TEACHER AND SCHOOL FACTORS INFLUENCING COLLECTIVE TEACHER EFFICACY IN

ELEMENTARY SCHOOLS

by

BRENT JEFFREY ROBERTSON

(Under the Direction of Jay Rojewski)

ABSTRACT

Collective teacher efficacy has shown promise as a predictor of student achievement. Although individual self-efficacy and teacher efficacy research is prevalent, less is known about how the collective self efficacy reflecting a group of individuals interacts with student achievement. This descriptive study used survey design to gather data and multiple correlation analysis for data analysis, as well as, multiple regression to relate collective teacher efficacy to student achievement. Two groups of factors related to collective teacher efficacy included: school-related (age, size, SES and school wide achievement on Criterion Referenced Competency Tests in mathematics and reading), and teacher factors (teaching experience total, teaching experience at present location, professional experience outside of education, path to teacher certification, and highest level of education attained).

Social cognitive theory was the theoretical framework for this study. This framework explains how individuals acquire and maintain specific behavior patterns. While the theory is well represented in the literature for individuals, much less has been hypothesized with social cognitive theory for a group as the unit of analysis.

Findings showed that collective teacher efficacy could not predict student achievement, above and beyond the strong influence of school socioeconomic status. School related environmental factors described collective teacher efficacy stronger than individual teacher factors for this study. Collective teacher efficacy was best described by school socioeconomic status, school enrollment and teacher experience at present location.

Recommendations for future study included: sampling at different times of the school year, identifying schools from this study with extreme scores in collective teacher efficacy for future research employing qualitative research methods, further analysis of this data set at the item level to further define this construct, and examining the relationship between collective teacher efficacy and job satisfaction.

INDEX WORDS: Collective efficacy; Multiple correlation analysis; Survey design; Teacher experience; Social cognitive theory; Unit of analysis; Elementary schools; Education

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DEDICATION

I would like to dedicate this work to my sons, Cole and Jack. I love you dearly. Thank you for your epistemologies, ideologies and companionship. Thank you to my wife, Pamela, for enduring me all of these years. I also want to thank the faculty and staff of Norcross High School. I never really knew how sublime collective teacher efficacy could be until I began working there in the fall of 2004. I also want to thank Colin Martin and the Gwinnett County Public Schools for allowing me to conduct this research in your fantastic organization. Finally, thank you Mom, Dad, Mark, and Brooke. Your encouragement was enlivening.

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CHAPTER 1

INTRODUCTION

In the dynamic landscape of the 21st century workforce, organizational behaviors, in general, and the collective perception of individuals that stated organizational goals can be achieved, specifically, have been studied in an effort to make employees and their organizations more competitive in a global environment (Ntshoe, Higgs, Wolhuter, & Higgs, 2010). Educational institutions are not immune from external pressures that require coordinated group efforts to achieve quality outcomes (Lakes, 2008; Park & Datnow, 2009). In order to better understand the collective nature of individual employee's shared perceptions, the concept of collective efficacy was developed to reflect a groups' shared belief in its conjoint capabilities to execute and organize courses of action required to produce given levels of attainments (Bandura, 1997).

Given the possible importance of collective teacher efficacy in schools and the limited scholarly research on this construct (Goddard & Goddard, 2001; Goddard, Hoy, & Woolfolk Hoy, 2004; Pajares, 1997), this study described the relationship between selected variables and collective teacher efficacy in a large suburban Georgia school district's elementary level (K-5) teachers. Additionally, this study attempted to confirm the results of previous studies (Bandura, 1993; Goddard, 2001; Hoy, Sweetland, & Smith, 2002) where collective teacher efficacy was shown to be a significant predictor of student achievement above and beyond the influence of socioeconomic status.

Collective teacher efficacy is anchored in social cognitive theory (Bandura, 1997), which states that all efficacy beliefs, whether individual or collective, are future-oriented judgments about capabilities to organize and execute courses of action required to produce given attainments in specific situations or contexts. For my study, collective teacher efficacy refers to the perceptions of the K-5 teachers in one school district that, as a group, they can execute courses of action resulting in attaining student academic achievement standards delineated by the College and Career Readiness Performance Index (CCRPI).

CCRPI is part of the Georgia Department of Educations' waiver proposal to federal No Child Left Behind legislation. Student achievement components for meeting these requirements are achieved in elementary schools in Georgia via the Criterion Referenced Competency Tests (CRCT) administered in the spring of each academic year (Georgia DOE Website, 2012). The perceived collective efficacy of elementary teachers in their respective schools is the dependent variable and was measured by the *Collective Efficacy* scale (Goddard, 2002).

Previous studies have focused on the indirect relationship between teachers' collective efficacy and student achievement in reading and mathematics (Bandura, 1993; Goddard, 2001). In a study of 79 elementary schools, Bandura (1993) described a pattern between hypothesized influences among factorially-verified indices of teacher and student body characteristics, collective teacher efficacy, and prior level of school level achievement. Standardized measures of end-of-year student achievement in reading and mathematics were used. A negative relationship was detected using path analysis that accounted for approximately 20% of the variance between lower socioeconomic status schools and teachers' constructive sense of instructional efficacy. A positive relationship accounting for almost 12% of the variance between teachers' collective efficacy and students' academic achievement was also reported, while controlling for student race/ethnicity and socioeconomic status.

Goddard (2001) examined the relationship between collective teacher efficacy and school differences in student achievement after controlling for past student achievement. Mastery experience was related to collective teacher efficacy, and the variability of faculty perceptions of collective teacher efficacy. Construction of the school-level collective teacher efficacy variable used a two-stage process that calculated a mean for each item of the 21-item Collective Efficacy scale (Goddard, Hoy, & Woolfolk Hoy, 2000) items from each school's set of instructor surveys and a school-wide standard deviation to represent a degree of consensus on each item. Because both school and individual variables were used, Goddard was faced with a unit of analysis problem, which is a recurring problem in all collective teacher efficacy research (Goddard et al., 2004; Pajares, 1997). Lindquist (1940) recognized this problem in educational and behavioral studies, namely, where individuals are used as the statistical unit of analysis

when a treatment or construct is applied to a class or group of individuals. Conversely, Sirotnik (1980) suggested that sociologists interested in correlations at the individual level often times employ data compiled over aggregates, such as communities or other social entities. Collective teacher efficacy is, by its nature, a groups' construct (Bandura, 1993; Goddard, 2004; Hoy & Miskel, 2008). Therefore, I aggregated individual teacher's responses to the school group level.

Citing the effect of ordinary least squares analysis used at the school level masking considerable variance in student characteristics within schools, Goddard (2001) reported that 26.6% of the variance in students' mathematics scores and 19.5% of the variance in reading scores occurred between schools. Hierarchical linear modeling was used to obtain these results. To explain the observed variation, Goddard employed hierarchical linear models to show that collective teacher efficacy was significantly and positively related to the between-school differences in student reading and mathematics achievement.

Despite this emergent research, much is yet to be understood about factors that are related to the collective teacher efficacy. Goddard et al. (2004) posited that of the three efficacy beliefs currently being studied by educational researchers—student, teacher and teachers' beliefs about the collective efficacy of their schools—it is the latter that is the most recent construct developed and the one receiving the least amount of attention from educational researchers. Hoy et al. (2002) hypothesized that collective teacher efficacy was positively associated with school achievement in mathematics. Although their research confirmed the hypothesis using path analysis, they called for additional research to describe the factors associated with, contributing to, and promoting collective teacher efficacy.

Bandura (1997) reasoned that most occupational activities are targeted at group goals achieved in organizational structures through collective effort. In a workforce education study, workgroup responses and analysis are germane to describing collective teacher efficacy. Additionally, the positive exercise of collective action requires more complex, socially-mediated paths of influence than what is required in individual self-direction (Bandura, 1997). Thus, a study of the collective view of efficacy beliefs is appropriate for both theoretical and practical aspects of educational research. I described a specific district's teaching force and their respective environments in terms of collective teacher efficacy.

Faculty's education, training, and selected individual faculty factors provided additional information to an otherwise limited set of data and research on collective teacher efficacy. Research literature specifically calls for more studies on collective teacher efficacy (Bandura, 1993; Fives & Looney, 2009; Goddard & Goddard, 2001; Goddard et al., 2004).

Purpose of Study

I described the construct of collective teacher efficacy by (a) measuring the influence of selected individual and school factors on this construct for elementary teachers in a suburban school district, and (b) analyzed the influence of collective teacher efficacy on school wide student achievement scores. The dependent variable was measured by Goddard's (2002) Collective Efficacy scale. The instrument focused on teachers' perceived collective efficacy towards a specific attainment, i.e., meeting the student achievement benchmarks for proficiency in the College and Career Readiness Performance Index (CCRPI). Individual teachers' collective efficacy scores were collapsed into a single school-level score for each elementary school in the district. In collective teacher efficacy research, the unit of analysis is at the group-level or in this case the school-level (Bandura, 1997, Tschannen-Moran & Barr, 2004). The school district contained 78 elementary schools within a unified K-12 school district. Data revealed relationships between teachers' collective efficacy to five environmental school factors-and five individual teacher factors.

Factors that may influence collective teacher efficacy were selected to reflect two categories of influence. The first category of factors reflected the school environment and inherent school characteristics. The second category reflected individual teacher factors, i.e. the transferable traits that individual employees bring to an organization. These two groups of factors were selected because of the dual nature of collective teacher efficacy. On one hand, collective teacher efficacy is measured by the perceptions of individuals who comprise a group. However, collective efficacy describes individual evaluations of the groups that they are a part (e.g., the school). Additionally, this study hypothesized that individual teacher factors would be manifest in Bandura's (1977b, 1986, 1997) mastery experience proposition, and school factors would be manifest in physiological and affective states.

Multiple correlational analysis (MCA) was used to determine the relationship of selected factors with collective teacher efficacy. An advantage of using this technique is that different composites of independent variables can be examined to determine the variable or group of variables that have the strongest composite correlation with the dependent variable (Huberty & Hussein, 2001). In this way, latent constructs, as well as the hypothesized groupings of variables, were identified from the selected factors used for the analysis.

School factors included: the socioeconomic status of each school, operationalized by the school-level percentage of free and reduced price lunch participation; school size determined by student enrollment; age of the school building facilities; and past and present achievement based on school means of Grade 3-5 Criterion Referenced Competency Test (CRCT) results in reading and mathematics for school years 2011-2012 and 2012-2013, respectively. Individual teacher factors chosen were years of professional teaching experience, years of teaching experience at current location, years of professional experience outside of education, highest educational degree obtained (bachelors, master, specialist, or doctorate), and credentialing path operationalized by the Georgia Professional Standards Commission (GAPSC-four categorized paths). These factors were chosen for their significant influence in prior studies on collective efficacy (Bandura, 1993; Hoy et al., 2002).

Independent variables provided a unique examination of the influence of selected factors on what Hoy et al. (2002) call an explanatory system, e.g., a system that can identify and describe an organization's strengths and weaknesses (i.e. collective teacher efficacy) as measured by the individual members' response. By using an appropriate research design, selected covariates were analyzed with respect to their influence on perceived collective efficacy. Analysis of the correlations between individual teacher factors and factors relating to the environment of the school (which may be considered to be outside the teachers' control) were also possible via subscales within the Collective Efficacy scale.

The purpose of this study also pursued the promise of previous collective teacher efficacy research (Bandura, 1993; Goddard, 2001; Goddard and Skrla, 2006; Hot et al., 2002) where a positive influence on student achievement was shown to be significant. These studies posited that collective

teacher efficacy influences school norms and organizational structure that motivate persistence. Hoy and Sabo (1998) suggested since the Coleman Report (Coleman et al., 1966) it has been difficult for educational researchers to identify constructs other than socioeconomic status that have a significant independent effect on student achievement. Although multiple correlation analysis is appropriate to describe psychological constructs, it should not be employed to predict (Huberty & Hussein, 2001). A multiple linear regression model was employed to determine collective teacher efficacy's influence on student achievement. Pedhazur (1982) suggested multiple regression models, used wisely, can play an important role explaining the analysis of effects in nonexperimental research.

Research Questions

1. What is the influence of collective teacher efficacy on school wide student achievement?

2. Do selected independent factors account for a greater proportion of the variance of collective teacher efficacy than what would be expected by chance?

3. What are the correlations of independent teacher factors and school-level factors with collective teacher efficacy in elementary schools?

4. Besides individual teacher factors and school-level factors, are there any latent composites of the selected variables that describe collective teacher efficacy in elementary schools?

5. What is collective teacher efficacy in elementary schools, and how can this description help build a deeper understanding why this construct influences the development of strong school climates?

Theoretical Framework

The framework used to study the collective teacher efficacy of elementary school teachers was social cognitive theory (Bandura, 1977a, 1986, 1997). This theory states that all efficacy belief constructs—student, teacher and collective—are future-oriented judgments about capabilities to organize and execute courses of action required to produce given attainments in specific situations or contexts. Collective teacher efficacy in this study was viewed as elementary school teachers' conjoint future judgments about capabilities to organize and execute specific organizational curricular goals. The specific

goals chosen reflect student achievement benchmarks detailed under the Georgia College and Career Readiness Performance Index (CCRPI, Georgia Department of Education web site).

Although there are several lenses to view the psychosocial functioning of human behavior (e. g. Harter, 1975; White, 1959), social cognitive theory differentiates itself in several respects. First, social cognitive theory explains psychosocial functioning using a triadic reciprocal causation model (Bandura, 1986). The three determinants in triadic causation are behavior, interpersonal factors such as cognitive, affective and biological events, and finally, the external environment. This differs from effectance motivation theories like those proposed by White in that in social cognitive theory behavior, effort and persistence are posited to be extensively regulated by beliefs about personal efficacy rather than effectance drive. Secondly, social cognitive theory differentiates self-efficacy from self-esteem. No connection is made in social cognitive theory between beliefs about one's capabilities and whether one has a strong sense of self-worth (Bandura, 1997). Thus, data used in this study did not measure group members' personality or other outlooks on life.

A critical idea of to social cognitive theory is the theoretical construct of human agency. Human agency posits that people can exercise influence over what they do (Bandura, 1997). Personal efficacy beliefs are a key factor in human agency. Human agency, when studied through psychosocial functioning, has been conceptualized in at least three different ways—autonomous agency, mechanical agency, and emergent interactive agency (Bandura, 1989). Autonomous agency is a self-governing agency, and mechanical agency models humans as elemental mechanical conveyors of animated environmental influences. Social cognitive theory uses the model of emergent interactive agency. In this model, a person can make a causal contribution to their own motivation and behavior with the system of triadic reciprocal causation.

The three factors of the triadic reciprocal causation model—behavior, personal, and environment—operate as interacting determinants. Personal influences were viewed as individual teacher factors such as; years of teaching experience, experience at their current location, and professional experience outside of education. However, the framework for understanding individual perceptions of

group characteristics was viewed by psychometric theory as the group unit of analysis (Sirotnik, 1980). For group statistical analysis group-referent stems on the questionnaires must be employed. All *Collective Efficacy* scale items on the instrument used a plural referent such as "we" or "the teachers here".

Environmental factors were linked to school factors such as the age of a school building, school size, and school's socioeconomic status measured by students' free and reduced price lunch participation. Teachers' level of education and paths to teacher certification were viewed from the lens of the theoretical triad element behavior. According to Bandura (1997), human behavior involves making choices, and a teacher must make choices that interplay with personal and environmental factors. These choices include how they obtain their teaching certificate and how many advanced degrees they pursue to guide them in their career.

Bandura (1997) cited four sources of self-efficacy including: enactive mastery experience, vicarious experience, verbal persuasion, and physiological/affective states. Enactive mastery experience refers to an individual's or groups' successes and failures in previous endeavors. Bandura considered prior experiences the most influential on determining self-efficacy because they provide the most authentic evidence of whether or not one can be successful. Past experience is a complex issue, however. For example, when an individual or organization has succeeded easily in past experiences, experiencing failure or a more difficult attainment may be hindered by the initial efficacy of easy success.

Vicarious experience deals with watching other individuals or groups attempt specific attainments which are modeled. Efficacy beliefs tend to emanate from comparisons with other individuals, groups, and events. Social comparison theory (Festinger, 1954) was one theoretical framework that included vicarious experience. However, the theory has been broadened in social cognitive theory to include psychological mechanisms which govern observational learning of behavioral and social competencies, cognitive skills and emotional propensities (Bandura, 1986). Prussia and Kinicki (1996) specifically studied vicarious experience, finding that group members' sense of collective efficacy was influenced by seeing effective problem-solving strategies modeled.

The third source of self-efficacy beliefs is verbal persuasion. According to Bandura (1997), people who are persuaded verbally that they have the capability to succeed in given tasks are much more likely to exert greater effort and sustain it, than those that have self-doubts and dwell on personal deficiencies when difficulties arise. While words of encouragement can lead to greater self-efficacy in adults, Bandura warned that disingenuous comments, excessive praise for mediocre performance are usually seen as thinly veiled devaluations of the recipient that can erode their personal self-efficacy. However, young children still respond favorably to excessive verbal praise (Lord, Umezaki, & Darley, 1990) because of they often lack of skills in deciphering the meaning of indirect appraisals.

