INVESTIGATING THE ROLE OF THE COLLECTIVE EFFICACY OF TEACHERS IN FISCAL EFFICIENCY AND STUDENT ACHIEVEMENT

DISSEMINATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
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By

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* * * * *

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ABSTRACT

Using variables from two specific strands within the body of educational research, that is, economic theory and organizational theory, a series of hypotheses and a set of theoretical models of student achievement were developed and tested. Student Instructional Ratio (SIR) and Student Services Ratio (SSR), measures of fiscal efficiency, were the variables selected from the economic literature base. Collective efficacy of teachers, teachers’ perceptions that the efforts of the faculty as a whole will have a positive influence on students, represented the organizational variable. In addition to these variables, socioeconomic status (SES) and prior student achievement were included in the study as control variables.

The theoretical models advanced within the study predicted that SIR as well as SSR had an indirect effect on student achievement through the collective efficacy of teachers. To test these models, data were collected from 146 elementary schools within the state of Ohio. Correlational analysis and structural equation modeling techniques were employed to analyze the data and determine the validity of the models.

The results of this investigation failed to support the hypotheses that SIR or SSR had an indirect effect on student achievement through the collective efficacy of teachers.
However, collective efficacy of teachers was found to have a positive, direct effect on student achievement controlling for both SES and prior student achievement. Not surprisingly, evidence from the data analyses showed SES to be directly related to student achievement and indirectly related to student achievement through the collective efficacy of teachers. The importance of collective efficacy in facilitating student achievement was demonstrated by the research.

The absence of finding a significant relationship between fiscal efficiency and student achievement through the key process variable of the collective efficacy of teachers precipitated ex post facto analyses on the sample set. These exploratory analyses demonstrated that money allocated directly to the instructional process at the school did have a significant, indirect effect on student achievement through the collective efficacy of teachers. Taken together, these results prompted the presentation of numerous implications for theory, practice, and future research.
Dedicated to my wife and eternal companion, Michelle
and our three beautiful children, Nathan, Brian, and Kayla
I extend a sincere thanks to the many individuals who have assisted me in accomplishing my personal, professional, and educational goals. To begin, I thank my mother and father, Pauline and Theodore Cybulski who have taught me the importance of hard work and consistent effort. They have truly modeled for me such attributes as courage, self-sacrifice, self-discipline, and attention to the details in life. Next, I pay tribute to the numerous teachers that have enriched my life, from elementary school through high school and on to my many experiences in undergraduate as well as graduate study. I say thank you to each and honor their efforts.

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Dr. Hoy has watched over me since my first days on campus to ensure that I had a successful experience at this great university. He models a relentless pursuit of excellence in all that he undertakes. He is a master motivator, a consummate scholar, a thoughtful
mentor, and a tremendous teacher. Simply put and borrowing a familiar phrase, he is *the best of the best!* He is concerned about all areas of my life and always made it a point to inquire about my family and my personal wellbeing. It shall be an honor to continue to work with him well into the future.

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CHAPTER 1

INTRODUCTION

Public schools in America face extreme pressures from forces associated with current legal, economical, and political fronts. State school funding programs are under legal scrutiny. At this time, 24 state education finance programs have been declared unconstitutional and have been modified or await complete revision (King, Swanson, & Sweetland, 2003). More specifically, in Ohio—the location of the present study—the current finance system was declared unconstitutional by the Ohio State Supreme Court (DeRolph v. State, 1997, 2000, 2001, 2002). The state high court found that the state funded public education system was not providing a thorough and efficient education for its students (DeRolph v. State, 1997, 2000, 2001, 2002). Now the Ohio General Assembly has been given the charge to enact a funding system that complies with the thorough and efficient clause of the state constitution.

As the public speculates how the legislature’s interpretation of the state high court’s order may affect their personal pocketbooks, school officials are left to wonder how the future state education funding program will impact the availability of resources for their schools. Will some school systems stand to gain from the outcomes of the ruling while others stand to lose? The answer awaits.
Within this climate of fiscal uncertainty, local school officials in Ohio are still expected to responsibly manage the economic resources allocated to their schools. In fact, since historic and recent data have revealed a steady increase in education funding (Ohio Office of Budget and Management Division of State Accounting, 2002), citizens are beginning to wonder how these funds are being allocated. In other words, as Ladd & Hansen (1999) have stated, “Citizens . . . want to know whether these resources are being used in ways that yield the maximum possible results for the expenditures involved” (p. 38). Simply put, how efficient are Ohio’s schools? Moreover, what indicators of efficiency are available to inform educators and the public about the resourcefulness of their schools?

At the same time that educators face questions concerning efficiency, they also face political fronts that clamor for more accountability (Consortium for Policy Research in Education, 2002; The Council of Chief State School Officers, 2002). However, this demand for increased accountability is not new. The most recent push for accountability began with the publication of *A Nation at Risk* (National Commission on Excellence in Education, 1983) and has been fueled over the last few decades by such publications as *Indicators of Schools of Quality* (National Study of School Evaluation, 1997), *The National Goals Report: Building a Nation of Learners* (National Education Goals Panel, 1999), and public laws, such as *Title I of the Elementary and Secondary Education Act*, *Improving America’s Schools Act of 1994*, and *No Child Left Behind Act of 2001: Reauthorization of the Elementary and Secondary Education Act*.

The most recent manifestation of accountability demands on public schools is found within the *No Child Left Behind Act of 2001*. With the passage of this Act, the
importance that all students reach some standard of excellence was placed at the top of the national education agenda. To determine how well students are reaching this standard, the federal government requires states to test all eligible students. The results of these tests gauge the extent of student progress and overall achievement.

In anticipation of the federal government’s actions, the state of Ohio, in a 1997 legislative mandate, established the groundwork for a statewide accountability system which included the use of proficiency examinations to assist in determining school effectiveness (Ohio Department of Education, 2002a). The results of these exams and other relevant school related data (e.g., student attendance, student mobility percentages, and percentage of teachers certified in their teaching area) are presented on school report cards. These report cards serve as an accountability tool because they allow citizens to view the progress or lack of progress of their schools. Ideally, this information assists citizens and local educators to work together to make improvements in their schools.

Like it or not, based on current national trends and specific laws enacted by federal and state governments, it appears that educators must embrace the accountability movement. This means educators must become more aware of the movement that is placing student achievement—especially as measured by various state tests—at the forefront of the indicators that are used to assess the effectiveness of their schools.

Combining the legal and resource availability problems associated with the state school funding system in Ohio along with the national movement for school accountability with its emphasis on increasing student achievement, makes the focus of this study, outlined in the following section, ripe for consideration.
Problem Statement and Purpose of the Study

A historical challenge for educational researchers has been the quest to identify determinants of student achievement. Since the Coleman Report (1966) scholars have found it difficult to identify constructs other than socioeconomic status that have a significant, independent effect on student attainment (Hoy & Sabo, 1998). Moreover, many studies that involve student achievement investigate only bivariate relationships (one independent variable and its potential affect on student achievement), which fail to capture the complexity of the educational process (Hoy, Sweetland, & Smith 2002). So, do other constructs exist that have a positive influence on student achievement, and, if so, can a path model be developed to explain this relationship?

For economists, the study of education has involved numerous conceptual frameworks, such as human capital theory, productivity, and efficiency (King et al., 2003). Based on the current economic climate within the state of Ohio enumerated within the previous section, the concept of efficiency appears to be highly relevant to the present study. But what is a useful and precise measure of efficiency that may be applied to schools?

The purpose of this study is to wed two previously separated theoretical strands of educational research, economic theory and organizational theory, by using variables from each theory base to develop and test a series of models of student achievement. The models, presented later, offer an explanation about the relationships that exist between the dependent and key school outcome variable: student achievement and several independent variables: Student Instructional Ratio (SIR), Student Services Ratio (SSR), socioeconomic status, and collective efficacy.
SIR and SSR are economic variables developed by Cooper and Associates (1994) and represent a precise approach to measure efficiency within a school building. The formulas and explanations for each of these concepts originate from the School-Site Micro-Financial Allocations Model (SMAM), which will be introduced later, yet, briefly stated, this model is an accounting tool that enables school systems to be responsible for expenditures made at the school building and district office levels (Cooper & Associates, 1994). The formulas for SIR and SSR will be adapted to fit the finance model used within the state of Ohio—which, in fact, has adopted the essential assumptions and framework of Cooper & Associates’ SMAM (Ohio Department of Education, 2002b).

Socioeconomic status is a well-established construct within education research and has been shown in numerous studies to influence student achievement (Coleman et al., 1966; King et al., 2003). Socioeconomic status will be used to test its independent effect on student achievement as well as controlled to allow for the examination of the relationship between the other independent variables within the study and student achievement.

Finally, teachers’ sense of collective efficacy is the carefully selected representative of organizational theory and has already been found to have a positive and significant effect on student achievement (Bandura, 1993; Barr, 2002; Goddard, 1998; Goddard, Hoy, & Woolfolk Hoy, 2000; Hoy, Smith, & Sweetland 2002; Hoy, Sweetland, et al., 2002). Collective efficacy of teachers is a group characteristic of the “perceptions of teachers in a school that the faculty as a whole can organize and execute the courses of action necessary to have positive effects on students” (Goddard, 2002b, p. 170).
Significance of the Study

Knowledge gained from this investigation adds to the empirical resources that are available to educational leaders and researchers as they encounter the challenges presented by current legal, economical, and political climates. For example, gaining a better understanding of efficiency measures as they relate to schooling assists educational leaders in their decisions to make the best use of scarce or limited resources.

In addition, developing a deeper understanding of the relationship between the collective efficacy of teachers and student achievement provides educational leaders with a potential avenue to increase student achievement. Past research has shown (e.g., Bandura, 1993; Goddard et al., 2000; Hoy, Smith, et al., 2002; Hoy, Sweetland, et al., 2002) and the present study posits: schools with high levels of collective efficacy tend to be accompanied by high levels of student achievement. Therefore, if educational leaders work to identify and strengthen the sources of collective efficacy within schools, albeit a challenging task, this activity would tend to enhance the collective efficacy of teachers. In turn, strong faculty efficacy influences productive school processes (e.g., involvement of teachers in school decisions) that have been shown to directly effect student achievement (Goddard, 2002b).

Furthermore, combining and testing these independent variables (SIR, SSR, socioeconomic status, and collective efficacy of teachers) within a path model, offers initial insight into how the measurement of traditional input variables of the educational system (SIR and SSR) are affected by processes that occur within schools (teachers’ perceptions of collective efficacy), and how these variables work together to affect a traditional output variable of the educational system (student achievement).
Finally, bringing together variables from economic theory and organizational theory opens a new frontier for educational researchers, which has been heretofore left unexplored. Therefore, this study provides fertile ground in which further research may take root.

Research Questions

Contemplation about the relationships that exist between the aforementioned variables gives rise to a series of questions that serve to frame and guide this study.

1. What is the relationship between SIR and SSR and collective efficacy of teachers?

2. Will collective efficacy of teachers, found to be a positive influence on student achievement in prior studies (Bandura, 1993; Barr, 2002; Goddard, 1998; Goddard et al., 2000; Hoy, Smith, et al., 2002; Hoy, Sweetland, et al., 2002), maintain this relationship with student achievement within the present study?

3. What is the relationship between SIR, SSR, socioeconomic status, collective efficacy, and student achievement?

4. Does socioeconomic status relate to SIR, SSR, and collective efficacy of teachers?

5. Do SIR and SSR have a direct effect on student achievement or does collective efficacy of teachers enable an indirect effect between the fiscal efficiency measures and student achievement?
Research Hypotheses

The issues and questions raised within the previous section encourage the testing of the following series of hypotheses.

1. Collective efficacy of teachers has a positive relationship with student achievement.
2. SIR and SSR have a positive relationship with collective efficacy of teachers.
3. SIR and SSR have a positive relationship with student achievement.
4. Socioeconomic status has a positive relationship with SIR and SSR.
5. SIR and SSR have an indirect relationship with student achievement through collective efficacy of teachers.
6. Socioeconomic status has a positive direct relationship with student achievement and a positive indirect relationship with student achievement through collective efficacy.

From these hypotheses, a path model will be developed in Chapter 2, which provides a theoretical explanation for the relationships that exist between the variables within this study. The theoretical model suggests how various school-level variables (i.e., SIR, SSR, collective efficacy, and socioeconomic status) interrelate as well as how they affect student achievement. Before this path model is introduced, the definitions, key assumptions and limitations, and review of the literature for each of the variables are presented.
Definition of Terms

Listed below are key terms along with accompanying definitions that will be used throughout this study.

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

**Collective Efficacy of Teachers** refers to “the perceptions of teachers in a school that the efforts of the faculty as a whole will have a positive effect on students” (Goddard et al., 2000, p. 480).

**Elementary Schools** refer to schools that provide public school instruction to students in grades K-6.

**Efficiency** is the ratio of outputs produced to inputs committed (King et al., 2003).

**Fiscal Efficiency** is “defined as the ratio of the cost of direct services to students to the operating or systems costs” (Cooper & Associates, 1994, p. 81).

**Internal Economic Efficiency** relates to “the allocation of resources within educational enterprises in order to maximize output (for example, academic achievement, skill development, behavior, and attitudes of students) from resources committed” (King et al., 2003, p. 348).

**External Economic Efficiency** refers to how well economic returns are received from investments in education compared to returns from other investment opportunities within a national economy (King et al., 2003).

**School-Site Micro-Financial Allocations Model (SMAM)** is an accounting tool that enables school systems “to account for [monetary] resources at the school site and classroom levels” (Cooper & Associates, 1994, p. 70).
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).

Socioeconomic Status is a measure of student background characteristics and is based on the proportion of students not receiving free or reduced priced school lunch.

Social Cognitive Theory is a set of interrelated concepts and assumptions that explains human behavior using the concept of triadic reciprocal causation and the exercise of control through the concept of human agency.

Student Instructional Ratio (SIR), an efficiency measure, is represented by the ratio “of per pupil costs in the classroom to those devoted to administration and operations at central office and at each school site” (Cooper & Associates, 1994, p. 81).

Student Services Ratio (SSR), an efficiency measure, “indicates the ratio of per pupil support to actual resources spent on students both inside and outside of the classroom” (Cooper & Associates, 1994, p. 82).

Student Achievement is a measure of student performance and is represented by the State of Ohio 4th grade proficiency test scores in mathematics and reading.

Teacher Efficacy refers to “the teacher’s belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context” (Tschanne-Moran, Woolfolk Hoy, & Hoy, 1998, p. 233).

Technical Efficiency is the extent to which a firm, industry, or economy is making best use of the resources it has (Shim & Siegel, 1995; King et al., 2003).
The Expenditure Flow Model (EFM) is used by the Ohio Department of Education and is an adaptation of Cooper & Associates’ (1994) School-Site Micro-Financial Allocations Model. “The EFM uses the districts’ end of year financial records to organize expenditure data into meaningful and comparable categories at both the district and building level” (Ohio Department of Education, 2002b, p. 2).

Assumptions

Because a survey was used to collect data in this study, it is assumed that teachers shared their frank and honest opinions as they responded to survey questions regarding their own beliefs about their behavior and the behavior of others. Given these honest perceptions one may make the broader assumption that valid and reliable measures of teachers’ sense of collective efficacy in a school provide a strong argument for making accurate predictions about teachers’ behaviors in the school (Bandura, 1997). These teachers’ behaviors will ultimately affect student achievement (Brophy & Good, 1986).

The Ohio 4th grade mathematics and reading proficiency exams serve as valid and reliable measures of student achievement. In addition, because school data were obtained from the Ohio Department of Education for calculating the efficiency and socioeconomic measures utilized within this study, it is assumed that these data have been accurately reported.

Limitations

Much care was taken in creating a sample that would match the diverse characteristics of public elementary schools in the state, including school population, socioeconomic status and the proportion of rural, urban, and suburban elementary schools. However, this study utilizes a non-random selection of public elementary
schools in the State of Ohio. Therefore, generalizing these results to larger school populations or public and private elementary schools located outside of Ohio should be done with caution.

Other input variables of the educational system have been shown to affect student achievement (e.g., teaching longevity (Bandura, 1993), teacher’s verbal score (Coleman et al., 1966), and student-teacher ratio (Finn & Achilles, 1999) but were not included within this study. Hopefully, researchers will test these variables within this model in future studies.

Multiple approaches for measuring school efficiency exist within the literature (for example, quadriform analysis, ratio analysis, and data envelopment analysis (Swanson and Engert, 1991; King et al., 2003)). However, since the State of Ohio adopted Cooper & Associates’ (1994) framework as a model for the state school accounting system, it seemed logical to test the efficiency measures developed by Cooper & Associates on a sampling of schools within the state. The implementation of other approaches to measure school efficiency is left for future investigations.

Summary

Public school personnel encounter many challenges from external forces of the educational environment. This chapter outlined specific legal, economical, and political concerns that face educators within the state of Ohio. The present study hopes to shed light on issues surrounding school efficiency, faculty efficacy, and student achievement by testing a theoretical model of student attainment. Major variables within the study, SIR, SSR, collective efficacy of teachers, socioeconomic status, and student achievement, were defined and briefly addressed. In addition, a series of hypotheses, derived from a
group of research questions about the variables, were developed to help guide the empirical phase of this academic investigation. Finally, the assumptions and limitations of this research were presented. The content of the following chapter contains a thorough review of the literature for each of the previously mentioned variables.
CHAPTER 2

REVIEW OF THE LITERATURE

This chapter presents the conceptual ancestry and theoretical underpinnings of the collective efficacy of teachers, school efficiency, and student achievement. First, the relevant historical developments, theories, concepts, and research studies, which have supported the birth and development of the collective efficacy of teachers, will be addressed. Next, a review of the literature on efficiency in education is presented. Later, a brief examination of student achievement is provided. The chapter ends with a rationale for each hypothesis that was established in the previous chapter and with the introduction of two path models. The models depict the theoretical relationships that exist between the variables within this study.

Overview of Collective Efficacy of Teachers

The key independent variable within this study, collective efficacy of teachers, has been found to be a powerful, group-level characteristic of schools that had its origin within the discipline of psychology. Bandura (1986, 1993, 1997) was first to theorize about collective efficacy. He postulated that collective efficacy is associated with the performance capability of an entire social group and is rooted in the conceptualization of perceived self-efficacy. Although the concept of self-efficacy has received significant
attention since Bandura’s (1977) groundbreaking study; collective efficacy has been relatively ignored (Pajares, 1997; Zaccaro, Blair, Peterson, & Zazanis, 1995). As a result, Bandura (1986, 1997) called upon the research community to engage in a comprehensive and expansive research effort on the concept. He hoped that researchers would create instruments to measure collective efficacy. More specifically, he believed that “[t]he greatest progress can be made in explaining the development, decline, and restoration of collective efficacy, and how it affects group functioning” (Bandura, 1997, p. 478).

Scholars responded, but not in due haste (Goddard, 2001). It will be shown later that even though the concept has been widely researched in multiple disciplines, it may, because of the lack of significant study, still be considered an infant within a concept’s lifespan.

Placing collective efficacy within the context of a school environment, Bandura (1993) developed the construct, collective efficacy of teachers or teachers’ sense of collective efficacy. He posited that in schools collective efficacy is important because “[t]eachers operate collectively within an interactive social system rather than as isolates. The belief systems of staffs create school cultures that can have vitalizing or demoralizing effects on how well schools function as a social system” (p. 141). He went on to test his conceptualization of collective efficacy of teachers by using a path model to show that teachers’ sense of collective efficacy did, indeed, have a positive, independent effect on student attainment.

Bandura’s (1993) work is considered a landmark study within educational research because a construct other than socioeconomic status and one that may be
influenced by educators was found to have a positive effect on student attainment. Following this work, a few studies on collective efficacy within education and outside of education have been undertaken.

However, before examining these studies, first one must carefully examine and analyze the theoretical heritage of this construct, which offers insight into its ability to act as such a powerful predictor of behavior. And so, the following sections provide a comprehensive examination of the theoretical birth, growth, and development of collective efficacy of teachers.

Theoretical Underpinnings of Teacher Efficacy

Collective efficacy of teachers, considered a group-level construct, evolved from teacher efficacy, its conceptual counterpart at the individual-level. Teacher efficacy enjoys a well-explored yet controversial research history (Tschannen-Moran et al., 1998). This controversy stems from the conceptualization of the construct. Therefore, before examining the definitions, conceptualization, and research associated with the efficacy of teachers, the theoretical underpinnings of the construct are reviewed. The conceptual genealogy of teacher efficacy may be traced back to two different theoretical parents: Rotter’s (1954, 1972) social learning theory of personality and Bandura’s (1986, 1997) social cognitive theory, which are explicated below.

Rotter’s Social Learning Theory of Personality

Rotter’s social learning theory of personality (1954, 1972) may be regarded as an integration of stimulus-response-reinforcement theories and cognitive theories, which were the prevailing views in American psychology at the time. A key assumption of his theory is that, “The major or basic modes of behaving are learned in social situations and
are inextricably fused with needs requiring for their satisfaction the mediation of other persons” (Rotter, 1954, p. 84). Based on this assumption, Rotter established a framework built upon the constructs of behavior potential, expectancy, reinforcement value, and psychological situation.

For Rotter (1972), behavior potential meant the possibility of any behavior occurring in any situation or situations based on the alternatives presented. His definition for behavior is broad and includes “all human responses having an effect on the environment. Any response to a meaningful stimulus that can be measured either directly or indirectly would qualify” (p. 15).

In a given situation, an individual develops a belief about the likelihood that a specific reinforcement follows a certain action or behavior. Rotter (1954, 1972) conceptualized this probabilistic belief as expectancy. Expectancy is influenced by past experiences and can often lead to generalized beliefs about behaviors and its consequences.

Reinforcement value may be defined as the degree to which an individual values one possible outcome in relation to another possible outcome. The reinforcement value is independent of expectancy because the possible outcome that is considered most likely to occur (expectancy) may or may not be the one that is most esteemed (reinforcement value) (Pintrich & Schunk, 2002; Rotter, 1954, 1972).

Rotter (1954) defined psychological situation “as that which is experienced by the [individual] with the meanings that the [individual] gives it. The situation must also be describable in objective terms for scientific purposes” (p. 111). Pintrich and Schunk (2002) added that psychological situation “highlights the importance of the context of
behavior. How individuals view situations affects reinforcement value and expectancy. In unpleasant situations, all potential outcomes might be viewed as negative and the least negative one as the most desirable” (p. 147).

An insightful synthesis of the aforementioned constructs was offered by Pintrich and Schunk (2002):

In essence, Rotter's theory says that people form expectations about the likely outcomes of behaviors and act in accordance with these expectations and the value they place on potential outcomes. Individuals will act in a given fashion if they believe that a reinforcing outcome will occur and if they value that outcome. (p. 147)

To expand his theory surrounding the nature and effects of reinforcement, Rotter (1965, 1966) developed and tested the dichotomous variable, control of reinforcement. He stated that this variable is of

major significance in understanding the nature of learning processes in different kinds of learning situations and also that consistent individual differences exist among individuals in the degree to which they are likely to attribute personal control to reward in the same situation. (1966, p. 1)

If individuals viewed reinforcements as following some behavior that was partially attributed to their own actions as well as to luck, chance, or powerful others then these individuals would be demonstrating a belief in an external control of reinforcement. On the other hand, if individuals perceived that an event was dependent upon their own actions or relatively stable characteristics then these individuals would be demonstrating a belief in an internal control of reinforcement (Rotter, 1966). This variable, control of reinforcement, would eventually provide a useful theoretical foundation for the conceptualization of teacher efficacy.
In fact, conceptualization is at the heart of the controversy surrounding the development, measurement, and testing of teacher efficacy (Tschannen-Moran et al., 1998). It will be discussed later that when teacher efficacy was first defined by researchers at the Rand Corporation (Armor et al., 1976) they relied on Rotter's internal and external control of reinforcement. However, with the arrival of Bandura’s expansion of social cognitive theory (1986, 1997) and his conceptualization of self-efficacy (1977), a second and more conceptually pure foundation for teacher efficacy appeared. Hence, a conceptual quandary arose because researchers were faced with defining teacher efficacy based on either Rotter’s control of reinforcement or Bandura’s self-efficacy theory. Because attention has been given to Rotter’s theory, the following sections will be devoted to an explanation of the major assumptions and constructs associated with Bandura’s social cognitive theory.

**Bandura’s Social Cognitive Theory**

Bandura’s expansion of social cognitive theory took years to develop. Careful examination of his earlier works offers insight into the introduction and maturation of concepts found within his current framework. For example, modeling, emotional arousal, self-control, vicarious experience, reciprocal interaction—various key concepts within his theory—are clearly an important part of his earlier writings (see, for example, Bandura, 1971, 1977, 1978). However, the bulwark of the theory was established within the publication, *Social Foundations of Thought and Action* (1986), with further support and elucidation found within *Self-Efficacy: The Exercise of Control* (1997). Articles
published subsequent to these two master works offer additional insight into various concepts or variables associated with social cognitive theory (see, for example, Bandura, 2000a, 2000b, 2000c, 2001b).

The theory acknowledges the social origins of much human action and thought as well as recognizes the influence of thought processes to human motivation, emotion, and action (Bandura, 1986). Put another way, it is “a unified theory of behavioral change postulating that different modes of influence (e.g., enactive experience, vicarious experience, and social persuasion) alter behavior through their effects on efficacy beliefs” (Goddard, 1998, p. 8).

The theory explains human functioning through the exercise of human agency and through the utilization of a model of triadic reciprocal causation. In addition, the nature of people is defined through various basic capabilities identified as symbolic, forethought, vicarious, self-regulatory, and self-reflective. Most importantly, this theoretical framework introduces and explores self-efficacy—most relevant to this study because it supplies the theoretical grounding for teacher efficacy and collective efficacy of teachers (Bandura, 1986, 1997; Goddard, 1998; Maddox, 1995). For the sake of clarity, assumptions involving basic human capabilities are presented before the descriptions of triadic reciprocal causation, human agency, and self-efficacy.

**Symbolic capability.** People use symbols to give meaning and continuity to their life experiences. Utilizing their powers to symbolize, people may create innovative courses of action or attempt solutions to complex problems and accept or discard the solution based on the estimated outcome. In addition, using symbols enables people to create ideas that move beyond their sensory experiences. As well, symbol usage allows
people to communicate with others over any distance in time and space. Symbolic capability serves as an essential conceptual footing for other characteristics that will be explored within this theory (Bandura, 1986).

**Forethought capability.** Within this framework, people are not simply manipulated by the environment, nor are they pushed around like pawns by their past experiences. Instead, most of their behavior may be considered regulated by forethought. Forethought capability manifests itself when people anticipate consequences of their actions, set goals for themselves, and plan routes of action. Additionally, the exercise of forethought assists people to motivate themselves and to steer their behaviors anticipatorily (Bandura, 1986).

Forethought is rooted in symbolic capability. “Future events cannot serve as determinants of behavior, but their cognitive representation can have a strong casual impact on present action” (Bandura, 1986, p. 19). People create images (symbols) of a desirable future, which leads to the manifestation of the behavior that would bring that future to realization. The cognitive process of representing foreseeable consequences symbolically enables people “to convert future consequences into current motivators and regulators of foresightful behavior. Forethought is translated into action through the aid of self-regulating mechanisms” (Bandura, p. 19). Self-efficacy, which will be introduced shortly, is an example of such a self-regulating mechanism.

**Vicarious capability.** People may learn not only through their own performances but also through the observation of others. Vicarious learning allows people to form their own rules for generating and regulating behavior patterns without having to engage in the
action or task themselves. This capability is essential for personal progress throughout life. Unsurprisingly, people have developed an advanced observational learning capability. Indeed, Bandura (1986) stated that

> apart from the question of survival, it is difficult to imagine a social transmission system in which the language, life styles, and institutional practices of the culture are taught to each new member just by selective reinforcement of fortuitous behaviors, without the benefit of models to exemplify these cultural patterns. (p. 20)

Models—exemplars that facilitate vicarious learning—provide significant aid to people as they seek to acquire such complex skills as speaking, writing, exercising, and calculating (Bandura, 1986).

*Self-regulatory capability.* People regulate much of their own behavior based on internal standards and self-evaluative reactions to their own behavior. Once personal standards have been set, “discrepancies between a performance and the standard against which it is measured activate evaluative self-reactions, which serve to influence subsequent behavior. An act, therefore, includes among its determinants self-produced influences” (Bandura, 1986, p. 20). External forces also work to influence self-regulatory capabilities. However, this external influence does not disprove the fact that the exercise of self-regulation partly determines the course of one’s actions (Bandura, 1986).

*Self-Reflective capability.* Self-reflection is a process in which people analyze their experiences and think about their own thought processes. From this process, people derive knowledge about the environment and themselves. Self-referent thought aids not only personal understanding, but also assists in evaluating and changing personal
thinking. In fact, a variety of processes may occur while engaged in self-reflective thought, such as monitoring ideas, acting on ideas or predicting occurrences from them, and judging the adequacy of thoughts from results (Bandura, 1986).

*Triadic reciprocal causation.* According to Bandura (1986), the aforementioned capabilities are distinguishing human characteristics. Put differently, they provide assumptions about the basic nature of people. Yet to fully understand human functioning, Bandura (1986, 1997) developed the model of triadic reciprocal determinism (see Figure 2.1).

![Figure 2.1: Theoretical Model of Triadic Reciprocal Causation. Source: Adapted from Bandura, 1997, p. 6.](image)

In this model the main components, behaviors, internal personal factors (cognitive, emotional, and biological), and environmental factors, all operate, in a reciprocal manner, to influence each other.

To illustrate this model at work, an example from schools is utilized. If a teacher decides to incorporate additional concepts into her or his overloaded mathematics
curriculum, the teacher’s actions (B) will interface with the environment (E) (e.g., represented by the students, parents, administrators, and resources needed), and the teacher’s own personal factors (P) (e.g., thoughts on and emotional response to the challenges this task presents). Hence, the determinants of the teacher’s future behavior are partially attributed to the blending of the teacher’s internal reactions to the environment (P → E) and the new action (P → B). In addition, environmental reinforcers on the teacher’s future actions (E → B), and the influence of the teacher’s new behavior on the environment (B → E) will also affect the future behavior. Finally, whether the teacher decides to incorporate these additional concepts into the curriculum is dependent upon how the environment influences her or his personal reactions (E → P) and how the new behavior influences her or his personal reactions (B → P) (Goddard, 1998). In sum this bi-directional triadic model of human functioning attempts to capture the multiple factors that work to produce or explain a given behavior.

*Human agency.* From this example, it can be readily observed that the teacher was actively shaping her or his own future by pursuing her or his own course of action. This exemplifies human agency or the purposive actions of people. Since the triadic reciprocal causation model provides the framework in which people exercise their agency, it would follow that human agency operates through three interdependent determinant factors: behaviors, internal personal factors, and the environment (Bandura, 1986, 1997).

*Self-Efficacy*

Having examined Bandura’s assumptions of human capabilities as well as the concepts, triadic reciprocal causation and human agency, this review turns to an analysis of self-efficacy. Because self-efficacy serves as the conceptual foundation for teacher and
collective efficacy of teachers, it shall be expounded in a thorough manner. First, the origins of the concept are unfolded and then linked to Bandura’s social cognitive theoretical scheme. Next, the specificity, generalizability, and determinants of self-efficacy are unpacked. Following the explanation of these characteristics of self-efficacy, the concept is distinguished from other self-referent concepts. Finally, empirical evidence is presented to support self-efficacy as a predictor of various human behaviors.

Origins of self-efficacy and its link with social cognitive theory. The genesis of self-efficacy may be traced back to Bandura’s (1977) pursuit of the identification of psychological treatments for people attempting to cope with fearful and avoidant behaviors. As a result of his investigations, he offered clinical psychologists the concept of self-efficacy. He defined it as the “conviction that one can successfully execute the behavior required to produce outcomes” (p. 193). Twenty years later, Bandura (1997) expanded the meaning of his concept by defining self-efficacy as the belief “in one’s capability to organize and execute the courses of action required to produce given attainments” (p. 3). From these definitions, one may conclude that personal efficacy manifests itself as a belief. These beliefs are formed through the exercise of intentional action and the cognitive processing of information (Bandura, 1997). Later in this section an explanation about the sources of self-efficacy is provided.

To link this concept with social cognitive theory, Bandura (1986, 1997) recognized self-efficacy as a mechanism of human agency, which placed its functioning within the tripartite causal model. As a result, self-efficacy is considered both a powerful contributor to the choices people make about the various courses of action they intentionally pursue and is, in turn, influenced by these choices.
Specificity and generalizability of self-efficacy beliefs. Although other conceptions of self-belief or self-evaluation may be considered global or trait constructs (e.g., self-esteem or self-concept) (Bandura, 1997; Maddox, 1995) self-efficacy, on the other hand, is “defined and measured in the context of relatively specific behaviors in specific situations or contexts” (Maddox, 1995, p. 8). The level of specificity is determined by the type of task and situation presented, the type of task or situation to which one desires to generalize, or in which one desires to predict. For example, an assessment on the self-efficacy beliefs for the skill of teaching science provides an adequate specification (Riggs & Enochs, 1990). However, if the assessment is too specified (e.g., teaching a lesson on osmosis to eighth grade students in an urban middle school during the month of October) then it will have limited generalizability (Maddox, 1995).

