSTOR 2	Leithwood et al	1993	n	n	n	?	n	perf. Appraisal
	JSTOR 2	Macmillan	2001	n	n	n	N	n	Violence
	JSTOR 2	Parkinson, Taggar	2006	n	n	n	Y	n	intell.
	JSTOR 2	Farkas	2003	n	n	n	N	n	cognitive

									skills
	JSTOR 2	Torney-Purta	2004	n	n	n		n	political social.
	JSTOR 2	Klassen	2002	n	y	n		n	SE- LD
	JSTOR 2	Eitle, McNulty Eitle	2004	n				n	school char.
	JSTOR 2	Hofferth et al	1998	n				n	Parents
	JSTOR 2	Raudenbush, Sampson	1999	n				n	Neighbor-hoods
	JSTOR 2	Farmer-Hinton	2002	n				n	urban processes
	JSTOR 2	Brody et al	2001	n				n	collective social-ization
	JSTOR 2	Avolio et al	2004	n				n	trans. Leadership
	JSTOR 2	Cook et al	2002	n				n	Influences
	JSTOR 2	Rogers	2002	n				n	civil rights
	JSTOR 2	Etzioni	2002	n				n	Communit arian
	JSTOR 2	Wright, Fitzpatrick	2006	n				n	Violence
	JSTOR 2	Ness	2004	n				n	girls fight
	JSTOR 2	Boardman, Field	2002	n				n	Jobless-ness
	JSTOR 2	Meares, Kahan	1998	n				n	inner city
	JSTOR 2	McPherson et al	2006	n				n	social isolation
	JSTOR 2	Marwell	2004	n				n	welfare state
	JSTOR 2	Piguero et al	2003	n				n	Criminal

10/27/2010	Diss. & Theses: proquest 1 (Collective Teacher Efficacy AND achievement)								
30 results	D&T:P 1	Hardin	2010	y	n	n	Y	n	PLC
18 unique	D&T:P 1	Cooper	2010	y	y	?	Y	y	
13 potential	D&T:P 1	Mills	2009	y	y	?	Y	y	
	D&T:P 1	Wagner	2008	y	y	?	Y	y	
	D&T:P 1	Pearce	2007	y	y	y	Y	y	
	D&T:P 1	Sidhu	2006	y	y	y	Y	y	
	D&T:P 1	England	2006	y	y	y	Y	y	
	D&T:P 1	Washburn	2006	y	y	y	Y	y	
	D&T:P 1	Hosley	2005	y	y	?	Y	y	
	D&T:P 1	Hylemon	2005	y	?	?	Y	y	
	D&T:P 1	Larrick	2004	y	y	y	Y	y	
	D&T:P 1	Robinson	2004	y	n	n	Y	n	Retention
	D&T:P 1	Garcia	2004	y	y	y	Y	y	
	D&T:P 1	Adams	2003	y	n	n	Y	n	Trust
	D&T:P 1	Barr	2002	y	y	y	Y	y	need to save
	D&T:P 1	Goddard	1998	y	y	y	Y	y	
	D&T:P 1	Murphy	1993	y	n	n	Y	n	interdisc.
	D&T:P 1	Beery	1992	y	n	n	N	n	teacher eval
10/27/2010	Diss. & Theses: proquest 2 (Collective Efficacy AND achievement AND teacher)								
46 results	D&T:P 2	Janke	2010	y	n	n	Y	n	

16 unique	D&T:P 2	Bevel	2010	y	Y	Y	Y	Y	
9 potential	D&T:P 2	Fancera	2009	y	y	y	y	y	
	D&T:P 2	Acevedo	2009	?	y	?	y	y	
	D&T:P 2	Mutillo	2008	y	y	n	y	n	Leadership
	D&T:P 2	Duffy-Friedman	2007	y	y	?	y	y	
	D&T:P 2	Hinds	2007	y	n	n	y	n	prof. deve
	D&T:P 2	Omolade	2007	y	y	y	y	y	
	D&T:P 2	Mayo	2007	n	n	n	y	n	parent efficacy
	D&T:P 2	Walgamuth	2007	y	n	n	y	n	Collabo-ration
	D&T:P 2	Antonelli	2005	y	y	y	y	y	
	D&T:P 2	Grass	2004	y	y	?	y	y	
	D&T:P 2	Cybulski	2003	y	y	y	y	y	
	D&T:P 2	Nicholson	2003	y	y	y	y	y	
	D&T:P 2	Gschwend	1999	n	?	n	y	n	TE
	D&T:P 2	Lubbers	1990	?	n	n	y	n	Principal
10/29/2010	Google Scholar (Collective teacher efficacy)								
39 results	GScholar	Parker, Hannah, Topping	2006	y	y	y	y	y	
11 unique	GScholar	Egger	2006	y	n	n	y	n	TE-CTE
2 potential	GScholar	Leishan	2006	y	?	?	n	n	Chin, No study
	GScholar	Xuezhen et al	2005	y	n	n	y	n	mental health
	GScholar	Fengqiang et al	2005	y	n	n	y	n	CE scale
	GScholar	LeRoy	2004	y	n	n	y	n	implement.
	GScholar	Mehrabizadeh et al	2004-2005	y	y	y	y	y	need to find
	GScholar	Somasundaram	2005	y	n	n	y	n	