Physiological and affective states are the fourth source of self-efficacy beliefs. These are the somatic indicators like increased heart rate, sweating, and shortness of breath that are especially relevant in the domains of physical accomplishment, health functioning and coping with stressors. In activities involving strength and stamina, physical cues are indicators of physical inefficacy. In social cognitive theory knowledge of bodily states is acquired. Mood is also considered in affective states. This may be important in the proposed study since collective teacher efficacy is a perception and daily events may influence respondents' choices on the scale.

 Finally, an advantage of social cognitive theory as a theoretical framework is its relationship to organizational functioning, career development, and employment pursuits in schools. Bandura's (1997) view that work is not entirely a private matter, and it is an interdependent activity structuring a good part of people's social relations, fits nicely with the social structure of public schooling. Social cognitive theory has been used in previous meta-analysis on perceived teacher collective efficacy in schools (Fives & Looney, 2009; Goddard, 2002; Goddard, Hoy, & Woolfolk Hoy, 2004; Goddard, Hoy, & Woolfolk Hoy, 2000; Hoy, Sweetland, & Smith, 2002; Prussia & Kinicki, 1996; Tschannen-Moran & Barr, 2004).

Importance of Study

The importance of studying the perceived collective efficacy of elementary school teachers is based on the potential contributions that can be made to theory, practice, and the scholarly literature. From a theoretical perspective, collective teacher efficacy has received little attention (Goddard, 2001).

Although social cognitive theory is well represented in studies on individual self-efficacy (Ferla, Valcke, & Cai, 2009; Hoffman, 2010; Schunk, 1996), there is less theory-based research on collective teacher efficacy. Bandura (1997) stated that the academic domain is well-suited to developing research on collective efficacy since most occupational activities of teachers are performed with others rather than independently. Social cognitive theory explains self-efficacy, and also serves as a framework for viewing collective teacher efficacy.

I used social cognitive theory to described collective teacher efficacy. Social cognitive theory has been used to explain self-efficacy and describe relevant domains such as academic achievement, health behavior, parenting styles, children's self-concept, athletic performance, and clinical disorders (Grusec, 1992). However, collective teacher efficacy should be differentiated from previous analysis of self-efficacy since the focus of the construct is on the group unit of analysis, not the individual.

Potentially, educational practice may be benefitted if leaders and policy makers examine data on individual and external factors describing collective teacher efficacy. Development of quality teaching staffs is desired in all schools, and collective teacher efficacy may help to describe what that would look like. I hoped to describe collective efficacy in the schools which participated in this study. Theoretically, instead of looking at an individual's mastery experience, correlations of individual's perceptions of a group's collective efficacy were described using teacher and environmental characteristics.

Self-efficacy beliefs have been described in relation to the individual (Bandura, 1977a). To test if the theory applies to organizations such as schools, this study described the four major contributions to efficacy as they apply to perceptions of the group. For example, enactive mastery experience, which was initially referred to by Bandura (1977a) as performance accomplishments, can be viewed in this study as the schools' measure of advanced degrees achieved by faculty. Vicarious experience can be viewed as the years of professional teaching experience held by the faculty of the school.

Practice was informed by addressing response rates and individual responses to measure group constructs. In previous meta-analysis the distinction between individual and group attributes hasn't been fully addressed (Kenny & La Voie, 1985). This is certainly the case in studies on collective efficacy

(Bandura, 1993; Goddard, 2002; Goddard, Hoy, & Woolfolk Hoy, 2000; Hoy, Sweetland, & Smith, 2002). This study addressed the response rates of individuals to group constructs.

Additionally, correlation of high collective teacher efficacy to high student achievement does not prove causation, but collective teacher efficacy can be addressed in staff development and common planning as a possible element in broader constructs like school climate and school culture. School leaders can share the data with the staff, as well. This study informed practice by sharing these correlations with district leadership and the participating schools.

With respect to contributing to scholarly literature, individual self-efficacy studies are abundant (Ferla, Valcke, & Cai, 2009; Hoffman, 2010; Schunk, 1996), - yet-, studies on collective efficacy remain scarce (Goddard et al., 2004). Pajares (1997) observed that the extensive data gathering required when school are the units of analysis have prevented researchers from engaging in studies of collective efficacy. For example, if four schools with faculties of 75 each are studied, the actual sample size is 4 schools, not 300 individual teachers. This lack of statistical power has been a deterrent to studying collective, group constructs, like collective teacher efficacy. Nonetheless, more studies are called for in this emerging construct (Bandura, 1993; Fives & Looney, 2009; Goddard & Goddard, 2001; Goddard et al., 2004).

CHAPTER 2

REVIEW OF LITERATURE

This literature review on collective teacher efficacy defines the psychological construct of collective efficacy, summarizes previous research on collective teacher efficacy, and discusses the influence of collective teacher efficacy on student achievement.

Collective Efficacy

Although I limited this study to collective *teacher* efficacy, it is worth looking broadly at literature on collective efficacy in general. According to Zaccaro, Blair, Peterson, and Zazanis (1995) collective efficacy represents "a sense of collective competence shared among individuals when allocating, coordinating, and integrating their resources in a successful concerted response to specific situational demands"(p. 309). Bandura (1986) originally defined collective efficacy as people's "perception of the groups' shared belief to effect change" (p. 451). More recently, Bandura (1997) defined collective efficacy as "a groups' shared belief in its conjoint capabilities to organize and execute courses of action required to produce given levels of attainments" (p. 477). Shea and Guzzo (1987) described a similar construct, called group potency, as a measure of a group's beliefs in its own opportunities for success. Shamir (1990) defined collective efficacy as "the perceived probability that a collective effort will result in collective accomplishments" (p. 316). Weldon and Weingart (1993) defined collective efficacy as, "an individual's judgment of how well the group can execute actions required to perform tasks" (p. 311). In each of these definitions, a different theoretical framework views the construct. For example, Shamir's definition is based on the theory of transformational leadership, while Weldon and Weingart viewed collective efficacy through goal commitment. Social cognitive theory is the preferred framework for viewing collective *teacher* efficacy according to the literature (Bandura, 1997; Goddard, 2002: Goddard, Hoy, & Woolfolk Hoy, 2000; Hoy, Sweetland & Smith, 2002) due to collective

teacher efficacy's primacy with individual self-efficacy and individual teacher efficacy (Tschannen-Moran & Barr, 2004).

While Bandura's (1997) definition of collective efficacy is a direct extension of self-efficacy theory synthesized in Bandura's *social learning theory* (1977b), and *social cognitive theory* (1986), numerous modifications are necessary to explain the perceptions of individuals to the collective (Zaccaro, et al., 1995). Although many factors influence collective efficacy, according to Bandura, the construct refers to a shared sense of competence within a group. The group is responsible for coordinating individual resources to achieve collective success. Therefore, measures of collective efficacy should assess group respondents' perceptions of how well the group can work collectively in successful accomplishments (Goddard, 2002). Moving from collective efficacy to collective *teacher* efficacy in school environments , these accomplishments can include reaching student academic achievement goals on standardized criterion-referenced tests, reducing student retention rates, reducing behavior referrals, fostering strong attendance, reducing dropout rates, and increasing graduation rates (Bandura, 1993). In Bandura's theoretical framework, efficacy beliefs can vary depending on specific attainments. For example, a group may feel efficacious about improving graduation rates, but less efficacious about making adequate yearly progress goals for No Child Left Behind (NCLB, 2001) or improving attendance rates. According to Bandura (1997), efficacy beliefs for a group can change over time, as well. The requirements for meeting AYP were less demanding when NCLB went into effect in 2001. Each year the requirements have become increasingly more stringent. In response to increasing demands, teacher's collective efficacy may become more pessimistic over the years. In fact, during the course of this study, Gwinnett County was granted a waiver in 2012 to No Child Left Behind, and was able to develop a Career College Readiness Performance Index as a means of measuring student achievement. According to the theoretical framework, collective efficacy must be targeted at a specific event or achievement, i.e. it is not a measure of general belief (Bandura, 1997).

Social Learning Theories

The modern genesis of social learning theory can be traced back to Sigmund Freud. According to Grusec (1992), Freud's theories of human cognitive development were not available to scientific testing. A movement arose to make psychoanalytic principals available to social scientific investigations. Leaders of the movement to make psychoanalytical principals available to social scientific investigators were able to operationalize scientific constructs relating to learning and behavior and make inferences about their collected data even though results were considered inadequate by proponents of Freudian psychoanalytic theory. Ultimately, behaviorism and learning theory were able to gain traction and acceptance in the academic world as legitimate scientific theories.

The Institute for Human Relations

The major formal effort to combine learning and psychoanalytic theory to understand social development through the life span began at the Yale Institute for Human Relations (Grusec, 1992). The Yale Institute's mission was to construct a unified science of behavior. Institute members John Dollard and Neal Miller published *Social Learning and Imitation* in 1941, in which the first major account of social learning theory was supported by experiments on imitation in young children. Concurrently, Clark Hull postulated humans have four basic biological needs; hunger, thirst, sex, and avoidance of pain. Likewise, B.F. Skinner began conducting experiments on individual organisms involving operant conditioning. Skinner (1953) felt that behaviors that were immediately rewarded would be repeated and all living organism's behaviors could be explained through previous reinforcements.

Following a slightly different path, another member of the Institute, Robert Sears, began to focus on socialization processes that had a strong influence on research and theory in social development psychology. Although much of Sears' theoretical efforts were spent on describing the way that children come to internalize the values, attitudes, and culture in which they are raised, his pioneering work in social learning theory influenced many researchers who would follow, including Albert Bandura, who received an appointment at Stanford University in Palo Alto California at the same time Sears left Yale to come to Stanford (Grusec, 1992).

One of the first latent factors studied at the Yale Institute for Human Relations using social learning theory as the theoretical framework was aggression. A link between frustration and aggression was hypothesized, and Sears argued that reactions to frustration could be altered through learning (Grusec, 1992). This agentive view of psychological behavior in which individuals have a deterministic role in their behavioral outcomes became a key contribution to the concept of human agency. Human agency stipulates that individuals can exercise influence over what they do (Bandura, 1997). Eventually, human agency became a key factor of social *cognitive* theory.

Human Agency

Bandura (1977b) synthesized key aspects of behavioral psychology in his theoretically reworked book *Social Learning Theory*. Specific formulations of human agency, observational learning, self-regulation, self-efficacy, and reciprocal determinism were delineated. Human agency is a key element of an individual's efficacy beliefs. In essence, human agency dictates that humans have some influence in the outcomes of their lives (Bandura, 1977b, 1986, 1997). Concisely, human agency states that people can exercise control over what they do. Bandura (1989) also described the nature and locus of human agency, as being conceptualized in at least three different ways—*autonomous agency*, *mechanical agency*, and *emergent interactive agency*. Social cognitive theory invokes emergent interactive agency, which is defined as people being neither completely isolated from their environment (autonomous agency), nor simple mechanical conveyors of animating environmental influences (mechanical agency). Instead, individuals make causal contributions to their own motivation and action within the social cognitive theory framework of triadic reciprocal causation. In triadic reciprocal causation, individuals interact with the environment, their behavior, and their personal factors in the form of cognitive, affective, and biological events (Bandura, 1977b). These interactions are bidirectional—that is, they are reciprocal. Bandura (1997) warns, however,

Reciprocity does not mean that the three sets of determinants are of equal strength. Their relative influence will vary for different activities and under different circumstances. Nor do the mutual influences

and their reciprocal effects all spring forth simultaneously as a holistic entity. It takes time for a causal

factor to exert its influence. (p. 6)

Human agency is a precedent to self-regulation, Bandura's (1977b) mechanism for theoretically

moving from individual to pro-social behavior. This is maintained by externally administered

consequences to behavior regulated by the self (Grusec, 1992). Bandura proposed that an individual could

affect courses of action required to produce given attainments in certain conditions. Self-efficacy is a

major determinant of self-regulation (Bandura, 1977b). In studies on phobic disorders, Bandura (1997)

observed an individual's perception of their own feelings of effectiveness determined how easily changes

in social behavior were achieved and maintained. Bandura's conceptualization stipulated individuals

develop domain-specific beliefs about their own ability and characteristics that guide their behavior by

determining what they try to achieve and how much effort they put into their performances in that

particular situation or domain. Ultimately, the three factors of Bandura's triadic reciprocal causation

model—behavior, personal, and environment—form the theoretical foundation of human agency. Human

agency leads to self-efficacy beliefs, and self-efficacy beliefs have been extended to teacher efficacy,

collective efficacy, and collective teacher efficacy (Goddard, 2002).

Self-efficacy

Self-efficacy is crucial to the theoretical understanding of this study. Bandura (1977b) cites four

sources of *individual* self-efficacy. These sources were a determinant in independent variable selection.

These sources are not mutually exclusive from the factors of human agency, rather they blend together

complementarily. Individual self-efficacy is influenced by enactive mastery experience, vicarious

experience, verbal persuasion, and physiological/affective states. Enactive mastery experiences deal with

an individual's or groups' prior successes and failures in previous endeavors. Bandura (1997) considered

these the most influential because enactive mastery experiences provide the most authentic evidence of

whether one can succeed. Past experience is a complex issue however. Bandura (1997) described the case

of an individual or organization that has succeeded easily in every attainment they have faced. Facing

failure or a more difficult attainment may be hindered by the initial efficacy of easy success.

If a person or group has had success in an attainment, generally a person anticipates future success in continued endeavors, but again higher levels of attainments can sometimes present a problem. In the proposed study, the Adequate Yearly Progress (AYP) for student achievement on the Criterion Reference Achievement Test (CRCT) in 2011-12 was raised from previous years under No Child Left Behind Legislation (NCLB, 2001), making successful attainment of AYP more difficult for the current school year than it was for the previous year. Additionally, for the 2012-13 school year, Gwinnett County used a new Career and College Readiness Performance Index (CCRPI) to measure student achievement under a waiver from No Child Left Behind. This new index was a new experience to the schools in the studies' population. Conversely, repeated failures reinforce a personal feeling of inadequacy. This same type of anecdotal evidence is applied to group attainments for collective efficacy. Bandura (1997) cites a sporting team that hasn't won a game in recent years usually continues to fair poorly unless some other conditions are changed.

Vicarious experience deals with watching other individuals or groups attempt specific attainments (Bandura, 1997). These attainments are then modeled. Efficacy beliefs tend to emanate from comparisons with other individuals, groups, and events. Social comparison theory (Festinger, 1954) was one theoretical framework to look at vicarious experience. However, the theory has been broadened in social cognitive theory to include psychological mechanisms which govern observational learning of behavioral and social competencies, cognitive skills and emotional propensities (Bandura, 1986). Prussia and Kinicki (1996) reported on vicarious experience where a groups' enhancement of their member's sense of collective efficacy was influenced by seeing effective problem solving strategies modeled. Vicarious experience is the modeled events in teaching, the educational setting, or coaching in the athletic environment (Bandura, 1997). Modeling and scaffolding are key elements in delivery of instruction (Hoy & Miskel, 2008). Variable selections that can be seen through the vicarious source of collective efficacy lens might include teaching experience, and advanced degree attainments. Often, experienced teachers learn strategies and techniques from colleagues. Pursuing advanced educational degrees can model pedagogical skills and assist teachers in career development (Lubinski & Benbow, 2006).

The third source of self-efficacy beliefs is verbal persuasion. According to Bandura (1997), people who are verbally persuaded that they have the capability to succeed in given tasks are much more likely to exert greater effort and sustain it, than if they have self-doubts and dwell on personal deficiencies when difficulties arise. However, Bandura warned that disingenuous comments, excessive praise for mediocre performance are usually seen as thinly veiled devaluations of the recipient that can erode their personal self-efficacy. Young children respond favorably to excessive verbal praise (Lord, Umezaki, & Darley, 1990) because of their lack of skill in deciphering the meaning of indirect appraisals.

Physiological and affective states are the fourth source of self-efficacy beliefs. These are the somatic (nervous twitching, sweating, shortness of breath) indicators that are especially relevant in the domains of physical accomplishment, health functioning and coping with stressors (Bandura, 1997). In activities involving strength and stamina, physical cues like sweating, increased heart rate, and lack of breath provided indicants of physical inefficacy. In social cognitive theory knowledge of bodily states is acquired. Bandura considered mood in affective states. Although these sources may be identifiable with individuals, it may be problematic to measure a relationship with groups for a construct like collective efficacy (Pajares, 1997).

Variable Selection

Variable selection for the proposed study is predicated on two ideas. First, multiple correlation analysis (MCA) was selected for data analysis to enable a descriptive dissertation on collective teacher efficacy. MCA requires a hypothesized grouping of the independent variables. According to Huberty and Hussein (2001)

it is essential that the collection of the, say, *X* variables constitute a *system* of variables that are interrelated in that they share some analysis unit attribute(s); they *hang together* in some substantively theoretical manner. To meaningfully interpret the results of an MCA one needs to make a substantive interpretation of the *X* composite. Such a substantive interpretation would not be feasible unless the collection of *X* variables constitute some type of substantive attribute system. (p. 326-327)

This requirement was satisfied by the hypothesized teacher related factors (teaching experience, teaching experience at present location, highest level of education attained, and path to obtain teaching credential) and school related factors (school building age, socio-economic status, student enrollment, and student achievement).