Just because self-efficacy beliefs do not refer to broad or global levels of competence does not mean they may generalize in certain situations. On the contrary, the literature supports the view that self-efficacy beliefs are generalizable when situations share common features and require similar functions and skills (Bandura, 1990, 1997; Maddox, 1995). For example, a teacher’s perception of efficacy for teaching Advanced Algebra might not generalize to his or her beliefs for teaching Auto Mechanics because of the differences in expertise expected in the teaching task. However, this teacher’s efficacy beliefs may generalize to his or her ability to teach Algebra I because of the similarities in the teaching task, which include the basic underlying curriculum similarities.
Determinants of self-efficacy. The previous sections provided an adequate description of the characteristics of self-efficacy. But how do self-efficacy beliefs form? How are they constructed? According to Bandura (1977, 1986, 1997), the sources of self-efficacy beliefs are actively constructed by individuals through cognitive processes. Sources of efficacy information become “instructive only through cognitive processing … and through reflective thought” (Bandura, 1997, p. 79). It is theorized that cognitive processes weigh and integrate four primary efficacy sources: mastery experiences, vicarious experiences, social persuasion, and physiological and emotional states.

Mastery experiences may be described as those in which a given attainment is attributed to an individual’s successful course of action. The adage, success breeds success and failure undermines it, is applicable for this source of self-efficacy. Elaborating on this point Bandura (1997) posited:

If people experience only easy successes, they come to expect quick results and are easily discouraged by failure. A resilient sense of efficacy requires experience in overcoming obstacles through perseverant effort. Some difficulties and setbacks in human pursuits serve a beneficial purpose in teaching that success usually requires sustained effort. Difficulties provide opportunities to learn how to turn failure into success by honing one’s capabilities to exercise better control over events. After people become convinced that they have what it takes to succeed, they persevere in the face of adversity and quickly rebound from setbacks. (p. 80)

Because of the nature of this source of efficacy it should come as no surprise that compared with other sources of self-efficacy beliefs, mastery experience is the most influential source of personal efficacy (Bandura, 1977, 1997).

Individuals do not strengthen or diminish efficacy beliefs solely by personal experiences. Instead, vicarious experiences (i.e., modeling, imitation, and observational learning) stand as an important source for the development of personal efficacy. When
individuals observe the actions of others, see what others are able to accomplish, note the outcomes of those actions, and then use this information to develop expectations about their own actions and outcomes, they are engaging in vicarious experiences that serve to influence efficacy beliefs (Maddox, 1995). Moreover, the strength of these influences on personal efficacy beliefs depends on “such factors as the observer’s perception of the similarity between himself and the model, the number and variety of models, the perceived power of the models, and similarity between the problems faced by the observer and the model” (Maddox, p. 10). Although considered an important source for the formation of efficacy beliefs, modeling experiences have been shown to have weaker effects on personal efficacy than mastery experiences (e.g., Bandura, Adams, & Beyer, 1977).

Social persuasion, the third source of efficacy belief formation, is manifested through feedback or the exhortations of others. Although not considered to be as strong a source as mastery and vicarious experiences (Pajares, 1997), verbal persuasion may promote efficacy expectations especially when such factors as the trustworthiness, expertness, and attractiveness of the source are considered (Maddox, 1995). In regards to considering social persuasion as a source of self-efficacy beliefs, Bandura (1997) stated:

Verbal persuasion alone may be limited in its power to create enduring increases in perceived efficacy, but it can bolster self-change if the positive appraisal is within realistic bounds. People who are persuaded verbally that they possess the capabilities to master given tasks are likely to mobilize greater effort and sustain it then if they harbor self-doubts and dwell on personal deficiencies when difficulties arise. (p. 101)

Alas, experimental studies have shown social persuasion to have only a moderate effect for changing self-efficacy beliefs (Maddox, Norton, & Stoltenberg, 1986).
The final source of constructing efficacy beliefs is found within physiological and emotional states. By these terms Bandura (1986, 1997) means that individuals rely on their physiological and emotional states to make judgments about their capabilities to accomplish specific tasks. Therefore, emotional states such as depression, fear, anxiety, stress, and fatigue may have an effect on efficacy beliefs. As well, the physiological state (e.g., hyperventilating, trembling, sweating, stomach upsets, and increased heart-rate) that may accompany the emotional state (e.g., fear, excitement, betrayal, nervousness, or disgust) will also have an affect on efficacy beliefs. Individuals’ attention to their internal state is the mechanism by which the physiological and emotional states produce their affect. In relation to this matter Bandura (1997) made the following point:

When situational matters command attention, one cannot be focused both inwardly and outwardly simultaneously. Hence, the less absorbed people are in activities and events around them, the more they focus attention on themselves and notice their aversive bodily states and reactions in taxing situations. (p. 107)

Thus, when individuals’ recognize unpleasant physiological or emotional states, they are more likely to question their personal competence (efficacy beliefs) than if the physiological or emotional state were pleasant or neutral (Maddox, 1995). For instance, some research studies have shown (Maddox & Meier, 1995; Williams, 1995) that depression and anxiety may have a “deleterious impact on self-efficacy” (Maddox, 1995, p. 12); whereas enhancing physical status, reducing stress levels and depleting negative emotional tendencies may alter efficacy beliefs in a positive manner (Bandura, 1991a; Cioffi, 1991).
These four sources of self-efficacy beliefs assist in distinguishing this self-referent attribute from others that have been compared to it. In the next section, a brief description of similar self-referent constructs is offered to heighten the distinction between self-efficacy and the other constructs that are presented.

**Self-efficacy and other psychological constructs.** Unfortunately, various psychological concepts have been confused or used interchangeably with self-efficacy. Self-concept, self-esteem, outcome expectancy, and locus of control are examples of such concepts and their distinguishing characteristics are delineated below.

Unlike self-efficacy, self-concept refers to images of the self that are global in nature (Bandura, 1997). Self-concept is a “composite view of oneself that is presumed to be formed through direct experience and evaluations adopted from significant others” (p. 10). Furthermore, this view is linked with ideas, feelings, and attitudes about oneself—a type of self-image (Woolfolk, 2001). Recall that self-efficacy relates to beliefs about the ability to accomplish specific tasks, not to personal, overall assessments of oneself. Because of the specificity associated with self-efficacy beliefs, it has been shown that self-efficacy is a much better predictor of behavior than self-concept (Pajares & Miller, 1994). Clearly, self-concept and self-efficacy are two different and unique psychological constructs.

Self-esteem beliefs are associated with an individual’s self-worth (Bandura, 1997). But as Bandura noted, “There is no fixed relationship between beliefs about one’s capabilities and whether one likes or dislikes oneself” (p. 11). To illustrate, just because a student has low-efficacy towards solving quadratic equations does not mean the same student has a negative perception of his or herself. Likewise, a student that feels great
about oneself may be inefficacious when it comes to speaking Latin. Hence, while self-esteem may be strong, self-efficacy for a specific task may be weak (or vice versa). In regards to empirical evidence, research has shown that self-efficacy is a better predictor of goals people set for themselves and their performance achievements than self-esteem (Mone, Baker, & Jeffries, 1995).

Another concept related to self-efficacy is outcome expectancy. This construct refers to the physical, social, and/or self-evaluative consequences that follow a specific action (Bandura, 1997). Based on Bandura’s theoretical scheme, efficacy beliefs form before a particular behavior is executed, whereas outcome expectancies are concerned with the consequences of the executions of behavior. This relationship has repercussions on the ability to predict behavior. Self-efficacy is a much more powerful predictor than outcome expectancy. Bandura (1977) noted, “individuals can believe that a particular course of action will produce certain outcomes [outcome expectation], but if they entertain serious doubts about whether they can perform the necessary activities [low self-efficacy] such information does not influence their behavior” (p. 193).

However, outcome expectancy is still considered important and plays a significant role in motivation. For example, when individuals realize that accomplishing a certain act leads to praise, rewards, and recognition these outcomes may serve to motivate individuals to pursue certain behaviors. Yet, it is the strength or weakness of efficacy beliefs that will ultimately be predictive of the level of accomplishing the behavior. Along this line of reasoning, Bandura (1997) cited hosts of studies that supported the following conclusions:
Where performance determines outcome, efficacy beliefs account for most of the variance in expected outcomes. When differences in efficacy beliefs are controlled, the outcomes expected for given performances make little or no independent contribution to prediction of behavior. This is true for diverse spheres of functioning, including academic attainments (Barling & Abel, 1983; Lent, Lopez, & Bieschke, 1991; Shell, Murphy, & Bruning, 1989), social behavior (Gresham, Evans, & Elliot, 1988) … [and many others]. (p. 24)

Locus of control is the final concept of concern within this section. Recall that Rotter (1965, 1966) made substantial contributions to the development and measurement of this construct. Over time locus of control and self-efficacy seem to have been mistaken as similar concepts measured at different planes of generality (Bandura, 1997). As a result, Bandura was moved to speak unequivocally, and with candor, that

Beliefs about whether one can produce certain actions (perceived self-efficacy) cannot, by any stretch of the imagination, be considered the same as beliefs about whether actions affect outcomes (locus of control). (p. 20).

Furthermore, empirical evidence not only supports the conceptual distinction between the two concepts (Bandura, 1991b), it also provides evidence that self-efficacy is a stronger predictor of behavior than locus of control (Bandura, 1977).

Lastly, remember that locus of control has been identified as a founding theoretical framework for the development of teacher efficacy (Armor et al, 1976; Tschannen-Moran et al., 1998). Because locus of control is clearly different than self-efficacy, which also has been identified as a founding theoretical framework for teacher efficacy (Tschannen-Moran et al., 1998), one can envision how some controversy has surrounded the conceptualization of the efficacy of teachers. In forthcoming sections, a thorough analysis of the birth and development of teacher efficacy along with an exposition of the controversy are related. However, before this occurs, the following section provides evidence that self-efficacy—the theoretical construct, which has
undergirded the definition, measurement and study of both the efficacy of teachers and
the collective efficacy of teachers—is a powerful predictor of various human behaviors.

*Self-efficacy: predictor of human behavior.* Up to this point self-efficacy has been
linked to its theoretical parent, social cognitive theory. Additionally, its major
assumptions and distinguishing characteristics have been presented. Now the discussion
moves to unveil a brief yet representative sample of research studies that support the
premise that perceived self-efficacy is a powerful predictor of behavior.

Comments made by Bandura (1997) that relate to the explanatory power of self-
efficacy serve as a logical preface for this section. He stated:

[T]o achieve explanatory and predictive power, measures of personal efficacy
must be tailored to domains of functioning and must represent gradations of task
demands within those domains. This requires clear definition of the activity
domain of interest and a good conceptual analysis of its different facts, the types
of capabilities it calls upon, and the range of situations in which these capabilities
might be applied. (p. 42)

Since Bandura’s (1977) pioneering work on efficacy, an enormous literature base
has been established in validating self-efficacy as a predictor of human behavior
(Bandura, 1997; Pajares, 1997). To illustrate, self-efficacy beliefs have been found to
predict susceptibility to test anxiety (Smith, 1989), tolerance to pain (Manning & Wright,
1983), and participation in politics (Wollman & Stouder, 1991). In addition, research
studies have shown personal efficacy beliefs to predict the use of preventative practices
in dental medicine (Beck & Lund, 1981), improvement in heart functioning (Kaplan,
Atkins, & Reinsch, 1984), adoption of healthy dietary and exercise practices (Sallis,

These studies demonstrated that self-efficacy plays a pivotal role in explaining general psychological and social functioning. However, this comes as no surprise because Bandura placed self-efficacy as an important personal factor within his social cognitive theory, which explains human behavior (Bandura, 1997). On this point Pajares (1997) stated, “Bandura provided a view of human behavior in which the beliefs people have about themselves [i.e., personal efficacy] are key elements in the exercise of control and personal agency” (p. 3).

But why should efficacy beliefs be so important in influencing human behaviors? Bandura (1997) claimed that individuals who hold a resilient sense of personal efficacy seek out challenging tasks, become engrossed in activities, set challenging goals, exert high levels of effort in activities, and heighten their effort in the face of setbacks or failures. In addition, highly efficacious individuals are task-focused, strategic thinkers and attribute their failures to lack of personal effort. As well, a resilient efficacy orientation helps individuals “[to] recover their sense of efficacy after failures or setbacks … [to] cope with potential stressors or threats with the confidence that they can exercise some control over them … [and to] enhance performance accomplishments, reduce stress, and lower vulnerability to depression” (p. 39). The findings listed above along with the previously mentioned attributes bolster Bandura’s view that “beliefs of personal efficacy are active contributors to, rather than mere inert predictors of, human attainments. People make things happen …” (p. 39).
Investigating the Conceptualization of Teacher Efficacy

Because the present study focuses on the collective efficacy of teachers the following sections will explore the development and predictive power of teacher efficacy. Or, said differently, how teachers make things happen based on their sense of personal efficacy within the school environment. Following these informative sections, this review moves to carefully consider the key theoretical assumptions, definitions, and research findings surrounding the collective efficacy of teachers.

Research Origins of Teacher Efficacy

The first appearance of the term teacher efficacy within the extant literature base is found within Barfield and Burlingame’s (1974) study of the pupil control ideology of teachers. They defined teacher efficacy as “a personality trait that enables one to deal effectively with the world” (p. 10). To measure the concept they relied upon a prior study which examined an individual’s sense of political efficacy, or an individual’s “positive attitude toward accomplishing things through politics” (p. 8). Although Barfield and Burlingame’s study found that teachers with a low sense of efficacy tend to demonstrate a custodial orientation in their pupil control ideology, the definition and measure of the concept is far afield from the present study’s path of examining the concept. A more useful approach for defining and measuring the concept of teacher efficacy is found a few years later within the work of the researchers at the Rand Corporation.

To evaluate the results of minority student performance on its instituted reading program, the Los Angeles Unified School District contracted the Rand Corporation to identify the factors that have been successful in increasing minority student reading scores. The study (Armor et al., 1976), which included a sample of 20 elementary schools
with an average enrollment of 1030 students, found that student background characteristics (e.g., socioeconomic status, health, and previous performance on tests) accounted for the largest portion of the variation in the reading scores of those minority students within the sample. However, other variables were identified that also contributed a significant affect to the variance in student test scores.

Of the four factors identified as producing improved reading gains for minority students (teacher attributes, classroom setting, program content, and implementation strategies), the first, teacher attributes, is particularly relevant to the present study. Teacher attributes were dichotomized into teacher background characteristics (ethnicity, college attended, and undergraduate major) and predispositions (or teacher attitudes toward teaching students). Furthermore, teacher predispositions or attitudes toward teaching were defined as “the extent to which the teacher believes he or she has the capacity to produce an effect on the learning of students” (Armor et al., 1976, p. 23). Armor and colleagues identified this construct as teacher efficacy and relied upon the work of Rotter (1966) for its theoretical foundation.

Interestingly, the Rand study has been identified as one of the two main contributors to the controversy that surrounds the conceptualization of teacher efficacy—the other being Bandura’s self-efficacy theory (Tschannen-Moran et al., 1998). Concerning the problems associated with the Rand’s conceptualization of teacher efficacy and its reliance on Rotter’s work, consider that an examination of Rotter’s (1966) piece finds no mention of the term teacher efficacy or efficacy. In fact, recall that this work focused on the conceptualization of internal and external control of reinforcement, or the extent to which individuals attributed their own behaviors and the
reinforcements that followed to internal stable characteristics or external forces (Rotter, 1966). Yet, the two questions developed by Armor et al. (1976) to measure teacher efficacy harmonize well with the internal and external locus of control developed by Rotter: 1) “When it comes right down to it, a teacher really can’t do much—most of a student’s motivation and performance depends on his or her home environment” [external locus] 2) “If I try really hard, I can get through to even the most difficult or unmotivated students” [internal locus] (Armor et al., p. 73).

Hence, on the one hand, Rotter’s (1966) work helped to frame the questions that attempted to measure the extent of a teacher’s belief in their ability to produce student outcomes based on an internal or external locus of control. On the other, Armor et al. (1976) chose to use the term efficacy to define their construct which would eventually lead to confusion with Bandura’s (1977, 1986, 1997) notion of self-efficacy—individuals’ beliefs about their capacity to accomplish a given task in a given situation.

Unfortunately, Armor et al. (1976) chose to define their concept using the term teacher efficacy rather than teacher locus of control. This choice has contributed to the controversy that has surrounded the construct’s development. Still, and more importantly, much credit must be given to the researchers at Rand for unveiling a construct that was shown to have a powerful affect on the improvement of minority student reading scores. As well, this work served to open a new frontier for research on a powerful construct within education.

In a second study produced by the Rand corporation, Berman, McLaughlin, Bass, Pauly, & Zellman (1977) surveyed 100 Title III project schools to examine their practices one to two years after federal funding for the projects had ended. Similar to the work of
Armor et al. (1976), this study found teacher efficacy to be a powerful predictor of various behaviors. More specifically, Berman et al. found teacher efficacy to have “major positive effects on the percentage of project goals achieved, improved student performance, teacher change, and continuation of project methods and materials” (p. xi). They defined teacher efficacy as “a belief that the teacher can help even the most difficult or unmotivated students” (p. 136) and relied on Armor et al.’s two-question scale to measure the construct. Taken together, the work of Armor et al. (1976) and Berman et al. (1977) helped teacher efficacy emerge as an important construct worthy of attention from both researchers and practitioners within education.

Early Studies of Teacher Efficacy: Conceptualization Crisis

Early studies on teacher efficacy struggled to explain the linkage between the construct and its theoretical parent—e.g. Rotter’s (1966) locus of control theory or Bandura’s (1977, 1986, 1997) self-efficacy theory. The following examples from the literature, therefore, demonstrate that initial studies faired poorly in their attempts to provide a clear conceptualization of teacher efficacy.

Rose and Medway (1981) developed a Teacher Locus of Control scale by surveying over 200 elementary school teachers from a 50,000-student school district. They intended to develop an instrument that measured the perceptions that elementary school teachers had on control of students within their classrooms. In attempting to identify a suitable validity check for their scale, they recognized promising results from past research studies on teacher efficacy and stated that teacher efficacy is “a concept
similar to locus of control” (p. 186). However, they failed to elaborate on this point and, therefore, left one to wonder about the connection between teacher efficacy and locus of control.

To encourage further research on teacher efficacy, Denham and Michael (1981) offered a detailed definition and crafted a theoretical model for the construct. They understood teacher efficacy to act as an intervening variable between certain antecedent variables (teacher training, teaching experience, system variables, personal variables, and causal attributions) and consequent variables (teacher classroom behaviors, support of innovation, professional activities, and remaining in the teaching profession, student achievement, affective, and behavioral outcomes). Furthermore, they posited that teacher efficacy consisted of two components, cognitive and affective, both components having dimensions of magnitude, generality, and strength.

At first glance, many of these terms may seem quite similar to those used within Bandura’s conceptualization of self-efficacy. In fact, Denham and Michael (1981) acknowledged Bandura’s (1977) influence on their conceptualization of the construct. Yet they parted with Bandura on the following point. Bandura theorized that self-efficacy expectations are beliefs in one’s ability to plan and execute a particular course of action and are formed through the cognitive processing of multiple forms of information (Bandura, 1977, 1997). In Bandura’s framework, it is beliefs about one’s capabilities that are the driving force behind the person’s exercise of agency.

Denham and Michael (1981) acknowledged that Bandura’s (1977, 1997) cognitive processing was the key process in the formation of efficacy beliefs, however, they added a second component to Bandura’s cognitive processing framework. They
argued that magnitude, strength, and generality of teacher efficacy beliefs was dependent not only upon teachers’ beliefs in their own capabilities to bring about positive changes in students in specific circumstances, but also based upon teachers’ beliefs in “that the ideal or normative teacher can bring about positive changes in given students under given circumstances” (Denham & Michael, p. 41). Hence, for Denham and Michael, teacher efficacy was based on an assessment of personal beliefs, what an ideal teacher might believe, and on an affective component—which lacked sufficient explanation.

Taking all of this into consideration, Denham and Michael (1981) transformed their conceptualization of teacher efficacy into a theoretical model. Self-admittedly, the authors were aware of the challenges that would present themselves as others would attempt to test their model. Absence of subsequent research studies to test this model validated their initial concerns. Still, in retrospect, this study served as an important source for broadening the conceptualization of teacher efficacy (see, for example, Gibson & Dembo, 1984) and for recognizing Bandura’s (1977) work on self-efficacy as a potential theoretical framework for the construct.

Also breaking away from Rotter’s (1966) locus of control theory as the leading framework for teacher efficacy was the work of Ashton, Olejnik, Crocker, & McAuliffe (1982). They desired to expand the Rand measure of teacher efficacy. After analyzing the data, which were collected from middle school teachers who were administered the Rand teacher efficacy questionnaire, they posited that a more “sensitive instrument was needed [and they] decided to take a multi-method approach to measurement of efficacy based on theoretical as well as methodological concerns” (p. 4).
For their theoretical approach they still relied on Rotter’s (1966) theory of locus of control and the two questions the Rand researchers generated from this theory. However, they, like Denham and Michael (1981), also utilized Bandura’s (1977, 1978) work on self-efficacy as a potential framework for teacher efficacy.

Ashton et al.’s (1982) theoretical approach manifested itself within a multi-dimensional model recognizing Teaching Efficacy, Personal Efficacy, and Personal Teaching efficacy as factors of teacher efficacy. Teaching Efficacy and Personal Teaching Efficacy were dimensions connected with the Rand studies (questions 1 and 2, respectively), whereas Personal Efficacy corresponded with Bandura’s conceptualization of self-efficacy.

Unfortunately, due to poor psychometric qualities, their use of the Webb Efficacy Scale to expand the two-question instrument developed by Rand was unsuccessful. Moreover, little attention was given to providing a rationale as to how or why Bandura’s (1977) conceptualization of self-efficacy should be linked with teacher efficacy as constructed by Rand researchers. For that matter, any linkage between Rotter’s (1966) locus of control and teacher efficacy was also missing.

Although admirable for its attempt to expand the theoretical base, which undergirds teacher efficacy, this study was left wanting for any substantial findings. Yet, Ashton et al.’s (1982) concluding remarks served to foreshadow the problems that would be encountered by researchers in subsequent studies on teacher efficacy. They professed that “we have only begun to identify the problems involved in measurement of efficacy. We hope that our experiences and the model we have proposed will be helpful to researchers in developing future measures” (p. 17).
To add to the conceptualization problems surrounding teacher efficacy, Guskey’s (1982) study on the differences in teachers’ perceptions of personal control defined teacher efficacy as a “‘sense of efficacy’ [or] perceptions of personal control on the part of teachers” (p. 70). He credited White’s (1959) work on competence for teacher efficacy’s theoretical base rather than Rotter’s work on locus of control. Later, in his review on the construct, Guskey cited other works (e.g., Murray & Staebler (1974)) as additional studies that supported the concept of teacher efficacy and its influence on student achievement. However, these studies focused on teacher locus of control, which is theoretically grounded in Rotter’s (1966) locus of control theory rather than White’s (1959) theoretical treatment on competence. Hence, it appeared that Guskey provided two theoretical frameworks for the construct of teacher efficacy. Again it appears that the literature is wanting for a pure, clean conceptualization of teacher efficacy. This problem would only continue.

*Studying Teacher Efficacy: A Pattern Emerges*

The hesitancy of researchers to tackle the conceptualization problem associated with teacher efficacy became evident within the literature. After reviewing numerous early studies on teacher efficacy, a pattern emerged from the study of teacher efficacy. It appeared that researchers were inclined to approach the study of teacher efficacy in the following manner: researchers provided limited, if any, attention to the research history and conceptualization of teacher efficacy and, using one of many scales (self-created or borrowed from prior research) that were available, demonstrated its powerful influence as an antecedent or consequence of various educationally related variables.
This approach was evident in studies that found teacher efficacy to influence: the development of teacher education programs (Ashton, 1984), teacher competency and teacher decision to re-enter the profession (Trentham, Silvern, & Brogdon, 1985), student achievement in earlier elementary grade levels (grade 3) versus later grade levels (grade 6) (Anderson, Greene, & Loewen, 1988), teacher implementation of new instructional practices, for example, mastery learning (Guskey, 1988), and special education referral decision making (Meijer & Foster, 1988).

However, not all studies employed teacher efficacy as an independent variable. In fact, many researchers investigated whether various educationally related variables influenced teacher efficacy. For instance, Parkay, Greenwood, Olejnik, & Proller (1988) found that teacher stress was negatively correlated with teacher efficacy. That is, the higher the teacher’s stress, the lower the teacher’s sense of efficacy. Guskey (1987) found that student achievement, student ability, and scope of influence variables (teachers’ perceptions of results with a single or group of students) all influenced teacher efficacy. Yet, even in these studies, the approach to study teacher efficacy that was mentioned previously was still evident—scant attention was given to the construct’s conceptualization and one scale from a myriad of instruments that were available to measure the construct was employed.

In these next sections, the maturation of the construct is addressed. That is, the major advances in the conceptualization and measurement of teacher efficacy are presented. Following these sections will be a review of the literature on collective efficacy of teachers.
A disruption in the prevalent pattern of research on teacher efficacy was found within Gibson and Dembo’s (1984) investigation, which sought to validate the construct by developing a 30-item scale to measure teacher efficacy. They noted, and as this review has heretofore shown, a lack of certainty within the literature base that surrounded the construct’s conceptualization and measurement. To solve this dilemma, the researchers utilized Bandura’s conceptualization of self-efficacy and outcome expectancy as the theoretical frameworks for teacher efficacy. Similar to prior studies on the concept, they theorized that teacher efficacy was, in fact, a two dimensional construct (Armor et al., 1976; Berman et al., 1977) composed of Personal Teaching Efficacy and Teaching Efficacy (Ashton et al., 1982; Webb, 1982). Indeed, their factor analysis confirmed a two-factor structure for teacher efficacy.

They posited that Personal Teaching Efficacy refers to teachers’ beliefs that they have the skills and capacity to influence student learning. Because the questions that measured this factor reflected teachers’ personal responsibility in student learning, Gibson and Dembo (1984) asserted that this factor corresponded to Bandura’s (1977) conceptualization of self-efficacy. Put differently, Gibson and Dembo’s Personal Teaching Efficacy factor was analogous to Bandura’s conceptualization of self-efficacy applied to teachers in the teaching and learning context.

Teaching Efficacy, the other factor identified by Gibson and Dembo’s (1984) analysis, referred to teachers’ beliefs that their ability to act as change agents is limited by factors external to the teacher, such as student and family background characteristics and the environment. Because questions used to measure this factor reflected teachers’ beliefs
about the relationship between the teaching and learning process, they asserted that this factor corresponded to Bandura’s (1977, 1997) conceptualization of outcome expectancy—the belief that certain behaviors will lead to pleasing consequences.

Essentially, Gibson and Dembo (1984) conceptualized teacher efficacy as a combination of two self-referent beliefs that work to bring about changes in behavior: self-efficacy beliefs and outcome expectancy beliefs. They stated:

When applied to the construct of teacher efficacy, outcome expectancy would essentially reflect the degree to which students can be taught given their family background, socioeconomic status (SES), and school conditions. This dimension is clearly represented by the second factor, Teaching Efficacy. Bandura’s self-efficacy dimension would indicate a teacher’s rating of his or her own abilities to perform the necessary tasks to bring about positive student change and is clearly represented by the first factor, Personal Teaching Efficacy. (p. 574)

In time, this conceptualization of teacher efficacy would be challenged and alternative factor structures for teacher efficacy would emerge (e.g., Tschannen-Moran & Woolfolk Hoy, 2001; Woolfolk & Hoy, 1990).

Still, Gibson and Dembo’s (1984) work was fruitful. Their study led to the development of a reliable measure of teacher efficacy. As well, they abandoned Rotter’s (1966) locus of control theory for Bandura’s (1977) self-efficacy theory. This choice fared well because they did reveal evidence that supported the application of Bandura’s conceptualization of self-efficacy to research on the efficacy of teachers. In addition, the study went on to show that teacher efficacy was a unique construct—as differentiated from teachers’ flexibility and verbal ability. Finally, Gibson and Dembo’s research revealed that teacher efficacy influences certain teacher behaviors known to increase student achievement.
Immediate support for Gibson and Dembo’s (1984) work was found within Tracz & Gibson’s (1986) study of 14 teachers from two elementary schools. Although their sample size is quite small, their results revealed that teacher efficacy, as measured by the Gibson-Dembo Scale, was significantly related with the classroom grouping of students and student achievement outcomes (as measured by scores on CTBS reading, math, and language subtests).

Following Gibson and Dembo’s (1984) example, Ashton and Webb (1986) provided a thorough explanation for their conceptualization and measurement of teacher efficacy. Specifically, they engaged in an ecological analysis of educational processes and placed teacher efficacy at the forefront of their investigation. Using interviews and observations as means for collecting their data, Ashton and Webb studied the relationship between the efficacy of 48 Florida teachers and their students’ achievement levels in mathematics. That their findings supported the relationship that teacher efficacy positively influences student achievement was not a revelation. However, what did set this study apart was the finding that teacher efficacy beliefs were specific to given situations. They stated:

Our findings strongly support the hypothesis that teachers’ sense of efficacy is related to student achievement. Furthermore, the results support the assumption that teacher’s efficacy attitudes are situation-specific…. Efficacy beliefs are not unidimensional and, consequently, can be expected to have different relationships to different subject matter, depending on teachers’ beliefs about the subject being taught and the students in the class. (pp. 138-139)
Recall that self-efficacy is conceptualized as the belief in one’s capability to accomplish a specific action in specific situations (Bandura, 1977, 1997). Hence, their finding supported their a priori assumption of accepting Bandura’s self-efficacy theory as their theoretical framework for teacher efficacy.

Continuing on this theme to develop a clearer conceptualization of teacher efficacy, Woolfolk and Hoy’s (1990) study on pre-service teachers challenged the two dimensions of teacher efficacy, Personal Teaching Efficacy and Teaching Efficacy, employed by Gibson and Dembo (1984) and Ashton and Webb (1986). While the latter pairs of researchers viewed the two dimensions as specific applications of Bandura’s (1977) theoretical constructs of self-efficacy and outcome expectancy, Woolfolk and Hoy, viewed them both as efficacy expectations. They stated:

An outcome expectation is a judgment of the likely consequences of an action, whereas an efficacy expectation is a judgment about ability to perform an action. The question of whether teachers can override the effects of adverse background influences (Rand item 1 [and associated with the teaching efficacy dimension]) is an efficacy expectation, not an outcome expectation, because it involves the potential to perform. In this case, the efficacy expectation has to do with beliefs about teachers in general, not oneself as a teacher. . . . The question of whether teaching can overcome the influence of student background is not an outcome expectation as described by Bandura. (p. 82)

Using this framework, they replicated Gibson and Dembo’s (1984) factor analysis procedures on their sample, which included 182 prospective teachers. Woolfolk and Hoy’s (1990) results were similar to those of Gibson and Dembo, however, they also chose to examine a three factor solution: the first factor related to General Teaching Efficacy and the second factor subdivided Personal Teaching Efficacy into Guskey’s (1988) Teachers’ Responsibility for positive and negative student outcomes. The results showed support for both the two-factor and three-factor solutions.
Since their analyses were not affected for whether a two-factor or three-factor solution was used for efficacy, they utilized the parsimonious two-factor conceptualization. However, their discovery led to making conclusions about the construct, teacher efficacy, which had been absent in previous studies. First, they validated the assumption present in prior studies that teacher efficacy is comprised of two independent dimensions. Second, and, more importantly, they found that Teaching Efficacy might be subdivided into Teacher Responsibility for positive and negative student outcomes. The combination of these two findings led them to assert “The nature of the problem and the dependent variables of interest will likely determine the appropriate conceptualization of efficacy for any given study” (Woolfolk & Hoy, 1990, p. 89).

Ross’s (1994) meta-analysis of 88 teacher efficacy studies supported this assertion. Based on his investigations he suggested that future researchers should treat the construct as a multi-dimensional entity rather than a singular trait, examining personal and general teaching efficacy separately rather than aggregating them. In the absence of a powerful rationale to the contrary, future researchers should measure teacher efficacy with the most frequently used instruments to facilitate comparisons between studies. (p. 27)

From the review of literature to this point it would appear that some consensus has formed around a generally accepted conceptualization of the construct of teacher efficacy. That is, teacher efficacy is considered a two-dimensional construct that has, as its dimensions, Personal Teaching Efficacy and Teaching Efficacy (or General Teaching Efficacy). Furthermore, these dimensions are extensions of Bandura’s (1977, 1986, 1997) self-efficacy theory where the first dimension (Personal Teaching Efficacy) maps to a teacher’s sense of personal self-efficacy and the second dimension (Teaching
Efficacy/General Teaching Efficacy) maps to beliefs about teachers’ abilities, in general, to execute a specific course of action (Gibson & Dembo, 1984; Woolfolk & Hoy, 1990). As well, when measuring teacher efficacy the specific action and specific situation or nature of the problem should also be taken into consideration (Ashton & Webb, 1986; Woolfolk & Hoy, 1990). However, even with the literature supporting such a conceptualization, it would not be long, as the following review of research attests, before alternative conceptualizations for the construct would appear.

**The Appearance of Alternative Conceptualizations Continues**

After carefully investigating Gibson and Dembo’s (1984) instrument as well as Woolfolk and Hoy’s (1990) new conceptualization of teacher efficacy, Guskey and Passaro (1994) offered a new factor structure for the construct. Based on analysis of surveys administered to 342 classroom and preservice teachers, they identified a two-factor solution. Although their work supported prior research findings that teacher efficacy is a multi-dimensional construct, they disagreed with prior conceptualizations that identified the dimensions as Personal Teaching Efficacy and Teaching Efficacy (Gibson & Dembo, 1984, Woolfolk & Hoy, 1990).