	GScholar	Shi	2005	y	y	y	N	n	overview
	GScholar	Hardin	2010	y	n	n	Y	n	PLC
	GScholar	Wu	2008	y	n	n	Y	n	trans leader

APPENDIX B

SPREADSHEET: CODING DOCUMENT/MANUAL

Study #		<as occurs in reference list>
Reference		<copy and paste reference here>
Study Characteristics		
	Authors	<list authors' last names>
	Publication Date	<year, more if available>
	Type of document	<article, chapter, book, dissertation, presentation report, unpublished item, other(specify)>
	Source	<journal name, website, book, other (specify)>
	Search source	<database (specify), references from other documents, search through relevant journals, expert recommendation>
	University Affiliation (if any)	<out of what university(ies) was this written>
Characteristics of the Setting		
	Geographic location of the study	<which state, district, region, country, other>
	Urbanicity	<urban, suburban, rural>
	Type of school	<public, charter, private/religious, private/non-religious, other(specify), can't tell>
	Level	< PreK K 1 2 3 4 5 6 7 8 9 10 11 12 other(specify)>
	Relevant page numbers	<where can the information about characteristics of the setting be found?>
Characteristics of the Subjects		
	Sampling method	<random, convenience, matching, other(specify),can't tell>
	Level of Analysis	<individual, classroom, school, school district, other (specify)>
	School characteristics	
	# of schools	<How does the study report this? NA if not available.>
	# of students	<How does the study report this? NA if not available.>
	# or % male/female students	<How does the study report this? NA if not available.>
	Age/Grade of students in sample	<How does the study report this? NA if not available.>
	Info about student SES	<How does the study report this? NA if not available.>
	Info about student ethnicity	<How does the study report this? NA if not available.>
	# of teachers in sample	<How does the study report this? NA if not available.>
	# or % male/female teachers	<How does the study report this? NA if not available.>
	Experience of teachers in sample	<How does the study report this? NA if not available.>
	Info about teacher SES	<How does the study report this? NA if not available.>
	Info about teacher ethnicity	<How does the study report this? NA if not available.>
	Info about leadership style	<How does the study report this? NA if not available.>
	Info about school structure	<How does the study report this? NA if not available.>
	Relevant page numbers	<where can the info about characteristics of the subjects be found?>
Study Design		
	What is the purpose of the study? Please include page numbers.	
	What is (are) the primary statistical method(s) employed? Please include page numbers.	