Social cognitive theory and the four sources of self-efficacy beliefs guided variable selection as well. Mastery experience has been associated with student achievement (Usher & Pajares, 2008). Student achievement has been included in many efficacy studies (Bandura, 1977a; Bandura, 1993; Gibson & Dembo, 1984; Goddard, 2001; Goddard, Hoy, & Woolfolk Hoy, 2004; Hoy & Woolfolk, 1993; Hoy, Sweetland, & Smith, 2002) due to its primacy with school related issues. Teaching experience and non-teaching experience was hypothesized in relation to mastery experience also. Bandura (1997) states

Most competencies must be developed over a long period. For complex ones, different subskills must be acquired, integrated, and hierarchically organized under continually changing conditions that can enhance or mar particular performances. Because attainments are governed by many interacting processes, the road to proficiency is marked by spurts, setbacks, and periods of little or no progress. (p. 86)

This study proposes that teacher educational level and years of experience will describe enactive master experience, as well as, school-wide student achievement on the CRCT.

Vicarious experience influenced the selection of IV's years of teaching experience, (at present school and total) highest level of education attained, and school age and enrollment. For experience, Bandura (1997) suggests that seeing or visualizing people similar to oneself perform successfully typically raises efficacy beliefs that they themselves possess the capabilities to attain comparable achievements. I hypothesized school factors that would reflect in vicarious experience. I chose building age to reflect the condition of the facilities, and school size to reflect teacher effectiveness. Zoda, Slate, and Combs (2011) conducted a 5-year longitudinal study of elementary schools and Hispanic students in Texas. They concluded the students in the larger schools outperformed the smaller school in every instance although this finding is not universally shared (Tanner & West, 2011). Although the literature

does not support the notion that school age may influence vicarious experience, I hypothesized that older schools may be at a disadvantage due to deferred maintenance.

Verbal persuasion was hypothesized to reflect teacher factors credential path, highest level of educational attainment, and school factor of academic achievement. Palmer (2010) found that increases in self-efficacy for elementary school science teachers were influenced by in situ feedback—the type of feed back available in traditional certification programs with student teaching. In this type of feedback an expert teacher would observe the teacher in their own class and provide constructive feedback afterward. Further, the additional training provided by an advanced degree was hypothesized to contribute to higher self-efficacy beliefs via verbal persuasion. School wide achievement is hypothesized as a benchmark for school success in previous years.

Physiological and affective states influenced the IV selection of school SES. Socio-economic status has been included in many other meta-analyses on collective teacher efficacy (Goddard, 2002; Goddard, 2001; Goddard & Goddard, 2001). It is hypothesized that schools in lower income areas may have more physiological issues associated with poverty than in more affluent areas. These include difficulty in eating properly outside of school, sleep problems due to extra familial demands, illness caused by lack of proper medical care, and unsatisfactory clothing available at home (Long & Long, 1974).

Teacher Efficacy

Initial instruments used to specifically measure teacher efficacy were based on locus of control theory (Rotter, 1966). However, there was a major difference reflected in Armor et al.'s (1976) early instrument and later instruments using Bandura's (1986) social cognitive theory as a theoretical framework; viz., Armor et al.'s (1976) instrument measured a dichotomous concept: Is the attainment of the goal within the individual's control or based on factors beyond the individual's control? This is due to the theoretical framework locus of control (Rotter, 1966). There were just two items on the Armor et al. scale. Item one read, ''When it comes right down to it, a teacher really can't do much because most of a

student's motivation and performance depends on his or her home environment.'' And item two read, ''If I really try hard, I can get through to even the most difficult or unmotivated students.''

The results of the Armor et al. (1976) study demonstrated that some teachers felt they could achieve successful outcomes with their students despite impediments arising from outside the school. The study was important because they presented a measurable way to correlate teachers' beliefs with their students' academic achievement (Tschannen-Moran & Wolfolk Hoy, 2001). Bandura's (1977b) first book on efficacy, *Social Learning Theory* came out shortly thereafter offering a different perspective. With a different theoretical framework, new efficacy instruments targeted directly for teachers were developed (Ashton & Webb, 1982; Gibson & Dembo, 1984). Applying Bandura's theory to the construct of teacher efficacy, the concept of outcome expectancy refers to the degree that teachers believe their students' academic performance could be controlled for factors like family background, IQ, and school conditions. In contrast, self-efficacy beliefs indicate a teacher's evaluation of their abilities to bring about a positive change (Tschannen-Moran & Wolfolk Hoy, 2001). This nuance is important in estimating the validity of instruments using social cognitive theory as a theoretical foundation. As human agency posits, there is internal control over outcomes. Given that the framework of the Armor et al.(1976) study was outcome expectancy theory and specifically Rotter's (1966) locus of control, it was sensible to only include two items; one positive stem and one negative stem, reflecting teachers' beliefs in their students' academic performance being within or outside of their control.

According to Tschannen-Moran and Woolfolk Hoy (2000) the early 1980's were a fertile time for attempting to develop instruments to measure teacher efficacy. Gibson and Dembo developed a 30-item measure that built on the foundation of the Armor et al. (1976) studies but including the conceptual underpinnings of Bandura as well. To validate the results of their teacher efficacy measure, Gibson and Dembo (1984) broke down the development of the teacher efficacy instrument into three distinct phases: Phase 1 (factor analysis): What are the dimensions of teacher efficacy? How do these dimensions relate to their theoretical framework in Bandura's (1977b) theory of self-efficacy? What is the internal consistency of the teacher efficacy measure? Phase 2 (multi-trait-multi-method analysis); Does evidence of teacher

efficacy gathered from different sources in different ways converge? Can teacher efficacy be differentiated form other constructs? Phase 3(classroom observation): Do high and low efficacy teachers exhibit differential patterns of teacher behavior in the classroom related to academic focus, feedback, and persistence in failure situations? Gibson and Dembo (1984) used factor analysis to come up with a two-factor structure for their teacher efficacy scale. Informed by social cognitive theory, Gibson and Dembo assigned the two factors as expectancies: self-efficacy and outcome expectancy. They labeled self-efficacy as personal teaching efficacy and outcome expectancy as general teaching efficacy. In their measure, Gibson and Dembo treated teacher efficacy as a trait of an individual, not a group.

Challenges to Measuring Collective Teacher Efficacy

Studies of collective efficacy pose unique challenges for researchers (Pajares, 1997). Since the unit of measure for collective efficacy is a group of individuals rather than the individual (Bandura, 1993; Goddard, Hoy, & Wolfolk Hoy, 2004; Hoy & Miskel, 2008), researchers must clearly differentiate between individual attributes and attributes of the workforces, faculties, groups, or organizations from which they belong. Kenny and La Voie (1985) suggested that many researchers paid "lip service" (p. 339) to the study of both individual and group attributes, but in reality, social psychologists focus on one at the exclusion of the other.

Another assumption that must be accepted prior to embarking on group-level measurement is that organizations, like individuals, learn, set goals, and otherwise have traits like individuals (Goddard, Woolfolk Hoy, & Hoy, 2000). One approach to the challenge has been to sample individuals using an instrument measuring an individual's perception of the group attribute (Goddard 2002). The stems for each individual item are worded as group referent beliefs. From these individual perceptions of the group construct, standard measures of central tendency like median and mean are used to give scores to the group. With the 12-item Coll*ective Efficacy* scale the "average" score for the group is standardized to take out any metrics that may have been present in the initial scoring of the instrument. This is done with instructions provided by Dr. Hoy to score the instrument. Within the standardized score for the group, a measure of variance is used to measure the strength of that average "perception". For example a high

standard deviation of perceived collective efficacy scores would indicate less of a shared belief, while a lower standard deviation would imply less variation in the group's shared belief about their collective efficacy.

The measurement of collective efficacy perceptions has been accomplished in several other ways as well (Goddard et al., 2004). One method is to aggregate measures of individual (self) efficacy beliefs. This would yield a group mean of self referent perceptions. The stems for the individual items would be *I believe this about the school or I believe that*. Responses to these self-referent statements would be averaged to measure a collective sense of efficacy at the school. Another possibility would be to assemble the group for a discussion of their capabilities and try to arrive at some sort of mutual consensus about their collective efficacy with every member of the group present. In addition to creating logistical difficulties, the group consensus method could introduce social desirability bias which would diminish the validity of the assessment (Bandura, 1997). This study will use the group referent version of this research method to arrive at perceived collective efficacy scores using the group as the unit of measurement. According to Sirotnik (1980), group level measurements must be made with group-level item stems.

The underlying logic to describe this method to measure collective efficacy is written in the scholarly literature and the theoretical framework on which collective efficacy is based. Sirotnik (1980) argued that the selection for appropriate levels of analysis during psychometric studies should be based on the item level. In the collective efficacy instrument used for this study, all of the items are operationalized at the group level. For example, whereas an item measuring self-efficacy in a certain domain would read *I believe every student in this school can learn,* in the collective efficacy instrument, the item measuring the same efficacy attribute would read *Teachers in this school believe every child can learn*. Thus, the respondent is asked to make a judgment about all of the teachers in the school. In a study of teacher's beliefs, Goddard (2003) showed that individual perceptions of self-capability varied less than five percent between groups, whereas individual perception of group capability varied by more than 40 percent among groups. This supports Bandura's (1997) assertion that perceived collective efficacy varies greatly among

groups. So in an attempt to describe collective efficacy in schools the present study is using the group referent position. For purposes of validation, what is being measured is the aggregate of individual group member's perceptions of group capability to organize and execute courses of action required to produce given levels of attainments in specific situations.

A problem with using individuals to describe group characteristics has vexed researchers for decades. In 1940 Lindquist recognized a problem in educational and behavioral studies where individuals were used as the statistical unit of analysis when the treatment is applied to a class or a group. Conversely, Sirotnik (1980) suggested that sociologists who were interested in correlations at the individual level often times employed data that was complied over aggregates, such as communities and other social entities.

In previous collective efficacy studies, as few as five (Goddard, 2001) and even one (Goddard et al., 2000) individual was used to represent group means. In these studies the total size of the group was not reported. In another collective efficacy study reporting 452 participants (Goddard et al., 2004) can appear deceiving when considering statistical power. With 47 schools this averages out to 9.6 responses per school. The percentage of faculty per school participated was not reported (Goddard, 2002; Goddard et al., 2000). Because the unit of analysis is the school in collective teacher efficacy it is often not reported in the literature the percentage of a teaching staff that is actually participating in the study.

Workforce Culture

Because collective teacher efficacy is not the only construct relating to teachers attitudes about their collective abilities to succeed in their work, a look at similar constructs is appropriate. According to Hoy and Miskel (2008) concern for the culture of work groups is not new. The work of Elton Mayo (1945) and Chester Barnard (1938) emphasized the importance of work-group norms, sentiments, values, and emergent interactions at work. Researchers study organizational culture to improve efficiencies of entities (Lakes, 2008; Ntshoe, Higgs, Wolhuter, & Higgs, 2010). Park and Datnow (2009) suggested that educational institutions are not immune to external pressures and influences that require group performances at maximum efficiency.

Shein (1985) defined organizational culture as the homogeneity and stability of group membership and the length and intensity of shared group experiences. The function of organizational culture is to stabilize the external and internal environment for an organization. New members must learn the culture for the culture to remain intact. Although this definition does make some salient points, many schools now emphasize celebrating diversity both of students and faculty. In Shein's defense the context with which he formulated the definition was the private sector. Later in *The Corporate Culture*, Schein (1999) argued that culture should be reserved for a deep level of basic assumptions, values, and belies that become shared and taken for granted as the organization becomes successful. Schein also described three levels of organizational culture: artifacts, shared values, and shared basic assumptions. In these, Schein hypothesized that the first two could be changed by replacing artifacts or modifying mission statements/codes of ethics respectively, whereas altering basic assumptions is not always clear.

Hoy and Miskel (2008) defined organizational culture as "a system of shared orientations that hold the unit together and give it a distinctive identity" (p. 177). Ouchi (1981, p. 41) defined organizational culture as, "symbols, ceremonies, and myths that communicate the underlying values and beliefs of that organization to its employees", whereas, Mintztburg (1989) related culture as an organizational ideology, or "the traditions and beliefs of an organization that distinguish it from other organizations and infuse a certain life into the skeleton of its structure" (p. 98).

Functions of Culture

Smircich (1983) listed five functions of culture:

1.   Culture is an instrument serving human biological and psychological needs, e.g., Malinowski's functionalism.

2.   Culture functions as an adaptive-regulatory mechanism. It unites individuals into social structures, e.g., Radcliffe-Brown's structural functionalism.

3.   The function of culture is to create a system of shared symbols and meanings. Symbolic action needs to be interpreted, read, or deciphered in order to be understood, e.g., Geertz's symbolic anthropology.

4. Culture's purpose is to project a mind's universal unconscious infrastructure, e.g. Levi-Strauss' structuralism.

5. Culture serves as a system of shared cognitions. The human mind generates culture by means of a finite number of rules, e.g., Goodenough's ethno science.

Morgan (1997) conceptualized the organizational culture of schools functioning like a brain in what he called a holographic organization. The foundations of this idea were four parts including: connectivity and redundancy, simultaneous specialization and generalization, minimum critical specifications, and self-organization. Goldman, Tindal, McCullum, and Marr (1999) suggested Morgan's organization as brains metaphor had its roots in classic decision-making theory pioneered by Herbert Simon (1947). In *Organizational Behavior: Concepts, Controversies, Applications*, Robbins (1998) summarized five important functions performed by the organization's culture:

1. Culture has a boundary-defining function; it creates distinctions among organizations.

2. Culture provides an organization with a sense of identity.

3. Culture facilitates the development of commitment to the group.

4. Culture enhances stability in the social system.

5. Culture is the social glue that binds the organization together; it provides the appropriate standards for behavior.

Two studies have identified seven primary elements of culture in most organizations (Chatman & Jehn, 1994; O'Reilly, Chatman, & Caldwell, 1991)

1. Innovation: The degree to which employees are expected to be creative and take risks.

2. Stability: The degree to which activities focus on the status quo rather than change.

3. Attention to detail: The degree to which there is concern for precision and detail.

4. Outcome orientation: The degree to which management emphasizes results.

5. People orientation: The degree to which management decisions are sensitive to individuals.

6. Team orientation: The degree of emphasis on collaboration and teamwork.

7. Aggressiveness: The degree to which employees are expected to be competitive rather than easy going.

During an eight-year ethnographic study in Michigan, Simpson (1994) studied an elementary school where through collegiality, teacher empowerment and effective leadership, a positive difference in school achievement and a culture for change occurred. Specifically, innovation was fostered by Tuesday planning meetings and common planning sessions. Empowerment became according to Simpson, "almost a life giving force, it has become validation, affirmation, vindication, and self-actualization all rolled into one" (p. 36). According to Porter, (1987) relevant collaborative opportunities, "break down teacher isolation and give credence to their ideas, make them more receptive to and analytical with new ideas, increase professional confidence, and strengthen commitment to the improvement of practice" (p. 150). In Simpson's study (1994), the school staff also implemented concerns-based staff meetings where issues are ranked, ordered, and confronted by the organization. Contrary to the loathsome faculty meetings of many institutions, Simpson observed the concerns-based faculty meetings were well received and provided a rich opportunity for meaningful involvement. The third category cited for innovation is leadership, and that is an extremely complex and super-analyzed topic. Needless to say great leadership is needed for innovative organizational culture.

The concept of stability is the antithesis of innovation when applied to elements of culture. While innovation encourages change, stability encourages the status quo. While many organizational studies have been analytical, philosophical, and rhetorical rather than empirical (Hoy & Miskel, 2008), there are specific examples in the literature of how school culture serves as a stabilizing force in young children's lives. In one such analysis, Haslinger, Kelly, and O'Lare (1996) described an elementary school in Maryland that had 610 fourth through sixth grade students who came from 37 different countries. The students spoke over 25 different languages, 65 % of their families were recent immigrants and 87 % of the students qualified for free lunches indicating low socioeconomic status, and only 18 % of the parents had earned a high school diploma. Given the challenging circumstances of the students, the teaching

faculty needed to create a culture that promoted stability at school. School administrators implemented three strategies to achieve their organizational goals including looping, the creation of an exhibition center to highlight student work, and an attendance incentive. These measures were designed to counter student apathy and anonymity.

Looping was a practice that involved o having one teacher lead the same class during the entire school day. This was effective for developing stability and teacher retention according to the case study. The study found that the longer teachers nurture relationships with children, the more they are able to identify individual student's strengths and weaknesses and tailor appropriate educational plans for them. Teachers lost no time every September determining student achievement levels, adjusting pacing, and delineating classroom policies. Looping was found to have a positive effect on the stability of the organizational culture. The highlight center and attendance center was equally effective at promoting a positive school culture.