As an alternative they posited the factor structure for teacher efficacy matched better with the internal and external distinction that is “similar to the locus-of-control distinction found in measures of causal attribution” (Guskey & Passaro, 1994, p. 637). However, they added that even though this distinction is similar to the locus-of-control dimension the distinction they offer is conceptually different. To elaborate on this point, they defined each factor as follows:
The internal factor appears to represent perceptions of personal influence, power, and impact in teaching and learning situations. Because of the nature of the items in the current scale, these perceptions reflect a perspective that is positive and optimistic. The external factor, on the other hand, relates to perceptions of the influence, power, and impact of elements that lie outside the classroom, and, hence, may be beyond the direct control of individual teachers. (p. 639)

In taking this new approach on the conceptualization of teacher efficacy they did admit that prior studies had recognized an internal/external distinction. But Guskey and Passaro (1994) believed that the emphasis on the Personal Teaching Efficacy versus Teaching Efficacy distinction “masked this internal versus external distinction and, as a consequence, confounded their interpretation of results” (p. 639).

Importantly, Guskey and Passaro (1994) suggested that their work only answered the question, “What do teacher efficacy scales actually measure?” (p. 640), rather than the question, “What is teacher efficacy?” (p. 640). They ended with a call for more research on the construct—including better conceptualizations. They stated: “Additional studies are needed that explore the precise nature of the teacher efficacy construct, based on well-defined conceptualizations of teacher efficacy” (p. 640).

Taking a more focused approach, Enochs, Scharmann, and Riggs (1995) believed that teacher efficacy should be conceptualized, as self-efficacy theory assumes, within a specific context. Therefore, they developed a scale to measure the efficacy beliefs of science teachers and named it the Science Teaching Efficacy Beliefs Instrument (STEBI) (Riggs & Enochs, 1990). Their development of the instrument came as a result of their analysis of prior research. They disagreed with the wording of various content items on Gibson and Dembo’s (1984) teacher efficacy scale as well as Woolfolk and Hoy’s (1990) alternative conceptualization of teacher efficacy. So, in contrast to Woolfolk and Hoy’s
personal teaching efficacy and general teaching efficacy dimensions, Enochs et al. proposed the use of the dimensions: Self-efficacy and Outcome Expectancy.

Recall, this is precisely what Woolfolk and Hoy (1990) argued was problematic with Gibson and Dembo’s (1984) initial conceptualization of the construct. However, from Enochs et al.’s (1995) view they suggested that many of the items on the Gibson and Dembo scale did not reflect the important distinction between self-efficacy beliefs versus outcome expectancy beliefs. That is, if Gibson and Dembo’s sub-scales had been crafted with questions that accurately measured self-efficacy and outcome expectancy beliefs then Woolfolk and Hoy’s argument against using such terms to describe the subscales would have been substantially weakened.

So, how did they deal with this issue? They approached the conceptualization of teacher efficacy in the following manner. Enochs et al. (1995) decided, based on assumptions from Bandura’s (1977, 1986, 1997) social cognitive theory, that working together teachers’ self-efficacy and outcome expectancy beliefs offer “the most complete prediction of human behavior” (Enochs et al., p. 67). Furthermore, since self-efficacy is a context specific construct, the efficacy beliefs of teachers must be measured within a specific situation. Hence, Enochs et al. employed the STEBI in their study, which measured not only the efficacy and outcome expectancy beliefs of teachers but also the perceptions of teachers as they relate to teaching science.

Their findings supported their initial assertions about teacher efficacy. They found that teachers with higher science teaching self-efficacy scores tended to have a more humanistic orientation toward classroom management than teachers with low science teaching self-efficacy scores. In addition, Enochs et al. (1995) posited that their
instrument modestly confirmed their theory that teacher efficacy was composed of the
dimensions, Self-efficacy and Outcome Expectancy. They stated: “it certainly appears
that the subscales [i.e., self-efficacy and outcome expectancy] measure related but very
different aspects of the construct of teacher beliefs. This result is indeed in concert with
the social learning theory espoused by Bandura” (p. 72).

Yet another study appeared within the literature that sought to clarify the
conceptualization of teacher efficacy. Soodak and Podell’s (1996) purpose was to
investigate the factor structure of teacher efficacy to see if additional dimensions existed.

To accomplish this task they surveyed 310 teachers from the New York
metropolitan area. The sample included multi-aged preschool, elementary, junior high,
and high school teachers in both urban and suburban school settings. In order to collect
the data, they relied on a modified version of the Gibson and Dembo (1984) Teacher
Efficacy Scale.

Similar to Woolfolk and Hoy’s (1990) results, their factor analysis yielded the
existence of three unique dimensions for teacher efficacy. However, they identified these
dimensions differently than Woolfolk and Hoy. Soodak and Podell (1996) chose the
terms Personal Efficacy (PE), Outcome Efficacy (OE), and Teaching Efficacy (TE) to
describe the three uncorrelated factors. In explaining the reason for their choice they
asserted:

The PE and OE factors … encompass distinct aspects of teacher efficacy and
pertain to teachers’ perceptions of themselves, rather than of their profession. PE
pertains to a teacher’s belief that he or she possesses teaching skills, while OE
refers to the belief that, when he or she implements these skills, they lead to
desirable outcomes…. The third factor, TE, has been viewed as the belief that
teaching can overcome the effects of outside influences…. In the present study, TE was clarified to include other influences, specifically heredity and television violence. (p. 408)

Once again, self-efficacy and outcome expectancy dimensions are employed to explain the factor structure of teacher efficacy. But, how did this happen? Placing Woolfolk and Hoy’s (1990) interpretation of the factor structure of teacher efficacy under scrutiny, Soodak and Podell (1996) contended that the factor Woolfolk and Hoy identified as positive outcomes associated with Personal Teaching Efficacy should have been named Outcome Expectations. Soodak and Podell justified their claim by examining the grammatical structure of the items used within Woolfolk and Hoy’s subscales (e.g., “When a student gets a better grade than he/she usually gets, it is usually because I found better ways of teaching that student” (Soodak & Podell, p. 403). They believed that “because these items are the only ones that pertain to student outcomes of any type, this factor is more appropriately characterized as being congruent with Bandura’s outcome expectations” (Soodak & Podell, p. 403).

As their detailed examination of scale items demonstrates, it appears that the appropriate wording of scale items on teacher efficacy instruments has become a key piece for solving the teacher efficacy conceptualization puzzle. In fact, Soodak and Podell (1996) highlighted grammatical differences in scale items as a possible cause for improper conceptualization of teacher efficacy. Indeed, even though Soodak and Podell’s work was supported through their data analysis they still encouraged continued exploration of the dimensions of teacher efficacy—especially their choice of identifying one factor as Outcome Efficacy (OE) and their identification of potential grammatical problems in the wording of efficacy scale items.
Moving Beyond the Conceptualization Crisis

As evident from this examination of the teacher efficacy literature base, even after nearly 20 years in existence, the construct is still faced with an identity crisis. Desiring to bring some coherence to the meaning and measure of teacher efficacy, Tschannen-Moran et al. (1998) examined the multiple and varied conceptualizations and past and present measurements of the construct. Their historical analysis was hoping to yield the identification of patterns within the literature, these patterns would, in turn, hopefully assist in clarifying the construct’s measurement and conceptualization.

After reflecting on their tour through the sea of studies that offered various measurements and diverse conceptualizations for the construct, they proposed an integrated model of teacher efficacy. This model, they posited, clarified the conceptualization controversy that surrounded the construct since its early years of study. More specifically, the model placed Bandura’s (1986, 1997) social cognitive theory—and its key construct, self-efficacy—as the theoretical foundation for the teacher efficacy construct. Additionally—and extremely important to the present study, this model would later be used as the basis for a theoretical model developed for the conceptualization of collective efficacy of teachers (Goddard et al., 2000).

Because this model is critical in the development of not only the conceptualization of teacher efficacy but also the collective efficacy of teachers, a brief explanation of the model (see Figure 2.2) follows below.
Figure 2.2: Theoretical model of teacher efficacy. Source: Adapted from Tschanen-Moran et al., 1998, p. 228.
With the assumption that teacher efficacy is more appropriately grounded in Bandura’s (1986, 1997) self-efficacy theory, it follows that “Sources of Efficacy Information” and “Cognitive Processing” are components of this model. As previously discussed, self-efficacy beliefs are formed through the cognitive processing of information derived from four distinct sources: verbal persuasion, vicarious experience, physiological arousal, and mastery experience. According to their model, the two dimensions which emerge from the cognitive processing of information and that precede the development of teacher efficacy beliefs are the analysis of the teaching task and the assessment of personal teaching competence.

Tschannen-Moran et al. (1998) noted that these two dimensions are related to but not the same as the two factors, General Teaching Efficacy and Personal Teaching Efficacy, found associated with measures of teacher efficacy. As to a description on how these factors work within the model the authors offered the following explanation.

In analyzing the teaching task and its context, the relative importance of factors that make teaching difficult or act as constraints is weighed against an assessment of the resources available that facilitate learning. In assessing self-perceptions of teaching competence, the teacher judges personal capabilities such as skills, knowledge, strategies, or personality traits balanced against personal weaknesses or liabilities in this particular teaching context. (p. 228)

When these two components interact, the result that follows is teachers make judgments about their efficacy for the intended teaching task.

A hallmark of self-efficacy theory is found within the consequences of efficacy beliefs. The model demonstrates, and Bandura’s (1986, 1997) theory has shown, that setting goals, increased effort, and the desire to persist are consequences that follow high levels of self-efficacy. Therefore, these authors postulated, the same consequences are
sure to follow the manifestation of higher levels of teacher efficacy beliefs. Finally, just as Bandura proposed the triadic reciprocal causation model to explain human choice and behavior, so these authors place teacher efficacy within a cyclical structure. Hence, not only will teacher efficacy be influenced by sources of efficacy information, but also the consequences and performances that follow teacher efficacy beliefs will influence new sources of efficacy information.

Even though Tschannen-Moran et al. (1998) offered an intriguing and theoretically sound conceptualization of teacher efficacy, an empirical examination of their model would come later. They concluded their work by inviting a rigorous testing of their model as well as the pursuit of measures of teacher efficacy that were in harmony with their framework.

On a separate path than Tschannen-Moran et al. (1998) but on the same quest to clarify the factor structure of teacher efficacy, Deemer and Minke’s (1999) study sought to examine “the effect of positive versus negative orientation in item wording on the interpretation of the [Teacher Efficacy Scale] factor structure by varying the orientation of items across both dimensions of efficacy” (p. 5). Using a slightly modified version of Gibson and Dembo’s (1984) Teacher Efficacy Scale (TES), they surveyed 196 teachers enrolled in summer graduate school courses. After a series of factor analyses they concluded that their data best fit a one-factor model. Hence, these researchers suggested that teacher efficacy was a unidimensional construct.

But what about the evidence in prior studies (e.g., Ashton & Webb, 1986; Gibson & Dembo, 1984; Woolfolk & Hoy, 1990) that teacher efficacy is at least a two-dimensional construct? Their answer: “the two-factor structure that has been replicated
throughout the literature appears to be at least partially an artifact of item wording not the result of underlying, distinct construct dimensions” (Deemer & Minke, 1999, p. 8). Yet these researchers do not unequivocally conclude that teacher efficacy is unidimensional. On the contrary, they point to the work of Pajares (1997) and Bandura (1997) who both suggest, “teacher efficacy may be more differentiated than the TES adequately captures” (Deemer & Minke, p. 9).

In fact, Deemer and Minke (1999) claimed the TES was a global instrument used to measure teacher efficacy. As a result, they posited, any measurements of teacher efficacy would be weak since efficacy judgments are context and situation specific. Based on this reasoning the authors suggested that future studies should take into consideration the specific duties associated with teaching, which is in harmony with the literature (Enochs et al, 1995; Tschannen-Moran et al, 1998)

As they concluded their study, they downplayed the frequently used global oriented Teacher Efficacy Scale, and reinforced the need to create more context oriented measures of teacher efficacy. They stated:

Although Gibson and Dembo’s (1984) TES added significantly to the literature, their findings do not appear to represent adequately the true dimensionality of the teacher efficacy construct. More specific measures, tightly coupled to specific outcomes (i.e., teacher behaviors), may hold the key for improving our understanding of how teacher efficacy promotes student learning and of how to encourage high levels of efficacy in all teachers. (Deemer & Minke, 1999, pp. 9-10)

Desiring to test the credibility of their newly created model (Tschannen-Moran et al., 1998) combined with the lack of consistently reliable measures of teacher efficacy (Henson, Kogan, & Vacha-Haase, 2001), Tschannen-Moran and Woolfolk Hoy (2001) proceeded to create a new measure for the construct. Their approach involved using a
group of teachers to devise potential questions that would adequately represent the duties associated with teaching. Using the outcomes of this work and combining it with 23 of the 30 items suggested by Bandura’s (undated) Teacher Efficacy Scale, resulted in the creation of a 52-item instrument for teacher efficacy. To seek reliability, validity, and a factor structure for their instrument they tested it within two different sample groups that were composed of both inservice and preservice teachers.

Based on their analysis of the data, they determined teacher efficacy to be best measured with an 18-item instrument, which they named the Teachers’ Sense of Efficacy Scale (TSES). These 18-items loaded onto three different factors, which they identified as Efficacy for Student Engagement, Efficacy for Instructional Strategies, and Efficacy for Classroom Management. All of these factors, they claimed, represented various tasks associated with teaching (Tschannen-Moran & Woolfolk Hoy, 2001).

Because the efficacy for classroom management factor was considered weak (low reliabilities) and was recommended to be eliminated in a separate study on the TSES (Roberts & Henson, 2001), Tschannen-Moran & Woolfolk Hoy (2001) decided to further refine the instrument. In their third study on the instrument they added more items to the survey—a total of 36. Some of the items assessed other aspects of teaching that were not included on the prior instrument while others represented additional items on classroom management. To test this new instrument they surveyed 410 inservice and preservice teachers. Factor analysis confirmed the existence of the three factors discovered in the prior studies and the possibility that a more parsimonious instrument could be created.

The next stage of their analysis included examining the results of using either a 12-item or 24-item scale instead of the original 36-item instrument. Once again their data
analysis produced promising results. They concluded, based on reliability, factor structure, and construct validity results, that the TSES “with either 24 or 12 items … should prove to be a useful tool for researchers interested in exploring the construct of teacher efficacy” (Tschannen-Moran & Woolfolk Hoy, 2001, p. 801).

True to their theoretical model on teacher efficacy (Tschannen-Moran et al., 1998), Tschannen-Moran and Woolfolk Hoy (2001) discovered a factor structure for teacher efficacy that was based on three critical tasks (instruction, student engagement, and classroom management) associated with teaching. Recall that, according to their model, teacher efficacy beliefs were shaped by an analysis of the teaching task and the assessment of personal teaching competence. The results of this study suggest support for this theory because Efficacy for Instruction, Efficacy for Student Engagement, and Efficacy for Classroom Management are factors related to teachers’ abilities to accomplish context specific teaching tasks. Hence, the development of high levels of efficacy would, according to Tschannen-Moran et al.’s (1998) model and their new findings, be based on the cognitive processing of information related to these three factors (Efficacy for Instruction, Efficacy for Student Engagement, and Efficacy for Classroom Management), which are a subset of analysis of the teaching task.

That this study has solved all of the conceptual and measurement problems associated with teacher efficacy was certainly not the position of its authors. Indeed, much more work needs to be done on this construct. In fact, Tschannen-Moran and Woolfolk Hoy (2001) encouraged further testing and validation of their instrument. As well, the assessment of teaching competence, the second dimension from their model
which is theorized to interact with and to be weighed against the assessment of the teaching task that shapes teacher efficacy beliefs, also needs to be addressed since it did not surface in their investigation.

In sum, this study represents the most recent advancements—both in conceptualization and measurement—on the construct of teacher efficacy (Woolfolk Hoy, personal conversation, December 3, 2002).

Teacher Efficacy Conclusions

To say the least, the construct of teacher efficacy, “a teacher’s belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context” (Tschannen-Moran et al., 1998, p. 233) has surely come a long way. From its initial conceptualization by investigators at the Rand organization (Armor et al., 1976; Berman et al., 1977), through its multiple conceptualizations (e.g., Denham & Michael, 1981; Ashton et al., 1982; Ashton & Webb, 1982; Gibson & Dembo, 1984; Woolfolk & Hoy, 1990; Guskey & Passaro, 1994; Enochs, et al., 1995) and measures (e.g., Gibson & Dembo, 1984; Enochs, et al., 1995) based on different theoretical foundations (Rotter, 1966; Bandura, 1977, 1986, 1997), to the sophisticated theoretical model and measure developed by researchers at The Ohio State University (Tschannen-Moran et al., 1998; Tschannen-Moran & Woolfolk Hoy 2001), teacher efficacy has certainly merited the attention it has been given.

Even though this review has focused on the construct’s conceptualization rather than its antecedents and consequences, many studies have found teacher efficacy to influence and to be influenced by numerous variables (Ross, 1994, 1998). Of particular interest to this study is the relationship that exists between teacher efficacy and student
achievement. Recall that this review has noted several research studies that have examined this relationship (e.g., Armor et al., 1976; Ashton & Webb, 1986; Tracz & Gibson, 1986). However, a few additional thoughts on the matter must be made before moving this review to consider the collective efficacy of teachers.

Some researchers have claimed that teacher efficacy indirectly affects student achievement. More specifically, Gibson & Dembo (1984) suggested that teacher efficacy “may influence certain patterns of behavior known to influence achievement gains” (p. 579). Said differently, teacher behaviors may intervene in the relationship between teachers’ efficacy beliefs and their students’ achievement levels.

Ross’s (1994) review of 88 teacher efficacy studies supported this view. In fact, he identified six ways in which teacher efficacy affects teachers’ behaviors, which, in turn, affects student achievement. Based on his analysis of the literature, Ross suggested that teachers with higher levels of efficacy are more likely to (1) learn and use new approaches and strategies for teaching, (2) use management techniques that enhance student autonomy and diminish student control, (3) provide special assistance to low achieving students, (4) build students’ self-perceptions of their academic skills, (5) set attainable goals, and (6) persist in the face of student failure (Ross, 1994).

Mentioning this indirect link between teacher efficacy and student achievement is important because it represents a significant component of the rationale (described at the end of this chapter) used to explain the relationship between the collective efficacy of teachers and student achievement.
Collective Efficacy of Teachers: Theoretical Considerations

In contrast to the controversy that has surrounded the conceptualization and measurement of teacher efficacy since its inception, collective efficacy of teachers has enjoyed theoretically pure and conceptually clean origins. As mentioned at the beginning of this chapter, collective efficacy was born of Bandura’s social cognitive theory—with its key concept of self-efficacy. However, Bandura (1997) never intended his theory to apply only to individuals. Indeed, he stated:

People do not live their lives in isolation; they work together to produce results they desire. The growing interdependence of social and economic life further underscores the need to broaden the focus of inquiry beyond the exercise of individual influence to collective action designed to shape the course of events…. People’s shared belief in their capabilities to produce effects collectively is a crucial ingredient of collective agency. (p. 7)

Within this study, collective efficacy is placed within the context of schools and is defined as the perceptions of teachers’ in a school that they are capable, as a faculty, to bring about positive affects on students (Goddard et al., 2000). In other words, the collective efficacy of teachers is the extension of teacher efficacy to the faculty or school level.

As was demonstrated in the prior review, teacher efficacy was found to be an important characteristic of effective teaching. Similarly, collective efficacy of teachers is considered to be an important feature of effective school organizations (Bandura, 1993, 1997). More specifically, recall that a teacher’s perception of efficacy was found to indirectly influence the achievement of students within her or his classroom (Ross, 1994, 1998). That being the case, it is reasonable to expect the collective efficacy of teachers will, in like manner, influence the achievement of students within the entire school.
Hence, developing an understanding of teachers’ sense of collective efficacy may, in turn, help in understanding how school districts may raise the achievement levels of all students—a key goal of quality school organizations.

To better understand the power of this organizational-level construct its linkages with social cognitive theory are explored. Following this examination, the results from related research both within and outside of education are presented.

To extend social cognitive theory to organizations requires taking the assumptions, which support this theory at the individual level, and applying them to the collective level. Earlier in this chapter it was shown that human agency is a key assumption associated with social cognitive theory. It is theorized that just as individuals act purposefully, so organizations act, in like manner, to pursue organizational goals (Bandura, 1997). For example, the diversity in student populations and the needs of local communities influence the various goals schools choose to pursue. While some schools choose to emphasize a pre-college curriculum for their students, others maintain a focus on vocational or technical courses and training. As well, one school may be striving to increase the involvement of parent volunteers in their building, while another school may be attempting to expand the extracurricular activity offerings for students. When actions of organizations show purpose then organizations may be considered to be exemplifying organizational agency. However, it must be understood that organizational agency is dependent upon the agentive actions of individuals—the teachers, administrators, and students—within the organization.
Other assumptions, which undergird social cognitive theory, such as, vicarious learning, forethought capability, symbolic capability, self-regulation, and self-reflection, may also be applied to the organizational level. An example that demonstrates an organization’s vicarious learning capability is found within a school district that desired to reform their current policies on student dress standards. Based upon the knowledge gained from a study of numerous neighboring school systems’ student dress policies, district administrators decided to adopt a new school dress code policy. Hence, because of the vicarious learning of the organization—through its school officials—the school district was able to enact reform and change the existing policy.

Another example of applying these assumptions to organizations may be found within a school district’s strategic plan. This document is generally created by the stakeholders of a school community after much reflection on past accomplishments and setbacks as well as consideration of future opportunities for its students. Thus, in this case—acting through its members, the organization is showing capabilities in self-reflection (a process in which people analyze their experiences and think about their own thought processes) and forethought (manifests itself when people anticipate consequences of their actions, set goals for themselves, and plan routes of action).
Although other examples may be supplied, it is clear the assumptions of social cognitive theory apply to organizations through the actions of its members. It follows that collective efficacy, which is concerned with the perceptions of individuals that they, as a collective, are capable of accomplishing specific tasks is an extension of self-efficacy, which is concerned with an individual’s perception of his or her capability to perform a given task. With the theoretical underpinnings of collective efficacy established it is now useful to present the findings of research on collective efficacy.

Research on Collective Efficacy

Early studies on collective efficacy of teachers did not measure or conceptualize the construct using the term “collective efficacy.” Instead, approaches included aggregating teacher efficacy measures to the school level. The findings of these studies are discussed below.

Aggregating Teacher Efficacy within Schools

Hoover-Dempsey, Bassler, & Brissie (1987) investigated the relationship between various school level variables and parental involvement in schools. Among the 13 variables in their study, teacher efficacy was chosen because the authors’ believed that this variable, normally conceptualized as an individual-level variable, might be conceptualized as an organizational quality of the school. Providing a rationale for this approach, Hoover-Dempsey, et al. argued:

Our decision to construe teacher efficacy, generally considered a person variable, as a school characteristic was based on the theoretical work cited earlier [i.e. the work of Lewin (1951), Barker (1968), and Berger & Luckman (1966)] concerning the influence of settings on individual behavior and suggestions implicit in some teacher efficacy … and school effectiveness literature … that specific qualities of individual schools as settings influence the efficacy of teachers in the school. (p. 422)
Taking this alternative approach to studying teacher efficacy, they surveyed 1,003 teachers from 66 elementary schools yielding some promising results. They found that aggregated teacher efficacy was a significant predictor of teachers’ perceptions of support from parents. More specifically, “Schools with greater teacher perceptions of parent support [operationalized as parent-teacher conferences, parent volunteers, parent tutoring, parent home instruction, and parent support] were schools with higher average SES levels and higher teacher efficacy scores” (Hoover-Dempsey et al., 1987, pp. 427-429). Even more significant, aggregated teacher efficacy more strongly influenced parent home tutoring and support from parents than did the SES of the school. This finding would eventually provide support for Bandura’s (1993) later discovery that collective efficacy of teachers had a greater influence on student attainment than SES.

Hoover-Dempsey et al.’s (1987) work is important because it recognized the utility of conceptualizing and measuring teacher efficacy at the school level. Put differently, by using the average aggregated teacher efficacy score from each school this study provided the basis—both conceptually and operationally—for examining the efficacy of teachers at the organizational level.

Similar to Hoover-Dempsey et al. (1987), Newmann, Rutter, and Smith (1989) aggregated teacher efficacy measures in their exploratory study on the effects of organizational features on school climate variables. They treated teacher efficacy as a school climate variable and defined it as “teacher’s perceptions that his or her teaching is worth the effort, that it leads to the success of students and is personally satisfying” (p. 223). The data used within their study were obtained from a sub-sample of schools that
participated in the 1984 High School and Beyond Teacher/Administrator Survey. The results showed teacher efficacy aggregated to the school level was positively associated with school orderliness, teacher innovation, teacher knowledge of other teachers’ courses, and students’ prior knowledge. Another variable, consensus on efficacy, was also instrumental in this study.

Newmann et al. (1989) posited, “Within each school, . . . teachers have different experiences and often disparate perceptions of common experiences that can produce within-school variance on teachers’ attitudes. This variance may be considered a measure of school consensus that may affect the school means on efficacy” (p. 225). Indeed, when the degree of consensus was added to the study’s regression model it demonstrated the largest coefficient of all variables and increased the variance explained by 10 percent. As for a specific reason for this affect the authors were uncertain. However, they offered the following possible explanation:

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

The importance of their findings is two-fold. First, they validated a prior study’s use of aggregated measures of teacher efficacy as a legitimate school-level variable (Hoover-Dempsey et al., 1987). Second, they identified group consensus as an important efficacy building mechanism. Taken together, these findings support a central position in this study: collective efficacy of teachers is a powerful school-level predictor variable that gains its influence through the collective efforts of the faculty as a whole.
Esselman and Moore (1992), desiring to learn more about the relationship between teacher efficacy and organizational variables (such as student attendance, failure rates, mobility, out-of-school suspension, and incidence of student dropout), obtained survey data from 1,082 teachers in an urban mid-western school district. Their analysis of the data found that, aggregated to the district level, teaching efficacy was negatively correlated with number of suspensions and positively correlated with student attendance. Personal efficacy, aggregated to the district level, was found to be positively associated with attendance and negatively associated with student mobility rates, number of suspensions, and student dropout rate.

These results, along with those reported in the two previously mentioned studies, offered evidence that teacher efficacy, extended to the school-level, was beginning to emerge as an independent construct, and, therefore worthy of continued attention. To pave the way for additional research on these collective perceptions of teachers, Bandura (1986, 1997) created and developed the construct of collective efficacy within his expansion of social cognitive theory.

Following his theoretical presentation on collective efficacy, Bandura (1986, 1997) encouraged the research community to embrace the study of the construct. In response, a limited number of researchers within and outside of education have explored the construct and contextualized it within a certain domain. Before considering the results of research within education, findings from a selection of studies outside of education are included in the following section. The outcomes of these investigations add to the evidence that collective efficacy, whether conceptualized within or outside of the educational arena, is truly a powerful organizational level construct.
Research on Collective Efficacy Outside of Education

Various researchers from diverse fields have studied the construct of collective efficacy. Examining the relationships between SES, personal efficacy, individual social efficacy, and collective social efficacy, Fernandez-Ballesteros, Diez-Nicolas, Caprara, Barbaranelli, & Bandura (2002) hoped to clarify the structure of collective efficacy specifically in terms of social-economic and self-referent variables. They found SES positively influences both personal efficacy and individual social efficacy, both of these, in turn, positively influence collective social efficacy. They also found a positive weak association between SES and collective social efficacy.

Studying group effectiveness, Prussia & Kinicki (1996) found collective efficacy to completely mediate the relationship between performance feedback and group effectiveness and partially mediate the relationship between vicarious experience and group effectiveness. This research is particularly relevant to the present study because Prussia & Kinicki were first to consider collective efficacy as a mediating variable in an input-process-output model of organizations.

In research that focused on neighborhoods and violent crime, Sampson, Raudenbush, and Earls (1997), found collective efficacy to be negatively associated with violence, victimization, and homicide. In other words, the higher the collective efficacy within a neighborhood, the lower the number of reported acts of violence, victimization, and homicide.

Conceptualizing collective efficacy as team efficacy, Durham, Knight, & Locke’s (1997) study on quality teams within the context of business management found collective efficacy to be positively correlated with team tactics, team-set goal difficulty,
goal commitment, and team performance. However, in the structural equation model used to test relationships between these variables, team efficacy was found to have an indirect affect on team performance through team-set goal difficulty.

Spink’s (1990) review of the literature on collective efficacy in athletic settings found this construct to have a positive affect on team outcomes in volleyball and ice hockey. More specifically, volleyball teams with high collective efficacy, as determined before a tournament began, placed higher at the end of the tournament than teams with low collective efficacy. As well, collegiate ice hockey teams with high collective efficacy finished the season with higher power play percentages than teams with low collective efficacy.

Studying group performance in a muscular endurance task, Hodges & Carron (1992) used experimental design to test the difference between low and high collective efficacy groups. They found that groups with high collective efficacy increased in performance following failures whereas groups with low collective efficacy decreased in performance following failures.

Lichaz & Partington (1996) also employed experimental design to study collective efficacy and its influence on collective performance. They found that a group’s ability to perform a task (i.e., rope pulling) was significantly related to the group’s historical collective efficacy factor (i.e., by group member’s performance history relative to the task) more so than by the experimental manipulation of collective efficacy (i.e., by providing varying levels of feedback during the experiment).

These findings, taken together, demonstrate the higher the perceived collective efficacy within a group the greater the ability to accomplish a given task. Indeed, whether
it was in neighborhood, business, athletic, or experimental settings, collective efficacy was shown to be a powerful predictor of behavior—especially performance behaviors. With collective efficacy established as an important process variable in diverse organizational or group settings, attention may now be turned to how this variable operates within the education setting.

Research on Collective Efficacy Within Education

In this last section on research that considers collective efficacy, the results from all studies that explore the collective efficacy of teachers are presented. Although the construct is considered a relatively new feature on the education research landscape, as this review will show, it has produced some captivating results.

The landmark study on collective efficacy of teachers. In his pioneering empirical work on collective efficacy within education, Bandura (1993) used path analysis to examine potential relationships that exist between several variables at the organizational level, namely SES, student body composition, teaching longevity, prior academic achievement, collective efficacy of teachers, and academic achievement. Analysis of the data revealed collective efficacy to have a positive, direct effect on academic achievement. In fact, this effect was greater than the negative direct effect that SES had on academic achievement. Based on these findings, Bandura commented:

Adverse student body characteristics [low SES] influence schools' academic attainments more strongly by altering faculties’ beliefs about their collective efficacy to motivate and educate their students than through direct effects on school achievement. Indeed, with staffs that firmly believe by their determined efforts, students are motivatable and teachable whatever their background, schools heavily populated with minority students of low socioeconomic status achieve at the highest percentile ranks based on national norms of language and mathematical competencies. (p. 143)
The importance of Bandura’s findings cannot be treated lightly. Indeed, since the Coleman Report (1966), few variables have been found to influence student achievement as strongly as student background characteristics—which were typically measured by students’ socioeconomic status. This study provided initial evidence that a school process variable, namely, the collective efficacy of teachers, not only had a significant, positive effect on student achievement, but this effect was greater than that offered by SES.

Furthermore, because the collective efficacy of teachers, unlike students’ SES, may be influenced by forces within schools, educational administrators were given an avenue to influence school achievement reform. That is, the results of Bandura’s (1993) work suggest that targeted efforts by school leaders to increase the collective efficacy of teachers’ within their buildings may result in increased student achievement scores.

Unfortunately, Bandura (1993) did not report the sample size, instrumentation used, or descriptive statistics within his study. Perhaps this lack of information fueled further investigations into this construct, which was found to be a powerful predictor of student attainment.

*Collective efficacy of teachers and improving urban education.* Henderson, Jones, & Self (1998) posited that collective efficacy was the key mechanism for improving urban education. More specifically, they believed that through training future urban educators about this powerful construct school improvement would follow. Relying on Bandura’s theoretical (1986, 1995) and research (1993) studies on collective efficacy for support, they claimed that collective efficacy was the conceptual “framework [needed] for organizing and motivating schools, homes, and communities to work together for optimal student achievement” (Henderson et al., p. 3). Taking this position, they
expanded the conceptualization of collective efficacy in education to encompass not only the belief systems of teachers but also the community at large. They stated:

[W]e define collective efficacy as a belief system that includes the mutual recognition of the various agents (e.g., home, school, and community), that each unit has a valuable and distinctive role in promoting success identities—and together—and only together, do they have the capabilities to create environments conducive for the optimal development of the student. (Henderson et al., p. 4)

Utilizing this framework they developed a course syllabus for pre-service urban educators. Their purpose in offering the course was “to increase awareness of, and exposure to, urban students and families, and to gain a theoretical and practical understanding of collective efficacy” (Henderson et al., 1998, p. 9). Ultimately, they hoped pre-service educators would exit the course and enter the profession better prepared to meet the challenging demands of the urban school environment. Their concluding remarks speak to both the importance of the pre-service training and its focus on collective efficacy:

[I]f preservice teachers are equipped with the knowledge, skills, and attitudes necessary to form linkages and create nurturing support systems for themselves and their students, they know, when, how, and where to begin the process. Most importantly, they are aware of how to find the rich resources of our urban communities. (p. 10)

This work, like Bandura’s (1993), recognized collective efficacy as an important factor in the educational process. Although this particular paper was not empirical in its design, its merit was found in its authors’ proactive approach toward change. In order to reform urban education, Henderson et al. (1998) believed the process must begin with training future teachers about collective efficacy.

*New insights into collective efficacy of teachers.* The arrival of Goddard et al.’s (2000) comprehensive treatment on the collective efficacy of teachers ended nearly seven
years of silence from the research community on the construct. Their work yielded three important contributions to the study of collective efficacy. First, they developed a theoretical model of collective efficacy that was founded on Bandura’s social cognitive theory (1986, 1997) and patterned after Tschannen-Moran et al.’s (1998) model of teacher efficacy. Second, they created an instrument to measure the perceptions of teachers’ collective efficacy beliefs in their schools. Third, they conducted a study to test their instrument and to validate Bandura’s (1993) assertion that collective efficacy of teachers has a significant, positive effect on student achievement. Since Goddard et al.’s research provides considerable support for the present study, a brief elaboration on each of these contributions follows below.