Outcome measures			
	Collective Teacher Efficacy		
	Measure		\<What instrument was used to assess CTE. Include author and publication date, if available>
	Info about Measure		\<existing instrument, modification of existing instrument, experimenter-made>
	Format of Measure		\<survey, observation, interview>
	Conditions of measurement		\<**When**/where/under what circumstances was the measurement administered?>
	Type of scale		\<dichotomous, count, continuous, Likert>
	Scale Lower bound and meaning		\<what is the lowest possible number in the scale? What does that represent?>
	Scale upper bound and meaning		\<What is the highest possible number in the scale? What does that represent?>
	Type of score yielded		\<One composite score and/or various subscores>
		Subscales	\<What subscales, if any, are specified?>
	How is this variable reported?		\<mean score, percentage above a certain score, other (specify)>
	Reliability coefficients		
		Test-Retest	\<report coefficient, NA if not available>
		Equivalent Forms	\<report coefficient, NA if not available>
		Internal consistency	\<report KR, alpha, or coefficient (specify), NA if not available>
		Interrater	\<report coefficient, NA if not available>
	Information about Validity		\<what is reported about instrument validity? NA if not available>
	Relevant page numbers		\<where can the info about collective teacher efficacy be found?>
	Student Achievement		
	Measure		\<What instrument was used to assess student achievement? Include author and publication date, if available>
	Format of Measure		\<standardized test, teacher-made test, CBM, grades, etc.>
	Conditions of measurement		\<**When**/where/under what circumstances was the measurement taken?>
	Type of score yielded		\<One composite score and/or various subscores>
		Subscales	\<What subscales, if any, are specified?>
	How is this variable reported?		\<mean score, percentage above a certain score, other (specify)>
	Reliability coefficients		
		Test-Retest	\<report coefficient, NA if not available>
		Equivalent Forms	\<report coefficient, NA if not available>
		Internal consistency	\<report KR, alpha, or coefficient (specify), NA if not available>
		Interrater	\<report coefficient, NA if not available>
	Information about Validity		\<what is reported about instrument validity? NA if not available>
	Relevant page numbers		\<where can the info about student achievement be found?>

Results- Statistics			
Sample size		<report N>	
Descriptive Statistics			
Page number for descriptive statistics		<report the page number where relevant descriptives were found>	
Collective Teacher Efficacy		<if more than one measure of CTE, specify which one here>	
	mean	<report mean>	
	Standard deviation	<report standard deviation>	
	range	<report lower to upper bound>	
Collective Teacher Efficacy (2)		<if more than one measure of CTE, specify which one here>	
	mean	<report mean>	
	Standard deviation	<report standard deviation>	
	range	<report lower to upper bound>	
Collective Teacher Efficacy (3)		<if more than one measure of CTE, specify which one here>	
	mean	<report mean>	
	Standard deviation	<report standard deviation>	
	range	<report lower to upper bound>	
Student Achievement		<if more than one measure of achievement, specify which one here>	
	mean	<report mean>	
	Standard deviation	<report standard deviation>	
	range	<report lower to upper bound>	
Student Achievement (2)		<if more than one measure of achievement, specify which one here>	
	mean	<report mean>	
	Standard deviation	<report standard deviation>	
	range	<report lower to upper bound>	
Student Achievement (3)		<if more than one measure of achievement, specify which one here>	
	mean	<report mean>	
	Standard deviation	<report standard deviation>	
	range	<report lower to upper bound>	
Student Achievement (4)		<if more than one measure of achievement, specify which one here>	
	mean	<report mean>	
	Standard deviation	<report standard deviation>	
	range	<report lower to upper bound>	
Student Achievement (5)		<if more than one measure of achievement, specify which one here>	
	mean	<report mean>	
	Standard deviation	<report standard deviation>	
	range	<report lower to upper bound>	
Student Achievement (6)		<if more than one measure of achievement, specify which one here>	
	mean	<report mean>	
	Standard deviation	<report standard deviation>	
	range	<report lower to upper bound>	

Correlations			
Page number for correlations		<report the page number where relevant correlation(s) were found>	
Correlation		<if more than one correlation between CTE and Achievement, specify which one here>	
	coefficient	<report correlation coefficient>	
	p-value	<report p values>	
Correlation (2)		<if more than one correlation between CTE and Achievement, specify which one here>	
	coefficient	<report correlation coefficient>	
	p-value	<report p values>	
Correlation (3)		<if more than one correlation between CTE and Achievement, specify which one here>	
	coefficient	<report correlation coefficient>	
	p-value	<report p values>	
Correlation (4)		<if more than one correlation between CTE and Achievement, specify which one here>	
	coefficient	<report correlation coefficient>	
	p-value	<report p values>	
Correlation (5)		<if more than one correlation between CTE and Achievement, specify which one here>	
	coefficient	<report correlation coefficient>	
	p-value	<report p values>	
Correlation (6)		<if more than one correlation between CTE and Achievement, specify which one here>	
	coefficient	<report correlation coefficient>	
	p-value	<report p values>	

Additional Information

What other variables were measured in this study? How were they measured? Include page numbers.

What other statistical finding are important to the relationship being studied (CTE-achievement)?
(Regression coefficients, regression weights etc)

What other information about the study is important to know?

Any relevant references to consider?