By distinguishing between industry culture and the effects of industry culture on organizational culture, Chatman and Jehn (1994) were able to describe and elaborate on the seven elements that permeate the culture of an organization. By specifying two important industry characteristics— technology and growth—they were able to increase the conceptual understanding of many key elements in the culture of organizations. They hypothesized that there is more variation in organizational culture across different industries than within the same industries. This hypothesis informed their conclusions so that they wouldn't compare the culture of an educational institution with that of a Fortune 500 company. Beginning with the original proposition; organizational cultures, within and across industries, can be characterized by seven dimensions: innovation, stability, respect for people, outcome orientation, detail orientation, team orientation, and aggressiveness, Chatman and Jehn (1994) started with three hypotheses:

Hypothesis 1: The magnitudes of dimensions of organizational culture will vary more across industries than across firms operating in *the* same industry.

Hypothesis *2a:* Firms in industries characterized by intensive technologies and high growth will have cultures that more strongly emphasize innovation and team orientation than firms in industries

characterized by mediating technologies and moderate growth and firms in industries characterized by long-linked technologies and low growth, respectively.

Hypothesis 2b: Firms in industries characterized by long linked technologies and low growth will have cultures that more strongly emphasize stability and detail orientation than firms in industries characterized by mediating technologies and moderate growth and firms in industries characterized by intensive technologies and high growth, respectively.

Hypothesis 3a: Firms in industries characterized *by* intensive technologies and high growth will have cultures characterized more by people orientation, team orientation, and innovation than by outcome orientation, stability, easygoingness, and detail orientation.

Hypothesis 3b: Firms in industries characterized by long linked technologies and low growth will have cultures characterized more by outcome orientation, stability, easygoingness, and detail orientation than by people orientation, team orientation and innovation.

Hypothesis 3c: Firms in industries using mediating technology and experiencing moderate growth will have cultures characterized by equivalent levels of people, team, outcome and detail orientation, innovation, stability, and easygoingness. (p. 529)

Chatman and Jehn (1994) used correlation; therefore no causal results were possible. However, the authors felt this study was an important first step in generating more systematic assessments of industry effects on organizational cultures. The study did contain some threats to validity, such as; the authors acknowledging incorrectly classifying some of the industries represented in the study, faulty assumptions (technology and growth do not always match), and using a limited of range of firms only from the service sector. However, if the primary findings of this study are accepted, then the foundational basis for understanding organizational culture in schools is to only look at schools and no other unrelated industries. For this reason, I only looked at collective efficacy in the contexts of groups of teachers in schools, although collective efficacy can be looked at in other workplaces, other contexts (like sports teams), and other group endeavors.

Culture of Efficacy

Bandura (1997) believed that perceived collective efficacy is relevant to issues of organizational culture. "Organizational cultures perpetuate themselves not only by their socialization practices but also through selective recruitment of people who readily fit into the prevailing system" (p. 475). However, Bandura felt the idea of an organization wide culture is intuitively appealing, but difficult to precisely describe. As mentioned earlier, there are so many definitions of organizational culture that it becomes a vaguely defined phenomenon embracing many different things. Quantitative studies of organizational culture like that of Chatman and Jehn (1994) have been questioned due to validity issues, ambiguity and inconsistencies in their findings. Bandura's findings indicate that many of the torchbearers of organizational culture studies dismiss the measures of core factors on which organizations can be compared and prefer phenomenological analysis of the social climates unique to given organizations. However, if these assumptions are accepted, it leads to the unwanted fact that factors which make organizations successful are unique to each organization, and research on the cultures of successful organizations would have very little, if any, generalizable value. In deciding between qualitative and quantitative methodologies to study workplace cultures, Bandura felt both were important, "Qualitative methods that rely on interviews and on-site observations provide essential insights for inductive theorizing and for constructing measures for analytic empirical studies" (p. 475). Bandura blamed the scholarly debate on post-modernist philosophies that carried the nihilistic extreme view that there is no accurate representation of reality, just differing viewpoints. Finally, Dr. Bandura felt that attempts to verify the structures and processes required for successful organizational performance get sidetracked by debates about whether a certain set of core factors selected for the study really represent the culture. Outcome choice is based more on values than epistemology. The outcomes of organizational practice can be measures in financial, humanistic, ecological and social terms. A value judgment is made when selecting factors affecting organizational functioning. Ultimately, Dr. Bandura believed that verification of theoretical propositions about organizational culture requires longitudinal studies to provide evidence

that culture affects subsequent organization performance rather than cross-sectional evidence that culture and organizational performance are related when measured simultaneously.

Student Achievement

The quest to identify organizational level determinants of student achievement has been a historical challenge in educational research (Cybulski, Hoy, & Sweetland, 2005). Socioeconomic status was shown to be a significant indicator for student achievement (Coleman, 1966). Hoy and Sabo (1998) contended it has been difficult for researchers to identify constructs other than student socioeconomic status that have a significant and independent effect on student achievement. Research has shown collective teacher efficacy provides a significant and independent influence on student achievement (Bandura, 1993; Goddard, 2001; Hoy et al., 2002). Ross, Hogaboam-Gray, and Gray (2004) theorized that the mechanism for this relationship may be due to the theoretical connection to mastery experience. Bandura (1997) considered mastery experience to be the strongest of the 4 factors affecting all efficacy beliefs. "Successes build a robust belief in one's personal efficacy. Failures undermine it, especially when the failures occur before a sense of efficacy is firmly established" (p. 80). The best proxy for mastery experience at the school level was hypothesized to be prior achievement scores for the school (Ross et al., 2004). "Such scores are likely to be the best predictor of collective teacher efficacy in jurisdictions where school achievement is defined by a mandated assessment in which an external test based on common standards is used to compare schools" (p. 166). Ross et al. (2004) also considered mastery experience to be both an individual and social construction. They argued that achievement by students are interpreted as evidence of teacher success and failure, and thereby contribute to individual and collective teacher efficacy.

Tschannen-Moran and Barr (2004) contended that a reciprocal relationship exists between collective teacher efficacy and student achievement. "The school environment can affect teachers' belief in their collective efficacy to improve student achievement, and increased student achievement can increase teachers' sense of collective teacher efficacy" (p. 196). They concluded that a positive reciprocal

relationship between student characteristics and school climate would ameliorate collective teacher efficacy and school wide student achievement.

   Previous studies examining the collective efficacy of teachers, school wide student achievement, and school wide socioeconomic status demonstrated socioeconomic status is positively related to both collective teacher efficacy and school wide student achievement (Bandura, 1993; Goddard, 2001; Goddard et al., 2004; Hoy et al., 2002). In the Bandura (1993) study, student race, ethnicity, and socioeconomic status were included in the factors influencing student achievement. Bandura employed path analysis using factorially-verified indices to show collective teacher efficacy had a positive and significant effect on school wide student achievement even after controlling for these school wide student ethnicity and socioeconomic status. With respect to path analysis, Everitt and Dunn (1991) warned that even with convincing, respectable, and reasonable a path diagram, any causal inferences extracted are rarely more than a form of statistical fantasy, and correlational data are still correlational. While Pedhazur (1982) advised regression analysis, when used wisely, can still play a role in non-experimental research. Tschannen-Moran and Barr (2004) eschewed path analysis in favor of a multiple regression model to determine the influence of collective teacher efficacy on school wide student achievement.

CHAPTER 3

METHOD

Purpose Statement

The purpose of this study was to investigate the relationship between ten selected independent variables and collective teacher efficacy in an educational workplace, and verify previous studies' conclusions that collective teacher efficacy is positively and significantly related to high student achievement. The Collective Efficacy scale (Goddard, 2002) was used to measure collective teacher efficacy. Social cognitive theory supports this study and posits that all efficacy belief constructs—student, teacher, and collective—are future oriented judgments about capabilities to organize and execute courses of action required to produce given attainments in specific situations or contexts (Bandura, 1997). Collective teacher efficacy reflects the perceptions of teachers in specific schools as to whether the faculty as whole can execute courses of action required to achieve specific attainments. For this study, the attainment is student achievement measured by Criterion Referenced Competency Tests (CRCT) and meeting and/or exceeding the benchmarks set forth under ESEA (Elementary and Secondary Education Act of 1965, reauthorized in 2001 as No Child Left Behind) legislation. In Georgia, scores on the CRCT are used to determine if a school achieves these benchmarks. These benchmarks are delineated as the Georgia College and Career Readiness Performance Index (Georgia Department of Education Website, 2012). The study examined selected school factors and individual teacher factors which described and explained why teachers in a school system have high standardized collective efficacy, measured by the 12-item Collective Efficacy scale (Goddard, 2002).

Independent variables were divided into two groups representing school factors and individual teacher factors. School factors include school socio-economic status (SES) determined by free and reduced price lunch participation, school size (student enrollment), age of the school facility, school-level achievement reported for 3rd, 4th, and 5th grade CRCT scores in mathematics and reading for the 2011-

12 school year. Selected teacher factors included total years teaching experience, years teaching experience at current school, years of professional experience outside of teaching, highest level of education attained, and credentialing path operationalized by Georgia Professional Standards Commission's (GPSC website, 2012) path to teacher credentialing. GPSC lists four paths to obtain a teaching credential in Georgia; traditional route, career change, international exchange rout, and permit route.

Research Questions

1.   What is the influence of collective teacher efficacy on school wide student achievement?

2.   Do selected independent factors account for a greater proportion of the variance of collective teacher efficacy than what would be expected by chance?

3.   What are the correlations of independent teacher factors and school-level factors with collective teacher efficacy in elementary schools?

4.   Besides individual teacher factors and school-level factors, are there any latent composites of the selected variables that describe collective teacher efficacy in elementary schools?

5.   What is collective teacher efficacy in elementary schools, and how can this description help build a deeper understanding why this construct influences the development of strong school climates?

Design

This study examined the relationships between an urban school districts' K-5 elementary school teacher's perceived collective efficacy and a selected group of independent variables. A non-experimental, quantitative, correlational, survey design with questionnaires for data collection (see Appendix A) was used to address research questions 2, 3, 4, and 5. Research question 1, pertaining to collective teacher efficacy's influence on student achievement, was addressed with a quantitative design multiple regression model. This choice was made to predict student achievement with student achievement measured by CRCT scores in math and reading for the most recent data available (2011-2012 school year) as the dependent variable and collective teacher efficacy, school enrollment, school

facility age, student participation in free and reduced price lunch (socioeconomic status), total teaching experience, current location teaching experience, professional work experience outside of education , teacher path to credential, and highest educational degree attainment as independent predictor variables. This choice was made at the request of the participating district's institutional review board (IRB). Gwinnett County felt a descriptive study of collective teacher efficacy would be beneficial insofar as a connection could be made to student achievement. Additionally, previous studies (Bandura, 1993; Goddard, 2001; Hoy et al., 2002) reported collective teacher efficacy made a significant and positive influence on student achievement, even after taking into account that variation accounted for by socioeconomic status. I sought to validate those studies in Gwinnett County.

Data was collected with survey questionnaires. According to Hill (2001), survey instruments provide a reasonable means of collecting large amounts of data efficiently. The instrument contains the 12- item Collective Efficacy scale (Goddard, 2002), and 5 demographic questions to participants such as teaching experience, credential path, and highest level of educational attainment. Pilot tests performed at Norcross High School in the spring of 2012 demonstrated an average of seven minutes to complete a questionnaire. Information was gathered from school district records to complete the environmental school factor independent variables for each school. The questionnaires (see Appendix A) were delivered by US mail during the spring 2013 semester. Included in the mailing were a letter to the principal (see Appendix B), an informational letter in lieu of consent letter to the participants (see Appendix C), an approval to conduct research in Gwinnett County (see Appendix D), and a stamped self-addressed stamped envelope to return the questionnaires.

A multiple correlation analysis was deemed to be the best approach for the description phase of collective teacher efficacy. Multiple correlation analysis (MCA) is a data analysis technique where multiple independent variables (IV) are grouped and compared to a dependent variable (DV). Multiple regression analysis (MRA) assumes a linear relationship between the independent and dependent variables in order to predict outcomes in the DV's. MRA orders the IV's in a manner that maximizes a linear relationship. Although MRA and MCA are similar (Huberty & Petoskey, 1999), the main purpose

of this analysis is not prediction, but rather to examine the relationships and underlying dimensions of collective efficacy. However, while describing collective teacher efficacy was deemed well-suited to a MCA for these purposes, a multiple regression model was chosen to predict collective teacher efficacy's influence on student achievement (Huberty & Hussein, 2001). Tschannen-Moran and Barr (2004) also favored a multiple regression model to determine collective teacher efficacy's influence on student achievement. For these reasons path analysis was eschewed in favor of a composite multiple regression to address the influence of collective teacher efficacy on school wide student achievement.

An advantage of MCA is that the analysis makes it possible to analyze relationships among a large number of variables (Gall, Gall, & Borg, 2007). One disadvantage is that results of correlational designs are often misinterpreted as reflecting cause and effect relationships. However, correlation does not mean causation. Even though two factors may be shown to be related, one factor does not necessarily cause the other. Given the goals of this study and the desire to analyze many factors related to perceived collective teacher efficacy, MCA was used for research questions 2-5, and a multiple regression model was used for research question 1.

Huberty and Hussein (2001) noted that in MCA data collection, it is important for the selected independent variables to interrelate in some analysis unit attribute(s). For my study, the independent variables were grouped into two analysis unit attributes: school factors and teacher factors. The meaningful interpretation of MCA data requires an essential interpretation of the *X* independent composite. The *X* independent composites are hypothesized groupings of the nine factors that form strong correlations with the dependent variable (Huberty & Petoskey, 1999). Independent variable composites will form two distinct theoretical groups. The first hypothetical group contained school-related factors (school SES, student achievement, enrollment, and age of the school). The construct, perceived collective teacher efficacy, is based on the workplace environment, and the organizational management procedures inherent at the school level (Hoy & Miskel, 2008). At the same time, perceived collective teacher efficacy is also a measure of individuals' perception of their faculty's ability (as a whole) to execute identified courses of action and attain stated goals (Bandura, 1997). This study included five selected individual

teacher factors as analysis unit attributes (total years of teaching experience, years of teaching experience at present school, years of professional experience outside of education, educational level attainment, and credentialing path). MCA allows a unique opportunity to describe perceived collective teacher efficacy in terms of these nine   selected factors that represent two broad categories of influence (individual and school). In addition to analyzing the hypothesized relationship between individual teacher and school environmental factors and collective teacher efficacy, MCA also uses Principal Component Analysis (PCA) to identity any existing latent constructs combining combinations of the ten factors (Huberty & Hussein, 2001).

The validity of this study does not lie in the instruments used per se, but rather in the interpretation of the data. Much of the school related factors (i.e. facility age, free and reduced price lunch participation, school enrollment) and the individual teacher factors (i.e. years' experience, credential path, and age) was self-reported and is not subject to the typical threats to validity in other instruments such as tests because the information provided is structured (Gall et al., 2007). Thus, the very nature of the instrument minimized risks to design validity. This approach has been used in studies measuring respondents' perceptions of their collective teacher efficacy beliefs (Dussault, Payette, & Leroux, 2008; Fives & Looney, 2009; Viel-Ruma et al., 2010).

Participants

The population was the 78 elementary schools in the Gwinnett County Public Schools (GCPS). In collective teacher efficacy, the unit of analysis is the school (Bandura, 1997).The county is comprised of 78 elementary schools, 26 middle schools, and 19 high schools. Elementary schools were chosen for their larger number which will result in greater statistical power and less margin of sampling error. Participants were all elementary teachers within those 78 identified schools. One school chartered for students with serious emotional disturbance, ages 5-22, and was eliminated from the study because this group was too dissimilar from all other schools in the district.

In the development of the original 21-item Collective Efficacy scale, Goddard et al. (2000) used Halpin's (1959) decision rule to determine that at least five members of a group must respond to a group

measurement of collective teacher efficacy for the sample to be valid and results generalizable to the entire group. In other words, if a school, regardless of actual teaching staff size, has at least five completed surveys, Goddard et al. considered the sample (school) to be valid. Goddard et al. (2004) sampled 452 teachers in 47 schools which yielded an average of 9.6 teachers per school. Actual staff per school was not reported. Using the Halpin decision rule, I obtained 429 for an average of 13.4 teachers per school. The unit of measurement for perceived collective teacher efficacy is the school (Bandura 1986, 1993, 1997; Fives & Looney, 2009; Goddard, 2001, 2002; Hoy et al., 2002). However, what has not been widely addressed in the literature is the appropriate group response rate needed for the group to be considered representative of a particular school. To this point, Huberty and Petoskey (1999) recommend providing as much descriptive information on the sampling units in any survey study.