After defining collective efficacy of teachers as “the perceptions of teachers in a school that the efforts of the faculty as a whole will have a positive effect on students” (Goddard et al., 2000, p. 480), Goddard et al. presented their theoretical model of collective efficacy. As stated previously, this model (see Figure 2.3) was consistent with the Tschannen-Moran et al.’s (1998) framework used to conceptualize teacher efficacy.

In fact, the models differ only cosmetically. Recall (see Figure 2.2), Tschannen-Moran et al. (1998) used the terms teacher efficacy, to describe the type of teacher beliefs, as well as performance to describe the actions, which follow the consequences of
teacher efficacy. In place of these two terms, Goddard et al.’s (2000) model used collective efficacy of teachers and feedback, respectively. Even though this model is nearly identical to the teacher efficacy framework, some explanation is warranted because this model examined efficacy beliefs of teachers at the organizational level.

The sources of collective efficacy of teachers information are similar to the sources of teacher efficacy information. Indeed, they differ only at the level of conceptualization. Recall that teacher efficacy information is processed at the individual level. Therefore, sources of collective efficacy of teachers (i.e., mastery experience,
verbal persuasion, vicarious experience, and physiological arousal) are processed at the organizational level—through the interdependent actions and cognitive processing of the organizations’ members.

To illustrate, Goddard et al. (2000) claimed that mastery experiences as sources of collective efficacy manifested themselves when teachers, as a group, experienced successes and failures. In particular, they stated:

Successes build a robust belief in the faculty’s collective efficacy and failures undermine it. If success, however, is frequent and too easy, failure is likely to produce discouragement. A resilient sense of collective efficacy probably requires experience in overcoming difficulties through persistent effort. (p. 484)

The other three sources of collective efficacy (verbal persuasion, vicarious experience, and physiological arousal) may be explained in like manner. That is, by extending the interpretation of the sources of self-efficacy information to the collective or group level and within the context of teaching.

Moving to the next components of the model, Goddard et al. (2000) theorized that the cognitive processing of sources of collective efficacy information, more specifically, analyzing the teaching task and assessing teaching competence, at the individual and school levels, occurs simultaneously. The framework then proposes that the interaction between these two processes resulted in the emergence of the collective efficacy of teachers within the school. Said differently, teachers consider what is required of them to do the job in their own classroom as well as what is required of their colleagues to do the same or similar job. At the same time teachers are analyzing the teaching task at the individual and school levels, they are making judgments on their own teaching competence as well as making inferences about their colleagues’ teaching competence.
According to Goddard et al., the result of this simultaneous cognitive processing is the emergence of an individual’s perceptions about collective efficacy of teachers within his or her school.

Once collective efficacy emerges, what are its consequences? Similar to those consequences associated with teacher efficacy, teachers that work in schools with high collective efficacy will, as a group, persist amid great difficulties, accept challenging goals, and demonstrate strong organizational effort. However, if teachers work in schools with low collective efficacy, then opposite consequences are expected. That is, teachers will tend to give up in the face of difficulties, to avoid challenging goals, and to exhibit less effort (Goddard et al., 2000).

Whether resulting from high or low perceptions of collective efficacy, these consequences provide feedback or a learning source for the entire organization. This feedback, in turn, provides new sources of collective efficacy information, which will serve to shape the future perceptions of collective efficacy of teachers in the school. In fact, inclusion of the feedback loop is consistent with Bandura’s (1997) assumptions about triadic reciprocal causation applied to the organizational level.

The creation of the Collective Teacher Efficacy Scale (CTES) is Goddard et al.’s (2000) second important contribution to the study of collective efficacy of teachers. Since the following chapter will focus, among other methodological issues, on instrumentation, it is sufficient to mention here that the measure developed by Goddard et al. (2000) was consistent with their theoretical model. In addition, results from field tests offered
evidence of the instruments’ validity and internal reliability. Elaboration on each of these points and additional information about the CTES are included in the forthcoming chapter.

The third and most intriguing contribution of this work was found in the results of the study. Using Hierarchal Linear Modeling techniques to analyze the data, which was collected from 47 elementary schools in a large mid-western urban school district, Goddard et al.’s (2000) findings were consistent with the results of Bandura’s (1993) study on collective efficacy of teachers. That is, Goddard et al., like Bandura, found collective efficacy to have a significant, positive effect on student achievement.

More specifically, they outlined five important findings from their research: 1) Their results supported the interaction of group competence and task analysis to explain the emergence of collective efficacy of teachers within a school. 2) Their multilevel analysis demonstrated that the collective efficacy of teachers is positively associated with the variance in student achievement scores that occur between schools. In particular, they found that by increasing a school’s collective efficacy scale score by one unit, an 8.62 point average increase in student mathematics achievement and an 8.49 point average increase in reading achievement might be expected. 3) Their study offered strong evidence that the group efficacy perceptions of teachers are systematically related to student achievement scores. That is, results may be cautiously applied to settings beyond the urban schools included within the study. 4) Their work supported the extension of Bandura’s social cognitive theory to the organizational level. That is, the various assumptions associated with social cognitive theory (e.g. human agency, self-regulation, forethought, and vicarious learning) may be applied to the organizational level and used
to explain the effect collective efficacy of teachers has on school differences in achievement scores. 5) Finally, they offered a specific explanation as to why collective efficacy has such a strong influence on performance behaviors in schools. Their rationale centered on the relationship between collective efficacy of teachers and the normative environment in schools. They explained:

[Collective efficacy of teachers] is a way of conceptualizing the normative environment of a school and its influence on both personal and organizational behavior. That is, teachers’ beliefs about their faculty’s capability to educate students constitute a norm that influences the actions and achievement of schools. (p. 502)

Even though this study provided strong theoretical support for deepening one’s understanding about the collective efficacy of teachers and offered convincing empirical evidence to support the construct’s influence on student achievement, many opportunities were left open for further investigations into the construct. Consequently, various questions about collective efficacy left unanswered by Goddard et al. (2000) are addressed in subsequent studies on the construct.

Uncovering new relationships. Deciding to address unanswered questions in Goddard et al’s (2000) initial study into teachers’ sense of collective efficacy, Goddard (2001) investigated three new relationships within his research. First, he examined the relationship between mastery experience, assumed by social cognitive theory to be a key source of collective efficacy perceptions, and collective efficacy of teachers. Goddard used past school-level achievement data as a proxy measure for mastery experience. Second, the relationship between collective efficacy of teachers and student achievement,
controlling for prior student achievement, was examined. Third, and finally, Goddard investigated the relationship between consensus among faculty members and collective efficacy of teachers.

The findings of this study were based on data collected from 452 teachers working in 47 elementary schools in a large mid-western school district. Using multi-level data analysis techniques, Goddard (2001) found, after determining that substantial variability existed between schools collective efficacy scores, that mastery experience was a significant predictor of the variability between schools in teachers’ collective efficacy beliefs. Recall that this finding is consistent with social cognitive theory’s assumption that mastery experience is a strong source of efficacy beliefs—whether at the individual or group levels.

Along with this finding, Goddard (2001) discovered collective efficacy of teachers to strongly influence student achievement. More specifically, he stated: “Collective efficacy was significantly and positively related to differences between schools in student achievement, even when school means were adjusted for students’ prior achievement and demographic characteristics” (p. 474). These results supported past research findings that teachers’ collective efficacy perceptions are strong predictors of student achievement scores (Bandura, 1993; Goddard et al., 2000).

The last finding reported within this study was somewhat surprising: faculty consensus about collective efficacy was not a significant predictor of student achievement. Indeed, investigation revealed that it was the group mean collective
efficacy score that explained the differences between schools in their mathematics and reading achievement scores. To clarify possible concerns about these findings, Goddard (2001) reported:

> Although this finding may seem counterintuitive to some, it is important to recognize that scholars in other disciplines have drawn similar conclusions about measures of central tendency as predictors of group behavior. For example, economists argue that public choice (e.g., in political elections) most often satisfies the median voter (Hyman, 1995), because the person whose preferences are in the middle is most likely the one whose position can gain majority support. From this perspective, variability in the preferences of voters is not a predictor of group decision making. Analogously, the group mean may effectively capture the normative influence of collective efficacy in schools. (p. 474)

Importantly, Goddard mentioned that his explanation was only a theoretical possibility and that further research would be needed to better understand these results.

As evidenced, Goddard’s (2001) study validated past research findings about collective efficacy of teachers and student achievement, confirmed the support for linking social cognitive theory to the group level, and provided initial support that faculty consensus about collective efficacy is not an important predictor of student attainment. Clearly, this study had deepened the knowledge base supporting collective efficacy of teachers, which, like the efficacy of teachers, has been shown to have a powerful impact on student achievement. Incidentally, what is the relationship between teacher efficacy and collective efficacy of teachers? Findings from a study that attempted to answer this question are reviewed in the following section.

*Examining the link between collective efficacy of teachers and teacher efficacy.*

Hoping to elucidate the connection between a well-tested, historically significant variable within education and an important, emerging one, Goddard & Goddard (2001)
investigated the relationship between the efficacy and collective efficacy of teachers.

They hypothesized that the collective efficacy of teachers predicted the differences among schools in teacher efficacy beliefs.

Using multi-level techniques to analyze the data they collected from 452 teachers in 47 elementary schools, their findings supported their hypothesis. More specifically, by controlling for various school contextual factors (mean socioeconomic status, mean prior mathematics achievement, minority concentration, and school size) they found significant variability between schools in their teacher efficacy scores. To explain this variation they built a school-level model which included collective efficacy of teachers. Tests of the model revealed that teachers’ sense of collective efficacy did, indeed, explain the differences in school’s teacher efficacy scores. In particular, a one standard deviation increase in collective efficacy of teachers within a school would be associated with a .248 standard deviation increase in teacher efficacy. Importantly, collective efficacy was the only significant predictor of teacher efficacy even when other school contextual factors, for example, mean socioeconomic status and mean prior achievement, were included in the model.

Commenting on the importance of their findings, Goddard and Goddard (2001) stated:

Our findings suggest that in this urban district, collective perceptions of faculty capability were predictive of the differences among schools in the perceptions that teachers held of their own self-capability. Such a result helps to show that collective efficacy is an important school contextual feature that is systematically related to teacher efficacy research. Moreover, building collective efficacy in schools may offer a new possibility for raising teacher efficacy and perhaps at least lessening the declines in teacher efficacy that are sometimes experienced by teachers when they leave their preservice programs. (p. 816)
Thus, collective efficacy and teacher efficacy are connected. But the extent of this connection is still in question. Goddard and Goddard (2001) noted, “Whether changes in collective efficacy lead to changes in teacher efficacy is, however, an unanswered question. Future researchers might wish to examine this question of causality” (p. 817). Still, they promoted the findings of their study by stating, “one possibility that is consistent with the correlational evidence in this study is that the efficacy of teachers and the collective efficacy of teachers have a reciprocal relationship—a change in one may lead to changes in the other” (p. 817).

The studies reviewed to this point have provided clear empirical evidence that collective efficacy of teachers is predictive of student achievement, supported by social cognitive theory, and connected with teacher efficacy. Yet, before this review comes to a conclusion, findings from the three most recent studies on collective efficacy of teachers are presented.

Collective efficacy of teachers and school organizational practices.

While we know that schools high in collective efficacy tend to have relatively high levels of student achievement, we actually know very little about how these schools are organized differently. Simply put, we know little about what collectively efficacious schools look like. (Goddard, 2002b, p. 170)

Using this as a pretext for his study, Goddard (2002b) investigated how collective efficacy of teachers was related to school organizational practices. Teacher influence, an example of school organizational practice was defined as “the extent to which teachers were able to exert influence over school decisions” (p. 175). This dependent variable was predicted to be positively influenced by the collective efficacy of teachers within the school.
The sample for this study included 428 teachers serving within 45 elementary schools of one large urban school district. Multi-level analyses of the data, which included controlling for school contextual factors (mean socioeconomic status, mean mathematics achievement, minority concentration, and school size) yielded support for their prediction. That is, collective efficacy of teachers was found to be a significant positive predictor of differences among schools to the degree to which teachers had influence over vital school decisions. Similar to Goddard’s past work (Goddard & Goddard, 2001), only collective efficacy of teachers was found to be a significant predictor of teacher influence even when school contextual factors were included within the model.

Moreover, the model employed in this analysis “accounted for a 24 percent reduction in between-school variation in teacher influence. In other words, after taking school context into account, collective efficacy explains approximately one fourth of the differences among schools in teacher influence” (Goddard, 2002b, p. 179). It comes as no surprise that these findings have important theoretical and practical implications.

As for the theoretical, the results suggest that enablement is an important ingredient in the exercise of group efficacy. “For groups to make a difference they must have a means to do so…. When groups have a say over their collective future, they tend to have higher levels of collective efficacy” (Goddard, 2002b, p. 181). And, as for the practical, these findings suggest that in order to build a sense of collective efficacy within a school whose teachers feel powerless, school leaders must involve their teachers in decisions that affect the school. However, Goddard warned that collective efficacy would not develop by simply turning decisions over to the faculty. Indeed, he noted that
opportunities for faculty decision making must occur within structured experiences. This task, he emphasized, would be the responsibility of the school leader. On this point he stated: “The implication is that to rise to the challenge of high standards, school leaders must work carefully to build the collective efficacy of a faculty” (p. 181).

Since initial studies on collective efficacy focused mostly on its relationship with student achievement, this study held significance because it addressed the practices within schools with high and low levels of collective efficacy of teachers. Once again, investigations into teachers’ sense of collective efficacy yielded fruitful results and provided more evidence of the construct’s predictive power.

Collective efficacy of teachers and student achievement: employing path models. In the final studies considered in this review on collective efficacy of teachers, Hoy, Smith, et al. (2002) and Hoy, Sweetland, et al. (2002) tested theoretical models of student achievement using the collective efficacy of teachers as the key independent variable within their respective studies.

Hoy, Smith, et al. (2002) collected data from 97 high schools within the state of Ohio. Path analysis provided evidence that collective efficacy of teachers had a larger, positive, significant affect on student achievement in mathematics than student background characteristics (socioeconomic status) and the academic press of the school. Taking a similar approach, Hoy, Sweetland, et al. (2002) further investigated whether their model for student achievement applied to a rural subset (55 high schools) of their original high school data set (97 high schools). True to their original findings and using
similar data analysis techniques, collective efficacy of teachers, once again, was found to be more important in explaining student achievement in mathematics than socioeconomic status.

Both of these studies supported past findings that teachers’ sense of collective efficacy beliefs “shape the normative environment of the school and influence both teacher behavior and student achievement” (Hoy, Smith, et al., 2002, p. 198). Although collective efficacy of teachers may still be considered in its early stages of development as a construct, as this review has demonstrated, its short existence has provided intriguing information for both educational researchers and practitioners.

**Conclusions and Opportunities for Investigation on Collective Efficacy of Teachers**

This review has presented a comprehensive treatment of the birth, growth, and development of collective efficacy of teachers. From its theoretical origins in Bandura’s social cognitive theory to its emergence from its conceptual counterparts at the individual level (i.e., self-efficacy and efficacy of teachers), collective efficacy of teachers has proven worthy of its attention to both researchers within and outside of education. Beginning with the landmark study on the construct (Bandura, 1993), collective efficacy has been shown most notably, among other findings mentioned previously, to be a significant, positive predictor of student achievement (Bandura, 1993; Goddard, 2001; Goddard et al., 2000; Hoy, Smith, et al., 2002; Hoy, Sweetland, et al., 2002).

This predictive power emanates from its ability to shape the normative culture within schools. That is, teachers in schools develop beliefs about their faculty’s capability to foster student learning. These beliefs manifest themselves in normative behaviors that
serve to influence the actions of teachers and, in turn, the behaviors of students. Student achievement is one performance behavior shown to be affected by the collective efficacy of teachers (Goddard et al., 2000)

Even though much progress has been made on understanding this construct, from theoretical and methodological (addressed in chapter 3) perspectives, opportunities for additional investigation into collective efficacy of teachers still remain. Although prior education studies examined collective efficacy as a process variable within schools, accept for the consideration of socioeconomic status, only Bandura’s (1993) study examined other input variables (i.e., student body composition, prior academic achievement, and teaching longevity) that might affect collective efficacy of teachers. So, a natural question that arises is: How might teachers’ sense of collective efficacy be influenced by other input variables within an input-process-output model or open systems model of school organizations? The present study attempts to address this question by considering collective efficacy as a key mediating variable within a theoretical model of student achievement, which will be presented and explained at the end of this chapter.

It is proposed in this model that collective efficacy of teachers enables an indirect effect between SIR and student achievement as well as SSR and student attainment. Recall that SIR and SSR are both considered variables that represent measures of school fiscal efficiency. Having presented the conceptualization and relevant research surrounding collective efficacy of teachers, this review now moves to consider the relevant research associated with school efficiency.
Efficiency

Efficiency, as developed within economics, describes how an organization is making the best use of its existing resources (King et al., 2003; Shim & Siegel, 1995). It may be defined, quite simply, as the ratio of outputs to inputs or, more specifically, producing the most output for the least input. Over time, scholars have taken these common definitions and transformed them into highly specific conceptualizations of the construct.

Economists generally view efficiency through two lenses: technical efficiency and economic or allocative efficiency. Technical efficiency is the degree to which an organization, “industry, or an economy is attaining maximum output by means of the best use of available resources” (Shim & Siegel, 1995, p. 119). Whereas economic efficiency is the degree to which “an organization not only has achieved technical efficiency but also is satisfying consumer preferences by producing the combination of goods and services consumers want with their current earnings” (p. 120).

Relying on these widely accepted conceptualizations of efficiency as a foundation, King et al. (2003) developed a useful framework for studying efficiency within education. Similar to the approach used by economists, King et al. differentiated between economic and technical efficiency. However, they further dichotomized economic efficiency into external and internal economic efficiency.

Although efficiency, as conceptualized, operationalized, and measured within this study departs from these traditional approaches used to study the concept, a brief explanation of each of these terms and how they have been utilized within educational research has merit and is supplied below. Following these descriptions, this review
examines the alternative approach taken to conceptualize and operationalize efficiency within this study. As well, a thorough explanation of the origin and development of this approach to school efficiency is provided.

External Economic Efficiency

King et al. (2003) described external economic efficiency as those contributions to national economic growth that are made by the scarce resources allocated by society to various sectors of production. With respect to education, we are interested in how well the economic returns we receive from investments in education compare to returns from other investment opportunities. (pp. 347-348)

Researchers have employed rate-of-return analysis (Psacharopoulos, 1981, 1985) for studying the economic returns on education, which, in turn, assists in determining the external efficiency of the educational system. More specifically, rate-of-return analysis is offered to policy makers to assist them in determining the amount to spend in a specific economic sector and on the programs or specified areas within each sector (King et al., 2001). The sectors that are able to provide the greatest return for the least amount invested would be considered the most efficient. Based on past research findings education has been found to be a worthy investment of a country’s resources (King, et al, 2003; Psacharopoulos, 1981, 1985).

Internal Economic Efficiency

Whereas external economic efficiency is concerned with the performance of economic sectors at the national level, internal economic efficiency is involved with the performance of individual organizations within the entire economy. More specifically, internal economic efficiency “concerns the allocation of resources within educational
enterprises in order to maximize output (for example, academic achievement, skill
development, and the behavior and attitudes of students) from the resources committed”
(King et al., 2003, p. 348).

Similar in their study of external economic efficiency, researchers have employed
various methods (e.g., production function analysis, cost-benefit analysis, and cost-
effectiveness analysis) for revealing the extent to which an organization is internally
efficient. Among these different methods, production-function analysis or input-output
analysis is considered the primary tool for studying efficiency within schools and districts
(King et al., 2003).

An education production function may be understood as a relationship between
the outputs (O) (e.g., behavioral and attitude changes), inputs (I) (e.g., student
characteristics, teacher characteristics, and school facilities), and the processes (P) (e.g.,
instruction, student engagement, decision making) of education. This relationship may be
expressed as a mathematical model in the following form: O = f(I, P). That is, the outputs
of education are a function of the inputs and processes of education. Using this model,
researchers collect relevant quantifiable data from school districts and then calculate
efficiency by using a formula (classical ratio or output to input analysis) or by employing
advanced statistical analyses of the data (e.g., quadriform and data envelopment analysis)
(King et al., 2003; Swanson & Engert, 1999).

A key assumption of production-function research is that the organization
considered for study must have a common underlying technology. Therefore, in order to
apply production-function techniques to the study of education, one must identify a
common core technology for education. Even though the core technology for education
may be considered inexact, researchers have arrived at one. King et al. (2003) provided
the following summary on this key assumption of production-function research in
education:

The sameness of American schools (and of schools around the world for that
matter, both public and private) lends credibility to an assumption of an implicit
technology. School buildings are typically arranged with classrooms and certain
ancillary spaces such as libraries, auditoriums, and gymnasiums. Each classroom
is usually presided over by one teacher only, and there is much similarity in the
ways teachers organize and manage classrooms. (p. 355)

Notwithstanding the inconclusive research to support this assumption (Klitgaard
& Hall, 1975), a multitude of studies over the last thirty-five years have investigated the
efficiency of schools using the production-function model (e.g., Coleman et al., 1966;
Ferguson, 1991; Ferguson & Ladd, 1996; Hanushek, Kain, & Rivkin, 1998; Woessmann,
2000; 2002). Although the results of many of these studies tend to suggest that school
organizations are operating inefficiently (Hanushek, 1994, 1997), this conclusion has
been extensively debated (Hanushek, 1991, 1994, 1997; Hedges, Laine, & Greenwald,

Recognizing this debate surrounding the input-output approach to studying
efficiency within education, King and MacPhail-Wilcox (1994) completed their analysis
of the relevant literature on this approach by stating: “A safe conclusion is that the way in
which schools, teachers, and students take advantage of whatever materials are available
matters as much or more than the actual human, physical and fiscal resources present in
schools” (p. 47). Not surprisingly, it appears from these remarks that school efficiency is
directly tied to the processes found within schools. In other words, school efficiency is
influenced more by the actions of those individuals that have decision making authority on resource use and allocation within the school or district than by the amount of resources allocated to schools.

The production-function approach for studying school efficiency has not come without criticism (Monk, 1989; Murnane, 1991; Rice, 2001). As a result, much more work in this area of study is needed before definitive conclusions may be reached.

Supporting this position King et al. (2003) asserted:

We are growing in our understanding of the relationships between educational inputs and outputs, but the causal relationships between school inputs and processes and pupil achievement are largely unknown…. There is not sufficient knowledge to specify a one-best-way for the organization, management, and operation of schools from the … state or federal government. (p. 362)

As can be gathered from the information shared in these prior sections, continued study of economic efficiency within education, be it external or internal, must continue if substantive conclusions are desired. Although much of the landscape that covers the study of efficiency within educational research has been dominated by studies of internal and external economic efficiency, another approach has emerged on the scene—that being the study of technical efficiency.

Technical Efficiency

On this different approach to conceptualizing efficiency, King et al. (2003) stated, “Technical efficiency is concerned with discovering what combination of inputs has the most favorable effect on outcomes (pupil performance). Unlike in economic efficiency studies, however, the cost of inputs is not a consideration” (p. 367). Approaching the conceptualization of the construct from a different angle, Hanushek (1986) asserted that “the consideration of technical efficiency is more complicated [than economic
efficiency]. The standard conceptual framework indicates that, if two production processes are using the same inputs, any systematic difference in outputs reflects technical inefficiency” (pp. 1166-1167). Regardless of which conceptualization is espoused, the construct has been the focus of a variety of studies within the research community. Although it must be noted that it is economists rather than educators that would describe these studies as focusing on technical efficiency (King et al., 2003).

Studies of technical efficiency in education may be divided into three categories (King et al., 2003): effective-schools research (e.g., Edmonds, 1979; Sammons, 1999), evaluation studies (e.g., Alexander, Entwisle, & Olson, 2001; Finn & Achilles, 1999; Reynolds & Wolfe, 1999) and whole-school reform models (e.g., Kirby, Berends, & Naftel, 2001). Each of these approaches used to study the technical efficiency of schools sought to determine what arrangement of processes or allocation of resources within the educational system promoted increases in specified student outcomes.

A detailed analysis of the findings associated with these studies goes beyond the needs of the present study. However, the following summary remarks offered by King et al. (2003) provide thoughtful insight into the current research associated with this construct:

Studies of technical efficiency provide clear evidence that some educational practices are better than others. This means there is great hope for improving effectiveness of schooling. But public policy should not be built on the findings of these studies alone, because they do not take into account cost—that is, the price of inputs. Effective practices must be costed out, and we need studies that compare the costs and effectiveness of alternative policy options. (p. 371)

In the next section, an alternative approach for measuring school efficiency is presented. As was mentioned previously, the model employed to conceptualize and
operationalize efficiency within schools departs from those traditional approaches heretofore explained. Among the many benefits for using this model, which will be explained shortly, is the inclusion of the costs of the various functions involved in the educational system. Indeed, these costs are key ingredients in the formulas used for determining the efficiency of the schools and districts included within this study.

School-Site Micro-Financial Allocations Model (SMAM)

After completing their analysis of the conceptualization and empirical evidence surrounding internal and external economic efficiency and technical efficiency, King et al. (2003) commented:

Analyses of economic and technical efficiency have presented us with conflicting results. Economic efficiency studies suggest that schools are using the resources allocated to them inefficiently and that there are, at best, tenuous links between financial inputs and student outcomes. Analyses of the technical efficiency of programs and even of whole-school reform models, however, show that some approaches work much better than others and that students can experience significant educational gains from some program innovations. (pp. 376-377)

The disparity between these findings motivated the authors to suggest two possible explanations. First, school organizations in general, or better, those individuals that work within them in general, are simply not using what prior research has identified as best practice. Since schools are failing to employ these practices, they are misusing their resources and, hence, in general, operating inefficiently. Second, and most relevant to the present study, “because evaluations of technical efficiency do not consider the cost of resources as do studies of economic efficiency, the [efficiency] problem may lie with the pricing and distribution of resources commonly used in the instructional process.” (p. 95)
377). In other words, understanding more about how schools allocate their resources for instruction may lead to better understanding about how schools may become more efficient with their resources.

To advance this understanding the present study examined school efficiency with the aid of an adaptation of the School-Site Micro-Financial Allocations Model (SMAM) (Cooper & Associates, 1993; 1994). This accounting tool, developed by Cooper and Associates (1994), was designed to address the problems associated with the “distribution of resources commonly used in the instructional process” (King et al., p. 377). Indeed, the accounting model, and the efficiency measures derived from it, offer insightful views at how school personnel utilize and allocate the funds that are entrusted to them.

**Origin and description of the model.**

Interdistrict resource allocation has dominated the study of school finance for years. But there is insufficient information on how to put dollars to productive use in districts, schools and classrooms. Indeed, there is considerable misinformation about how schools use money. . . . [Moreover,] little is known about what happens to dollars once they reach districts. (Odden & Picus, 1992, pp. 256-257)

The problems associated with tracing the allocation of resources used for the instructional process raised by King et al. (2003) in the prior section along with the lack of knowledge about *intra-district* financial operations observed by Odden & Picus (1992) above, provided the impetus for Cooper and Associates’ (1994) development and testing of SMAM.

The framework for the model was based on a series of questions Cooper & Associates (1994) developed while engaged in their research on the model.
1) How can money be accounted for at the location, whether school or central, where it was incurred? … 2) To what degree can money, once at the site, be attributed to the function to which it was devoted? … 3) How can data be analyzed so as to make comparisons across locations, functions, type of school, and individual school in a number of districts in a variety of states? … 4) How can accurate school-site allocations data be used to calculate the efficiency and the productivity of schools? (p. 71)

Taking these questions into consideration, they designed their model which is depicted below in Table 2.1.

<table>
<thead>
<tr>
<th><strong>School Building Categories</strong></th>
<th><strong>District Office Categories</strong></th>
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<tbody>
<tr>
<td><strong>Function a: administration</strong></td>
<td><strong>Function A: Administration</strong></td>
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<tr>
<td>Salary and fringe benefits for principal, assistants, secretaries, and office expenses.</td>
<td>Salaries and fringe benefits for superintendent, staff, supervisors, directors, and offices.</td>
</tr>
</tbody>
</table>

**Function b: facilities and operations**
School building costs including utilities, repairs, custodial salaries and fringe benefits, bus services, and food services.

**Function B: Facilities and Operations**
Salaries and fringe benefits for operation management staff at the district office. Cost of running district office buildings, including light, heat, air conditioning, repairs, maintenance, as well as coordinating and running the facilities and operations.

**Function c: staff support and development**
Delivery of school-side staff in-services, mentoring, sabbatical leaves, coaching, and other teacher support efforts.

**Function C: Staff Support and Development**
Costs of planning, coordinating, and directing the teacher in-service education, staff training director and staff who work out of the district office.

**Function d: pupil support**
Salaries and fringe benefits for out-of-classroom student support, including club leaders, coaches, library staff, and school guidance counselors.

**Function D: Pupil Support**
Salaries and fringe benefits, office and secretarial support for the pupil personnel and support functions (e.g., school psychologist) that direct and coordinate student services.

**Function e: instruction**
Salaries and fringe benefits for teachers for work done within the classroom. Costs for teaching aides, paraprofessionals, textbooks, materials, computers, paper, chalk, and other disposables.

**Function E: Instruction**
Salaries and fringe benefits of coordinators and directors of instructional programs who provide services to teachers in their classroom. Costs of supporting instruction, such as screening textbooks, writing tests, and materials.

Table 2.1: School-Site Micro-Financial Allocations Model

Source: Adaptation of Cooper & Associates (1994) model, p. 75
Table 2.2: Per Pupil Cost for Dove County District Office and Generic Elementary School by Location and Function. Source: Author.

<table>
<thead>
<tr>
<th>Dove County School District</th>
<th>Generic Elementary School Expenditures ($)</th>
<th>District Office Expenditures ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>596</td>
<td>451</td>
</tr>
<tr>
<td>Facilities and Operations</td>
<td>65</td>
<td>928</td>
</tr>
<tr>
<td>Staff Development</td>
<td>120</td>
<td>3</td>
</tr>
<tr>
<td>Pupil Support</td>
<td>2,048</td>
<td>36</td>
</tr>
<tr>
<td>Classroom Instruction</td>
<td>5,309</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8,138</strong></td>
<td><strong>1,423</strong></td>
</tr>
</tbody>
</table>

The SMAM is a financial accounting tool that requires school officials to 1) identify the location of expenditures at either the school building or district office level, 2) identify the specific function (administration, facilities and operations, staff support and development, pupil support, and instruction) of the educational organization where the funding was spent (e.g., salary and fringe benefits or textbook and supplies), 3) carefully consider each expenditure to ensure that multiple functions contained within a single expenditure are allocated to their appropriate function. For example, if an assistant principal teaches two classes in the morning and serves as an administrator the rest of the school day the expenditures, in this case, should be allocated to both instruction (approximately 20% of salary and benefits) and administration (approximately 80% of
salary and benefits), and 4) aggregate the total expenditures for each function within a
school or district office and then report the results based on per pupil costs (see Table 2.2
for a hypothetical example).

Examination of Table 2.2 shows that items under the column heading “Generic
Elementary School Expenditures ($)” correspond to the column “School Building
Categories” in the SMAM (Table 2.1). Likewise, items delineated under “District Office
Expenditures ($)” correspond to the column “District Office Categories” in the SMAM.
In this particular example, Dove County School District allocates $5,309 per pupil for
expenses related to classroom instruction at Generic Elementary school (i.e., Costs for
salaries and fringe benefits for teachers for work done within the classroom as well as
costs for teaching aides, paraprofessionals, textbooks, materials, computers, paper, chalk,
and other disposables). Whereas the school district apportions $928 for expenses related
to facilities and operations at the district office (i.e., Cost for salaries and fringe benefits
for operation management staff at the district office. Cost of running district office
buildings, including light, heat, air conditioning, repairs, maintenance, as well as
coordinating and running the facilities and operations). Additionally, Dove County
School District spends a total of $1,423 per pupil on district office related expenditures
and $8,138 per pupil on expenses generated at the Generic Elementary school. Therefore,
$9,561 is spent on educating each child who attends Generic Elementary School within
the Dove County School District.

Once the finance data have been collected and presented (as in Table 2.2) an
analysis of this data may be employed. Cooper and Associates (1994) suggested that
analyses of the data generated by SMAM may reveal two important indicators of school
quality: measures of school efficiency and productivity. This study focuses on the measure of efficiency within schools. Yet before considering how school efficiency may be measured using the data organized within this Model, the following section investigates findings from research studies that have investigated the usefulness of SMAM.

Research on SMAM. Evidence for the utility of the Model was found in two separate test situations. Cooper and Associates (1994) initially tested the Model within “eight representative school districts selected from across the United States to gain some balance by size, type, and region of the nation” (p. 70). Using the results from this study, the researchers refined the model and then tested it within twenty-eight districts in various states across the country (e.g., Colorado, South Carolina, and New Jersey). The data acquired from the twenty-eight district sample served not only to validate the initial study’s findings of the utility of the model but also provided the information by which the efficiency and productivity of the schools might be determined.

Cooper and Associates (1994) presented findings resulting from an analysis of five of their participating school district’s finance data. They found that within these five school districts the percent of total funds available in a school district that eventually reached school buildings ranged from 84 percent to 93 percent. This information contradicted common criticisms of schools spending exorbitant amounts of money on the district office. Furthermore, analysis of the funds used within the school buildings showed that monies spent directly on instruction ranged from 51.99 percent to 61.73
percent. This information supported what Cooper and Associates reported as the national average expenditure for instruction, which is approximately 61 percent of funds available within a school district.