APPENDIX C

MODERATOR ANALYSIS OF R-MEAN (OUTLIER REMOVED)

Moderator	$Q_{between}$	Q_{within}	Subgroups Q_{within}	Subgroup r (95% CI)
Univ. Affiliation	15.434, df= 2, p<.001	22.764, df= 22, p= 0.415	$Q_{withinOSU}$= 7.993, df=4, p=0.092 $Q_{withinWM}$=0.174, df=3, p=0.982 $Q_{withinOther}$=14.596, df=15, p=0.481	r_{OSU}= 0.676 (0.598-0.742) r_{WM}= 0.457 (0.330-0.567) r_{Other}=0.618 (0.573-0.659)
CTE measure	12.047, df= 3, p=0.007	26.151, df= 21, p= 0.201	$Q_{withinCE\ Long}$ = 2.443, df=4, p=0.655 $Q_{withinCE\ Short}$=23.339, df=13, p=0.038 $Q_{withinCTBS}$=0.333, df=3, p=0.954 $Q_{withinOther}$=0.036, df=1, p=0.850	$r_{CE\ Long}$= 0.605 (0.531-0.670) $r_{CE\ Short}$= 0.645 (0.590-0.695) r_{CTBS}= 0.464 (0.329-0.581) r_{Other}= 0.455 (0.042-0.736)
State	14.111, df=3, p=0.003	34.087, df= 21, p= 0.289	$Q_{withinAL}$ = 0.774, df=1, p=0.379 $Q_{withinOH}$=7.993, df=4, p=0.092 $Q_{withinVA}$ = 1.525, df=4, p=0.822 $Q_{withinOther}$=13.796, df=12, p=0.314	r_{AL}= 0.629 (0.464-0.752) r_{OH}= 0.676 (0.598-0.742) r_{VA}= 0.483 (0.369-0.582) r_{Other}= 0.619 (0.563-0.668)
Level	3.174, df=3, p=0.366	35.025, df= 21, p= 0.028	$Q_{withinALL}$ = 1.190, df=1, p=0.275 $Q_{withinELEM}$=21.179, df=14, p=0.097 $Q_{withinMID}$ = 3.075, df=1, p=0.079 $Q_{withinHS}$=9.581, df=5, p=0.088	r_{ALL}= 0.680 (0.557-0.774) r_{ELEM}= 0.619 (0.559-0.673) r_{VMID}= 0.541 (0.332-0.699) r_{HS}= 0.625 (0.508-0.720)
Type	3.201, df=1, p=0.074	34.997, df= 23, p=0.052	$Q_{withindiss}$ = 26.278, df=15, p=0.035 $Q_{withinpub}$=8.719, df=8, p=0.367	r_{diss}= 0.631 (0.568-0.686) r_{ELEM}= 0.591 (0.532-0.644)

APPENDIX D

INSTRUMENTS TO MEASURE COLLECTIVE TEACHER EFFICACY:
CE-SCALE (SHORT) AND CTBS

CE-SCALE (SHORT)

Retrieved April 18, 2011 from

http://www.waynekhoy.com/collective_efficacy.html

CE-Scale
Short Form

Directions: Please indicate your level of agreement with each of the following statements about your school from **strongly disagree** to **strongly agree**. Your answers are confidential.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
1. Teachers in the school are able to get through to the most difficult students.	①	②	③	④	⑤	⑥
2. Teachers here are confident they will be able to motivate their students.	①	②	③	④	⑤	⑥
3. If a child doesn't want to learn teachers here give up.	①	②	③	④	⑤	⑥
4. Teachers here don't have the skills needed to produce meaningful student learning.	①	②	③	④	⑤	⑥
5. Teachers in this school believe that every child can learn.	①	②	③	④	⑤	⑥
6. These students come to school ready to learn.	①	②	③	④	⑤	⑥
7. Home life provides so many advantages that students here are bound to learn.	①	②	③	④	⑤	⑥
8. Students here just aren't motivated to learn.	①	②	③	④	⑤	⑥
9. Teachers in this school do not have the skills to deal with student disciplinary problems.	①	②	③	④	⑤	⑥
10. The opportunities in this community help ensure that these students will learn.	①	②	③	④	⑤	⑥
11. Learning is more difficult at this school because students are worried about their safety.	①	②	③	④	⑤	⑥
12. Drug and alcohol abuse in the community make learning difficult for students here.	①	②	③	④	⑤	⑥

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CTBS

Retrieved April 18, 2011 from
http://wmpeople.wm.edu/site/page/mxtsch/researchtools

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VITA

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