Additionally, this study design called for two additional tests to insure representativeness of sample. The first measure employed a t-test of equivalent means for the participating schools and the non-participating schools for data that was readily available from the district office. This data included school age, school enrollment, student achievement in math and reading for 2011-2012, and percentage of student receiving free and reduced price lunch. The second method was a design employed by Whipple and Muffo (1982) in a survey design for university alumni. This method involved treating responses from the first request as respondents and responses from the second request as non-respondents. Then t-tests are preformed on the two sets of data. If the means are deemed equivalent, the threat to validity due to non-response is considered to be low.

Elementary teachers were sampled for several reasons. First, results from earlier studies provide a baseline of the collective teacher efficacy of elementary faculty. Goddard et al. (2000) limited their study to elementary schools and teachers. Second, elementary teachers are responsible for both math and reading instruction. These two academic areas were included as independent variable representing student achievement (e.g., CRCT test scores). Finally, a larger number of elementary schools are available for this study. For these reasons, elementary school teachers were chosen to participate in the study of collective efficacy.

Instrumentation

The development of the21-item Collective Efficacy scale was achieved in steps. Initially, Goddard et al. (2000) modified Gibson and Dembo's (1984) *teacher efficacy* scale to reflect collective teacher efficacy. For example, "I" was changed to "We". Then, additional items were developed in response to a panel of experts with expertise in teacher efficacy research. After new items were added, the instrument was field tested, and then pilot tested with 46 teachers in 46 elementary schools. The 21 items on the final version of the Collective Efficacy scale provided valid and reliable results for the collective teacher efficacy construct (Goddard et al., 2000). Each item in the instrument is aimed at either task analysis (TA) or group competence (GC) (Goddard, 2002). The literature supports a model of teacher efficacy that is task and situation specific (Pajares, 1997; Tschannen-Moran et al., 1998). TA represents the task related items, and GC represents the situation related items. *Teachers in this school are able to get through to difficult students* is an example of a positively worded GC item with a group referent stem. *Learning is more difficult at this school because students are worried about their safety* is an example of a negatively worded TA item with a group referent stem. Each item is answered using a 6 point Likert scale with responses strongly disagree, disagree, somewhat disagree, somewhat agree, agree, and strongly agree.

The internal and criterion-related validity of the Collective Efficacy scale has been supported (Goddard, 2002; Goddard & Goddard, 2001). Goddard and Goddard (2001) tested the criterion and predictive validity and reliability of scores obtained from the Collective Efficacy scale using a larger sample of 452 teachers in 47 elementary schools in a large urban district. Item results were submitted to principal axis factor analysis. All 21 items loaded strongly on a single factor and explained 57.89 % of the item variation. The alpha coefficient of reliability was strong at .96.

A primary concern with the measurement of collective teacher efficacy is the unit of analysis problem. How do researchers develop scales to measure organizational characteristics such as collective teacher efficacy? While social cognitive theory asserts that efficacy beliefs are formed by the cognitive processing of individuals, researchers interested in differential performances of groups will select the

group as the unit of analysis (Goddard, 2002). Psychometric analysis of the Collective Efficacy scale was conducted using individual teacher's responses to the scale items. Since the group attribute of perceived collective efficacy of elementary school teachers is the target measurement, the analysis must be made using group mean scores with group referent stems on each item on the instrument (Sirotnik, 1980).

Goddard (2002) proposed to re-examine the scale developed by the team of researchers from the University of Michigan and the Ohio State University in an attempt to improve the psychometric properties, re-examine the theoretical underpinnings of the 21-item scale, and develop a more parsimonious instrument. Goddard was able to preserve the criterion-related validity of the 21-item instrument, balance the number of positively and negatively worded group construct questions with task analysis questions, maintain the school as the unit of analysis, and develop a parsimonious 12-item Collective Efficacy scale. The 12-item scale compares favorably to the single factor construct of the 21-item scale and additionally, yields high internal consistency values (alpha = .94). The development of the short form, while being strongly related to the original scale, also provides multi-level tests of predictive validity. Plus, the short form was shown to be a positive predictor of between school variability in student mathematics achievement. This would support the assumption made earlier that collective efficacy is related to student achievement (Bandura, 1993). For all of these reasons, the short form (12 items) of the Collective Efficacy scale was used in this study.

<div align="center">**Procedure**</div>

These steps were completed upon being admitted into candidacy:

1. Submit application to GCPS for permission to conduct study (September, 2012).

2. Met with Professional Standards Commission (PSC) to obtain data for classifying path to certification independent variable (September 2012).

3. Sent proposal for study to Institutional Review Board (IRB) (October, 2012).

   a. IRB application for research participants

   b. Signature of participants

   c. Description of study for approval (6-8 weeks)

4. Submitted permission for approval to use instruments (Fall 2011).

    a. Collective efficacy 12-item scale (Goddard 2002) (completed)

5. Pilot test instruments (spring, 2012). (Completed)

6. Oral defense and submit proposal to candidacy (April, 2012).

7. Sent questionnaires to elementary school principals (February, 2013)

8. Follow up to principals requesting online participation (March 15, 2013)

9. Email to non responding teachers to encourage participation (March 27, 2013)

10. Data analysis (April 2013)

11. Final defense (May 30, 2013 10:00 AM)

Data Analysis

Huberty and Hussein (2001) recommended that a pre-analysis phase be included in the data analysis protocol, encouraged an inspection of the data, and suggested specific computer programs for conducting a MCA study. In the pre-analysis phase, the purpose of the study must be explicitly stated. The purpose of this study was to describe and relate collective teacher efficacy in elementary schools to 5 school and 5 teacher factors.

The next step in the pre-analysis phase was sampling. A population of 77 elementary schools in one suburban school district was sampled representing a convenience sample. Sample packets were mailed to each principal of the 77 schools. The packets included a letter to each principal (see Appendix B) detailing the purpose for the study and the procedure for administering surveys, a certification letter required by the district IRB (see Appendix D), and an in Informational Letter in Lieu of Consent (see Appendix C) required by the University of Georgia IRB, as well as, the 17-item survey instrument for the faculty (see Appendix A). Analysis units are each of the 77 schools in the population which are comprised of the elementary teachers from each school. Prior to mailing the questionnaires, one school chartered for seriously emotionally disturbed students between the ages of 5 and 22 was eliminated because its purpose was considered too dissimilar to the other schools in the study.

Methodological designs in studies of perceived collective teacher efficacy pose unique challenges. Since the unit of measure for collective teacher efficacy is a group of individuals, as opposed to individuals (Bandura, 1993; Goddard, Hoy, & Woolfolk Hoy, 2004; Hoy & Miskel, 2008), researchers must clearly differentiate between individual attributes and attributes of the workforces, faculties, groups, and organizations. Kenny and La Voie (1985) suggested that many researchers paid "lip service" (p. 339) to the study of both individual and group attributes, but in reality, most studies focus on one at the exclusion of the other. Independent variables in my study clearly represent individual-level and group-level processes. However, being a group-level construct, the statistical unit of measurement is at the school-level, not the individual-level. Unlike researchers who try to eliminate non-independence among subjects' responses to satisfy the statistical requirement for independent observations, non-independence among individuals in a group is a central tenet of real groups and of this study. Therefore, non-independence among groups should exist since each school and school faculty is from the same county unified school district and shares certain things in common (e.g. district correspondence protocols, common core curriculum, and code of ethics dictated by the GPSC).

According to Cronbach and Meehl (1955), simultaneous study of both individuals and their groups can be regarded as an exercise in construct validity. Construct validity refers to how well the instrument and its interpretation measures the psychological concept that is being studied. Often for each level (e.g., group and individual), variability, covariance and causal relations between constructs are addressed. I used intact workplace groups that are not randomly assigned. At the outset of the research, this threat to validity was acknowledged. The individual attributes are only reported insofar as they affect the description of collective efficacy.

Another assumption of research using groups as the unit of measurement is that organizations, like individuals, learn, set goals, and otherwise have traits like individuals (Goddard, Woolfolk Hoy, & Hoy, 2004). Just like a corporation is considered a legal entity, so too must an organization like a school or school district be considered an entity. One method used to measure group-level attributes has been to measure the perceptions of individuals within the group on selected group attributes (Goddard, 2002). The

stems used for each individual survey item are worded to reflect group-referent beliefs. Individual perceptions of selected group constructs are measured to calculate group-level measures of central tendency and reflect group-level scores. Average group scores are standardized to take out any metrics that may have been present in the initial scoring of the instrument. Within standardized group scores, a measure of variance is used to measure the strength of the average perception. For example, a high standard deviation of perceived collective teacher efficacy scores would indicate less of a shared belief, while a lower standard deviation would imply less variation or more consensus in the group's shared belief about collective teacher efficacy.

The measurement of collective teacher efficacy perceptions has been accomplished in several other ways (Goddard et al., 2004). One method is to aggregate measures of individual (self) efficacy beliefs. This would yield a group mean of self-referent perceptions. Stems for these individual items reflect a personal belief about the organization or task. Responses to self-referent statements are averaged to measure a collective sense of efficacy at the school-level. Another possibility is to assemble a group for discussion of their capabilities and arrive at mutual consensus about the collective efficacy of the group with every member present. In addition to creating logistical difficulties, the group consensus method can introduce social desirability bias which would diminish the validity of the assessment (Bandura, 1997). The proposed study used a group-referent approach to assess perceived collective teacher efficacy scores using the group as the unit of measurement to maintain consistency with other studies of collective teacher efficacy (Hoy et al., 2002; Goddard & Goddard, 2001; Goddard (2001); Goddard & Skrla, (2006); Hoy et al., 2004; Tschannen-Moran & Barr, 2004).

The underlying logic to describe this method of measuring collective teacher efficacy is written in the scholarly literature and theoretical framework in which collective teacher efficacy is based. Sirotnik (1980) argued that determining appropriate levels for analysis during psychometric studies should be based on the item-level. In the Collective Efficacy scale (Goddard, 2002) selected for the proposed study, all of the items are operationalized at the group-level. For example, an item measuring individual teacher self-efficacy for learning might read *I believe every student in this school can learn,* in contrast, a

Collective Efficacy instrument would alter the perspective of the item to read **Teachers** *in this school believe every child can learn*. The change in focus requires respondents to make judgments about all teachers in the school, rather than just for him or her.

Goddard (2002) showed that individual perceptions of self-capability typically varied vary little, less than five percent between groups. In comparison, individual perception of group capability could vary a great deal, more than 40 percent among groups. This finding supports Bandura's (1997) assertion that perceived collective efficacy (for many career fields) varies greatly among groups. So in an attempt to describe collective teacher efficacy in schools, the present study used the group-referent position. For each item, the participant responded from the group-level, not the individual-level. In other words, the aggregate of individual group member's perceptions of group capability to organize and execute courses of action required to produce given levels of attainments in specific situations was measured.

The variables in MCA must also be chosen with care (Huberty & Petosky 1999). Because the purpose of MCA is to describe and not predict, the selected independent variables need to reflect a theoretical system where the variables share some substantive meaning. For my study, the independent variables reflected selected influences on collective teacher efficacy; the individual members of the workforce, and the organizations themselves. The responses from the faculty and by the data provided by the school organization were designed to represent these influences respectively.

In the data inspection phase of a MCA, Huberty and Hussein (2001) recommend closely inspecting the raw data. Aberrant variable measures and missing measurements are the first inspections to make. Data entry errors and outliers are the most common forms of aberrant measures. If any statistical technique is used to deal with outliers is mentioned in the narrative in data analysis. Most critical to MCA studies is that the search for and handling of outliers and missing data be reported. Orr, Sackett, and Dubois (1991) assert that outlying data points can be extreme in both the dependent and independent variables. By inspecting the covariance ratio, I was able to determine if some schools had an extreme influence on the analysis results. This value was recommended by Huberty & Hussein (2001), as well as procedures available for dealing with missing data.

According to Huberty and Hussein (2001), description of the type of software and detailed information on the statistical methods used in the MCA is reported. Data was entered into SPSS version 21. Data analysis procedures and specific techniques included:

1.   Data reduction via principal component analysis-Factor

2.   Descriptives-Frequencies

3.   Normal probability plot to assess multivariate normality- Regression

4.   Residual plot to assess homogeneity-Regression

5.   Mahalanobis distance-outliers

6.   Influence statistics-Regressions

7.   MCA/MRA-Regressions

8.   Correlations and structure r's-Correlations

Huberty and Petoskey (1999) considered 2 approaches to data reduction: (a) face-valid components, and (b) principal components (PCA). A component is considered a linear composite of the total set of items. PCA was chosen in this study because of its smooth integration with the computer software employed in the study (SPSS version 21). It is possible to obtain weights on all 11 variables in this study; however, Rencher (1995) contended all component weights are not necessary to determine the relationships among the 11 items. Although there are more than 3 ways to determine the number of principal components to retain, Huberty and Petoskey (1999) recommended using 80% of the total variance as a reasonable cutoff, visual analysis using a Cartesian scree plot, and "eigenvalue-greater-than-on-rule" (p. 21). An eigenvalue is a scalar value calculated and assigned to each set of component weights.

To illustrate what the data might look like after initial data inspection, a hypothetical population of schools was considered. For example, some data may have recording problems, such as incomplete responses, torn or mangled forms, and otherwise unusable questionnaires. Depending on the response rate, and level of statistical error considered acceptable, those responses may be deleted. In this study, responses that were illegible, or where more than one check box was marked were deleted. Like blanks,

these responses were not factored into the data analysis. For listwise deletion, five or less responses may be deleted (Huberty & Hussein, 2001). Huberty and Petoskey (1999) recommend deleting any data for which a dependent *Y* score is missing. After a useable data set is determined, a principal component analysis can be used to define response variables and correlate independent variable scores with the response variables. A principal component analysis determines linear item composites and maximizes the explanation of variance in the *X* variables (Huberty & Hussein, 2001). In the study, the purpose of this analysis was to examine the relationship between a measure of perceived collective teacher efficacy and a collection of individual and group characteristics. A summary of the following information is reported: Purpose of the study, how the analysis units were sampled, support for representativeness of the sample, and sample size. Preliminary data analysis will calculate minimum score, three quartiles, maximum score, mean and standard deviation. A Pearson-product correlation matrix is also reported. Although other algebraic models can be analyzed, a linear model is the most universal (Huberty & Hussein, 2001). Three conditions which must be met to use a linear model include the independence of teacher score vectors, *Y*-variate normality, and homogeneity of *Y*-variable variance across the *X*-variable score possibilities. A probability plot is used to assess the normality condition, and a residual plot is used to assess the homogeneity condition.

Other critical details are essential for valid interpretations of data using MCA. If one response had an extreme influence on the analysis results, that was be noted. This response may not be what is typically thought of as an outlier. Huberty and Petoskey (1999) recommend using a test to assess the influence of an individual participant on the precision of the weights for the *X* variables. The index they recommend to assess this influence is the covariance ratio (CVR). Teachers with extremely small or large CVR ratios are noted and possibly deleted in data analysis.

For data analysis preliminaries Huberty and Hussein (2001) recommend reporting the following:

1. Five-point descriptives (minimum, 3 quartiles, maximum, mean and standard deviation

2. Correlation matrix

3. Defense of independence of unit score vectors

4.   Support for approximate Y-variable normality

5.   Support for approximate Y-variable variance homogeneity

6.   Support for no undue influence of unit score vectors on biased or imprecise estimation- or support for deleting units with undue influence

A numerical index of the estimated relationship between composites and the dependent variable is reported (Huberty & Hussein, 2001). The relationship is maximized by the weights of the *X* variables derivation. Huberty and Hussein (2001) recommended an adjustment to the squared multiple correlation coefficients, R^2_{adj}. Mathematically, this adjustment is as follows:

P denotes the number of *X* variables and N is the sample size. The adjusted index will represent the percent of variation in collective teacher efficacy scores that is shared with the linear composite of either individual or school components. An important question that MCA examines is whether the percent of shared variance is greater than what would be expected by chance? There is a test to determine if this is true (Huberty & Petoskey, 1999) by examining the difference between the adjusted R^2 and the expected value (i.e., the long–run mean) which is equal to p/ (N-1). An associated effect size index can be calculated as the adjusted R^2 – p/ (N-1). This value is reported in studies using multiple correlation analysis (MCA). The effect size represents what percentage of the variation in the dependent variable can be explained by the independent variable.

Next, the question "What is collective efficacy related to?" can be addressed. Specifically, the latent constructs defined by the linear composites of the *X* variables were analyzed. An examination of the simple correlations between each of the selected factors describes the basic question of structure. A squared structure *r* refers to the amount of variance that is shared between the component and linear

composite of all of the components. For example, high structure *r* for years of teaching experience and

years at their present school could define the construct of employee engagement.

For relationship studies,

Huberty and Hussein (2001) recommend reporting the following:

1. R^2_{adj}

2. R^2_{adj} – p/(n-1) Value—an effect size value

3.   Results of the statistical test of a better-than-chance relationship—*F* value, *df* values, *P* value

4.   Structure correlations

5.   Construct interpretation

In MCA, it is also possible to analyze which independent variables are the most descriptive of the

relationship with perceived collective teacher efficacy. This is accomplished by *X*-variable ordering. To

conduct *X*-variable ordering, the study used p MCA each with (p-1) *X* variables. The *X* variable, which

when deleted lowers the R^2_{adj} value the most, is considered the most significant *X* variable affecting the

dependent variable. Decreases in the adjusted R^2 value can be used as well. Smaller decreases by selected

X variables would indicate smaller levels of influence in the relationship with the dependent variable.