Continuing with their analysis of the data, Cooper and Associates (1994) mentioned another significant benefit of using their model: making comparisons across types of schools, districts, and states. Most states report school finance data using average costs for administration, capital improvements, or instruction at the district level. Since the data within SMAM is traced directly to individual schools, comparisons may be made among individual schools, then aggregated to analyze financial data at the district and state levels.

Because of the ability to track money directly to school sites and make comparisons between schools, one district within the study became aware of the differences in allocations by the type of school and made changes by distributing more resources to children in elementary schools. Cooper and Associates (1994) reported:

At a meeting with principals, teachers, and parents of elementary school children, the superintendent learned that these lower grades did not have as much science, physical education, music and art, compared to the laboratories, gymnasiums, and marching bands in the high school. A team of science, arts, and physical education teachers were assembled and every elementary school pupil was provided instruction in these subjects two days per week. (pp. 77-78)

Obviously, this intervention had direct impact on instruction for these children and demonstrated the practical application and utility of the Model. In a paper that provided the groundwork for the publication of their Model, Cooper and Associates (1993) described other benefits for using SMAM. They stated:
A number of superintendents reported that the [SMAM] data allowed them to save money, improve programs, and reassure the voting public that resources were going into worthwhile functions. Even when the model turned up a costly ‘outlier’ school, the superintendent had the opportunity to explain that, yes, Coal Creek Elementary School was most expensive to administer, run, and maintain because it was located 89 miles from the district’s population center, was high in the mountains, was expensive to transport, heat, maintain, and was too small to be very economical. ‘No,’ he reported, ‘the district could not close the school because the students lived too far away from the nearest accessible school.’ (p. 48)

According to Cooper and Associates, because the superintendent articulated the problem and supported his argument with finance data obtained from SMAM, the district went on to pass “the largest bond issue in the State’s history after 11 years of unsuccessful attempts” (p. 48).

Over time educators and researchers grew interested in the power and utility of Cooper and Associates’ (1994) Model for organizing, tracing, and reporting school finance data. As a result, SMAM matured into what is now called the Finance Analysis Model (FAM) (Speakman et al., 1997). Using Cooper and Associates (1994) path breaking work, the K-12 Education Team of Coopers & Lybrand LLP developed what may be considered an even more sophisticated approach for working with educational finance data. Similar to SMAM, FAM is able to trace expenditures to the school level. However, additional features were made available in the new model.

FAM is organized into four dimensions: function (instruction, instructional support, operations, other commitments, and leadership), location (central, school site, and other commitments (non-allocated)), individual school and school type (elementary schools, middle, senior high schools, alternative schools, and other schools) and program (special education, bilingual/ESL, Chapter 1/Title 1, vocational/School-to-Work, and
general education). Note that function, location, individual school, and school type in FAM relatively correspond to function, location, individual school, and school type in SMAM. The fourth function, program, is unique to FAM.

Additional information about FAM and the powerful findings associated with its use are available (Speakman et al., 1997); however, such information presented herein would move this study, unfortunately, beyond its intended scope and capability. In order to apply Cooper and Associates (1994) work to an appropriate research setting, those school districts and states involved with the study must have adopted SMAM. Fortunately, the state of Ohio, the location of the present study, adopted the fundamental principles and framework of Cooper and Associate’s SMAM. However, the detailed accounting procedures associated with FAM have not been implemented within Ohio and, therefore, testing this model’s utility is not feasible within this study. Still, before leaving this discussion on FAM, it must be noted that this new finance model not only supported the findings of SMAM but also expanded the Model’s utility (Speakman et al., 1997).

Up to this point SMAM has been shown to be an extremely useful accounting tool that has enabled researchers and practitioners, among other things, to trace education expenditures to the school building level. Research has demonstrated that the Model has provided extremely useful information for superintendents and other educational officials who need credible and reliable tools to aid in their ability to inform the public on how the resources within their schools are being utilized.

Since Ohio has adopted SMAM, an analysis of how schools spend money within the state is possible. The focus of this expenditure analysis, still to be addressed, is a
measure of school efficiency, which may be calculated by creating a relationship between the various functions (i.e., administration, pupil support, instruction, etc.) within the model. The following section describes these formulas as developed by Cooper and Associates (1994). Following the examination on how school efficiency is conceptualized and operationalized within this study, this review on school efficiency ends with a description of the Expenditure Flow Model (EFM) (Ohio Department of Education, 2002). The EFM is the state of Ohio’s adaptation of Cooper and Associates’ (1994) SMAM.

Measuring school efficiency using SIR and SSR. Recall that from the onset, Cooper and Associates (1994) desired to utilize the information gathered from implementing the SMAM to make assertions about school quality indicators. The fourth question which guided the development of their model manifested this desire and their interest in using the data in meaningful ways: “4) How can accurate school-site allocations data be used to calculate the efficiency and the productivity of schools?” (p. 71). Although productivity of schools is considered an important concept worthy of study, this study maintains a focus on school efficiency.

Instead of relying on traditional conceptualizations of school efficiency (internal economic efficiency or technical efficiency), Cooper and Associates (1994) devised their own conceptualization and linked it directly with the functions (see Table 2.1) delineated within SMAM. They defined efficiency “as the ratio of the cost of direct services to students—Levels d + e, Pupil Support + Instruction to the operating or systems costs” (p.81). In this study, this definition may be interpreted and expressed as the following mathematical model:
Using the terminology from SMAM, efficiency within schools is considered a ratio of those costs of direct services to students (pupil support + instruction) to all other costs incurred within the system (All five functions at the District Office + administration + facilities and operations + staff support and development at the School Building).

Even though this is a testable operational definition for school efficiency, Cooper and Associates (1994) did not stop here. Instead, they identified the aforementioned formula as the Student Services Ratio (SSR). They asserted this formula “indicates the ratio of per pupil support to actual resources spent on students both inside and outside the classroom” (p. 82). Hence, the formula may now be written as:

$$\text{Efficiency} = \frac{d + e}{A + B + C + D + E + a + b + c}$$

They also created a second measure of school efficiency, the Student Instructional Ratio (SIR), which is a ratio “of per pupil costs in the classroom (Level e) to those devoted to administration and operations at central office and at each school site” (p. 81). They chose not to include staff support and development (Level c) and pupil support (Level d) within their ratio. Since no explanation was given for their absence one can only assume that these costs, which are closely connected to helping students, may not be considered administration and operations costs. Given this definition, they asserted the formula for this measure would investigate the following relationship:

$$\text{Student – Instructional – Ratio} = \frac{e}{A + B + C + D + E + a + b}$$
According to Cooper and Associates (1994) these two formulas provided credible and reliable evidence of efficiency within schools because “Districts will try, one presumes, to deliver the most [italics added] services to students for the least [italics added] ‘overhead’ or systems costs” (p. 81). In other words, these researchers incorporated a specific application of the classic definition (rather than an economic or technical definition) of efficiency. Following their approach, this study took the position that an efficient school may be described as one that is spending the most dollars on instruction for the least amount invested in administration and other supportive functions. Furthermore, this study moved forward embracing both conceptualizations and operational definitions for school efficiency (i.e., using both SSR and SIR as measures for school efficiency).

The section that follows presents a description of how the state of Ohio has adapted and applied the principles and structure of Cooper and Associates’ (1994) SMAM to the state’s education finance program. State officials elected to call this accounting or reporting program the Expenditure Flow Model (EFM).

*Putting SMAM to work: A description of Ohio’s expenditure flow model.* The Ohio Department of Education (2002b) published the manual, *Reporting School District Revenue and Spending Per Pupil*, to assist educators and the general public in developing an understanding of how education finance data in the state is reported. The main focus of the manual is the EFM, which is a tool employed by state officers “to report per-pupil spending for Ohio’s schools … [and is] based on concepts developed by Dr. Bruce
Cooper of Fordham University” (p. 2). More specifically, the EFM, like SMAM, “uses the districts’ end of year financial records to organize expenditure data into meaningful and comparable categories at both the district and building level” (p. 2).

A graphic representation of the EFM is depicted on the following page (Figure 2.4). Categorical headings in the published version of the EFM were slightly adjusted to correspond directly with those used in SMAM. These changes are only cosmetic. A complete description of the EFM, which follows, reveals that it parallels Cooper & Associates’ (1994) SMAM very closely.

The Ohio Department of Education (2002b) decided that all expenditures within school districts should not be categorized at either the district or building level. They stated:

School districts also provide accounting for operations unrelated to student centered education. Since the purpose of the EFM is to track expenses related to students who are part of the district’s EMIS [Education Management Information System] report, it is necessary to exclude expenditures, which do not relate to them. (p. 7)

The manual listed nearly three pages of exclusions from the model. Furthermore, the manual provided only a brief description of each of these items, which included bond retirement, adult education, recreation, rotary, mental health, and others. It appears that each of these expenditures did not relate to the education of students (a basic assumption of the model) but were still considered services offered by the school district. Further investigation into these expenses and the rationale for excluding them (beyond being not related to the education of students) are left for future investigations.
Figure 2.4: State of Ohio Expenditure Flow Model (EFM)

Source: Adaptation of Ohio Department of Education (2002b) EFM, p. 3
The remaining elements of the EFM precisely parallel those within the SMAM except that in the EFM “instruction” is not included as a function at the District Office level. On this change, ODE (2002b) stated: “There should be no instructional costs assigned to the central office. If any instructional costs are coded with the Central Office OPU [operational unit] or the District-wide OPU, they will be prorated back to the buildings” (p. 4).

Each of the four categorical functions under District Office and the five categorical functions under School Building within the EFM are defined in a similar fashion as those categorical functions found within Cooper and Associates (1994) SMAM. For a comparison carefully consider the ODE’s definitions for these functions, which are listed in Table 2.3 on the following page, in relation to Cooper & Associates’ conceptualizations for the functions, which were listed in Table 2.1. To make comparisons between the two models easier, Table 2.3 was formatted identically to Table 2.1.

Since the state of Ohio adopted Cooper and Associates’ framework for reporting school finance data, application of Cooper and Associates’ conceptualization for measuring school efficiency is possible. That is, based on the previous discussion on school efficiency as conceptualized by Cooper and Associates and recognizing the
<table>
<thead>
<tr>
<th><strong>School Building Categories</strong></th>
<th><strong>District Office Categories</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Function a: administration</em></td>
<td><em>Function A: Administration</em></td>
</tr>
<tr>
<td>Costs associated with the Principal’s office. The principal has the responsibility to make hiring recommendations and to evaluate the staff and faculty in the building. He or she must also deal with crisis situations and focus on the general environment of the school.</td>
<td>These are costs which are incurred by the Board of Education, Superintendent’s Office, and other central office administration. These costs are attributed to planning, research, information services, staff services, and data processing.</td>
</tr>
<tr>
<td><em>Function b: facilities and operations</em></td>
<td><em>Function B: Facilities and Operations</em></td>
</tr>
<tr>
<td>These costs deal with both operating and maintaining the physical buildings and utilities equipment (heating, water, central air) within the school.</td>
<td>At the district level these expenditures deal primarily with salaries and operation support from transportation office, plant maintenance, and the food services program.</td>
</tr>
<tr>
<td><em>Function c: staff support and development</em></td>
<td><em>Function C: Staff Support and Development</em></td>
</tr>
<tr>
<td>This function deals with providing funds for the professional training of employees in the school buildings. On-site sessions, college courses, and other development opportunities are all included in this function.</td>
<td>Funds are available to assist in the professional growth of all district office staff. Similar to the building level, district officers receive training from any number of mediums (seminars, courses, on-site training, and so forth).</td>
</tr>
<tr>
<td><em>Function d: pupil support</em></td>
<td><em>Function D: Pupil Support</em></td>
</tr>
<tr>
<td>At the school students are supported in their educational experiences by a wide variety of specialists, namely guidance counselors, media specialists, college advisors, and psychologists.</td>
<td>Costs associated with pupil support services, such as guidance services, health services, psychological services, speech pathology and audiology services, and any social work activities.</td>
</tr>
<tr>
<td><em>Function e: instruction</em></td>
<td><em>Function E: Instruction</em></td>
</tr>
<tr>
<td>All costs associated with the technical core of the educational process or the teaching and learning process are included in this function. Specifically, the cost of paying teachers, teacher aides, and other paraprofessional who work within the classroom. Also, any instructional supplies or equipment (computers, paper, overhead machines, file cabinets) that are used to support the instructional process would be included in this function.</td>
<td>No instructional costs are assigned at the district office level. If any are incurred these costs will be prorated back to the buildings based on guidelines specified by the Ohio Department of Education.</td>
</tr>
</tbody>
</table>

Table 2.3: Definitions for the functions used within EFM.

Source: Adapted from Ohio Department of Education’s (2002b) EFM pp. 3-5.
absence of “instruction” at the District Office level within the EFM, this study employed the following operational definitions for measuring school efficiency:

\[
\text{Student – Instructional – Ratio} = \frac{e}{A + B + C + D + a + b}
\]

\[
\text{Student – Services – Ratio} = \frac{d + e}{A + B + C + D + E + a + b + c}
\]

Examples to illustrate these formulas at work are provided in the forthcoming chapter, which focuses on the methodology of this study.

Summary of School Efficiency

In summary, it has been shown that conceptualizations of school efficiency within the extant literature base have included external and internal economic efficiency as well as technical efficiency. Although these approaches to school efficiency have offered significant insight into the study of efficiency within education, one glaring limitation of these approaches is that they have failed to consider what happens to school funding once it arrives at the front doors of the district office (Cooper & Associates, 1994). How much money is spent on instruction—at the building level? How much funding is allocated to other services that support education—at the building level? Furthermore, to what extent are these funds being used efficiently, that is, the most on instruction and least on administration and other support costs—at the building level? In direct response to these questions and as an alternative approach to past research on efficiency, Cooper and Associates (1994) developed the SMAM. This accounting tool enabled school officials to trace and report school finance funding to the school building level.
Along with the model, these researchers also created measurements for school efficiency. In particular, they developed SSR and the SIR. Since both formulas provided information as to the degree to which education funds were being spent on instruction or student services as compared to administration and other support services, both are employed as efficiency measures.

Finally, this review on efficiency revealed how state officials from Ohio adopted Cooper and Associates’ (1994) School-Site Micro-Financial Allocations Model within their Expenditure Flow Model. The EFM is considered a financial tool used to report state education finance data to educators and the general public. Because the EFM is a slightly modified version of SMAM, the formulas used to measure the efficiency of schools based on SMAM were modified to reflect the organization of EFM. Formulas for these two measures of school efficiency were provided and examples to illustrate these formulas at work are presented in the following chapter.

At this point in the present chapter, literature reviews have been presented on school efficiency along with the collective efficacy of teachers. In the following section, a review of literature on the sole dependent variable within this study is offered. Recall, that the purpose of this study was to create and test a theoretical model of student achievement. The models, which will be depicted and explained shortly, included a key variable from organizational theory (i.e., collective efficacy of teachers) and economic theory (school efficiency-operationalized as SIR and SSR). Because findings and support from the relevant literature bases have been presented on these two independent
variables, this review now considers the last key variable of the theoretical model. Hence, this literature review concludes with a brief yet substantive examination of student achievement.

**Student Achievement**

In the education system, various student outcome variables have been the focus of educational researchers’ interests of study. Academic, social, cultural, and economic outcomes have been included in investigations about the outputs of schooling (U.S. Department of Education, 2000b, pp.18-20). However, the outcome variable that has drawn the most recent attention by researchers, practitioners, and the public at large, has been the academic outcomes or the achievement of students in America’s schools.

**No Child Left Behind**

With the passage of the *No Child Left Behind Act*, the entire nation was made to steer its attention toward the academic successes of its students. The Act, “designed to improve student achievement and change the culture of America’s schools” (U.S. Department of Education, 2002a, p. 9) was revolutionary in its design. It was founded on four broad-based principles: “stronger accountability for results; greater flexibility for states, school districts and schools in the use of federal funds; more choices for parents of children from disadvantaged backgrounds; and an emphasis on teacher methods that have been demonstrated to work” (p. 9). These principles and the policies shaped by them were created for several reasons.

Among these reasons, a key rationale for the federal government’s decision to enact such sweeping changes in American education is linked to the performance gap that exists in student attainment (U.S. Department of Education, 2000a; U.S. Department of
Education, 2002b). This achievement gap has existed and continues to exist not only between U.S. students and their contemporaries in foreign countries, but also between students in the majority (White) and minority (African-American, Hispanic-American) subgroup populations. Even more, this breach in student attainment is evident in students originating from different family economic backgrounds. Hence, desiring to narrow these gaps and address the inequities prevalent within the education system national lawmakers promulgated the new Act. This action sent a clear message to the nation and specifically to those who worked in schools that, as the title of the Act declares, no child shall be left behind.

To accomplish this idealistic goal, the architects of the Act designed it to give increased attention to measuring and reporting student performance. Specifically, the Act was organized to help all students meet high academic standards by requiring that states create annual assessments that measure what children know and can do in reading and math in grades 3 through 8. These tests, based on challenging state standards, will allow parents, educators, administrators, policymakers, and the general public to track the performance of every school in the nation. (U.S. Department of Education, 2002a, p. 9)

Even though these requirements appear revolutionary many states had already adopted accountability and standards-based educational reforms to enhance student achievement. The following section describes how the state of Ohio has approached improving student achievement via a statewide accountability program.
Tracking Student Achievement within Ohio

Although the federal government, through No Child Left Behind, had mandated that state governments reform their education systems, Ohio had already enacted major reform initiatives that addressed the fundamental principles of the federal law. In the late 1990s, the state of Ohio passed legislation that “laid the groundwork for a statewide performance accountability system. It established minimum performance indicators for school districts and use[d] the Local Report Card to hold districts accountable to their communities” (Ohio Department of Education, 2002a). Included in these indicators were measures of student performance. Using a series of proficiency exams administered to students during their 4th, 6th, 9th, and 12th grade years in reading, writing, mathematics, science, and social studies, citizens were made aware of student progress and the effectiveness of their schools and school districts.

Existing for only a short time, this accountability system was replaced by a new system that linked the state testing system to a statewide standards based curriculum (Amended Substitute Senate Bill 1, 2001). More specifically, the intent of the new legislation was to establish a system of education based on “clear, reasonable expectations (standards); aligned instruction and intervention (curriculum); [and] fair measurements (assessments) that provide useful information about a student’s progress toward achievement and need for help” (Ohio Department of Education, 2001, introduction).

Of the many requirements codified within this new law, those of relevance to the present study involved requirements relating to student achievement. The proficiency tests, used since the mid-1990s, would be phased out and replaced with diagnostic and
achievement tests. These latter tests, unlike the proficiency exams, would be tied directly to a standards based curriculum used throughout the state. In particular, the diagnostic exams would aim to provide evidence of student progress and would assist educators in making decisions associated with student advancement, retention, and remediation. The new law did not require that the results of these exams be made public. On the other hand, the achievement exams would be made public and the content of these exams would be linked directly to the standards based curriculum (Ohio Department of Education, 2001). As well, an Ohio Graduation Test would be administered in the 10th grade year and serve as an exit exam for high school students. Although criteria exist to allow students to graduate from high school without passing this test, an examination of these criteria leaves little doubt that students must acquire the knowledge and academic skills expected of them in their coursework or it would be extremely difficult to earn a high school diploma.

Because the state of Ohio’s new testing program as outlined within Amended Substitute Senate Bill 1 was not completely aligned with the mandates outlined within the No Child Left Behind Act, the state will need to make some revisions to their achievement/diagnostic approach to testing students. Until these revisions have been approved by the U. S. Department of Education and the subsequent new system of testing takes full affect, the proficiency test system will remain. This system still offers citizens and educators the data needed to make informed judgments about how well students are performing in schools. Since this present study relies on the results of these exams,
specifically in reading and mathematics in 4th grade, as indicators of student achievement in those schools that participated in this study, the following section offers a general overview of these tests.

**Proficiency tests in Ohio.** To develop the proficiency tests the Ohio Department of Education decided to involve a broad-based group of individuals organized into multiple committees. After receiving recommendations from numerous educational, business, and civic groups from throughout the state of Ohio, state education officials formed five committees with twenty-five members. Each of these committees was representative of the diversity in gender, ethnicity, geography as well as the occupation of citizens within the state. These content committees were created for each of the five content areas (reading, mathematics, writing, science, and social studies) involved in the proficiency testing system. Importantly, teachers were allotted half of the seats on each of the five content committees.

Following committee formation each group was given the charge “to discuss and eventually decide what the learning outcomes should be for that grade and that subject area. The source documents in writing, reading, mathematics, citizenship, and science were the State Board of Education adopted model courses of study” (Ohio Department of Education, 1996, p. 2). These learning outcomes were expressed as specific performance objectives at each grade level. For example, the 4th grade proficiency exams were based on 9 learning objectives identified for writing, 20 for reading, 25 for mathematics, 18 for citizenship, and 19 for science (Ohio Department of Education, 1996).

After the learning outcomes were established the Ohio Department of Education accepted bids from private companies to create test items that aligned with the learning
outcomes and that would be suitable for use on subsequent test administrations. Each of
the possible tests items developed by the contracted companies had to meet specific
criteria including a bias review/sensitivity screening, content review examination, field-
testing experimentation, and reevaluation of test items along with additional field-testing.
If a test item survived all these steps successfully it was considered eligible for inclusion
in the general test bank for that particular content area.

Preparation for, administering, and scoring the exams. To prepare for the tests
students strove to master the various learning objectives over the course of their daily
learning experiences. Recall that the learning objectives used as the basis for test
formation were developed from the model curriculum guidelines from each of the content
areas. Since schools should be crafting their curriculum based on these model guidelines,
instruction should reflect the principles and objectives outlined within the state’s model
curriculum. Hence, daily classroom learning experiences would, ideally, be preparing
students for the proficiency exams. In addition to this approach, students prepared for
these exams by taking practice exams. This process exposed students to the testing
environment as well as to the rigor and type of questions offered in each content area.

After extensive preparation the exams were administered during a weeklong
period at the beginning of March. Each content area test consists of multiple choice, short
response, and extended response type questions. A total of 2.5 hours is given for students
to complete all of the questions on each of the exams.

Exams are scored by a private company, which secured this privilege through a
competitive bidding process. Multiple choice questions are scored based on a correct or
incorrect answer format whereas the short and extended response questions are scored
using specific procedures. To ensure consistency in scores a committee from the Ohio Department of Education worked with the scorers from the private company and monitored the results the company reported. If problems were identified in the scoring of tests, these tests were submitted once again to the scoring process. Once the scoring process was completed individualized reports were created and sent to schools for distribution to the students’ parents or guardians. Aggregated score results (percentage of students passing) were also presented on school district’s Local Report cards.

As evidenced, from the initial development to preparation, administration and scoring, the Ohio proficiency exams are exposed to processes that ensure the tests’ content validity (ODE committee process develops learning objectives, private company creates test questions using standardized procedures) and scoring reliability (ODE committee monitors and provides quality control measures on work entrusted to private company). Because these exams demonstrate both content validity and scoring reliability it is reasonable to suggest that these exams represent adequate measures for student achievement of elementary grade students in the state of Ohio.

Operationalizing Student Achievement

The purpose of the proficiency exams is to measure the competency and literacy of students within the state of Ohio (Ohio Department of Education, 1996). Since student achievement is a broad concept that may represent the outcome of student performances in a wide range of academic experiences, it is important to note that the proficiency exams in reading and mathematics are only two of numerous indicators that may be used as a proxy for student achievement in elementary schools in Ohio. However, historically, tests of reading and mathematics have been the traditional tool used by researchers for
studying student achievement results in the K-12 schooling experience (e.g., see U. S.
Department of Education, 1994, 2000a). Therefore, consistent with past research
approaches, this study utilized student test results, specifically the mean-scaled scores of
student test performances on the Ohio 4th proficiency exams in reading and mathematics,
as the operational definition for student achievement.

The benefits for using these tests as a measure of student achievement for
elementary grade students in Ohio include: 1) Ohio 4th grade proficiency exams are
administered to all students in the state of Ohio and, therefore provide a common metric
for all students’ abilities in mathematics and reading. 2) The exams assess students’
comprehensive knowledge in the specified content area. Thus, students’ knowledge
gained over their educational career in various classroom settings is being tested versus
students’ knowledge gained within a single year’s educational experience in one
particular classroom. 3) As explained above, the proficiency exams were developed and
scored using rigorous procedures thereby ensuring the tests’ content validity and scoring
reliability. 4) The results are published on the Ohio Department of Education website as
well as on Local School Report cards as the percentage of students passing each content
area exam. The mean-scaled scores for each school are also made available upon request
from the Ohio Department of Education. Hence, all interested researchers have access to
this information making replication of this study possible.

**Summary of Student Achievement**

Student achievement has attracted significant national attention with the passage
of the *No Child Left Behind Act of 2001*. In Ohio, student achievement is also associated
with the content of recently passed legislation. Although the exams or proficiency tests used within this study will be phased-out as a result of this new legislation, these tests still serve as a valid and reliable measure of student achievement.

Having reviewed the relevant literature for the two independent variables, collective efficacy of teachers and school efficiency, and the sole dependent variable, student achievement, this review now considers the reasoning behind the predicted relationships, as specified within chapter 1, that are purported to exist between these variables.

Rationale, Hypotheses, and Theoretical Model of Student Achievement

The following paragraphs rely on the theoretical and empirical findings previously presented in this chapter to develop rationales for each of the hypotheses presented in chapter 1. Path models, located after the presentation of the hypotheses, depict the relationships theorized to exist between the variables under consideration. Furthermore, the path models will be tested by examining the significance of the fit between the data-driven models and the theoretical models.

Rationales for Hypotheses

Studies (Bandura, 1993; Barr, 2002; Goddard, 1998; Goddard et al., 2000; Hoy, Smith, et al., 2002; Hoy, Sweetland, et al., 2002) that have offered empirical evidence of a positive relationship between collective efficacy of teachers and student achievement have relied on the work of Coleman (1985, 1987) to explain this relationship. Coleman theorized that strong interpersonal relationships among groups of people resulted in the development of social norms. These norms, in turn, affected the beliefs, attitudes, and behaviors of the entire group.
Applying this theory to the school setting, teachers work together and develop strong interpersonal relationships within the school. Over time beliefs emerge on what is considered appropriate or inappropriate approaches to teaching or working with students. Hence, normative behaviors may develop in such areas as decorating bulletin boards, presenting lessons on various topics, or helping students achieve. According to Coleman (1987), if teachers embrace these normative behaviors they are rewarded. If, on the other hand, teachers chose to ignore these social norms within the school they are sanctioned.

As to how this social theory connects specifically with collective efficacy, Goddard et al. (2000) explained:

[Collective efficacy of teachers] is a way of conceptualizing the normative environment of a school and its influence on both personal and organizational behavior. That is, teachers’ beliefs about their faculty’s capability to educate students constitute a norm that influences the actions and achievement of schools. (p. 502)

Recall in an earlier discussion in this chapter that teacher efficacy beliefs were found to influence teacher behaviors, which, in turn, influenced student achievement within the classroom (Ross, 1994, 1998). This same reasoning may be applied to the collective efficacy of teachers as it relates to its power to influence student achievement at the school level. That is, as teachers develop beliefs that certain actions lead to increased levels of student achievement throughout the school, these actions develop into group or school-wide normative behaviors. These group normative behaviors along with their concomitant rewards and sanctions, in turn, will penetrate each classroom influencing both teacher and student behavior. The ideal result: increased levels of student attainment throughout the school.
Consistent then with Coleman’s (1987) theoretical position on social norms and with past research findings that explored the relationship between collective efficacy and student achievement (Bandura, 1993; Barr, 2002; Goddard, 1998; Goddard et al., 2000; Hoy, Smith, et al., 2002; Hoy, Sweetland, et al., 2002), the following hypothesis is advanced:

\( H1: \) Collective efficacy of teachers has a positive relationship with student achievement.

Until the present study, no research had investigated the relationship between school efficiency and collective efficacy of teachers. For that matter, any study that linked school efficiency with any teacher perception based variable (e.g. teacher efficacy, trust, academic press) was unable to be located. Despite this lack of empirical evidence, theoretical support to predict a relationship between these two constructs is available.

When Goddard et al. (2000) developed their theoretical model for collective efficacy of teachers (Figure 2.3), they posited that teachers’ perceptions of collective efficacy were formed after processing and interpreting four sources of information: mastery experience, vicarious experience, social persuasion, and affective states. In particular, this cognitive processing included the weighing of two specific elements: analysis of the teaching task and assessment of teaching competence. Goddard et al. further theorized that analysis of the teaching task occurred at the individual and school level. In relation to this point, they stated:

At the school level, the analysis produces inferences about the challenges of teaching in that school, that is, what it would take for teachers in the school to be successful. Factors that characterize the task include the abilities and motivation of students, the availability of instructional materials [italics added], the presence of community resources and constraints, and appropriateness of the school’s
physical facilities. To summarize, teachers analyze what constitutes successful
teaching in their school, what barriers or limitations must be overcome, and what
resources are available to achieve success [italics added]. (p. 485)

This theoretical perspective suggests that teachers’ perceptions about their ability
to be effective in the classroom are influenced by the availability of resources within their
school. Without question, instructional resource availability, whether it is the amount of
textbooks, or money for teachers’ salaries is tied directly to fiscal resource
availability within the school and district. Since SIR and SSR serve as measures of the
extent of resource availability for instruction or student services in a particular school, it
is reasonable to theorize that both of these fiscal efficiency ratios may serve to indicate
the effort made by schools and districts to support the instructional process. Although
teachers’ perceptions of collective efficacy are not directly linked with these two
efficiency indicators per se, these perceptions, according to collective efficacy theory
(Bandura, 1997; Goddard et al., 2000), develop from four sources of information
(mastery experiences, vicarious experiences, social persuasion, and affective states). It is
further theorized that these four sources of collective efficacy are linked directly to the
two efficiency measures (SIR and SSR).

To illustrate, if teachers perceive that successes in the classroom (mastery
experiences) may be partially attributed to the availability of textbooks, supplies,
equipment, and state-of-the-art technology provided by the school or district then
teachers may develop beliefs that the school or district is using available funds to help
them be successful. In addition, when resources are made available for teachers to view
model school programs (vicarious experiences), listen to stories about effective schools
(vicarious experiences), or hear motivating messages while attending conferences
(verbal/social persuasion), these experiences—made available through school and district funding—may serve as positive sources of information from which teachers form their efficacy beliefs. As well, teachers that have these experiences may tend to feel supported, empowered, and encouraged (affective states) in their work. As a result, these emotional states may also serve as positive sources for the development of collective efficacy beliefs.

Similar reasoning may be applied to each of the four sources of collective efficacy in the context of minimal resource availability. For instance, if teachers perceive that student failures in the classroom may be connected to low salaries (inability to attract talented teachers) or the lack of textbooks, supplies, equipment, and state-of-the-art technology then teachers may develop beliefs that the school or district is misappropriating funds and preventing or limiting their efforts to be successful with students. Additionally, teachers’ inability to view models of effective schools or to attend professional development workshops may tend to stymie teachers’ growth which, in turn, may have a negative affect on the quality of their performance in the classroom. As well, these situations, taken together, may breed feelings of discouragement, apathy, and distrust which, according to theory (Bandura, 1997; Goddard et al., 2000), would tend to undermine the development of teachers’ sense of collective efficacy in the school.

In both of these scenarios, which demonstrated either adequate or limited funding, the four sources of collective efficacy were tied directly to the fiscal resources made available by the school or district to the instructional process. Based on Goddard et al.’s (2000) model of collective efficacy of teachers, these four sources are processed within the two domains mentioned previously: analysis of the teaching task and assessment of
teaching competence. These two gate-keeping mechanisms of information are not necessarily separate cognitive processes. Rather, they work in relation to each other.

So, how does assessment of teaching competence, absent from this rationale to this point, factor into this argument? It is posited that even if teachers’ felt that their staff was highly competent they would still need adequate instructional resources to meet the needs of their students. From this perspective, analysis of the teaching task, especially when considering resource availability, weighs heavier than assessment of teaching competence in the cognitive processing that leads to the development of perceptions of teachers’ collective efficacy beliefs.

In sum, it is theorized that the extent to which resources are made available for instruction or student services in a school (SIR and SSR) influences the four information sources of collective efficacy (mastery experiences, vicarious experiences, social persuasion, and affective states). These four sources, in turn, provide information which is processed through two cognitive activities: analysis of the teaching task and assessment of teaching competence. The interplay of these internal processes results in the formation of teachers’ collective efficacy beliefs. Based on this reasoning and the rationale provided in the preceding paragraphs, the following predictions are made:

H2: SIR and SSR have a positive relationship with collective efficacy of teachers.

Wisely investing funds in the instructional process, whether it is through textbooks, technology (computers, notepads, software), instructional support materials, general supplies, or teachers’ salaries, offers more assistance to teachers in their efforts to improve student performance. Having up-to-date textbooks enables teachers and students to explore current and relevant issues. Using recent advancements in technology affords
teachers the opportunity to extend the learning environment beyond the four walls of the classroom (e.g., World Wide Web) and invites both teachers and students to organize and present information through various mediums (e.g., spreadsheet, word processing, and presentation software). As well, having numerous instructional materials available (e.g., computer software, graphic organizers, manipulatives, visual aids, etc.) expands teachers’ abilities to strengthen students’ understanding of course concepts. Finally, using basic supplies such as, pens, pencils, paper, scissors, and glue ensures that everyday learning activities are feasible.

In addition to these material resources, schools and districts must also seek to employ the best and brightest teachers. Quality may be costly, however, because teacher effectiveness has been found to be a significant predictor of student achievement (Marzano, 2000; Wright, Horn, & Sanders, 1997) it is worth the investment.

The instances described above may only exist when schools make a concerted effort to allocate funds to the instructional process and student services. It seems reasonable to assert that when schools allocate more money for instruction and student services via materials, equipment, or personnel the intended result of these monetary investments is the increase of student performance. However, even though these intentions may seem reasonable the literature has not necessarily supported this position.

Hanushek’s (1997) meta-analysis of 377 studies that examined the relationship between school resources and student achievement found:

There is no strong or consistent relationship between school resources and student performance. In other words, these is little reason to be confident that simply adding more resources to schools as currently constituted will yield performance gains among students. (p. 148)
Even with these strong conclusions Hanushek wanted to make clear that he was not suggesting “that resources never matter, nor does it suggest that resources could not matter. It only indicates that the current organization and incentives of schools do little to ensure that any added resources will be used effectively” (p. 156).

Contrary to this conclusion, Krueger (2000) reanalyzed Hanushek’s data and found “unless one weights the studies of school resources in peculiar ways, the average study tends to find that more resources are associated with greater student achievement” (p. 18). Other critiques on Hanushek’s data analyses have come to similar conclusions, that is, school resources do impact student achievement (Hedges, Laine, & Greenwald, 1994a, 1994b). Taking all of these studies into consideration, it appears that the empirical literature offers no definitive conclusion as to whether school resources influence student attainment.

Because this study employs two measures of school resource allocation never tested before in a student achievement model, the influence these measures may have on student achievement are unknown. When Cooper and Associates (1994) developed their measures for school efficiency (SIR and SSR) they did not determine if these measures were related to academic achievement. Instead, these researchers included the variable instruction (see Table 2.1, School Building Categories, Function e: instruction) from SMAM in a regression model to test its affect on student achievement (as measured by SAT scores). They found, unlike Hanushek’s (1997) analysis, that dollars allocated to instruction at the school level did have a positive affect on SAT scores in the large school district that participated in the study. Taking these particular results into consideration the
present study wished to continue the investigation commenced by Cooper and
Associate’s and determine if their measures for school efficiency had a relationship with
school achievement.

Because the formulas for SIR and SSR are linked directly to the amount of
resources allocated to schools, especially those devoted to teachers’ salaries, the
established literature base does not offer strong support that a relationship may exist
between SIR, SSR, and student achievement. However, since no specific empirical
evidence exists to refute the precise nature of this relationship, that is, no study has
examined the relationship between Cooper and Associates’ (1994) measures for school
efficiency and the academic performance of elementary aged students in the State of
Ohio, the potential connection between these constructs remains a mystery.

Furthermore, once this relationship is explored it will provide additional evidence
as to the utility of Cooper and Associates’ SMAM. In other words, since most school
resource studies have been unable to trace expenditures directly into the school, this study
will help to determine whether this added layer of specificity shines new light on the
relationship between school resource allocation and student achievement or if it only
serves to confirm Hanushek’s (1997) assertions.

Notwithstanding the lack of definitive support from empirical findings, this study
asserts that school districts with higher SIR and SSR will tend to have students
performing at higher achievement levels. More resource availability means higher teacher
salaries, up-to-date textbooks and technology, and other instructional supports in the
classroom. With these resources teachers may lead their students to higher levels of
performance. Conversely, school districts with lower levels of SIR and SSR will tend to
have students performing at lower achievement levels. A lack of resources for teachers (lower teacher salaries, out-dated textbooks and technology, and scarce instructional materials) translates into poor learning environments for students. These settings ultimately take their toll as evidenced by students’ poor performance on academic indicators. Thus, based on this theoretical rationale, this study predicts the following relationships:

\[ H3: \text{SIR and SSR have a positive relationship with student achievement.} \]

Socioeconomic status is a variable conceptualized in terms of the income, education, and/or occupational attainments of students’ parents (Coleman et al, 1966; White, 1982). It is consistent with this measure to expect students categorized as having high levels of socioeconomic status to originate from families having an abundance of resources. On the other hand, students categorized by lower levels of socioeconomic status, by definition, originate from families lacking economic and education resources. Based on these definitions of socioeconomic status, districts and schools with high levels of socioeconomic status are likely to be located within communities financially able to be supportive of their schools. The opposite is true for schools with low levels of socioeconomic status, that is, these schools are likely to be located within communities that lack the fiscal capacity to be supportive of their schools.

Based on this reasoning, it follows that schools with high levels of socioeconomic status have more funding available which may be channeled into the instructional process. In these schools, teachers enjoy higher salaries and students have access to the latest technology and other instructional materials that may be purchased to enhance the learning environment. In contrast, schools with low levels of socioeconomic status may
not be able to attract teachers because of their lower salaries and the limited resources that are available to support instruction. Although no empirical evidence exists that has investigated the relationship between socioeconomic status, SIR, and SSR, the theoretical rationale built upon the operational definition of socioeconomic status and the instruction and student service-based formulas of SIR and SSR leads to the following prediction about this relationship:

\[ H4: \text{Socioeconomic status has a positive relationship with SIR and SSR.} \]

When process variables are included in an input-output or systems model of education, these process variables enable a more realistic view of the complexity of the education system. Hence, in this investigation collective efficacy, a key process variable, is helping to provide a theoretical explanation as to the impact resources have on student achievement. That explanation is centered on the premise that teachers form perceptions of the extent to which schools and districts provide them with the resources they need to accomplish their work. Although fiscal resources appear in state and district audit reports as dollars, these resources manifest themselves in schools as salaries, textbooks, supplies, and facilities. Therefore, fiscal resources by themselves do not directly influence student achievement; rather, it is through the actions of teachers and other school personnel on these resources that the influence of student performance is made possible.

As was demonstrated in the rationale for the second research hypothesis (H2), it is consistent with social cognitive theory to propose that indicators of resource expenditures for instruction and student services (SIR and SSR) are likely to influence collective teachers’ efficacy beliefs. These beliefs will, in turn, influence group—that is, both teachers and students—behaviors, which ultimately will influence the student
achievement in the entire school. In other words, collective efficacy of teachers may enable an indirect effect between school efficiency and student achievement.

Additional support for this position, which places collective efficacy of teachers as an enabler of an indirect effect, comes from the empirical literature base, which has found collective efficacy of teachers to serve as a pathway for other input variables effects on student achievement (Bandura, 1993; Goddard et al., 2000; Hoy, Smith, et al., 2002; Hoy, Sweetland, et al., 2002). Relying on the rationale supplied above and the reasoning that recognizes collective efficacy as a powerful process variable, the following relationships are predicted:

\[ H5: \text{SIR and SSR have an indirect relationship with student achievement through collective efficacy of teachers.} \]

Although lacking specific attention in the review of literature within this chapter an important variable in any educational research study which considers variables that influence student achievement is socioeconomic status. This variable, since the Coleman Report (1966), has been found by numerous researchers to be a strong predictor of academic achievement (White, 1982). The rationale behind its influence is found within its operational definition which usually includes some measure of the amount of income, education, and/or occupation attained by students’ parents (White, 1982).

Researchers have found that families with relatively high levels of socioeconomic status—that is, higher levels of income, education, and/or occupation status—tend to have more resources available for their children. These may include both tangible and intangible resources such as learning materials (computers, calculators, books, videos), facilities (housing, libraries, entertainment parks, and state-of-the art schools), and
experiences (travel, theater, symphony). All of these resources combine to provide diverse and rich contexts where students may learn. In contrast to an abundance of resources, families with relatively low levels of socioeconomic status tend to have fewer resources available for their children. Students originating from such backgrounds may have minimal learning experiences prior to entering and while going to school. It comes as no surprise that research studies have shown students originating from homes with high levels of socioeconomic status enjoy higher levels of academic achievement than their colleagues originating from homes with low levels of socioeconomic status (White, 1982).

Past studies that have examined the relationship between collective efficacy of teachers, socioeconomic status, and student achievement have found socioeconomic status to be positively related to both student achievement and collective efficacy of teachers (Bandura, 1993; Goddard et al., 2000; Hoy, Smith, et al., 2002; Hoy, Sweetland, et al., 2002). To explain these relationships, the rationale used to establish the connection between SIR, SSR, and collective efficacy of teachers may be applied to the argument that explains the relationship between socioeconomic status and collective efficacy of teachers. That is, teachers who perceive their students come to school prepared to learn and have available all the resources they need to enact effective instruction (i.e., high student socioeconomic status) will tend to have higher levels of collective efficacy. Likewise, teachers who perceive their students are lagging behind in a resource-deprived learning environment that lacks the necessary tools to assist their students (i.e., low student socioeconomic status) will tend to have lower levels of group efficacy.
Since teachers’ beliefs have been found to influence behaviors, which, in turn, influence student achievement (Ross, 1994, 1998), evidence of a direct affect of socioeconomic status on student achievement should be combined with an indirect affect of socioeconomic status on student achievement through teachers’ sense of collective efficacy. Said another way, past research has shown socioeconomic status affects both collective efficacy and student achievement. Similar then to past studies (Bandura, 1993; Hoy, Smith, et al., 2002; Hoy, Sweetland, et al., 2002) this pivotal role of collective efficacy is expected to appear in the present investigation. Based on this reasoning outlined above, supported both empirically and theoretically, the last hypothesis of this study is advanced:

\[ H6: \text{Socioeconomic status has a positive direct relationship with student achievement and a positive indirect relationship with student achievement through collective efficacy of teachers.} \]

**Path Models**

The explanatory models presented below are a depiction of how the variables within this study are expected to covary in the empirical world. Placing each of the concepts within a square represents that each of the concepts are measurable (that is, any numerical values associated with the concepts have been obtained through the concepts’ operational definitions). The use of the solid arrows that connect one concept to another represents the predicted affect one concept may have on another (Cappell, 2003).
Figure 2.5: Theoretical Models of Student Achievement.

Consistent with the explanations associated with each of the hypotheses above, the model demonstrates that teachers’ perceptions of collective efficacy and the socioeconomic status of students have direct affects on student achievement. In addition, socioeconomic status is predicted to directly influence collective efficacy of teachers and
the two fiscal efficiency measures, SIR and SSR. Finally, the model does not depict a
direct linkage between SIR, SSR, and student achievement. Instead, these efficiency
ratios are predicted to affect student achievement through the collective efficacy of
teachers. Hence, collective efficacy is predicted to be the key variable through which SIR
and SSR influence student achievement.

Summary

A review of the literature on collective efficacy of teachers, school efficiency, and
student achievement comprised the primary focus of this chapter. Each of these reviews
provided relevant information pertaining to the concepts’ history and growth or, in the
case of student achievement, its contextual relevance to the present study. Following
these reviews, rationales to support each of the hypotheses advanced in chapter one were
presented. The theoretical and empirical evidence surrounding the relationships between
the variables under investigation formed the basis for the rationales. The chapter
concluded with the presentation of two explanatory or path models, which depicted the
theoretical relationships predicted to exist between the variables. The following chapter
examines the methodology used to test the hypotheses and the path models advanced in
this study.
CHAPTER 3

METHODOLOGY

This chapter provides an explanation of the methodological procedures employed to test the hypotheses and explanatory models presented in the last chapter. The following sections incorporate descriptions about the sample, data collection, variables, and research instrumentation. An explanation of the statistical methods used to analyze the data for this study is offered at the end of the chapter.

Sample

The sample for this study included 146 elementary schools located within the state of Ohio. Even though random sampling procedures were not utilized to generate a potential list of schools for inclusion, care was taken to ensure the final sample set was representative of the economic and geographic characteristics of the elementary schools in the state. Therefore, school characteristics such as levels of socioeconomic status, location of school (rural, urban, or suburban), and rural-urban population density were obtained for each school that was willing to participate. As the sample set formed a concerted effort was employed to maintain a balance among these characteristics so that
the final set was indicative of the same categorical groupings of all elementary schools within the state. Information available at the Ohio Department of Education’s website made this possible.

In terms of individual school characteristics, this study examined elementary schools organized under some variation of the K-6 grade configuration. In addition to passing this criterion, schools must have employed at least 21 certified educators. Based on these standards, 1,095 schools out of a possible 2,689 qualified for inclusion in this study. Therefore, the sample of 146 elementary schools represented 5 percent of all elementary schools within the state and 13 percent of the schools that qualified for the study.

Data Collection

Data relating to collective efficacy of teachers were collected from educators and administrators during a scheduled faculty meeting. These meetings generally took place before or after the school day commenced. After securing an appointment with the school, a trained researcher administered the surveys to those educators qualified to participate in the study. Before distributing the survey the researcher read a statement which described the purpose of the study and requested that respondents share their frank opinions. In addition, the researcher informed participants that they need not respond to any question they felt uncomfortable with. Finally, to secure anonymity and confidentially, the researcher reminded participants not to include their name on the survey.
When it came time to administer the surveys every effort was made to distribute them on a random basis. Therefore, to the greatest extent possible, educators sitting next to one another did not have the same instrument. The data collection process at each school took approximately 20 minutes.

Data used to calculate SIR and SSR as well as the data which indicated school levels of socioeconomic status and school student achievement were received from the Ohio Department of Education. How this data was used to operationalize each of these variables will be explained shortly.

Variables

As can be deduced from the prior section, a total of five variables were included within this empirical investigation. Socioeconomic status (SES), Collective Efficacy of Teachers (CET), Student Instructional Ratio (SIR), and Student Services Ratio (SSR) represent the independent variables, whereas Student Achievement (SA) represents the lone dependent variable. The testing of the relationships predicted to exist between these variables and the path models that depicted these relationships was made possible through the development of operational measures for each. A thorough discussion of these operational measures is included in the following section.

Operational Definitions and Research Instrumentation

An operational definition identifies the precise procedures employed to measure the variable (Kerlinger, 1986). The following sections present a thorough treatment of the operational definitions for each of the variables in this investigation in the following order: SES, Collective Efficacy of Teachers, Student Instructional Ratio, Student Services Ratio, and Student Achievement.
Measures for SES have generally been a function of three specific factors: family income level, parents’ education level, and parents’ occupation (White, 1982). Within this study SES is operationalized as the proportion of students within a school that do not receive free or reduced priced lunch. Thus, schools with high percentages of students not benefiting from the free and reduced priced lunch program would be considered high SES schools. The opposite is true for low SES schools, that is, these schools serve higher percentages of students accepted into the federal lunch program.

Operationalizing SES in this manner provides a credible measure for this variable for the following reasons: 1) Students must qualify for the federally supported free or reduced priced lunch program, which is based on family income level. Therefore, assuming all students applied to this program who were qualified, this measure should provide an accurate measure of the family income levels for those schools which participated in the study. 2) This measure is available for all schools within the study. 3) The measure is obtained directly from the Ohio Department of Education. 4) Even though information about the parents’ education or occupation is not directly linked to this measure, SES as defined in this study still provides an adequate estimation of students’ family background characteristics.

Collective Efficacy of Teachers

To measure the collective efficacy of teachers, a 12-item scale created by Goddard (2002a) was employed (Table 3.1). The scale was constructed to reflect, in equal proportions, the two sub-dimensions of the concept: analysis of the teaching task (TA) and assessment of teaching competence (GC) (see Goddard et al.’s (2000)
theoretical model in Figure 2.3). The 12 items on the scale may be categorized in the following manner: 6 items (3 positively and 3 negatively worded) relate to analysis of the teaching task and 6 items (3 positively and 3 negatively worded) relate to assessment of teaching competence. These items accompanied with their respective classification are included in Table 3.1.

After submitting these items to a principal axis factor analysis, Goddard (2002a) extracted a one-factor solution (7.69 Eigenvalue and 64.10 per cent of the variance explained with single factor). These results gave credence to his theory that indicated collective efficacy resulted (rather than from two separate dimensions) from the simultaneous cognitive processing of teachers’ perceptions of their assessment of the teaching task weighed with and against their perceptions of group competence (Goddard et al., 2000).

To arrive at a value that indicates the strength or weakness for the collective efficacy of teachers at each school, teachers responded to each item under a Likert-type scale ranging from 1 (strongly disagree) to 6 (strongly agree). After calculating a mean score for each item in the school, these 12 mean item scores were averaged producing an overall teachers’ sense of collective efficacy score for the entire school. School mean scores closer to 1 would represent faculties with lower levels of collective efficacy while school mean scores closer to 6 would represent staffs with higher levels of collective efficacy.
### Survey Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>These students come to school ready to learn.</td>
<td>TA+</td>
</tr>
<tr>
<td>Home life provides so many advantages that students here are bound to learn.</td>
<td>TA+</td>
</tr>
<tr>
<td>The opportunities in this community help ensure that these students will learn.</td>
<td>TA+</td>
</tr>
<tr>
<td>Drug and alcohol abuse in the community make learning difficult for students</td>
<td>TA-</td>
</tr>
<tr>
<td>Students here just aren't motivated to learn.</td>
<td>TA-</td>
</tr>
<tr>
<td>Learning is more difficult at this school because students are worried about their safety.</td>
<td>TA-</td>
</tr>
<tr>
<td>Teachers in the school are able to get through to the most difficult students.</td>
<td>GC+</td>
</tr>
<tr>
<td>Teachers in this school believe every child can learn.</td>
<td>GC+</td>
</tr>
<tr>
<td>Teachers here are confident they will be able to motivate their students.</td>
<td>GC+</td>
</tr>
<tr>
<td>If a child doesn't want to learn, teachers here give up.</td>
<td>GC-</td>
</tr>
<tr>
<td>Teachers here don't have the skills needed to produce meaningful student learning.</td>
<td>GC-</td>
</tr>
<tr>
<td>Teachers in this school do not have the skills to deal with student disciplinary problems.</td>
<td>GC-</td>
</tr>
</tbody>
</table>

Table 3.1: 12-Item Collective Teacher Efficacy Scale. Source: Adapted from Goddard, 2002a, p. 107

In terms of the reliability of this instrument, Goddard (2002a) reported that the CTE scale demonstrated high internal consistency (alpha = .94). Criterion-related validity was assessed by correlating the scores from the 12-item instrument with those from a 21-item instrument used in prior research on the construct (Goddard, 2001; Goddard et al., 2000). The results of this analysis yielded a high correlation (r = .983) suggesting the shortened form was measuring the same construct as the longer form. In fact, the 12-item
instrument is a true subset of the 21-item instrument. To assess predictive validity, Goddard (2002a) entered the scores from his shortened form into a multi-level model of between-school variations in student mathematics achievement. The results of this analysis demonstrated, as expected, that the scores from the 12-item scale were a significant predictor of between-school variations in student mathematics attainment (Goddard, 2002a). Based on these acceptable psychometric properties it is proposed that Goddard’s (2002a) 12-item CTE scale produces a valid and reliable measure for the collective efficacy of teachers construct.

SIR

Recall from chapter 2 that operational definitions for SIR and SSR were provided. Specifically, SIR represented the ratio of dollars allocated to instruction within a particular school to the dollars allocated to administrative and support costs within the school along with costs for funding various functions at the district office. The formula, conceived and developed by Cooper and Associates (1994) was modified to fit Ohio’s EFM—an adaptation of Cooper and Associates’ SMAM. This formula was given as follows:

\[
SIR = \frac{e}{A + B + C + D + a + b}
\]

As promised earlier, what follows is an example of this formula at work. Table 3.2 provides hypothetical school and district office finance data. This information will be used not only to calculate the SIR for the two schools listed, but also employed in the following section which directs its attention to calculating measures for SSR.
### Table 3.2: Hypothetical Expenditures for School Districts A and B in the State of Ohio.

To calculate SIR for the A and B elementary schools, simply substitute the values for each of the school or district office functions into its appropriate place in the SIR formula. The formulas would have the following appearance after these initial substitutions:

**A Elementary School:**

\[
SIR_A = \frac{5000}{450 + 900 + 5 + 40 + 500 + 60}
\]

**B Elementary School:**

\[
SIR_B = \frac{6000}{650 + 1000 + 10 + 50 + 700 + 40}
\]
Further simplification of each formula yields the following results: A Elementary School has a SIR = 2.56 whereas B Elementary School has a SIR = 2.45. Accordingly, A Elementary School spends $2.56 for the instructional process (that is, costs associated with teachers, teacher aides, or paraprofessionals, as well as materials, computers, books and other consumable materials that are used with students in the classroom setting) for every $1 it spends in administrative and other support costs both at the school and district levels. On the other hand, B elementary school spends $2.44 for instruction for every $1 it spends in functions that support the instructional process.

So, even though B elementary school spends $1000 more on the instructional process than A elementary school ($6000 as compared to $5000), B elementary school has a lower SIR than A elementary school, and, according to Cooper and Associates’ (1994) definition of school fiscal efficiency (most money allocated to instruction for the least allocated to other support costs), is less efficient than A elementary school. Since this is for illustration purposes only, further discussion on using this formula will be saved after the data for the schools which participated in this study have been analyzed.

Based on this approach for operationalizing efficiency within schools, similar efficiency indices will be calculated for all schools in the investigation. In addition to this school efficiency index, a second index will also be calculated that includes both money for instruction and other student services. An example of how SSR is calculated is provided in the following section.

SSR

Cooper and Associates (1994) devised a formula for measuring efficiency at the school level that examined resources allocated to students both inside and outside of the
classroom. As mentioned earlier, the precise meaning of SSR was offered in chapter 2. SSR was defined as the ratio of the combined costs of instruction and pupil support to expenditures devoted to administration, operations, and other support services at the district office and at each school site. This semantic definition was translated into the following operational definition and adapted to the finance model used in Ohio:

\[
\text{Student} - \text{Services} - \text{Ratio} = \frac{d + e}{A + B + C + D + E + a + b + c}
\]

To illustrate this formula at work, the hypothetical data set presented in Table 3.2 is used again. Just as values were calculated for a school efficiency index by using SIR, a similar approach is employed for calculating a school efficiency index by using SSR. Substitutions for each value in the SSR formula were made for both schools in the hypothetical district. Following these substitutions the formulas are simplified and expressed as a decimal. The necessary substitutions and values of SSR for the hypothetical schools are presented below.

A District:

\[
SSR = \frac{5000 + 2000}{450 + 900 + 5 + 40 + 500 + 60 + 120} = \frac{7000}{2075} = 3.37
\]

B District:

\[
SSR = \frac{6000 + 1800}{650 + 1000 + 10 + 50 + 700 + 40 + 150} = \frac{7800}{2600} = 3.00
\]
Consistent with the results from calculating SIR for these two school districts, even though B District allocated $800 more for instruction and pupil services than A District, B District’s SSR is lower. According to Cooper and Associates (1994), this means A District is more fiscally efficient than B District—that is, A District allocates more fiscal resources to instruction and pupil support costs compared to administrative and other support costs at the building and district levels than B District. More specifically, A District expends $3.37 on instructional and pupil support costs for every $1 it allocates to all other building and district office expenses. Whereas B District spends $3.00 on instructional and pupil support costs for every $1 it appropriates to all other school and district expenses.

Having provided operational definitions for all the independent variables associated with this empirical investigation, this presentation now moves to consider the operational definition of the sole dependent variable: student achievement.

Student Achievement

Students’ test scores, which were an indication of students’ performance on the Ohio 4th grade proficiency exams in reading and mathematics, served as the measure for student achievement in this study. Reliability scores, obtained from the Ohio Department of Education, for the 2002 Math and 2002 Reading proficiency exams were 0.86 and 0.84 (Cronbach’s alpha), respectively.

Recall from the information shared in chapter 2 on this construct that the exams were created to evaluate students’ literacy and competency. Furthermore, procedures outlined in that chapter, which addressed the development, administration, and scoring of the exams, supported their reliability and content validity.
In terms of arriving at a score, students earn points on these exams based on their performance with each question type. Multiple choice questions are worth one point each, whereas short answer and extended response questions vary in their point allotment. Although no partial credit is available on the multiple choice questions, students may receive partial credit on the short answer and extended response questions. On the mathematics exam students face 30 multiple choice, 8 short answer, and 2 extended response questions. While students encounter 20-24 multiple choice, 5-7 short answer, and 2 extended response questions on the reading exam (Ohio Department of Education, 1995).

To arrive at a student’s raw score, test examiners, after allocating the appropriately earned points, simply sum the points earned on the exam. Following this procedure a scaled score is produced for each student. This scaled score is then used to determine if the student has met the pre-established proficiency level for the exam. Taking the results from all students who participated in the reading and mathematics proficiency exams, a mean scaled score for each exam will be calculated for each school. Hence, these school mean scaled scores will serve as the precise measures for student achievement in this investigation.

Statistical Methodology

The unit of analysis within this study is the school, therefore all data will be aggregated to the school level. Data will be analyzed using two statistical packages: Statistical Package for the Social Sciences (SPSS) Version 11.0 for Windows and LISREL 8.50. Specifically, SPSS is used to calculate the descriptive statistics (means and standard deviations) and determine bivariate and partial correlations. Because this study
sought to understand how each independent variable independently affects the lone dependent variable within an entire model of interrelated variables, the technique of Structural Equation Modeling (SEM) was utilized (Bollen, 1989).

In addition to using SPSS to analyze the data, this study used LISREL 8.5, which is a software program that allows for statistical analyses of data using SEM (Bollen, 1989). Because SEM was developed to allow for testing the validity of conceptual models involving both latent and measured variables, it is especially suited for the present investigation. In this study SEM is used for two main purposes: 1) to determine the extent to which the theoretical explanatory models (Figure 2.5), which purports to explain the relationships between the variables in this study, fits with the sample or data-driven models, and 2) to determine the strength and significance of the relationships (or paths) that exist within the theoretical models. Additional details associated with this approach to data analysis are left for the presentation of the results of this study which are found in the following chapter.

Summary

This chapter has considered the methodological approaches employed within this study. Descriptions of the sample, data collection protocols, and operational definitions for each of the five variables were presented. Finally, brief explanations of the statistical methodologies, namely correlation analysis and structural equation modeling, were provided. Results of the data analysis are addressed in the following chapter.
CHAPTER 4

RESULTS

This chapter presents the results from the analysis of the data. First, the sample set is described, each of the variables is presented with its respective descriptive statistics, and each of the research hypotheses is tested using zero-order correlational analysis. Next, the path models presented in chapter two are analyzed using structural equation modeling. Finally, the last section presents additional findings from the data that are not directly linked with the hypotheses that framed this study.

Sample of Elementary Schools

Survey data for this investigation were collected from 146 elementary schools within the state of Ohio. Even though random sampling techniques were not employed, great effort was expended to build a sample set composed of rural, suburban, and urban schools. As presently constituted, Ohio’s population of elementary schools are located in 33% rural, 23% suburban, and 44% urban settings. The sample for this study includes schools in the following categories: 27% rural, 37% suburban, and 36% urban.

An examination of Table 4.1, which contains various demographic indicators, allows further comparisons between the study’s sample set and the state’s appropriate population of elementary schools. Only schools that participated in the statewide
administration of the 4th grade proficiency tests are included in the state’s population of schools described in the table. Measures for these demographic indicators were obtained from the Ohio Department of Education.

<table>
<thead>
<tr>
<th>Demographic Indicator</th>
<th>Sample Set</th>
<th>State of Ohio Elementary Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Student Population</td>
<td>436</td>
<td>374</td>
</tr>
<tr>
<td>Proportion of Students Receiving Free and Reduced Priced Lunch</td>
<td>28%</td>
<td>34%</td>
</tr>
<tr>
<td>Average Teacher Salary</td>
<td>$44,565</td>
<td>$43,332</td>
</tr>
<tr>
<td>Average Teaching Experience</td>
<td>13.1</td>
<td>13.3</td>
</tr>
<tr>
<td>Average Number of Teachers</td>
<td>27.4</td>
<td>23.8</td>
</tr>
<tr>
<td>N</td>
<td>146</td>
<td>1,949</td>
</tr>
</tbody>
</table>

Table 4.1: A Comparison of Demographic Indicators

In addition to these characteristics, the grade configurations for elementary schools within the sample ranged from K-6 with multiple variations of this format (e.g., K-4, K-5, 1-5, 1-6). The K-5 format (59.9%) represented the largest grade configuration within the sample. Likewise, the state population of elementary schools contains multiple elementary grade formats with K-5 serving as its lead configuration (38.78%). In terms of school personnel participation in the study, a total of 4,069 certified educators completed surveys. Of this total, 95.8% indicated their gender on the form with females (92.6%) constituting the largest group. Based on this description of the sample set and its
comparison to the state population of elementary schools, it is reasonable to suggest that
the characteristics of the sample set resemble those of the state’s population of
elementary schools. However, because the choice was made not to incorporate random
sampling procedures any inferences derived from this study should be cautiously applied
to Ohio elementary schools or to public elementary schools within the nation in general.

Additional Examination of the Variables

The following sections investigate the formation of the collective efficacy of
teachers construct and the SIR and SSR indices. Following these brief explanations, this
chapter moves on to consider the descriptive statistics associated with the research
variables.

Collective Efficacy of Teachers

As mentioned in chapter 3, collective efficacy of teachers was measured using
Goddard’s (2002a) 12-item collective efficacy scale. After submitting these items to a
principal axis factor analysis, Goddard derived a one-factor solution (7.69 Eigenvalue
and 64.10% of the variance explained with the single factor). In addition, Goddard’s short
form had high internal reliability (alpha = .94). Within the present study, a one-factor
solution derived from a principal axis factor analysis also proved reasonable for the
collective efficacy construct. The one factor explained 56.36% of the variance with all
items loading strongly on the first factor (10 of the 12 factors loaded greater than or equal
to .61). Additionally, high internal reliability (alpha = .93) was found, this value being
consistent with Goddard’s findings.
SIR and SSR

SIR and SSR were calculated for each school that participated in the study. Recall that SIR and SSR were defined as the extent to which a school is providing the most money for instruction (SIR) or instruction plus pupil support (SSR) compared to other administrative and operational costs at the school and central office. These unique values were determined by substituting the dollar amounts for each category of the Expenditure Flow Model (EFM) into the corresponding formulas (presented in chapter 3) and then simplifying the respective formulas. Table 4.2 provides the descriptive statistics for the categories contained within the EFM for the schools in the sample set. Because financial data were unavailable for one of the schools (community or charter school) within the sample, the size of the sample set was decreased by one, that is, from 146 schools to 145.

Not surprisingly, the category representing the area of greatest expense within schools is found at the building level, specifically, dollars allocated to instruction ($6,800.00 maximum, $4,580.82 mean). Further examination of the mean statistics finds four of the top five mean expenditures in schools at the building level (building instruction ($4,580.81), building facilities and operations ($1,272.73), building pupil support ($725.41), central office administration ($508.06), and building administration ($404.49).
### Table 4.2: Descriptive Statistics for School and Central Office Funding Levels in Expenditures Per Pupil.

<table>
<thead>
<tr>
<th>Category</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Administration</td>
<td>154.00</td>
<td>665.00</td>
<td>404.49</td>
<td>97.94</td>
</tr>
<tr>
<td>Building Instruction</td>
<td>3,064.00</td>
<td>6,800.00</td>
<td>4,580.82</td>
<td>842.29</td>
</tr>
<tr>
<td>Building Facilities &amp; Operations</td>
<td>397.00</td>
<td>2,691.00</td>
<td>1,172.73</td>
<td>308.14</td>
</tr>
<tr>
<td>Building Pupil Support &amp; Dev.</td>
<td>245.00</td>
<td>1,873.00</td>
<td>725.41</td>
<td>341.46</td>
</tr>
<tr>
<td>Building Staff Support</td>
<td>0.00</td>
<td>4,308.00</td>
<td>191.41</td>
<td>384.01</td>
</tr>
<tr>
<td>Central Office Administration</td>
<td>297.00</td>
<td>933.00</td>
<td>508.06</td>
<td>130.08</td>
</tr>
<tr>
<td>Central Office Facilities &amp; Operations</td>
<td>0.00</td>
<td>1684.00</td>
<td>233.85</td>
<td>318.27</td>
</tr>
<tr>
<td>Central Office Pupil Support</td>
<td>0.00</td>
<td>374.00</td>
<td>75.37</td>
<td>92.00</td>
</tr>
<tr>
<td>Central Office Staff Support &amp; Dev.</td>
<td>1.00</td>
<td>381.00</td>
<td>71.93</td>
<td>76.96</td>
</tr>
</tbody>
</table>

N = 145

In the next section, the descriptive statistics for all of the research variables are presented. Following this section, the bivariate correlations will be presented as well as the results from testing the structural models advanced earlier in the study.

Descriptive Statistics for the Research Variables

Descriptive statistics (minimums, maximums, means, and standard deviations) were calculated to gain initial insight into the variables under study. This information is presented in Table 4.3 on the following page. Notice the variable Prior School Achievement (operationalized as 2001 Math Mean Scaled Score and 2001 Reading Mean
Scaled Score) has been included within this study. Past studies (Bandura, 1993; Goddard, Hoy, & LoGerfo, 2003; Parker, 1994) have employed prior student achievement as an important control variable for models that involved collective efficacy, SES, and current student achievement. Therefore, consistent with past research, this study includes prior student achievement as an independent variable. Accordingly, this variable will be added to the structural models advanced at the end of chapter 2. Specifically, the models will be tested to investigate the effect prior student achievement has on collective efficacy of teachers and on current student achievement. The influence SES, SIR, and SSR has on prior student achievement will also be tested in the structural models.