Huberty and Hussein (2001) recommended reporting the following with respect to *X*-variable ordering:

1.   (p-1)-X-variable analysis

2.   Structure correlations

3.   Variable ranks

In summary, the outcomes outlined allow a thorough analysis of collective teacher efficacy. Since

the purpose of the current study was to describe collective teacher efficacy and not predict levels of

collective teacher efficacy in other populations, multiple correlation analysis is appropriate. Outcomes of

data analysis can be used to inform our current knowledge of collective teacher efficacy. Although

clearly, there are many more facets of the overall school climate than collective teacher efficacy, such as

school trust, leadership, and school climate, perhaps the results of this research will help to describe the

construct. The literature calls for more current research (Bandura, 1993; Fives & Looney, 2009; Goddard

& Goddard, 2001; Goddard et al., 2004) on collective teacher efficacy to inform theory. Huberty and

Hussein (2001) explain that multiple correlation analysis can provide answers to substantive theoretical

questions. However, care must be taken to report the use of subjective researcher judgments. They cite at

least 11 instances in MCA where judgment calls are made: [1] initial variable choice, [2]

representativeness of sample, [3] quality of variable measures, [4] existence of outliers, [5] existence of

influential variable measures, [6] support for meeting data conditions, [7] interpretation of statistical test

information, [8] better-than-chance magnitude, [9] construct interpretation, [10] relative magnitude of

adjusted R^2 values, and [11] variable rankings.

      A summary of the statistical analyses is given in Table 1.

Table 1

Data Analysis

Research questions	IV/Conceptualization	DV	Statistical procedure
1. To what extent does the result of this study in Gwinnett County support previous meta-analysis that collective teacher efficacy is positively and significantly related to high student achievement?	Collective teacher efficacy, school enrollment, building age, percentage of students participating in free and reduced price lunch, teaching experience at current location, teaching experience total, non-teaching professional experience, path to teacher certification, and highest educational level attainment. Bandura's (1997) social cognitive theory, Hoy, Sweetland and Smith (2002) explanatory systems.	CRCT composites of 3rd, 4th, and 5th grade students in math and reading at participating elementary schools.	Multiple regression controlling for SES. CTE descriptives-frequencies, -normal probability plot to assess multivariate normality, residual plot to assess homogeneity-regression, inspection of CVR to determine no undue influence of unit vectors.
2. Do the selected independent factors account for a greater proportion of the variance of collective efficacy than what would be expected by chance?	Independent variables assigned to categories: school factors and individual teacher factors.	Collective Efficacy 12-item scale (Goddard, 2002)	Chance value calculation of $R^2 = p/(N-1)$-F value *df* values. P value to three decimal places. Examine the difference between the adjusted R^2 and the expected value (i.e., the long–run mean) which is equal to $p/(N-1)$.
3. What are the correlations of individual teacher factors and school-level factors with perceived collective efficacy of elementary school teachers?	Teacher individually: teaching experience in current location, total teaching experience, highest educational level, credentialing path, and prior professional work experience. School as an organization: SES, student achievement math and reading, enrollment, and facility age.	Collective Efficacy 12-item scale (Goddard, 2002).	$(p + 1)$-by-$(p-1)$ correlation matrix. p-1 by N matrix, MCA, Adjusted Pearson's r squared. Margin of error. Outliers: Mahalanobis distance, correlation matrix, defense of independence of unit score vectors, support for approximate Y-variable normality, support for approximate Y-variable variance homogeneity, support for no influence of unit score vectors on biased or imprecise estimation- or support for deleting units with undue influence.

Table 1 continued

Data Analysis

Research Questions	IV/Conceptualization	DV	Statistical Procedure
4. Do latent composites of variables exist to describe perceived collective efficacy of elementary school teachers	District reported data and self-reported data	Collective efficacy 12-item scale (Goddard, 2002)	PCA (principal composite analysis). Correlation: $R^2_{adj.}$ Effect size: P/ (N-1). Defense of independence of unit score vectors.
5. What is the perceived collective efficacy of elementary teachers?	Bandura's (1997) social cognitive theory. Hoy, Sweetland, and Smith explanatory systems.	Collective efficacy 12-item scale (Goddard, 2002)	MCA, five point descriptives statistics-Min., Q1, Q2, Q3, Max, Standard deviation, and mean.

CHAPTER 4

RESULTS

The purpose of this study was (a) to describe the group construct collective teacher efficacy in elementary schools using ten selected factors grouped theoretically as teacher factors and environmental school factors, and (b) to determine what influence collective teacher efficacy has on school wide student achievement. Collective teacher efficacy was measured by the 12-item Collective Efficacy scale. The 10 selected factors were school enrollment, school age, school wide achievement on CRCT exams for math and reading in 2011-2012, socio-economic status determined by free and reduced price lunch participation, teachers' path to credential according Georgia Professional Standards Commission's classification, teachers' highest educational attainment, teachers' total teaching experience, teachers' teaching experience at their current location, and teachers' professional experience outside of education. CRCT test results measured student achievement in 2011-2012 of 3rd, 4th, and 5th graders in the 32 participating schools. Specifically, this study addressed five research questions:

1. What is the influence of collective teacher efficacy on school wide student achievement?

2. Do selected independent factors account for a greater proportion of the variance of collective teacher efficacy than what would be expected by chance?

3. What are the correlations of independent teacher factors and school-level factors with collective teacher efficacy in elementary schools?

4. Besides individual teacher factors and school-level factors, are there any latent composites of the selected variables that describe collective teacher efficacy in elementary schools?

5. What is collective teacher efficacy in elementary schools, and how can this description help build a deeper understanding why this construct influences the development of strong school climates?

Within the framework of a multiple correlation analysis (MCA) as described by Huberty and Hussein (2001) the population was sampled via US mail. Packets were sent to the principals of the 78 elementary schools in Gwinnett County School District. These packets contained questionnaires for the staff, a letter of explanation to the principal, information letter in lieu of consent (see Appendixes A, B, and C), and a stamped self-addressed envelope to return completed questionnaires. After three weeks, principals of non-responding schools were contacted by phone to encourage participation in the study. Finally, teachers of non-responding schools were contacted by email with an electronic version of the survey to encourage their participation. Of the 78 schools in the district, 32 schools responded with five or more responses, 17 responded with fewer than five responses, and 28 did not respond after the three attempts. Of the 32 schools that responded with 5 or more responses, 9 schools responded with the electronic resampling after the initial mailing. One school was eliminated from the study because its mission of serving severely emotionally disturbed students between the ages of 5 and 22 was deemed too dissimilar to the target population in the study. A total of 452 teacher responses were received, including 429 from the 32 schools that were ultimately included in the study. Including schools that provided 5 or more responses (Halpin, 1959) was consistent with previous peer-reviewed literature conducting collective teacher efficacy research (Goddard et al., 2000; Goddard, 2001; Hoy et al., 2002; Tschannen-Moran & Barr, 2004). To substantiate the representativeness of the sample, Huberty and Petoskey (1999) recommended providing as much descriptive information on the sampling units in any survey study. The data collected from the samples on the questionnaire were coded according to the protocol presented in Table 2.

Table 2

Survey Items and Scales for Correlations

Item	Scale
1. Teachers in this school are able to get through to The most difficult students 2. Teachers here are confident they will be able to motivate their students. 3. If a child doesn't want to learn, the teachers here give up. 4. Teachers here don't have the skills to produce meaningful student learning. 5. Teachers in this school believe that every child can learn. 6. These students come to school ready to learn. 7. Home life provides so many advantages that students here are bound to learn. 8. Students here just aren't motivated to learn. 9. Teachers in this school do not have the skills to with student disciplinary problems. 10. The opportunities in this community help insure that these students will learn. 11. Learning is more difficult at this school because students are worried about their safety. 12. Drug and alcohol abuse in this community make learning difficult here.	1= Strongly disagree 2= Disagree 3= Somewhat disagree 4= Somewhat agree 5= Agree 6= Strongly agree
13. At the end of the current school year, how many years experience will you have as a paid contract teacher? 14. At the end of the current school year, how many years experience will you have as a paid contract teacher at your current location? 15. How many years of professional work experience do you have outside of education rounded to the nearest full year?	Numerical value 1 to 50
16. Select how you obtained your teaching credential. `	Traditional route=1 Alternative route=2 International exchange teacher route=3 Permit route=4
17. What is the highest degree you hold?	Bachelors=1 Masters=2 Specialist=3 Ed.D or PhD=4

Data Analysis Preliminaries

Table 3 presents the descriptive information on the 10 independent variables and the dependent

variable collective teacher efficacy for the 32 schools included in the study. Although there were three

methods of scoring the collective teacher efficacy—total raw collective teacher efficacy, average per item

collective teacher efficacy, and standardized collective efficacy—total raw score measurement was used.

Total raw score was chosen over the standardized measure of collective efficacy because sufficient

information about the normative sample was lacking (Wayne Hoy Website, 2013). Total raw score was

also chosen over average because of its more desirable range (12 to 72 versus 1 to 6) and wanting to avoid

the average due to this metric being subjected to extreme scores. The total score was accomplished by

averaging the item scores for each of the 12-items on the Collective Efficacy scale and adding those 12

means to arrive at a total collective efficacy score.

Table 3

Component Descriptors32 Participating Schools

	Min	Q$_1$	Q$_2$	Q$_3$	Max	Mean	sd
1	581.00	776.00	996.00	1137.50	1861.00	1001.34	284.51
2	4.00	10.00	15.50	33.00	57.00	21.31	15.52
3	823.33	842.34	855.84	869.67	878.00	853.86	15.85
4	826.67	839.84	852.84	858.67	868.33	849.02	11.22
5	6.00	25.50	44.50	79.50	96.00	51.19	28.94
6	7.53	12.24	14.27	18.16	22.60	14.95	3.61
7	2.87	5.90	7.65	10.29	15.80	7.98	3.02
8	.80	4.09	6.72	9.00	15.50	6.80	3.28
9	1.00	1.00	1.12	1.28	1.60	1.16	.15
10	1.60	1.88	2.13	2.24	3.40	2.13	.32
11	50.70	53.65	58.29	62.30	65.69	58.16	4.77

Note. 1= School enrollment, 2= Facility age, 3= Student achievement Math 2011-12, 4= Student achievement reading 2011-2012, 5=Percentage students receiving free and reduced price school lunch, 6=Total teaching experience, 7= Teaching experience at current location, 8= Professional experience outside of education, 9=Path to teacher certification, 10= Highest educational attainment, 11= Total collective teacher efficacy

One manner of assessing the representativeness of the 32 schools participating in the study can be

seen by comparing the descriptive data of the sample to the other 48 elementary schools in the district for

factors like school enrollment, school age, and student achievement in math and reading (this data was

available from the county records (Table 4)). Similarities were noted, in mean enrollment, school age,

CRCT math, CRCT reading and percentage of students receiving free and reduced price lunch between the sample and the population.

Table 4

Component Descriptors Entire District

	Min	Q1	Q2	Q3	Max	mean	*sd*
1	236*	762	968	1137	1861	977.71	295.67
2	3	9	17	31	61	22	16.90
3	823.33	843	851.5	860.67	885.66	852.10	13.78
4	825.33	840.92	848.83	854.33	868.67	847.74	9.66
5	6	33	53	78.75	96	55.16	26.48

Note. 1= School enrollment, 2= Facility age, 3= Student achievement Math 2011-12, 4= Student achievement reading 2011-2012, 5=Percentage students receiving free and reduced price school lunch
*small enrollment for a charter school indirectly associated with New Life Christian Church.

For example, in the sample of the 32 schools used in my study the minimum, first quartile, median, third quartile, maximum, mean and standard deviation for CRCT scores in mathematics were 823.33, 842.34, 855.84, 869.67, 878.00, 853.86, and 15.85, respectively. Whereas, for the entire school district, according to school records the minimum, first quartile, median, third quartile, maximum, mean and standard deviation are 823.33, 843.00, 851.5, 860.67, 885.00, 852.10 and 13.78 respectively. Visual inspection of these descriptive statistics was confirmed by a t-test of equivalence of means between the 48 schools that did not participate and the 32 participating schools (*df=47, t=.410, p= .027*). These similarities indicated the 32 schools participating in the study were similar in student achievement in math to the entire district.

Likewise for school SES, the comparison of the 32 schools included in the sample to the 48 elementary schools in the district looks similar for the descriptive statistics minimum, first quartile, median, third quartile, maximum, mean and standard deviation. For the sample those data are 6.00, 25.50, 44.50, 79.50, 96.00, 51.19, and 28.94, respectively. Those same figures for the remaining 48 Gwinnett County elementary school population are 6.00, 33.00, 53.00, 78.75, 96.00, 55.16, and 26.48, respectively. Although this visual analysis superficially seems to show similarities between the 32 schools used in the study and the 46 schools that did not participate, there are actually two parts to determining the representativeness of this sample. First, are the 32 schools used in the study, representative of the

districts' 78 elementary schools? Comparison of equivalent means using a t test between the 32 schools

participating in the study and the 46 non-participating schools supported this judgment, as no significant

difference was evident (*df=47, t=.410, p = .027*). The second part of the representativeness of the sample

involves assessing weather the participants for each school in the sample were representative of all of the

teachers in that school. This was addressed using a method suggested by Whipple and Muffo (1982)

where participants who responded to the electronic surveys after the first wave of sampling were treated

as non-responders. Then a t test of equivalent means between the first respondents and the follow up

respondents was performed (*df=31, t=.330*, p =.013). Using this analysis, I determined the threat to

validity due to non-response bias was low.

The component correlation matrix using Pearson's r for all ten factors and total collective efficacy

score is given in Table 5.

Table 5

Component Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11
1											
2	.215										
3	-.396	-.293									
4	-.421	-.390	.961								
5	.446	.437	-.912	-.963							
6	.118	-.040	.480	.466	-.358						
7	.276	.432	.139	.120	-.023	.581					
8	-.053	.068	-.007	-.020	-.008	-.174	.113				
9	-.059	-.137	.036	.056	-.151	-.488	-.254	.229			
10	.330	.284	-.053	-.148	.158	.203	.397	-.125	.015		
11	-.217	-.249	.797	.829	-.863	.366	.177	-.057	.010	.056	

Note: 1= School enrollment, 2= Facility age, 3= Student achievement 2011-2012 Math, 4= Student achievement 2011-2012 reading, 5=Percentage students receiving free and reduced price school lunch, 6=Total teaching experience, 7= Teaching experience at current location, 8= Professional experience outside of education, 9=Path to teacher certification, 10= Highest educational attainment, 11= Total collective teacher efficacy

The universal correlation advocated by Huberty and Hussein (2001) is one that involves a linear

relationship between collective teacher efficacy (Y dependent variable) and the 10 independent variables.

Potential outliers were identified by inspecting the Mahalanobis distance of each school (Table 6). School

15 was inspected due to its elevated Mahalanobis distance. I concluded this was due to its extreme

school enrollment ($n= 1861$, $z =3.00$). School 22 also recorded a high Mahalanobis distance, and not

coincidentally, school 22 had the second largest student enrollment in the data set ($n=1648$, $z=2.34$).

Extreme enrollment was not seen as reason to exclude a participant from the sample. Extreme enrollment

was welcomed in light of its potential impact on collective teacher efficacy.

Table 6

Covariance Ratios and Mahalanobis Distances of Sample

Participating School	Covariance Ratio	Mahalanobis distance
1	2.05	4
2	2.34	7
3	.41	9
4	.96	4
5	1.02	6
6	2.19	6
7	1.38	8
8	.99	4
9	2.62	8
10	2.54	9
11	1.38	5
12	2.18	7
13	.64	4
14	2.59	6
15	6.09	19
16	1.57	5
17	.01	3
18	2.03	5
19	2.24	9
20	1.92	6
21	1.70	7
22	4.66	19
23	2.35	6
24	2.82	8
25	2.94	6
26	2.71	9
27	3.06	9
28	1.60	6
29	2.16	4
30	1.46	8
31	.67	8
32	1.34	8

Since no other schools had a Mahalanobis distance that was considered extreme in relation to the other members of the sample, no participating schools were eliminated from this study as an outlier. The linearity condition is assessed with a residual plot (Weisburg, 1985). This data met the requirement, in that the difference between observed values and predicted values did not exceed the standard error of the estimate (*df*=9, *F*=13.620, standard error of the estimate=2.309). Three conditions are necessary to make the linear multiple correlation analysis legitimate. The three conditions are independence of independent variable score vectors, Y-variate normality, and homogeneity of Y-variable variance across the X-variable-score possibilities. A *probability plot* was used to subjectively assess the normality condition and a *residual plot* was used to assess the homogeneity condition. Independence of score vectors was assessed by study design and my judgment. Finally, the data matrix was checked to see if any schools had extreme influence on the analysis results. The covariance ratio (CVR) was used for this analysis (Table 6). Since there were no extremely small or extremely large covariance ratio scores, it was deemed that no school had an extreme undue influence on the analysis. Therefore, no participating schools were deleted from the study.

Interpreting the Relationship

Huberty and Hussein (2001) recommended an adjustment to the multiple correlation coefficient, $R^{2.}$. The adjustment is

In this adjustment, *p* denotes the number of variables and *N* is the number of schools participating in the sample (*p*=10, *N*=32). Mathematically, this calculation adjusts for multiple computation discrepancies based on the number of factors and the size of the sample. The multiple correlation coefficient for the linear composite consisting of all 10 factors was .853 and adjusted to .783 using this calculation.

Research Question 1

What is the influence of collective teacher efficacy on school wide student achievement?

I wanted to determine if the results of my study in Gwinnett County supported previous research results—specifically the studies conducted by Bandura (1993) and Goddard (2001)—that collective teacher efficacy is positively and significantly related to high student achievement, even when controlling for socioeconomic status. Although, the Bandura and Goddard studies employed statistical analysis such as; path analysis using factorially-verified indices, hierarchical linear modeling, and a means as outcomes model (Bryk & Raudenbush, 1992), I favored a statistical procedure of regression like the Tschannen-Moran and Barr (2004) study, using student achievement as the dependent variable while controlling for collective teacher efficacy. This decision was predicated by the fact that in the Bandura and Goddard studies, there were many factors which my study didn't include. For example, in both the Bandura and the Goddard study, both student race and ethnicity were included in the factors influencing student achievement. Additionally, in both of these previous studies—because of the scope and resources involved— researchers were able to include survey information that was collected over longer periods of time. Although path analysis was not used in this study, the theoretical model (Figure 1) shown is similar to the model employed by the Bandura study (1993).
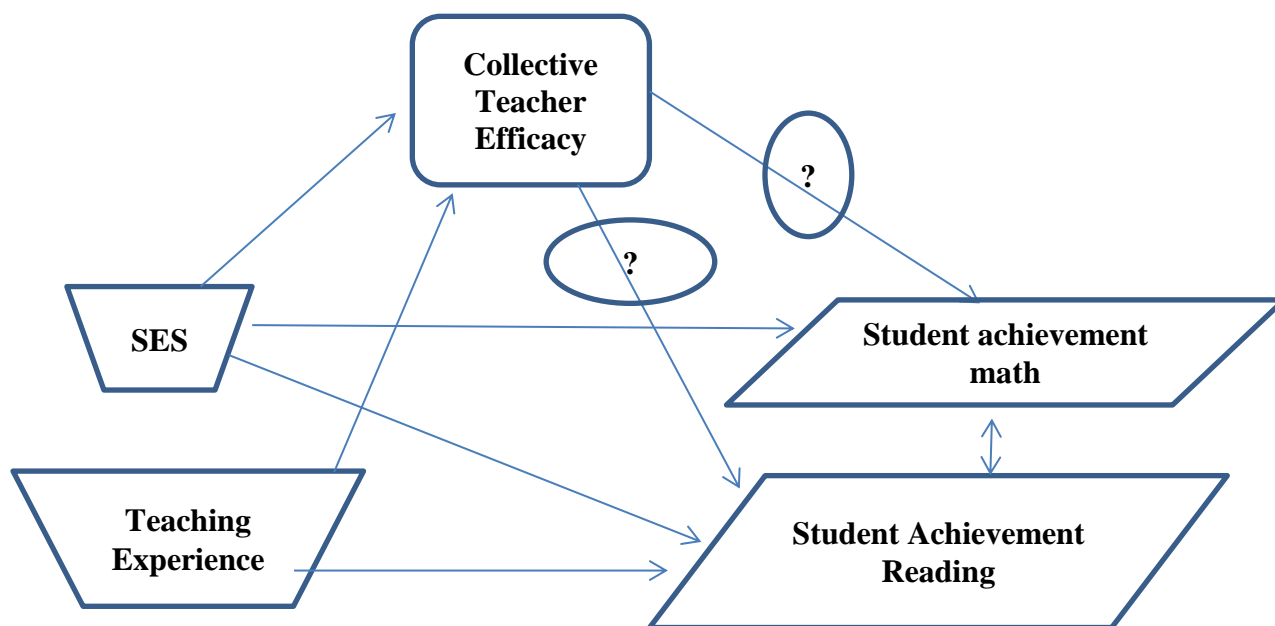
Figure 1 Theoretical model of collective teacher efficacy's influence on student achievement

In both the Bandura and Goddard studies, student demographic variables were coded, whereas, in my study, there were no student demographic variables, other than the school SES which was operationalized by the participation of a school's students in the free and reduced price lunch program. For this study, student ethnicity and race data were not available. Tschannen-Moran and Barr (2004) also favored a multiple regression model to determine collective teacher efficacy's influence on student achievement. For these reasons path analysis was eschewed in favor of a composite multiple regression.

Performing 2 linear regression models with student achievement in math and science as dependent variables, I sought to determine the contribution of collective teacher efficacy to the linear composite which also included school age, school enrollment, school wide participation in free and reduced price school lunch, teacher experience at current location, teacher experience total, non teaching professional experience, path to credential, and highest level of educational attainment. Pedhazur (1982) explained that linear regression analysis is not restricted to experimental research, and regression is the most powerful method of studying the effect of an independent variable, X, on a dependent variable, Y. I determined that collective teacher efficacy did not make a measurable and significant influence on student

achievement above and beyond the socioeconomic status and total teaching experience for the 32 schools

involved in my study (Table 7).

Table 7

Regression analysis for student achievement controlling for total collective teacher efficacy

Reg.	Dependent Variable	Independent Variables	Variables Omitted	Composite R	R^2_{adj}	Standard Error	Anova
1	3	1,2,5,6,7,8,9,10,	4,11	.935	.830	6.53	*df*=8, *F*=19.960 *Sig*=.000
2	3	1,2,5,6,7,8,9,10,11	4	.937	.828	6.58	*df*=9 *F*=17.536 *Sig*=.000
3	4	1,2,5,6,7,8,9,10	3,11	.947	.929	2.99	*df*=8 *F*=51.784 *Sig*=.000
4	4	1,2,5,6,7,8,9,10,11	3	.973	.926	3.05	*df*=9 *F*=44.111 *Sig*=.000

Note. 1= School enrollment, 2= Facility age, 3= Student achievement Math 2011-12, 4= Student achievement reading 2011-2012, 5=Percentage students receiving free and reduced price school lunch, 6=Total teaching experience, 7= Teaching experience at current location, 8= Professional experience outside of education, 9=Path to teacher certification, 10= Highest educational attainment, 11= Total collective teacher efficacy

As expected, there was a strong negative correlation between socioeconomic status and both

CRCT scores in math and reading. The higher the proportion of subsidized meals in a school described a

lower score range for both math and reading achievement. School percentage participation in free and

reduced price lunch correlated with math and reading achievement at -.912 and -.963, respectively.

Collective teacher efficacy correlated with math and reading achievement at .797 and .829, respectively.

Collective teacher efficacy could not add anything statistically significant to the composite prediction for

student achievement above what school wide SES had already accounted for. According to Pedhazur

(1982), in nonexperimental research, independent variables are almost always intercorrelated. Once

school SES was found to correlate so substantially with academic achievement, it became difficult to find

additional variables that correlated substantially with student achievement and *not* with school

socioeconomic status.

Research Question 2

Do selected independent factors account for a greater proportion of the variance of collective teacher efficacy than what would be expected by chance?

Huberty and Petoskey (1999) recommended using the chance value of $R^2 = p/(N-1)$ to determine the chance value of the obtained percent of shared variance. For this data set the chance value is .323. The composite R^2_{adj} for this data set was .783 using the formula prescribed by Hubert and Hussein (2001). This statistic is testing the difference between Δ^2 and the expected value of R^2 (the long run mean). Since the R^2_{adj} of .783 represents that approximately 78% of the variation in collective teacher efficacy scores is shared with the obtained linear composite of the ten components and the chance value is approximately 32%, I concluded that the values obtained accounted for a greater proportion than what would be obtained by chance. The effect size for this calculation is given by:

$$E = R^2_{adj} - p/(N-1)$$

For this data set, the effect size computed to be .379.

The effect size can be seen as the strength of a relationship between independent variables (the ten selected teacher and school factors chosen for the study) and a dependent variable (the total score on the Collective Efficacy scale), I can report that my data accounted for approximately 38 percent of the variation of collective teacher efficacy in Gwinnett County elementary schools. While there are different interpretations of the power and significant of a reported effect size, it is clear that a larger sample of schools would increase the statistical effect size.

Research Question 3

What are the correlations of independent teacher factors and school-level factors with collective teacher efficacy in elementary schools?

This question examined variable importance. Collective teacher efficacy is described and defined by the linear composite of the 10 factors in my study. Huberty and Hussein (2001) favored reporting the structure *r*'s for each selected factors, which represent the simple correlation between each of the 10

factors and the linear composite of the 10 factors. The linear composite calculation was the R^2_{adj} of .783.

A squared structure *r* reports the variance shared between a factor and the linear composite of factors.

The conditions for Y-variable normality, Y-variable variance homogeneity, and no undue influence of

unit score vectors were satisfied with the probability plot, residual plot and covariance ratio inspection.

Table 8 reports the structure *r*'s for the 10 selected factors chosen for this study.

Table 8

Structure Correlations

Component	Structure r
1	-.175
2	-.199
3	.660
4	.669
5	-.678
6	.348
7	.178
8	-.043
9	-.012
10	.034

Note: 1= School enrollment, 2= Facility age, 3= Student achievement 2011-2012 Math, 4= Student achievement 2011-2012 reading, 5=Percentage students receiving free and reduced price school lunch, 6=Total teaching experience, 7= Teaching experience at current location, 8= Professional experience outside of education, 9=Path to teacher certification, 10= Highest educational attainment.

Collective teacher efficacy was primarily defined by factors 3, 4, and 5 (CRCT scores math,

CRCT scores in reading, and participation in free and reduced price lunch, respectively). Since the

strongest three factors were in the external school factors grouping, it can be inferred that external school

factors are correlated more strongly to collective teacher efficacy than individual teacher factors. This is

born out by separate regressions with each of the two groups. Using an all variable entered regression

technique, the school factors showed an R^2 value of .772 with an *F* statistic of 21.976 and significance of

p< .000, while the individual teacher factors using the same regression technique showed an R^2 value of

.115 with an *F* statistic of 1.802 and significance of *p*< .148.

In MCA, *it* is also possible to analyze which independent variables are the most descriptive of the relationship with perceived collective teacher efficacy. This is accomplished by *X*-variable ordering. To conduct *X*-variable ordering, the study used p (10 factor) MCA each with p-1 (9) *X* variables. The *X* variable, which when deleted lowers the R^2 value the most, is considered the most significant *X* variable affecting the dependent variable. Decreases in the adjusted R^2 value can be used as well. Smaller decreases by selected *X* variables would indicate smaller levels of influence in the relationship with the dependent variable collective teacher efficacy. For my data set the results of the ten nine-component analyses are given in Table 9.

Table 9

Results of the Nine-Component Analyses

Variable deleted	R^2	R^2_{adj}	Rank
1	.834	.755	2
2	.853	.783	10
3	.846	.773	5
4	.850	.779	8.5
5	.791	.691	1
6	.841	.765	4
7	.839	.762	3
8	.850	.779	8.5
9	.849	.777	6.5
10	.849	.777	6.5

Note: 1= School enrollment, 2= Facility age, 3= Student achievement 2011-2012 Math, 4= Student achievement 2011-2012 reading, 5=Percentage students receiving free and reduced price school lunch, 6=Total teaching experience, 7= Teaching experience at current location, 8= Professional experience outside of education, 9=Path to teacher certification, 10= Highest educational attainment.

According to results of the of the nine component analyses, factors which changed the total regression by their omission individually were percentage of free and reduced price lunch, total school enrollment, present school teaching experience, total teaching experience, and student CRCT scores in mathematics. This result supported my findings in research question 1 that collective teacher efficacy is strongly intercorrelated with socioeconomic status. This result also indicated the strongest individual teacher descriptors of collective teacher efficacy are selected factors 6 and 7, the teaching experience at the current location and in total, respectively. In terms of the 5 individual teacher factors, total teaching experience was shown to correlate most strongly to collective teacher efficacy, and student achievement.

Total teaching experience shared a Pearson r of .480, .466, and .366 with CRCT scores in math, science, and collective teacher efficacy, respectively.

Although there were no accommodations made for specific item analysis in MCA, the items on the scale were divided into two categories—group competence (GC) and task analysis (TA). GC items were 1, 2, 3, 4, 5, and 9. TA items were 6, 7, 8, 10, 11, and 12. Several items on the instrument were highly focused on the external environment of the school. These were considered by Goddard (2001) to be on the task analysis (TA) subscale, but I would put these items in a subscale called "external environment". These were items 6, 7, 10, and 12. These four items dealt specifically with the community and home life. I would expect the individual item analysis of items 6, 7, 10, and 12 to correlate strongly with socioeconomic status. This may be an avenue of future quantitative design collective teacher efficacy research. Table 10 presents the sample item descriptors for this data set.

Table 10

Sample Itemized Descriptors

	Sample Min	Sample Max	Sample Mean	Sample Standard Deviation
Item 1	1	6	4.47	.96
Item 2	1	6	4.90	.90
Item 3*	1	6	5.39	.77
Item 4*	1	6	5.57	.77
Item 5	1	6	5.50	.70
Item 6	1	6	4.30	1.10
Item 7	1	6	3.00	1.00
Item 8*	1	6	4.58	1.16
Item 9*	1	6	4.93	1.07
Item 10	1	6	4.25	1.20
Item 11*	1	6	5.58	.78
Item 12*	1	6	5.31	1.01
Item 13	.5	43	14.75	8.04
Item 14	.5	32	7.86	5.08
Item 15	0	40	6.86	8.31
Item 16	1	4	1.11	.38
Item 17	1	4	2.11	.72

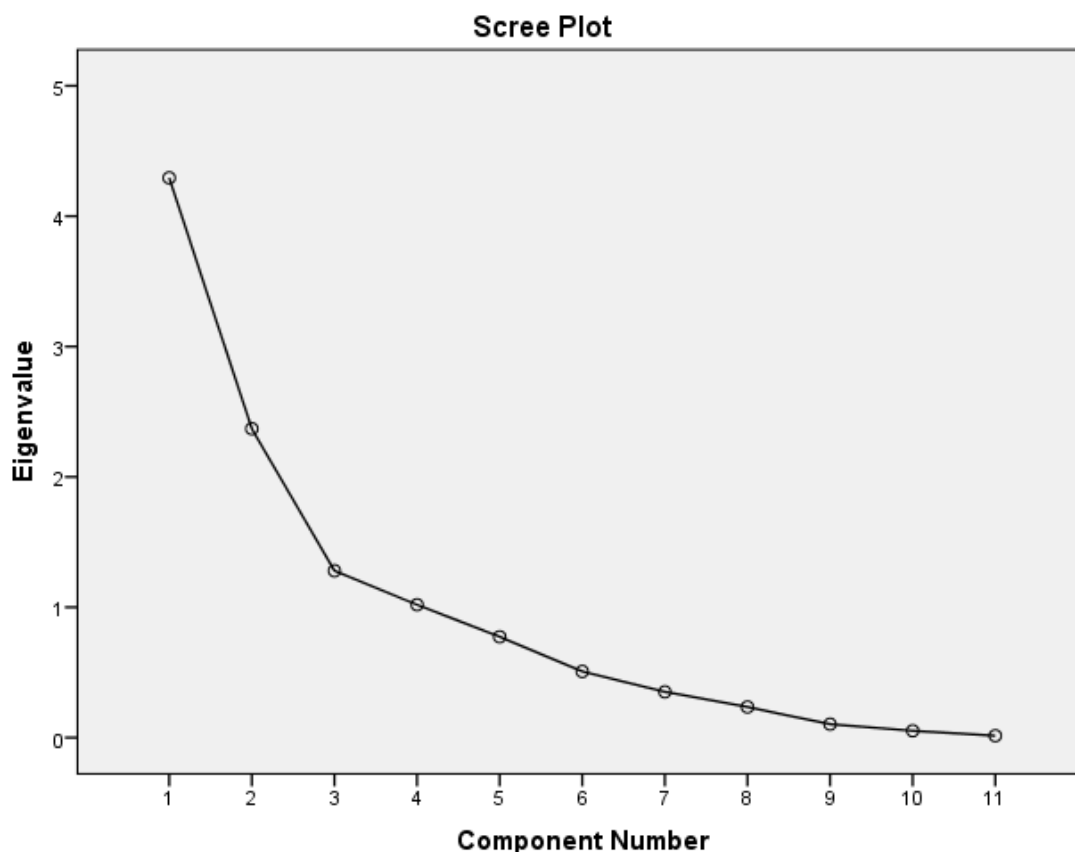*Negatively worded collective teacher efficacy scale items where scores 1-6 were reversed

It may be valuable to future researchers interested in this construct to analyze the Group Competence (GC) items 1, 2, 3, 4, 5, 9 to find small standard deviations, and extreme item scores from

schools in this study. Total teaching experience would be a statistic to look at for schools that stood out on the GC items. Theoretically, this would be significant since total teaching experience aligned closely to the enactive mastery experience source of all efficacy beliefs. Bandura (1997) stated this was the most important source of all efficacy beliefs.