Interpretation of the descriptive statistics for SIR and SSR merits attention. The elementary schools involved in this study allocated an average of $1.89 to instruction for every dollar that was spent on administration and facilities and operations at the building level as well as all other categorical costs at the district office level. With respect to SSR, on average, $2.04 was spent on instruction and pupil support for every dollar allocated to administration, facilities and operations, and staff support at the building level along with all other categorical costs at the district office level. The minimums and maximums for each variable (1.09 and 2.73 for SIR and 0.51 to 3.00 for SSR, respectively) demonstrate a fairly wide range of effort expended by districts to support the instructional process. With the descriptive statistics presented, the following section offers the results from the bivariate correlation analysis.
Hypothesis Testing: Evidence from Correlational Analysis and Structural Models

The table below (Table 4.4) depicts the Pearson bivariate correlation statistics for each of the research variables. Following the presentation of these statistics, the first four

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Instructional Ratio (SIR)</td>
<td>145</td>
<td>1.09</td>
<td>2.73</td>
<td>1.89</td>
<td>0.33</td>
</tr>
<tr>
<td>Student Services Ratio (SSR)</td>
<td>145</td>
<td>0.51</td>
<td>3.00</td>
<td>2.04</td>
<td>0.40</td>
</tr>
<tr>
<td>Collective Efficacy of Teachers</td>
<td>145</td>
<td>3.26</td>
<td>5.47</td>
<td>4.50</td>
<td>0.52</td>
</tr>
<tr>
<td>SES (Proportion of students not receiving Free &amp; Reduced Priced Lunch)</td>
<td>145</td>
<td>0.16</td>
<td>1.00</td>
<td>0.72</td>
<td>0.23</td>
</tr>
<tr>
<td>2001 Math Mean Scaled Score</td>
<td>138</td>
<td>169.00</td>
<td>254.00</td>
<td>223.43</td>
<td>14.95</td>
</tr>
<tr>
<td>2001 Reading Mean Scaled Score</td>
<td>138</td>
<td>167.00</td>
<td>236.00</td>
<td>217.86</td>
<td>9.14</td>
</tr>
<tr>
<td>2002 Math Mean Scaled Score</td>
<td>145</td>
<td>185.00</td>
<td>252.00</td>
<td>225.34</td>
<td>13.53</td>
</tr>
<tr>
<td>2002 Reading Mean Scaled Score</td>
<td>145</td>
<td>200.00</td>
<td>235.00</td>
<td>220.94</td>
<td>6.95</td>
</tr>
</tbody>
</table>

Table 4.3: Descriptive Statistics for Research Variables
hypotheses advanced in chapter 1 are reintroduced and addressed in light of the correlational evidence. Later, the last two hypotheses are examined based upon the results of testing the structural models presented earlier.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SIR</td>
<td>-</td>
<td>.869**</td>
<td>.192*</td>
<td>.136</td>
<td>.134</td>
<td>.129</td>
<td>.131</td>
<td>.139</td>
</tr>
<tr>
<td>SSR</td>
<td>-</td>
<td>.244**</td>
<td>.220**</td>
<td>.220**</td>
<td>.224**</td>
<td>.190*</td>
<td>.187*</td>
<td></td>
</tr>
<tr>
<td>Collective Efficacy</td>
<td>.93a</td>
<td>.810**</td>
<td>.754**</td>
<td>.723**</td>
<td>.590**</td>
<td>.605**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SES</td>
<td>-</td>
<td>.783**</td>
<td>.753**</td>
<td>.597**</td>
<td>.630**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading 2002</td>
<td>.84a</td>
<td>.897**</td>
<td>.700**</td>
<td>.751**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math 2002</td>
<td>.86a</td>
<td>.700**</td>
<td>.792**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading 2001</td>
<td>.84a</td>
<td>.900**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math 2001</td>
<td></td>
<td></td>
<td>.87a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.4: Correlations for Research Variables

Notes: **Correlation is significant at p < .01 (2-tailed). *Correlation is significant at p < .05 (2-tailed). a=reliability coefficient (Cronbach’s alpha)
**H1: Collective efficacy of teachers has a positive relationship with student achievement.**

Strong correlational evidence supports the first hypothesis. Specifically, collective efficacy of teachers correlated with the 2002 Math mean scaled scores ($r = .723$, $p < .01$) and the 2002 Reading mean scaled scores ($r = .754$, $p < .01$). Because SES has been found in past studies (Coleman et al., 1966; White, 1982) to be such a strong predictor of student achievement, partial correlations were also calculated controlling for the SES construct. Although not tabulated here, evidence from the partial correlation analysis found collective efficacy to be significantly associated with 2002 Math mean scaled scores ($pr = .307$, $p < .01$) and 2002 Reading mean scaled scores ($pr = .343$, $p < .01$) when controlling for SES. Hence, taken together, the evidence suggests that the higher the collective efficacy of the faculty—perceived by the individual teachers within the school, the higher the school’s level of student achievement in mathematics and reading.

**H2: SIR and SSR have a positive relationship with collective efficacy of teachers.**

Although weak, the relationship between SIR and collective efficacy of teachers ($r = .192$, $p < .05$) and SSR and collective efficacy of teachers ($r = .244$, $p < .01$), did, in fact, reveal a positive and significant relationship. However, when controlling for SES, partial correlation analysis revealed no significant relationship between SSR and collective efficacy of teachers ($pr = .137$, $p = .109$). Interestingly, the relationship between SIR and collective efficacy of teachers maintained a positive and significant relationship ($pr = .170$, $p < .05$) even after controlling for SES. This evidence suggests that SSR is influenced more by SES than SIR. At this point, it appears the greater the effort a school district makes toward channeling money for instruction (SIR), the greater
the perceived collective efficacy of the faculty. The evidence also supports the view that
the effort a school district makes to allocate more money for instruction and other student
services (SSR) does not necessarily appear to relate to the collective efficacy of teachers
when taking into account the socioeconomic status of the students.

*H3: SIR and SSR have a positive relationship with student achievement.*

The results associated with this hypothesis were mixed. On the one hand, SIR did
not have a significant relationship with student achievement ($r = .134, p = .108, 2002$
Reading and $r = .129, p = .121, 2002$ Math). While, on the other, SSR was found to have
a positive and significant relationship with 2002 Reading ($r = .220, p < .01$) and 2002
Mathematics ($r = .224, p < .01$) achievement scores. When examining the partial
correlations (once again controlling for SES) no relationship was found to exist between
SIR and student achievement ($pr = .063, p = .465, 2002$ Reading and $pr = .049, p = .570,$
2002 Math). For that matter, no significant relationship was found between SSR and
student achievement ($pr = .093, p = .277, 2002$ Reading and $pr = .099, p = .249, 2002$
Math).

Although the bivariate correlational evidence between SSR and student
achievement scores is weak, it does suggest that Ohio districts that tend to spend more
money on instruction and other student support services tend to experience greater results
measured by student achievement scores. However, when student’s socioeconomic status
is considered the significant relationship between SSR and student achievement ceases to
exist. As well, the evidence presented here suggests that the effort Ohio school district
officials make in directing money specifically for instruction in the school building compared to other administrative and support costs (SIR) does not appear to relate to student achievement test scores in reading and mathematics.

**H4: Socioeconomic status has a positive relationship with SIR and SSR.**

Once again, the evidence provides mixed results. A significant, positive relationship appears to exist between SSR and SES ($r = .220$, $p < .01$), whereas no significant relationship appears between SIR and SES ($r = .136$, $p = .102$). This correlational information suggests that school districts that direct more money to instruction and student-centered support services (SSR) compared to administrative and other central office support services tend to serve students with higher levels of SES. Yet, no evidence was revealed to suggest a relationship between the effort districts make for channeling money toward instruction (SIR) and the socioeconomic background of the student body.

**H5: SIR and SSR have an indirect relationship with student achievement through collective efficacy of teachers.**

To test this hypothesis, the path models presented at the end of chapter 2 were analyzed using maximum likelihood estimation via a structural equation measurement model. More specifically, the structural models were analyzed using LISREL 8.50. This program uses a technique, as mentioned, called maximum likelihood estimation to estimate the parameters of the variables theorized to be related to each other. In addition to calculating the values of these path coefficients (that is, the beta weights), LISREL has the ability to provide goodness-of-fit statistics for the models being tested. These statistics reflect how well the data driven models fit with the theoretical models. Among
the many goodness-of-fit statistics available from LIRSEL, of critical import is the Chi-square test of fit. Because the desirable outcome for testing the models is to yield no significant difference between the hypothetical model and the data driven model, a statistically non-significant (p > .05) Chi-square statistic is the goal. Additional goodness-of-fit criteria are included for these models and they may be found in Appendices A and B.

The results of these analyses are presented in Figures 4.1 through 4.4 on the following pages. Because bivariate correlations revealed a significant, positive relationship between SIR and collective efficacy of teachers and SSR and collective efficacy of teachers as well as collective efficacy of teachers and student achievement, further investigation into a possible indirect effect of SIR and SSR on student achievement through collective efficacy is plausible.

Examination of all four models reveals that SIR (Models 1 and 2) and SSR (Models 3 and 4) have neither a significant effect on collective efficacy of teachers (e.g., Model 1: beta = .09, p = .057) nor on prior student achievement (e.g., Model 1: beta = .04, p = .575). However, with the models explaining up to 75% of the variance in student achievement and with goodness-of-fit statistics within acceptable ranges (please see Appendix A) it appears that the theoretical rationale connecting the other research variables (i.e., collective efficacy, prior student achievement, SES, and student achievement) is reasonable. Therefore, taking all of this evidence into consideration it appears the fifth hypotheses has not been sustained.
Figure 4.1: Theoretical Model Examining the Relationship Between SIR, Collective Efficacy of Teachers, and Student Achievement in Mathematics (Model 1).
Figure 4.2: Theoretical Model Examining the Relationship Between SIR, Collective Efficacy of Teachers, and Student Achievement in Reading (Model 2).
Figure 4.3: Theoretical Model Examining the Relationship Between SSR, Collective Efficacy of Teachers, and Student Achievement in Mathematics (Model 3).

Model’s Explained Variance of Math Achievement is .75
Figure 4.4: Theoretical Model Examining the Relationship Between SSR, Collective Efficacy of Teachers, and Student Achievement in Reading (Model 4).
In other words, it appears that the amount of effort a school district exerts to steer money toward instruction or instruction plus student support services compared to other administrative and support costs may not have an indirect influence on how students perform in the classroom through collective efficacy. The two efficiency ratios, SIR and SSR, appear not to have the influence as theorized. Possible explanations for these results are offered in the final chapter in this study.

H6: Socioeconomic status has a positive direct relationship with student achievement and a positive indirect relationship with student achievement through collective efficacy of teachers.

Evidence from both the bivariate correlations and the structural models support the final hypothesis in the study. Zero-order correlations revealed a strong correlation between SES and student achievement (r = .783, p < .01, 2002 Reading and r = .753, p < .01, 2002 Math). In addition, all paths, both direct and indirect, from all four structural models depict strong effects between SES and student achievement. For example, in Model 1, SES has a significant, direct effect on student achievement (beta = .27, p < .01) and an indirect effect on student achievement through collective efficacy (beta = .15, p < .01). Taken together, in Model 1, the total standardized direct and indirect effects of SES on student achievement through collective efficacy are significantly large (beta = .42, p < .01). This empirical evidence indicates that schools that serve students with higher levels of SES tend to score higher on achievement tests. It also suggests that the collective efficacy of teachers is influenced by SES. Notice, for example, that in all four models SES has a greater influence on collective efficacy of teachers (e.g., Model 1: beta = .70, p < .01) than on student achievement (beta = .27, p < .01). These results suggest that
student achievement scores will not only be influenced directly by a student’s socioeconomic background but will also be influenced by teachers’ perceptions of the staffs’ collective ability, which is, in turn, influenced by student’s background characteristics.

Additional Examination of Research Hypotheses

Now that the results pertaining to the six research hypotheses have been presented it would be wise to revisit two of the four hypotheses in light of the findings associated with the structural models. Recall that the first four hypotheses were tested using bivariate and partial correlational analysis. The results from the path analysis provide a way to strengthen the presentation of the results associated with Hypothesis 1 and Hypothesis 4.

**H1: Collective efficacy of teachers has a positive relationship with student achievement.** All four structural models reveal that collective efficacy of teachers has a significant positive direct effect on student achievement (e.g., Model 1, beta = .21, p < .05). This evidence suggests that teachers’ perceptions of their ability to influence student outcomes serves to create a normative environment within the school where student success is valued. High levels of collective efficacy are reflected in faculty’s who work diligently and with increased effort to assure high levels of student performance. Increase the collective efficacy of teachers within the building, and, these results suggest, will lead to increased levels of student performance in reading and mathematics. Moreover, the relationship between collective efficacy of teachers and student achievement is sustained
even with the powerful influence of SES and prior student achievement in the model—two variables which typically account for much of the variance in models of student achievement (Hoy & Sabo, 1998).

**H4: Socioeconomic status has a positive relationship with SIR and SSR.** In two of the four models, SES has a significant positive direct effect on SSR (beta = .24, p < .05, Model 3 and beta = .24, p < .05, Model 4). On the other hand, no significant direct effect was found between SES and SIR (see Models 1 and 2). These findings provide a reasonable basis for suggesting that schools with higher SES levels tend to expend higher levels of effort for allocating more money to instruction plus pupil support services (SSR) as compared to administrative and other support costs at the building and central office levels.

**Serendipitous Findings: Examining the Effect of Dollars Allocated to Instruction**

Before concluding this chapter additional results beyond those anticipated through the a priori hypotheses are presented. When Cooper and Associates (1994) initially presented their School-Site Micro Financial Allocations Model (SMAM) for schools they did not examine the potential influence SSR or SIR may have on student achievement. On the contrary, they proposed that if any link between financial resources allocated to schools and student achievement would be established this relationship would be a reflection of the productivity of schools. In their words: “a school may be ‘efficient’ at delivering services to students (low administration and high instruction) without necessarily improving academic outcomes [productivity]” (p. 81). So, instead of testing
their efficiency indices in a model of student achievement they elected to test the relationship between dollars allocated to instruction in the building (instruction from SMAM) and student achievement.

The results from Cooper and Associates’ (1994) study offered insight into the relationship between money allocated for instruction and student achievement. Specifically, they found that instructional expenditures had a significant impact (beta = .18, p < .001) on a cluster of high schools’ average combined Verbal and Math SAT scores. Cooper and Associates’ model included SES and teacher experience as control variables. These findings offered some evidence that money allocated to instruction did, in fact, have an influence on college bound students’ achievement scores.

In this study, because no substantive results were revealed using the efficiency indices a decision was made to test Cooper and Associates (1994) question, which relates to dollars allocated to instruction and student achievement scores. Hence, two more structural models were tested using the variable instruction from the Expenditure Flow Model (EFM) in the place of SIR and SSR. These models are presented below.

The variable, instruction, was defined in the EFM as the amount of money allocated to school buildings to support the salaries and benefits of teachers, teacher aides, paraprofessionals as well as the cost to purchase computers, books, and other classroom materials (Ohio Department of Education, 2002b). Before testing these models bivariate correlations were examined between instruction and the other research variables (including SIR and SSR). The results of this analysis are presented in Table 4.5.
Figure 4.5: Theoretical Model Portraying the Relationship Between Instruction, Collective Efficacy of Teachers and Student Achievement in Math (Model 5).
Figure 4.6: Theoretical Model Portraying the Relationship Between Instruction, Collective Efficacy of Teachers and Student Achievement in Reading (Model 6).
Correlations

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<tr>
<td>Instruction</td>
<td>.470**</td>
<td>.432**</td>
<td>-.021</td>
<td>-.179*</td>
<td>-.127</td>
<td>-.083</td>
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Table 4.5: Correlations for Instruction and the other Research Variables

Notes: **Correlation is significant at p < .01 (2-tailed). *Correlation is significant at p < .05 (2-tailed).

As expected, instruction has a significant and positive relationship with SIR (r = .470, p < .01) and SSR (r = .432, p < .01). Results from partial correlational analysis, where SES was held constant, also supported these findings (SIR: pr = .482, p < .001; SSR: pr = .467, p < .001). Both efficiency measures rely on the amount of money allocated to instruction as part of their respective formulas. Hence, one would anticipate that the efficiency measures would correlate with the instruction variable. The more money districts allocated to instruction (SIR) or instruction plus student support costs (SSR) as compared to administrative and other categorical programs at the building and central office levels the more money districts allocated specifically to instruction.

Another result that bears notice is the significant yet negative relationship that exists between instruction and SES (r = -.179, p < .05). Although a weak relationship, this correlational evidence suggests districts that spend more money for instructional
purposes tend to serve students with lower levels of SES. Or, more specifically, schools which expend higher levels of their funding for instruction tend to have higher numbers of students on the federal free and reduced priced lunch program.

Examination of the other correlations in the table reveals no additional significant findings. That is, money allocated to instruction does not have a significant relationship with either the collective efficacy of teachers ($r = -.021$, $p = .807$) or the achievement scores of students ($r = -.127$, $p = .129$, 2002 Reading and $r = -.083$, $p = .320$, 2002 Math). Yet, when examining partial correlations a significant and positive relationship does exist between instruction and the collective efficacy of teachers ($pr = .239$, $p < .05$). These results suggest that when controlling for the SES of student’s within a school, the more money allocated to instruction, the higher the perception of teachers’ collective efficacy. Partial correlations did not reveal any significant relationship between instruction and current student achievement ($pr = .040$, $p = .646$, 2002 Reading and $pr = .095$, $p = .272$, 2002 Math).

At this point it appears the correlational evidence does not support Cooper and Associates (1994) findings that money allocated to instruction is related to student test performance. However, because partial correlations demonstrated that instruction correlates positively with collective efficacy and, from the earlier presentation in this chapter, collective efficacy of teachers correlates with student achievement scores, it seems possible for instruction to have an indirect influence on student achievement. Put another way, will the structural models reveal that instruction has an indirect effect on student achievement through the collective efficacy of teachers when the effects of SES
and prior student achievement are controlled? Findings from testing the structural models, which are presented next, offer some provocative evidence to answer this question.

*Structural Models*

Path analysis results for the two structural models are presented in Figures 4.7 and 4.8 below. To reemphasize, these models differ from the models presented earlier in this chapter only in one aspect: instruction replaces SIR and SSR.

Goodness-of-fit statistics (see Appendix B) provide evidence of a reasonable fit between the theoretical and data-driven models. Recall, the theoretical model is based on Cooper and Associates’ (1994) assertion that instructional dollars expended in the classroom have a significant impact on student achievement scores—more specifically, student SAT scores.

Of significant importance, the two structural models (Models 7 and 8) presented herein are not exact replicas of Cooper and Associates’ (1994) model. The choice of variables used in the structural models differs slightly from Cooper and Associates’ model. Along with instruction, Cooper and Associates, added SES and teaching experience (average years). In addition, their sample consisted of 84 high schools located in the New York City school district and, to reemphasize, the measure for student achievement was student SAT scores. The choice of using SAT scores may over represent one segment of the student population; namely, those students who are college bound. In other words, the SAT score may not serve as an adequate estimator of student achievement for all students in all the high schools studied.
Figure 4.7: Theoretical Model Examining the Relationship Between Instruction, Collective Efficacy of Teachers and Student Achievement in Math (Model 7).
Figure 4.8: Theoretical Model Examining the Relationship Between Instruction, Collective Efficacy of Teachers and Student Achievement in Reading (Model 8).
The structural models, on the other hand, include instruction and the four other research variables: SES, prior student achievement, collective efficacy of teachers, and student achievement. Therefore, teaching experience is the only major variable from Cooper and Associates’ (1994) model that was not included in the structural models. However, it is posited that the structural models strengthen the model tested by Cooper and Associates for several reasons.

First, the structural models reflect the complexity of the educational process by including a process variable (collective efficacy of teachers) within the model. In fact, Cooper and Associates (1994) recognized the challenge of finding a link between financial resources and student achievement because of the reality of numerous process variables. They stated:

The problems of relating resources to outcomes are monumental, since so many other variables intervene in this interaction [emphasis added]: family income, neighborhood conditions, student background, prior preparation, language spoken in students’ homes, and teacher quality. (p. 83)

Second, the operational measure representing student achievement in the structural models was proficiency test scores. These scores reflect a performance from, ideally, all students attending the elementary schools that were members of the sample set. Unlike the Cooper and Associates (1994) study, the student achievement scores used in the path models are representative of the entire student population within a school.

Finally, the structural models are tested using data collected from a reasonably representative sample of an entire state’s pool of elementary schools. Cooper and Associates (1994) sample involved a large number of high schools within one city school
district. Therefore, the ability to generalize the results to larger populations appears to weigh more heavily in favor of the present study than in Cooper and Associates’ investigation.

Having expounded the differences between Cooper and Associates’ (1994) model and the current structural models under exploration, the results of the analyses on the theoretical models are now presented. The most notable finding in both structural models, that is, Models 7 and 8, is the significant positive path linking instruction with collective efficacy of teachers (beta = .13, p < .05, Model 7 and beta = .12, p < .05, Model 8). These results suggest that the amount of money allocated to instruction at a school building has a positive and direct effect on the perceptions of the collective efficacy of teachers in that building. These results stand in contrast to those findings addressed earlier in the chapter that examined the relationship between SIR and SSR and collective efficacy. It appears that the amount of money allocated to instruction has more of an influence on teacher’s perceptions of building efficacy in their building than the effort districts make to steer money toward instruction (SIR) or instruction plus student services (SSR) compared to other school and building costs.

Other findings worth noting center on paths that did not yield statistical significance. In fact, the only paths that lacked statistical significance in Model 7 are those connecting SES and instruction (beta = -.16, p = 0.054) and instruction and prior academic achievement (beta = .12, p = 0.088). Similarly, Model 8 revealed a statistically insignificant path between instruction and SES (beta = -.16, p = 0.054). A possible explanation for the lack of significance (note the p-value, 0.054, is barely insignificant) between instruction and SES may be attributed to the possibility that, on average, more
schools with lower levels of SES allocate more money to instruction at the school level than schools with higher levels of SES. Indeed, schools with higher levels of SES may, because their community may have the ability to offer more support to their schools, have the ability to spend more money on other areas of the budget (staff professional development, student support services, etc.), which would steer money away from instruction.

Despite these findings, it is easily observed in both structural models, that all other paths yielded significant results (p < .05). Of most interest to the present investigation is the finding that instruction has a direct effect on collective efficacy of teachers and collective efficacy of teachers, in turn, has a direct effect on student achievement (beta = .21, p < .05 Model 7 and beta = .27, p < .05 Model 8) holding SES and prior student achievement constant. Therefore, the amount of money allocated to instruction at a school building has an indirect effect (beta = .027 (.13 × .21), p < .05, Model 7 and beta = .032 (.12 × .27), p < .05, Model 8) on student reading and mathematics achievement through collective efficacy of teachers (the faculty’s belief in their ability to collectively influence student outcomes). These findings refine the results reported by Cooper and Associates (1994). Indeed, these results provide initial evidence for steering many research agenda’s emphases away from wondering if more money in schools matters to studying how money allocated to schools makes a difference in student achievement.

The key finding of this spontaneous exploration centers on the relationship that exists between money allocated to instruction and collective efficacy of teachers. Identifying a statistically significant link between these two constructs validates the need...
for continued research on input-process-output models of the educational system. Although more elaboration on these findings is found in the following chapter, it is sufficient at this stage of this investigation to assert that these findings add to those offered by Cooper and Associates (1994). Moreover, these results open space for a new discourse on the much-studied and much-debated issue of the relationship between monetary resources and student achievement.

Conclusion

This chapter presented the results of the statistical procedures used to examine the data collected for this investigation. Correlational analysis along with maximum likelihood estimation via structural equation modeling comprised the main statistical tools employed. Evidence derived from the examination of the data found support for a few of the research hypotheses while others were not sustained or provided mixed results. Most noteworthy was the finding that SIR and SSR did not have an indirect effect on student achievement through collective efficacy. Additional exploration revealed that money allocated to instruction has a positive and indirect effect on student achievement through collective efficacy of teachers. In the following chapter, the findings of this study are discussed and the implications for future research are advanced.
CHAPTER 5

DISCUSSION OF RESULTS

Two competing themes ring loud in today’s educational arena. First and simply put, educators are being held accountable for results in the classroom. Public laws, such as, *No Child Left Behind*, provide clear evidence concerning the pressing demand the public is making on educators for improving student achievement. Along with this cry for accountability, another voice, calling for adequacy in resource allocation, may also be heard (King et al., 2003). Numerous court cases across the country attest to the heightened tension that exists on whether school personnel and the children they serve have enough resources to do their respective jobs (King et al., 2003). Educators are expected to be held accountable for results and to be held to higher standards but do they have an adequate amount of resources to accomplish these demands?

Within this milieu of controversy, educational researchers have found and continue to find ways to assist government and educational leaders as well as taxpayers and other educational stakeholders in their ability to understand the complex process of education. In the past, many research studies that focused on the relationship between monetary resources and student achievement—traditional input-output studies, tended to ignore the throughput or processes of education (Cooper, Fusarelli, & Randall, 2004).
Likewise, studies that focused on process variables within education (e.g., school climate, trust, academic press) failed to include critically important input variables, specifically finance variables. Taken together, from this author’s review of the literature, past educational research has not attempted to merge an input-output approach to studying schools with its critical process component.

The present investigation has attempted to bridge this gap in the educational literature base by offering a careful examination of the relationships between a selection of input, process, and output variables from the educational system. More specifically, this study intended to advance the understanding surrounding the effect that collective efficacy of teachers has on student achievement. Past studies have found this organizational level variable to have a significant independent effect on student achievement even with prior student achievement and student SES included within the model (e.g., Bandura, 1993; Goddard et al., 2000). However, because studies have been sparse on collective efficacy, little research has focused on the antecedents of the concept (Goddard & Goddard, 2001). For that matter, no empirical analysis could be found that examined the influence funding may have on the perceptions’ of educators in their ability to influence student achievement. Therefore, the absence of study surrounding these variables (finance or economic variables, collective efficacy of teachers, and student achievement) invited the opening of a path through which an entire research agenda could be established.

To enact this line of research, it was asserted that the effort schools and districts make in allocating resources to the instructional process (SIR) or the instructional process plus pupil services (SSR) as compared to other administrative and support costs may
have an influence on student achievement through the powerful organizational level variable of collective efficacy. Furthermore, it was posited that money, by itself, will not influence student achievement. Indeed, it is how money is used within schools that will make the difference.

That being said, two overarching questions guided this study: 1) How do schools expend their funds? That is, to what extent do schools allocate more money for instruction (SIR) or instruction plus pupil services (SSR) compared to administrative and other support costs? 2) Does the effort associated with the allocation of funding within schools affect educators’ perceptions of their ability to influence positive student outcomes? In other words, does school efficiency have an indirect influence—through teachers’ perceptions—on how students perform in schools?

In order to address these questions, a set of variables (SIR, SSR, collective efficacy of teachers, student achievement, SES, and prior student achievement) were selected and a series of research hypotheses involving these variables were advanced. Next, a number of path models were organized that represented a model for understanding the nature of the relationships among the variables within the study. Later, operationalizing each variable enabled the possibility for survey data to be collected and then analyzed. Finally, the hypotheses were tested using correlation and structural equation modeling techniques. The results of these analyses were presented in the previous chapter. A summary of these results follows below.

Summary of Findings

1. Collective efficacy of teachers was shown to be positively related to student achievement. More specifically, collective efficacy was
significantly related to student Math 2002 (r = .723, p < .01) and Reading 2002 (r = .754, p < .01) achievement scores. Moreover, the analysis of all four path models (that is, Models 1, 2, 3, and 4) provided evidence that collective efficacy of teachers had a direct effect on student achievement, controlling for SES and prior student achievement (e.g., Model 1, beta = .21, p < .05).

2. SIR (r = .192, p < .05) and SSR (r = .244, p < .01) both had a weak positive relationship with collective efficacy of teachers. However, partial correlations revealed that SES negated the relationship between SSR and collective efficacy of teachers (pr = .137, p = .109) and maintained the relationship between SIR and collective efficacy of teachers (pr = .170, p < .05). Furthermore, analysis of all four path models produced no significant relationship between the two efficiency variables (SIR and SSR) and collective efficacy of teachers.

3. Although bivariate correlations revealed mixed results, when controlling for SES, partial correlations revealed no significant relationship between SIR and student achievement (e.g., pr = .063, p = .465, 2002 Reading) and SSR and student achievement (e.g., pr = .099, p = .249, 2002 Math). Because this investigation was concerned with understanding how SIR and SSR worked through the process variable of the collective efficacy of
teachers to indirectly influence student achievement, the path models did not test any direct relationships between SIR or SSR and student achievement.

4. Socioeconomic status had a significant, positive relationship with SSR ($r = .220$, $p < .01$) but did not have a significant relationship with SIR ($r = .136$, $p = .102$). Path analysis also revealed mixed results. Models 3 and 4 provided evidence of SES having a direct effect on SSR (Model 3: beta = .24, $p < .05$, Model 4: beta = .24, $p < .05$). However, Models 1 and 2 did not support a significant relationship between SES and SIR.

5. Neither SIR nor SSR had an indirect relationship with student achievement through collective efficacy of teachers. As stated in summary statement 2 above, analysis of all four structural models did not reveal a significant relationship between SIR and collective efficacy of teachers or SSR and collective efficacy of teachers. If an indirect effect between SIR and student achievement or SSR and student achievement were to be shown, a relationship needed to be established between the independent variable in question (SIR or SSR) and its pathway (collective efficacy of teachers) to the dependent variable (student achievement). In this study, collective efficacy of teachers was not shown to enable an indirect influence between school fiscal efficiency and student achievement scores.
6. Both correlational and path analysis evidence supported the finding that socioeconomic status had a positive direct relationship with student achievement and a positive indirect relationship with student achievement through collective efficacy.

7. Money allocated directly to instruction was shown to have a significant positive indirect effect on student achievement (2002 Math and 2002 Reading) through the collective efficacy of teachers. Models 7 and 8 provided evidence from path analysis to support this claim.

Discussion

This study supported some of the hypothesized relationships while leaving others in doubt. Strong evidence was found to support the theorized relationship between collective efficacy of teachers and student achievement, socioeconomic status and collective efficacy of teachers, as well as socioeconomic status and student achievement. This investigation, however, did not support the a priori position that SIR and SSR would have an indirect effect on student achievement through collective efficacy of teachers. For that matter, partial correlation evidence negated the relationship between SIR, SSR and student achievement. Even more, mixed results left in question the relationship between SES and SIR while offering some support for a statistically significant relationship between SES and SSR. Finally, and most promising for future research, exploratory analysis found that money allocated directly to building level instruction had a significant indirect relationship with student achievement through the key independent
variable of this study: collective efficacy of teachers. Elaboration on each of these relationships, bolstered by the extant literature base, is addressed in the following sections.

_Collective Efficacy of Teachers and Student Achievement_

Consistent with past findings (e.g., Bandura, 1993; Goddard et al., 2000; Hoy, Smith, et al., 2002; Hoy, Sweetland, et al., 2002) this study found collective efficacy to be predictive of student test performance. Even with prior student achievement and SES included within the structural model, collective efficacy maintained its reasonably strong effect on achievement. For example, the findings from Model 1 suggest that a 1 standard deviation increase in collective efficacy may lead to a .21 standard deviation increase in 2002 Math mean scaled proficiency scores.

However, in contrast to past findings (see for example, Bandura, 1993; Hoy, Smith et al., 2002; Hoy, Sweetland, et al., 2002), the standardized path coefficients from this study do not reveal the path between collective efficacy of teachers and student achievement (e.g., Model 1: beta = .21) to be stronger than the path from SES and student achievement (e.g., Model 1: beta = .27). Indeed, in all four models, the paths from both SES and prior academic achievement were substantially greater than the path from collective efficacy of teachers and student achievement. Although supportive of past researchers (e.g., Bandura, 1993; Goddard et al., 2000; Hoy, Smith, et al., 2002; Hoy, Sweetland, et al., 2002) in their findings about the relationship between collective efficacy and student achievement, this study questions the strength of that relationship.
Researchers who chose to test future models that include collective efficacy should learn from this investigation and include both SES and prior academic achievement as control variables.

From a theoretical standpoint, these findings sustained the rationale that linked collective efficacy of teachers and student achievement. That is, the perceptions educators form about their abilities to mobilize their effort to influence student outcomes may manifest itself in specific behaviors. Teacher’s work behaviors are influenced by the working norms of the organization. Collective efficacy has the ability to influence these norms, and thus, the behaviors of the teachers in the school. Consistent then with Coleman’s (1987) theoretical position on social norms, this study supports the theory that an element of the culture of the school, that is, collective efficacy, has a powerful normative influence on teachers’ behaviors, which, in turn, directly influence student achievement.

These findings are also supported by Bandura’s (1986, 1997) triadic reciprocal causation model (see Figure 2.1). As teachers engage in their craft, their work influences both the students in their classrooms as well as their fellow colleagues. As teachers receive feedback on their performance from students and their colleagues this serves as a source of efficacy (verbal persuasion) as does the mastery experiences involved with the process of teaching. Taken together these sources serve to influence future estimations of the collective efficacy of the faculty. Frequent mastery experiences and consistent sources of feedback for individual teachers will serve to either strengthen or diminish the efficacy of the faculty as a whole. As students perform well, collective efficacy of teachers may be enhanced and, conversely, poor student performance may lead to
negatively influencing teachers’ collective efficacy. So, either looking through the lens of norms offered by Coleman (1987) or the lens for explaining behavior by Bandura, the positive relationship between collective efficacy of teachers and student test performance is expected and was sustained by this investigation.

**Socioeconomic Status and Collective Efficacy of Teachers**

When Goddard et al. (2000) developed their model of collective efficacy of teachers they posited that efficacy beliefs formed as the result of cognitive processing. Specifically, teachers weigh and interpret sources of efficacy through two mechanisms: analysis of the teaching task and assessment of teaching competence. The context in which the sources are available for interpretation would, according to theory, influence the formation of teacher’s beliefs in their ability to influence student achievement (Bandura, 1997). The socioeconomic status of students offers insight into the context in which teachers may form their beliefs.

For example, students who come to school prepared to learn and have available to them numerous tools to assist them in their learning are at a considerable advantage compared to students who come to school with little preparation and go home to meager instructional support. So, it comes as no surprise that this study, consistent with others that investigated the effect of SES on collective efficacy (Bandura, 1993; Goddard et al., 2000; Hoy, Smith, et al., 2002; Hoy, Sweetland, et al., 2002), found the two variables to be strongly related. Indeed, as teachers analyze the teaching task and find that they are facing extremely difficult challenges from either their students or the lack of resources, over time, these realities—based on Bandura’s social cognitive theory and Goddard et al.’s model of collective efficacy, are bound to have a debilitating affect on the efficacy
of the teachers in the school. In contrast, teachers who analyze their daily tasks and find them to be reasonable or within their coping abilities would tend to realize stable or increased gains in their efficacy beliefs. Acceptable to theory and consistent with past findings, this study found a significant positive relationship between SES and collective efficacy of teachers.

Socioeconomic Status and Student Achievement

Since the famous Coleman Report (1966) was published, the positive relationship between SES and student achievement has been a consistent finding within the literature (White, 1982). Indeed, few educational research studies have found other variables beside SES to have such a powerful predictive effect on student achievement. In this study, SES was found to have a direct influence on student achievement as well as an indirect influence.

An examination of the four models (Figures 4.1-4.4) reveals the absolute power this variable wields in the model. In all but one of the structural models (that is, Model 2) every path emanating from SES to another research variable is significant. In addition, the magnitude of these paths reveals the effect SES has on each of the variables associated with it. For example, SES has a stronger effect on teachers’ sense of collective efficacy than on student achievement (e.g., Model 1: beta = .70 for collective efficacy and beta = .27 for student achievement). Totaling the direct and indirect effects of SES on student achievement within any one of the four models positions SES as the preeminent variable within the models—as, based on past research, should be the case.

But, why should this be the case? Students who have the resources, that is, the intellectual, economical, and social, come to school with an advantage over those
students who lack in these resources. Put differently, individuals who enjoy greater human and social capital are at a significant advantage over those individuals who lack in these resources (Coleman et al., 1966; Ladd & Hansen, 2001; King et al., 2003). The end result, students with the human and social resource advantage have historically out performed their disadvantaged colleagues.

What further complicates the matter at hand is the influence SES has on collective efficacy of teachers. Even though collective efficacy was found to have a positive effect on student achievement, the four models revealed that SES also has a significant positive effect on collective efficacy. This means that staffs with higher levels of efficacy tend to teach in schools whose main clients, that is, their students, originate from homes with higher levels of SES.

Yet, if the collective efficacy of teachers could be targeted by school leaders and subsequently enhanced then the intended result would be the improvement of student performance scores in spite of the influence of SES. More on this practical implication will follow; however, it is important to end this subsection by recognizing how important SES is for any educational model, particularly those that include student achievement variables. This study supports past research and has found SES to be a powerful predictor of both past and present student performance results as well as teachers’ perceptions about their ability to influence student outcomes.

*Student Instructional Ratio, Student Services Ratio, and Collective Efficacy of Teachers*

The findings in this study regarding SIR, SSR, and collective efficacy of teachers do not support the theory that fiscal efficiency in schools influences the four sources of collective efficacy in such a manner as to influence the perceptions of teachers about their
ability to influence positive student outcomes. When building the rationale to link these variables it was posited that teachers would be able to perceive the effort school officials were making in allocating funds that would strengthen their instructional practices through professional development (vicarious experiences and verbal persuasion) or additional resources to enhance the instructional process (mastery experiences).

It appears that Cooper and Associates (1994) argument about productivity lays claim to the explanation behind why efficiency would not directly influence the collective efficacy of teachers. Officials in some school districts may be doing admirable work at being efficient with their funding. When calculating the SIR or SSR indices for school buildings, efficient schools will obviously be found along the higher end of the SIR or SSR continuum. However, just because school officials are targeting this money toward instruction does not mean that teachers are being paid adequately, facilities and classrooms they work in are being maintained, or that school personnel are receiving professional development experiences. Indeed, schools with higher levels of SIR may have arrived at these levels at the expense of other categorical areas (e.g., low funding for staff support and development or facilities and operations, low support for central office services).

This is where Cooper and Associates (1994) conceptualization of productivity enters the explanation. From their perspective, productivity must look at what school personnel are doing with the actual dollars allocated to instruction. That is, they defined productivity as the ratio of dollars per pupil directed toward instruction as compared to student performance results. In this framework, schools that are productive, that spend money and produce results, would provide a more complete picture of what is happening
in schools. Efficiency answers only a portion of the question that teachers need answered. More specifically, efficiency answers the question of effort while productivity answers the question of results.

Recognize that in Goddard et al.’s (2000) model of collective efficacy the consequences of collective efficacy serve as feedback and potential future sources for the formation of efficacy beliefs. If no recognizable results are being achieved within schools, over time, no matter how efficient schools are being run, lack of positive outcomes (mastery experiences) will definitely result in debilitating the efficacy of the group (Bandura, 1997).

In addition, more teachers may begin to doubt whether their efforts make a difference. They may become discouraged when they realize that no professional development is available to enhance their teaching or, that, once again, meager supplies will be available for their students. Accomplishing school wide goals may become more of an ideal while surviving day to day is the reality. Effort and persistence may wane and the result of all of these problems will be, according to social cognitive theory, decreased levels of the collective efficacy of the faculty (Bandura, 1986, 1997).

On the other hand, if schools use their funds productively then teachers may enjoy more mastery experiences. When great effort is being exerted by the teaching staff concomitant with the effort from students and the district office and measurable successful results are achieved, a basis for the building of strong collective efficacy beliefs has been established. When positive results are achieved teachers would tend to
set challenging goals, exert greater effort, and persist when they inevitably face challenges in their teaching. All of these consequences serve to foster and facilitate the growth of the efficacy of the group (Bandura, 1986, 1997).

Within this study, it appears that the efficiency question fails to address the complete picture that teachers’ view when they process their sources of efficacy. Adding Cooper and Associates’ (1994) conceptualization of productivity would appear to capture the entire landscape that teachers’ view as efficacy beliefs are formed individually and collectively. Indeed, as will be discussed shortly, the serendipitous findings of this study strongly support such an assertion.

**Student Instructional Ratio, Student Services Ratio, and Student Achievement**

The literature base is replete with studies that debate the issue of whether money matters in schools (e.g., Hanushek, 1991, 1994, 1997; Hedges, Laine, & Greenwald, 1994a, 1994b, Greenwald, Hedges, & Laine, 1994; Krueger, 2000). The position in this investigation was not whether money matters but *how* it matters. Herein it was posited that the effort schools and districts make in allocating resources for instruction or instruction plus pupil services compared to administrative and other support costs would have an indirect effect on student achievement through collective efficacy of teachers. No direct effect between SIR and student achievement or SSR and student achievement was theorized. When partial correlations were analyzed and no significant relationship was found to exist between SIR and student achievement or SSR and student achievement these findings supported past research and yet still left open the possibility of establishing an indirect effect between SIR and student achievement or SSR and student achievement.
It appears from this investigation that the amount of fiscal effort extended by schools to allocate resources directly to instruction or instruction plus pupil services compared to other school and central office expenditures does not have an influence on student performance. Cooper and Associates (1994) predicted this relationship when they offered the view that school systems that are efficient do not necessarily need to be improving student outcomes. In their view, school productivity is the means by which one can determine a relationship between monetary resources and student achievement. According to Cooper and Associates, and as mentioned previously, productivity is determined by examining the ratio of direct costs to specific academic or social outcomes.

Based on the findings of this study, it appears from Cooper and Associates’ (1994) conceptual framework that this investigation’s hypotheses, which included the relationship between SIR and student achievement and SSR and student achievement, were foreshadowed to fail. However, because no empirical evidence existed to refute the plausibility of these relationships and with what was offered as a reasonable rationale (see the end of chapter 2) to connect these research variables together, the relationship between SIR, SSR, and student achievement appeared worthy of closer examination.

Alas, no significant relationship was found. It appears from this investigation that school efficiency, as measured by SIR and SSR, does not correlate with the achievement of students. One plausible explanation: efficiency answers only one part of the problem. That is, efficiency must be examined along with the notion of productivity if the mystery behind the influence of money on student achievement is to be uncovered.
In order to see the complete picture, that is, the relationship between money and student outcomes, view the influence of monetary resources through both efficiency and productivity lenses. For example, the hypothetical case presented in chapter 3, which presented data for two different school districts (see Table 3.2 below), is useful to explain how this might be accomplished.

<table>
<thead>
<tr>
<th>School and District Office Functions</th>
<th>A Elementary School Expenditures ($)</th>
<th>A District Office Expenditures ($)</th>
<th>B Elementary School Expenditures ($)</th>
<th>B District Office Expenditures ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>500</td>
<td>450</td>
<td>700</td>
<td>650</td>
</tr>
<tr>
<td>Facilities and Operations Staff Development</td>
<td>60</td>
<td>900</td>
<td>40</td>
<td>1000</td>
</tr>
<tr>
<td>Pupil Support</td>
<td>2000</td>
<td>40</td>
<td>1800</td>
<td>50</td>
</tr>
<tr>
<td>Classroom Instruction</td>
<td>5000</td>
<td>0</td>
<td>6000</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7680</strong></td>
<td><strong>1395</strong></td>
<td><strong>8690</strong></td>
<td><strong>1710</strong></td>
</tr>
</tbody>
</table>

Table 3.2: Hypothetical Expenditures for School Districts A and B in the State of Ohio.

Recall, that when SIR and SSR were calculated for these two school districts, school district A (SIR = 2.56 and SSR = 3.37) was found to be more efficient than school district B (SIR = 2.45 and SSR = 3.00). However, notice that school district B spends, on average, $1000 more per student than school district A. Hence, even though school
district A may be more efficient with its funds, the efficiency of the school may not trump the ability of school district B to use those extra $1000 per student to purchase more teachers for smaller class sizes, more textbooks, better classroom supplies and equipment, and so forth. Hence, with the additional resources or potentially higher quality of resources, school district B may enjoy higher student academic achievement than school district A.

In fact, in most schools in the nation one would hope to find schools that have very little resources to be allocating as much funding as possible into instruction compared to other areas of the budget (e.g., facilities or administration). This approach would, by the conventions posited within this study, yield a fairly high SIR and SSR. Conversely, school districts that enjoy a wealth of resources not only may allocate a large amount to instruction but also may allocate substantial amounts of funds to support services. Again, relative to the prior example and the hypothetical example presented above, this scenario would yield a potentially lower SIR and SSR. Hence, one would expect in the public schools of America to find schools with meager resources to be more efficient with those funds but not necessarily enjoy great performance from their students just because of the efficient use of those funds.

So, what is to be done? The goal would be to establish greater fiscal efficiency along with higher productivity. That is, find those schools that have high levels of SIR and SSR accompanied by some adequate standard for pupil expenditures for instruction that yields high student achievement. This scenario would present the most advantageous situation for any school district to be in with respect to accountability and adequacy principles. The school district is offering results with an adequate amount of money to
accomplish those results. The next obvious question: What is an adequate level of funding? This is the question that has been and will continue to haunt the statehouses and courthouses throughout the nation. Although tempting to speculate, it is left for future research to determine what may be considered an adequate level of funding for schools.

Nevertheless, harkening back to the hypothetical example from above, one way to determine whether school district B is more productive than school district A is to test the hypothesis that dollars allocated directly to instruction has a positive relationship with student achievement scores. Fortunately, Cooper and Associates (1994) tested that hypothesis in their study and did find such a relationship. Absent any significant findings between fiscal efficiency and student achievement within this study, the instructional dollars and student achievement question was put to the test. The discussion of these findings is offered in a forthcoming section.

*Student Instructional Ratio, Student Services Ratio, and Socioeconomic Status*

The findings surrounding SIR, SSR, and SES provided mixed results. It appears that the students’ level of SES is positively correlated and has a direct effect (based on Models 3 and 4) on the extent to which school districts allocate money directly to instruction plus pupil services (SSR) compared to administrative and other support costs. However, the same conclusion may not be reached about the relationship between SES and SIR. That is, no correlational evidence was found to support a relationship between the two variables. Furthermore, in Models 1 and 2, no significant effect was established between SES and SIR.

An explanation for these relationships may be found at the most fundamental level. School districts serving students in population areas where more money is available
for schools may have the ability to use their funding for not only instruction but also student support services. Recall that SSR includes a ratio of money allocated to instruction *plus pupil services* compared to all other categorical costs at the building and central office levels. Populations with higher levels of SES tend to have more tax dollars available for their schools. These tax dollars translate into more services for students—for example pupil support services (counselors, psychologists, therapists, etc.) and, hence, higher SSR levels. The assumption placed within this explanation is that relatively speaking, school districts serving populations with higher levels of SES tend to allocate a similar proportion of their funds to the central office and administrative and facilities operations at the building level as their colleagues who serve students with low SES levels. This seems to be the case because in order to reach high levels for SSR high values in the numerator (instruction plus pupil support) would need to be accompanied with relatively low values in the denominator (all other categorical funds).

Conversely, SIR is a ratio that includes money allocated to instruction compared to funds expended on administration and facilities at the building level as well as other categorical funds from central office. Unlike the SSR formula, student services at the building level are not a component of the SIR formula. Hence, populations that serve families with lower SES levels may tend to spend more on instruction compared to their counterparts in higher SES areas because they do not have the ability to spend it in other support areas (like pupil support services). No direct relationship would be found because school districts that serve both low and high SES levels would both need to allocate as much money to instruction as possible. In short, SIR is not influenced by the social or economic background of the students in the school district. All districts are expected to
allocate the most money for instruction compared to other administrative and support costs. This study found no statistically significant relationship to advance the notion that districts which serve wealthier populations exert greater effort for efficient use of their funding with respect to the instructional process.

*Instruction, Collective Efficacy of Teachers, and Student Achievement*

Lacking any significant findings that revealed a statistical relationship between SIR and collective efficacy or SSR and collective efficacy, the author elected to test Cooper and Associates’ (1994) question about productivity. That is, would actual dollars allocated to instruction make a difference on student achievement scores? However, in this study, unlike Cooper and Associates’ investigation, a direct link between instructional dollars and achievement was not of great interest. Indeed, recall the uniqueness of this work is building a model of student achievement that includes inputs, processes, and outputs. Therefore, instead of investigating the direct effect of per pupil expenditures on student performance, the desire was to determine whether collective efficacy of teachers enabled an indirect relationship between instructional dollars and student achievement.

As the findings demonstrated (Figure 4.7 and 4.8), collective efficacy did serve to enable an indirect effect between money allocated to instruction and student achievement scores. Specifically, in Model 7, a 1 standard deviation increase in instruction may result in a .13 standard deviation increase in the collective efficacy of the faculty. In turn, a 1 standard deviation increase in collective efficacy of teachers may result in a .21 standard deviation increase in 2002 Math mean scaled scores. Taken together—that is, calculating the indirect effects of instruction through collective efficacy of teachers, a 1 standard
deviation increase in instruction has the potential for a .03 standard deviation increase in student achievement, holding prior academic achievement and SES constant. The results for Model 8 yielded extremely similar results.

What does this mean? In this study a one standard deviation increase in instructional dollars is equivalent to $842.29 (see Table 4.2) and a one standard deviation increase in the 2002 Math mean scaled scores is 13.53 points (see Table 4.3). Based on the results specified above for Model 7, if schools expended approximately $842 more per pupil the net average effect on student achievement scores (that is, 2002 Math) is .41 points (.03 × 13.53). For Model 8, the results reveal that investing approximately $842 more per pupil at the building level in instruction may yield the net average effect on student reading achievement scores of .23 points (.03 × 6.95).

Although not substantial, these findings do lend support that monetary resources do hold influence on student achievement scores through the processes within schools. Also, the results do not directly support Cooper and Associates (1994) work because recall that they examined and found a statistically significant direct relationship between instruction and student SAT scores. Here, no direct relationship was found between money and student achievement. However, it appears the findings from this investigation prove of greater worth because the models tested included the generally neglected component of the educational system: process variables.

From a different perspective these results should not come as a surprise because all money allocated to schools is transformed into some type of either investment into human capital (teachers salaries and benefits) or physical capital (facility upgrades). What is particularly useful about this investigation is the knowledge gained about
collective efficacy and its relationship with the other variables. In particular, within the 146 elementary schools participating in this study, monetary resources allocated to each school building had an indirect effect on student performance on mathematics and reading proficiency exams through the collective efficacy of teachers holding the SES and prior academic achievement of students constant.

As this chapter comes to a close, these serendipitous findings along with the others discussed above, proved highly relevant and applicable to theory, practice, and future research.

Theoretical, Practical, and Research Implications

The value of this investigation is found in its implications for theory, practice, and future research. The following sections address each of these broad topics in light of the specific findings that were previously discussed.

Theoretical

Of most significance to the theoretical base undergirding this investigation is the evidence that found support for the relationship between collective efficacy and student achievement. Even though collective efficacy of teachers is still developing as a research variable, past studies (Bandura, 1993; Goddard et al., 2000) and the present investigation continue to provide conclusive evidence of its power in the educational system. In short and based on the evidence presented herein, this study validated Bandura’s (1986, 1997) social cognitive theory and Goddard et al.’s (2000) theoretical model of collective efficacy.

Along with this validation came implications for theory surrounding the educational system. Specifically, these results support the open systems model of
schooling (Hoy & Miskel, 2001). The educational system may be considered a complex arrangement of inputs, processes, and outputs. Unraveling the relationships that exist between these three components and the variables conceptualized within each has consumed the work of educational researchers for decades (Hoy & Miskel, 2001). This study, with the use of its several structural models, has attempted to forge new ground and provided evidence to support this new undertaking by investigating the relationship between input, process, and output variables.

Some intriguing results, namely those which involved instruction, collective efficacy of teachers, and student achievement, should draw attention from the research community. More study on this and other input, process, output relationships should be advanced. If the theoretical base surrounding an open systems approach to education is to be expanded then this study has offered one way to accomplish this challenging task.

This study has, to some extent, supported Cooper and Associates’ (1994) conceptualization of school efficiency and school productivity. In particular, the findings do suggest that it is the productivity of schools and not necessarily the efficiency of schools that make a difference in student outcomes—adding that it is through the processes happening within schools that this difference is enacted. However, the position advanced here is that both efficiency and productivity matter. Because resources are limited within any economic framework the efficient and productive use of those resources should consume the attention of those entrusted to care for those resources as well as those that use them. The ultimate goal for schools would be to attain greater efficiency along with greater productivity. A theoretical framework has been established (that is, Cooper and Associates) more investigations need to follow.
In sum, this study has validated the theories which have supported it (that is, social cognitive theory by Bandura, 1986, 1997 and collective efficacy of teachers theory by Goddard et al., 2000), advanced the understanding of the theory that contextualized it (that is, open systems theory by Hoy & Miskel, 2001), and provided evidence for the finance theory that motivated it (that is, efficiency and productivity by Cooper & Associates, 1994). The following section examines the practical implications for this research.

Practical

The findings from this study give rise to a multitude of practical implications. First, appealing to educators are the findings surrounding collective efficacy. Because SES and prior student achievement are not directly in the control of educators, collective efficacy of teachers—a variable more open to direct influence within the educational system—holds promise as a mechanism by which educators may enact change and influence the achievement of the students in their care. If educators became more aware of the concept of collective efficacy of teachers and more aware of its sources and how it might be strengthened, according to the results of this study and other past findings (Bandura, 1993; Goddard, 1998; Goddard et al., 2000; Hoy, Smith, et al., 2002; Hoy, Sweetland, et al., 2002), the improvement of student achievement is most likely to follow. However, the task of strengthening the collective efficacy of the faculty is not, as this investigation has noted, an easily obtainable goal.

Nevertheless, educators must press forward with a desire to improve achievement for all of their students. Using data-based decision making (verbal persuasion), offering thoughtfully planned professional development experiences (vicarious experiences), and,
of course, ensuring that teachers are placed in positions so that they may succeed (mastery experiences) in their teaching will all aid, according to the sources of efficacy espoused by Bandura (1986, 1997), in strengthening the collective efficacy of a faculty.

In addition, past research has found that involving faculty in decisions relevant to the teaching process may also aid in bolstering this important organizational level component of the school culture (Goddard, 2002). Indeed, as Goddard stated, “When groups have a say over their collective future, they tend to have higher levels of collective efficacy” (p. 181).

Other findings from this study that may be of particular interest to educational leaders would be those associated with fiscal efficiency. Even though efficiency may not have a direct influence on student achievement and it was not shown to have an indirect influence on achievement through the collective efficacy of teachers, does not mean efficiency is irrelevant. On the contrary, the present state of affairs in this nation is demanding for educators to be held more accountable for results. Demands for results will not necessarily be followed by an increased level of funding into the system. Indeed, for many decades educators have been receiving additional funds into their budgets and now the question is being asked: where are the results (Ladd & Hansen, 1999)? Educators may need to achieve those results with the resources they have. In order to accomplish this feat, educators must raise their awareness on how funding is being allocated. In short, educators must be more efficient with the resources they have.

The SIR and SSR measures are one simple way educators may calculate the efficiency of their schools. Findings from these analyses may generate additional
investigations into school processes and these investigations may end with conversations where decisions are made to allocate resources more efficiently.

Yet, recall that the important finding in this study was actually the result of answering a question that had failed to be asked at the beginning: How important are monies allocated directly into the classroom? The relationship statistically established between instruction, collective efficacy of teachers, and student achievement, should be of great import to educational leaders. Not so much because money was found to matter in the educational system, but rather how it mattered. In this particular case, money was found to matter through the perceptions of educators in their ability to positively influence student outcomes. Money mattered on how it was allocated, or perceived to be allocated to the instructional process.

Knowing this, educational leaders may use the limited resources they have to target ways to improve the collective efficacy of their faculties. However, like in any other approach for improving student achievement, the argument made here is not to place collective efficacy of teachers as a panacea for the problems plaguing education. To be sure, much more work must be done on the study of this organizational level characteristic of a faculty. However, while the study of the concept will continue, educators should move forward embracing the results offered here and from other research studies (Bandura, 1993; Goddard et al., 2000) that have shown collective efficacy to be a key variable in improving student achievement.

In short, this study provided evidence to support the view that money allocated directly to instruction had an indirect influence on student achievement through the collective efficacy of teachers. Educators would be wise to learn more about the
collective efficacy concept and find ways to strengthen its influence within their respective schools. With that challenge given, the research community is invited to carefully examine the results of this study. In the next section, the author offers a series of questions and issues to consider that may serve to guide further research on the theories, concepts, and principles presented within this investigation.

Research

In terms of implications for research, this study has opened a path for future inquiry on any number of topics. From using different statistical or measurement methodologies or including additional variables into the structural models to examining the current data set more closely the following list of suggestions will guide additional research on the variables and conceptual models advanced within this study.

1. This study used data collected from a set of elementary schools within the state of Ohio. Would changing the school setting influence the findings? Bandura (1997) asserted that the degree to which an organization is tightly or loosely coupled may influence the collective efficacy within that organization. Would similar results be found if this study were replicated within the middle or high school settings?

2. Many highly sophisticated approaches to measuring school efficiency are available (for example, quadriform analysis, ratio analysis, and data envelopment analysis (Swanson & Engert, 1991; King et al., 2003)). If other methods for measuring efficiency were utilized, how would this affect the results?
3. It was proposed in this study that it is the combination of efficiency and productivity that would yield the best results for schools. Based on this reasoning, an approach should be taken to reanalyze this data and examine those schools that would be characterized as both highly efficient as well as highly productive. Perhaps on site visits to these schools might reveal practices that are similar. These practices might help struggling schools or at least provide insight into improving current practice. That being said, what common practices might be found within schools that rank high on the SIR and SSR continuum along with producing strong results with respect to student achievement?

4. In a recent paper presented by Goddard, Hoy, & LoGerfo (2003), collective efficacy of teachers was found once again as a key predictor of student achievement in a variety of other disciplines other than mathematics and reading—namely, science, social studies, and writing. In addition, these researchers also included school size and urbanicity as independent variables and antecedents of collective efficacy. Goddard, Hoy, et al.’s study models the need to look at different antecedent variables of collective efficacy as well as different student outcomes other than the traditional math and reading achievement scores. How might the current investigation be improved if other antecedent or consequence variables of collective efficacy were included? For example, academic press—the extent to which a school strives for excellence in academic work—has been found to be an important predictor of student achievement (Goddard, Sweetland, & Hoy, 2000; Hoy, Smith, et al., 2002). How might adding
this variable or other process variables to the model generate greater understanding about the educational system? For that matter, how might adding additional input variables, like average teacher’s years of experience (Cooper & Associates, 1994) or study body composition (Bandura, 1993) improve the current model?

5. “To date, no system of estimating resources utilized for each student [emphasis added] has been devised … The development of true ‘student-level’ financial measures of resources is crucial to understand questions of adequacy, equity, and productivity, and will be essential to our emerging view of financial reporting in the millennium” (Fowler, 2001, p. 43). How might this type of accounting system, that is, one which can trace expenditures to the actual student help the educational system? Moreover, if one merged this view with those espoused by Sanders and Horn (1998), who have used a value-added approach (that is, an approach which examines individual student achievement gains over time) to examining student achievement, then it might be possible for schools to determine how much it costs to educate each child and determine what results are linked to those costs.

6. In light of the questions asked about adequacy within this study, more questions and research must continue to be asked. With no pun intended, what is an adequate operational definition for the principle of adequacy for the public school system? May adequacy only be approached or can it truly be achieved? Once it is achieved, how will one know it?
7. Because this study revealed a relatively small effect between instruction and collective efficacy of teachers and an even smaller indirect effect between instruction and student achievement—more emphasis in future studies may want to examine other process variables which may capture more of the variance in student outcomes. However, when other processes are explored, researchers should be careful to examine these variables in light of other input variables, especially those linked with money.

8. Instructional dollars directed to the building are, for the most part, comprised of teachers and other paraprofessional’s salaries and benefits. So, when talking about instruction as a variable, does this variable actually represent teacher’s salaries in disguise? If so, what will this mean for future research?

9. Perhaps another statistical methodology would be more appropriate to analyze the data. For example, Hierarchical Linear Modeling was successfully used by other researchers who examined the influence of collective efficacy (e.g., Goddard et al., 2000) on student achievement. Would using a different methodology refine the results?

10. A follow-up qualitative study on the schools within this sample may help to reveal the practices that are occurring in highly efficient and highly productive schools. Taking a small sampling of schools that meet this criteria and spending a
substantial amount of time with the faculty, students, administrators, and parents may help to understand how efficiency and productivity may work together to improve student achievement.

11. How might this study aid in closing the achievement gap? How might the questions or hypotheses that guided this study be adjusted so that the issues which undergird the achievement gap may be brought to light? Would a closer look at the data reveal that students who attend schools where overall student achievement is poor receive a substantially less amount of money directed toward instruction compared to students who attend schools that reflect strong student achievement? That is, will dollars allocated to instruction tend to be lower for schools that evidence a wide achievement gap for their diverse groups of students? Would examination find that students at low performing schools are generally run inefficiently by the conventions presented within this study? Or, would the evidence run counter to these notions?

12. Where does this study land in the great debate on whether or not money matters? How might Hanushek, Monk, Odden, and even Cooper respond to these findings? For that matter, how might some of those who have questioned Hanushek’s findings view these results, for example Hedges, Laine, Greenwald, or Krueger?

13. What does the future hold for the construct of collective efficacy of teachers? It is still considered a relatively new concept on the educational research landscape.
Will new conceptualizations appear? How might it be challenged considering its close relationship with SES? Will Goddard’s 12-item short form (2002a) face possible refinement as more knowledge about the concept emerges? Although these questions are appropriate, it appears that the concept of the collective efficacy of teachers has a healthy line of research in its future.

These questions and many others may be raised as the issues brought forth in this investigation continue to be examined into the future. It appears this research has sprung forth fruitful results that need more attention and continued examination. The thirteen suggestions for future inquiry delineated above certainly provide an adequate foundation for such a task.

Conclusion

The desire of this investigation was to offer new knowledge about a set variables theorized to be related in an input-process-output model of the educational system. In taking on this challenge, three variables were carefully selected from the extant literature base: school efficiency (SIR and SSR), collective efficacy of teachers, and student achievement. Along with these organizational level variables two important control variables, SES and prior student academic achievement, were introduced into the model. In the end, four theoretical models were presented and tested. The outcomes of these analyses lead to mixed results.

Of most promise were those associated with the relationship between the collective efficacy of teachers and student achievement. In part, this study confirmed past research, which examined the same relationship and found, more specifically, that the collective efficacy of teachers within 146 elementary schools in Ohio has a positive direct
effect on student reading and mathematics achievement. However, this study also discovered that no significant relationship was found between school efficiency and collective efficacy of teachers. To explain the lack of a relationship between efficiency and achievement the author utilized Cooper and Associates’ (1994) conceptualization on productivity within schools. Applying their framework to this study, it was advanced that school productivity provided a more complete picture for teachers as they developed their perceptions about how they might exert their combined effort to influence student performance.

Based on this assertion, this investigation added an exploratory component by investigating the relationship between direct money allocated to instruction, collective efficacy of teachers, and student achievement. Results from testing two additional structural models supported such a relationship, namely that collective efficacy of teachers enabled an indirect relationship between money allocated to instruction and student achievement.

Taken together, these findings provided a rich array of theoretical, practical, and research implications. In sum, it appears that as the educational community searches for answers to improve student achievement in schools this quest should include applying the knowledge gained in this investigation not only about the powerful predictive variable of collective efficacy of teachers but also about the approach for studying the educational system—that is, utilizing an input-process-output model. Furthermore, the questions about whether money matters in school should be refined by examining how money is used (efficiency) and what are the results that come with that use (productivity).

Regardless of how long this journey for solutions may take, the effort will be worth it
because it may prove to spring forth results—most notably, better results that may serve to benefit all students in all classrooms across this great country and throughout the world.
APPENDIX A

GOODNESS OF FIT CRITERIA FOR THE THEORETICAL MODELS OF STUDENT ACHIEVEMENT

<table>
<thead>
<tr>
<th>Selected fit measures with recommended parameters</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Fit Function Chi-Square (P &gt; 0.05)</td>
<td>P = 0.87</td>
<td>P = 0.97</td>
<td>P = 0.47</td>
<td>P = 0.63</td>
</tr>
<tr>
<td>Root Mean Square Error of Approximation (RMSEA &lt; 0.05)</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Goodness of Fit Index (GFI &gt; 0.90)</td>
<td>1.00</td>
<td>*</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Adjusted Goodness of Fit Index (AGFI &gt; 0.90)</td>
<td>1.00</td>
<td>*</td>
<td>0.98</td>
<td>0.99</td>
</tr>
<tr>
<td>Standardized Root Mean Squared Residual (RMR &lt; 0.05)</td>
<td>0.002</td>
<td>*</td>
<td>0.008</td>
<td>0.005</td>
</tr>
</tbody>
</table>

Degrees of Freedom = 1  
N = 138

*LISREL output supplied a “perfect fit” message. The value of the Chi-square and RMSEA provided strong evidence for a good fit for model 2.
### APPENDIX B

GOODNESS OF FIT CRITERIA FOR THE EXPLORATORY MODELS OF STUDENT ACHIEVEMENT

<table>
<thead>
<tr>
<th>Selected fit measures with recommended parameters</th>
<th>Model 7</th>
<th>Model 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Fit Function Chi-Square (P &gt; 0.05)</td>
<td>P = 0.58</td>
<td>P = 0.14</td>
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<tr>
<td>Root Mean Square Error of Approximation (RMSEA &lt; 0.05)</td>
<td>0.0</td>
<td>0.09</td>
</tr>
<tr>
<td>Goodness of Fit Index (GFI &gt; 0.90)</td>
<td>1.00</td>
<td>.99</td>
</tr>
<tr>
<td>Adjusted Goodness of Fit Index (AGFI &gt; 0.90)</td>
<td>0.99</td>
<td>.91</td>
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<tr>
<td>Standardized Root Mean Squared Residual (RMR &lt; 0.05)</td>
<td>0.006</td>
<td>0.016</td>
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</table>

Degrees of Freedom = 1  
N = 138

Amended Substitute Senate Bill 1, 123rd Ohio General Assembly, (2001).


DeRolph v. State, 78 Ohio St.3d 193 (1997).

DeRolph v. State, 89 Ohio St.3d 1 (2000).

DeRolph v. State, 93 Ohio St.3d 309 (2001).

DeRolph v. State, 97 Ohio St.3d 434 (2002).


Esselman, M. E., & Moore, W. P. (1992, April). In search of organizational variables which can be altered to promote an increased sense of teacher efficacy. Paper presented as the annual meeting of the American Educational Research Association, San Francisco.


222


Spink, K. S. (1990). Collective efficacy in the sport setting. Special Issue: The group in
sport and physical activity. *International Journal of Sport Psychology, 21*, 380-
395.

district effect and efficiency. Buffalo, NY: Graduate School of Education

Tracz, S. M., & Gibson, S. (1986, November). Effects of efficacy on academic
achievement. Paper presented at the annual meeting of the California Educational
Research Association, Marina Del Rey, CA.


   http://www.ccsso.org/introprofile.html


Government Printing Office.


   www.ed.gov/offices/OESE/reference

Washington, DC: U.S. Department of Education, National Center for Education
Statistics.


Woessmann, L. (2002). Schooling resources, educational institutions, and student performance: The international evidence (Kiehl working paper No. 983 (revised version)). Kiehl, Germany: Kiehl Institute of World Economics.