Research Question 4

Do latent composites of variables exist to describe perceived collective efficacy of elementary school teachers?

Using principal component analysis as a data reduction technique, the linear composite loaded strongly on the first 5 environmental school factors. Figure 2 shows the scree plot from this analysis.

Note: 1= School enrollment, 2= Facility age, 3= Student achievement 2011-2012 Math, 4= Student achievement 2011-2012 reading, 5=Percentage students receiving free and reduced price school lunch, 6=Total teaching experience, 7= Teaching experience at current location, 8= Professional experience outside of education, 9=Path to teacher certification, 10= Highest educational attainment, 11=Total collective teacher efficacy.

Figure 2. Scree plot from principal component analysis.

A total of 82.39% of the total composite variance was explained by the first 4 school environment factors. This result was obtained with Varimax Rotation using both extraction and rotational sums. School enrollment, facility age, student achievement in 2011-2012 Math, and student achievement in 2011-2012 reading accounted for 39.04%, 21.54%, 11.63%, and 9.68% of the total explained variance, respectively. Eigenvalues were greater than 1.00 for the first 4 factors and lower than 1.00 for the remaining 6 factors. The R^2_{adj} for the first 4 factors was compared to the R^2_{adj} for all 10 factors. For the first 4 factors the composite R^2_{adj} was .646, while the composite R^2_{adj} for all 10 factors was .783.

Research Question 5

What is the perceived collective efficacy of elementary teachers?

The strongest linear composite to describe collective teacher efficacy involved all 10 factors included in the model. ($R = .923$, $R^2 = .853$, $R^2_{adj} = .783$). Using results of the nine-component analysis (see Table 4.6), school age added the least to the statistical composite. School age added little in relation to the linear composite of collective teacher efficacy, although when conducting principal component analysis, school age did load strongly (eigenvalue=1.39). Similarly, teacher path to credential, non-professional teaching experience, highest level of educational attainment, and CRCT results in reading contributed very little to the linear composite describing collective teacher efficacy. The limited contribution made by CRCT reading scores is possibly due to this factor sharing the same variance that has already been accounted for in linear composite by the CRCT math scores and student socioeconomic status. From the component correlation matrix (Table 5), student achievement in math and reading were highly correlated with school socioeconomic status. To test this, I ran a regression without the CRCT math scores, CRCT reading scores and percentage of students receiving free and reduced price school lunch. The linear composite for the remaining 7 factors resulted in $R=.608$, $R^2=.370$, and $R^2_{adj}=.070$. Apparently, collective teacher efficacy is best described by student achievement and student socioeconomic status. School enrollment, school age, total teaching experience, teacher experience at their current location, non-teaching professional experience, teacher path to credential, and teacher highest level of educational

attainment accounted for 7% of the variance in the linear composite of collective teacher efficacy in my study.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

I described the collective teacher efficacy for a sample of elementary school teachers in the largest student populated school district in the state of Georgia. A representative sample of 32 elementary schools was surveyed using questionnaires in March, 2013. I used multiple correlation analysis to describe collective teacher efficacy in terms of 5 selected school related factors (student enrollment, facility age, school wide Criterion Referenced Competency Test scores from 2011-2012 in math, school wide Criterion Referenced Competency test scores from 2011-2012 in reading, and school wide percentage of free and reduced price lunch participation) and 5 selected individual teacher factors (total teaching experience, teaching experience at present location, professional work experience not related to education, path to teacher credential, and highest level of educational attainment). The dependent variable was a 12-item measure of collective efficacy developed by Goddard (2002). This instrument, the Collective Efficacy scale, had two subscales: group competence (GC) and task analysis (TA). Using group referent stems, such as, "we" and "the teachers here", the instrument contained 6 positively worded and 6 negatively worded items. Collective teacher efficacy had previously been shown to be positively and significantly correlated to high student achievement, even after controlling for socio-economic status (Bandura, 1993, Goddard, 2001, Hoy et al., 2002). Scholarly literature strongly encouraged more studies on collective teacher efficacy (Bandura, 1997; Fives & Looney, 2009; Goddard et al., 2004; Hoy et al., 2002; Pajares, 1997) in order to describe how this psychological construct plays a role in larger ideas like school climate, school culture and academic press.

Summary and Discussion of Findings

The purpose of the study was to describe collective efficacy by (a) measuring the influence of selected individual and school factors on this construct for elementary school teachers in Gwinnett

County Georgia, and (b) analyzing the influence of collective teacher efficacy on school wide student achievement scores.

The study was viewed through the theoretical lens of social cognitive theory (Bandura, 1977a, 1986, 1997). Collective teacher efficacy was viewed as particular schools conjoint teachers' beliefs regarding future judgments about capabilities to organize and execute specific goals related to the achievement of the schools' students on the Criterion Referenced Competency Test (CRCT). Four sources of collective teacher efficacy—enactive mastery experience, vicarious experience, verbal persuasion, and physiological/affective state—were conceptualized to maintain consistency with Bandura's (1997) description of individual self-efficacy. I sought to determine if efficacy beliefs were quantifiable at the group level, how those beliefs could be described by the 10 selected individual and environmental factors, and if these beliefs could significantly and positively affect student achievement regardless of other factors like socioeconomic status.

The Influence of Collective Teacher Efficacy on Student Achievement

In order to determine if collective teacher efficacy was positively and significantly related to student achievement, a linear regression model was employed. As expected there was a strong negative correlation between socioeconomic status and both CRCT scores in math and reading. The higher the proportion of subsidized meals in a school described a lower score range for both math and reading achievement. According to Pedhazur (1982), in nonexperimental research, independent variables are almost always intercorrelated. Once school SES was found to correlate so substantially with academic achievement, it became difficult to find additional variables that correlated substantially with student achievement and *not* with school socioeconomic status. This is substantially the findings of the Coleman Report (Coleman, 1966).

This study found a different conclusion than other collective teacher efficacy studies (Bandura, 1993; Goddard 2001; Hoy et.al., 2002) regarding the influence of collective teacher efficacy being positively and significantly tied to student achievement even when accounting for important selected factors like socioeconomic status. This conclusion bears further discussion. First, not every collective

teacher efficacy study conducted has arrived at the same conclusions of Bandura (1993), Goddard (2001), and Hoy et al. (2002). Tschannen-Moran and Barr (2004), while using a multiple regression model, found that for student achievement on 8th grade math and English tests, collective teacher efficacy did not have a strong and independent contribution beyond SES. In Bandura's path analysis, socioeconomic status, student body composition (described as "adverse characteristics of student body populations reflecting largely socioeconomic disadvantage" (p.142)), and teaching longevity were related to prior academic achievement which in turn was related to collective efficacy. This path contributed to current academic achievement.

Another issue in my study was the timing of data collection. With respect to the theoretical framework of social cognitive theory proposed by Bandura (1997), physiological/affective states are one of the four sources of efficacy beliefs. Ermakova (2002) was able to show that key physiological indicators in school children changed markedly from the beginning of the school year to varying points throughout the year. Thus, the timing of the data collection may have influenced the physiological and affective states of the students and the teachers in the schools involved in my study.

Additionally, and this may be a point to note for future research using qualitative methods, the particular chronological point in the school year and the particular stresses unique to that period may affect responses to questionnaires. In my example, the data collection was started and completed at the point in the school year preceding spring break. I did receive notes from three principals, apologizing for their faculties' lack of participation, but at the same time, explaining that this was a stressful time of year for their staff. These principals cited the upcoming administration of CRCT tests after returning from spring break as a big reason for their staff's stress. Studies by Hoy, Sweetland and Smith (2002) and Goddard (2001) collected data in the fall of the school year. In studies of school dynamics (Skinner, Furrer, Marchand, & Kinderman, 2008; Strahan, 2003) a qualitative design employing longitudinal case studies was employed to address the issue of ebb and flow through out the school year. Because of the quantitative survey design of this study, only a one dimensional static image of collective t e4acher efficacy at that particular point in the school year was obtained.

Several school principals I heard from reported that this was a busy time of the school year. What affect this had on the results of this study is unknown. In a qualitative study involving student achievement and among other factors, collective teacher efficacy, Brown, Benkovitz, Muttillo, and Urban (2011) hypothesized that the pressure on teachers from high stakes accountability testing (e.g. No Child Left Behind) may be manifest in affective/physiological states, the fourth source of collective efficacy beliefs (Bandura, 1997). Brown et al. (2011) reported the level of stress and anxiety of these tests affected the school, as an organization, sense of collective efficacy, and not just the collective efficacy of the teachers. Here might be an opportunity for further research into collective teacher efficacy. Perhaps, if a quantitative methodology was still desired, teachers could complete one set of questionnaires at the beginning of the school year, one in the middle, and one at the end of the year, after academic achievement testing is completed in April. This could give a more comprehensive picture of the levels of collective teacher efficacy throughout the entire school year.

Another possible study could adopt a longitudinal perspective of collective teacher efficacy consisting of tracking several schools over 3-5 years. If a study with this scope were possible, I would recommend a qualitative case study design. This recommendation would be predicated by many of the survey responses I received during the data collection period of my study. On many questionnaires, teachers wrote additional comments. I received comments like, "this school has changed", or "I don't feel the same way I used to about that item", or "the parents at this school are great." Although the Collective Efficacy scale is a psychometrically sound research instrument, it lacked the breadth and depth of what could be accomplished with an intensive case study where researchers could spend longer periods of time in each school. My recommendation is to identify individual schools the extreme ends of measures for student achievement, socioeconomic status, and collective efficacy. These schools could be targeted for longitudinal case studies to determine what specific programs and/or other factors are in place at the school that make them stand out in student achievement, collective teacher efficacy and socioeconomic status.

In conclusion, although collective teacher efficacy was not shown to have a significant effect on student achievement above and beyond the powerful effect of school-level socioeconomic status, the data set does contain valuable information for researchers who may be interested in conducting additional research on collective teacher efficacy. One possibility would be to conduct this same research at different times of the year and see what affect the timing of data collection has on response rate, measuring collective teacher efficacy, and multiple measures of student achievement that may be employed in the forthcoming growth models. I think my study could have been greatly enhanced if I could have looked at several years of student achievement data along with collective teacher efficacy data over a longer period (3-5 years would be ideal) of time. If a case study like this could be could be accomplished, I believe collective teacher efficacy could be described in much more depth, and its relationship to student achievement could be further clarified.

Study Findings and Chance Findings

Explained variance and effect size coefficients indicated that results were unlikely to be obtained merely by chance. I interpreted this to mean the sample was representative of a unique population. However, the unit of analysis problem, making statistical inferences about groups from data obtained from individuals, created some problems. For this study, one problem that surface was in determining the minimum number of faculty members from a school that would be needed to be considered representative of the entire school. In other collective teacher efficacy studies (Goddard et al., 2000; Goddard, 2001; Hoy et al., 2002; Tschannen-Moran & Barr, 2004), the Halpin Rule (1959) was utilized to include any group that submitted a minimum of 5 responses. This rule originated when Halpin was studying the leadership behavior of aircraft commanders (Halpin, 1955). The minimum number of responses to represent a group was based on surveys of B-29 aircraft crew. These groups consisted of 11 servicemen. Later, when Halpin expanded leadership studies to include faculty at schools rating administrators, the rule persisted. Although this rule appears arbitrary, the threat to validity was determined to be low due to non-response bias. The literature has presented different ways of dealing with the representativeness of samples. Whipple and Muffo (1982) offered a possible method to check for non-response bias by treating

late respondents (individuals who responded after the first mailing) as non-respondents. Researchers then compared early and late responders to determine if significant differences existed. If no statistically significant differences were determined then the possibility of non-response bias was low. Although previous collective teacher efficacy studies did not report methods to treat non-response bias, in this study, the results of the t-test between first responders and second responders signified that the validity threat due to non-response bias was low.

However, in interpreting much of the quantitative data for this study, in many instances, I saw the need for a deeper level of understanding this construct than what could be accomplished with a survey. For example, I was interested in learning about teachers non-education related work experience. I conceptualized this factor as the efficacy source enactive mastery experiences. Many of the responses coded on the questionnaires needed clarification. On quite a few, there were teachers who responded with a large number for total teaching experience (>30 years) and an equally large number of years for experience outside of education. It wasn't clear if they had misread the question or they had worked in two distinct careers for a total of 60 plus years. The results of this quantitative analysis showed unexpected correlations of non-educational experience within the teacher factors. For example non-educational work experience correlated -.174, and .113 to total teaching experience, and experience at current location. I expected a much stronger negative correlation between teaching experience and non-teaching experience. In other words, I would expect more years of work experience in education to translate to less years of work experience in the private sector. These are aspect of collective teacher efficacy that could be clarified with a qualitative study conducted over a longer duration of time.

Correlations of Independent Teacher Factors and School-wide Environmental Factors

The variance of collective teacher efficacy was better described by environmental school factors than by individual teacher factors. Specifically, school socioeconomic status, and student math and reading achievement contributed most. These three factors were also highly intercorrelated. Pedhazur (1982) posited, in nonexperimental research, independent variables are almost always intercorrelated. School socioeconomic status and student achievement in math and reading were found to correlate so

substantially with collective teacher efficacy that it became difficult to find additional variables that correlated substantially with collective teacher efficacy and not with student achievement and school socioeconomic status.

From a theoretical perspective, environmental classes of determinants proved to be more significant than both personal and behavioral factors in Bandura's (1986) three-legged model of human agency in triadic reciprocal causation. This study conceptualized the school factors to describe the environmental determinants of human agency. Delving deeper into the four theoretical sources of self-efficacy (enactive mastery experience, vicarious experience, verbal persuasion, and physiological/affective states), I conceptualized previous student achievement as a manifestation of enactive mastery experience, while the socioeconomic status of a school manifests itself in the physiological /affective states.

I had conceptualized teacher educational attainment as the theoretical source of self-efficacy vicarious experience. Vicarious experience is the modeled events in teaching, the educational setting, or coaching in the athletic environment (Bandura, 1997). Pursuing advanced educational degrees can model pedagogical skills and assist teachers in career development (Lubinski & Benbow, 2006). However, the correlations of highest educational attainment with collective teacher efficacy were insignificant. I had anticipated a stronger correlation of advanced degrees with collective teacher efficacy and student achievement.

Latent Composites of Variables to Describe Collective Teacher Efficacy

This study, examined the underlying dimensions or combinations of factors that best described collective teacher efficacy. For example, was there some combination of individual teacher factors and environmental school factors that best described collective teacher efficacy? Several of the selected factors did not contribute a great deal, e.g. the individual teacher factor path to credential. Path to credential was seen as reflecting as both vicarious experience and verbal persuasion sources of theoretical self-efficacy. I had anticipated that activities in a traditional teacher credentialing program from a

4-year university, such as, student teaching to be what Bandura (1997) called comparable activities. Comparable activities occur when a person persuades him/herself that if others can perform an activity, then they may have the capability to raise their performance as well. I had anticipated a group with a larger number of non-traditional credentials might differentiate themselves in collective teacher efficacy by not having a traditional student teaching experience. Many alternative credentialing programs allow a professional to use their paid classroom experience as their student teaching requirement (National Center for Educational Information, 2012). Although teachers in these alternative programs work closely with mentor teachers, they are not working in another teacher's classroom, but rather, they have their own paid assignment and are periodically visited by the mentor teacher assigned to them. Typically, these candidates are assigned classrooms immediately, with much less pre-service training, and with little or no orientation, while taking education courses at night and during summers.

Likewise, I also conceptualized the primary efficacy source, verbal persuasion, to be related to path to credential.

> Verbal persuasion alone may be limited in its power to create increases in perceived efficacy, but it can bolster self-change if the appraisal is in 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 than if they harbor self-doubts and dwell on personal deficiencies when difficulties arise. (Bandura, 1997, p. 101)

I anticipated traditional teacher education programs would employ more verbal persuasion than a non-traditional program where a teaching candidate may receive less pre-service preparation and less day-to-day verbal persuasion. As a result, I expected, but did not find a significant negative correlation between teacher credential path and collective teacher efficacy.

The strongest factors to describe collective teacher efficacy were the first four environmental school factors including student enrollment, facility age, school wide CRCT scores in math, and school wide CRCT scores in reading. The combination of these four factors explained over 80% of the variance in all of the factors included in this study. One factor that did not contribute to the variance was school

socioeconomic status. It is possible that the contribution of socioeconomic status was already accounted by the two student achievement factors. Previous research studies reported in scholarly literature have reported socioeconomic status to be highly correlated to, as well as, a good predictor of student achievement (Caldas & Bankston, 1997; Coleman, 1966; Hanushek, 1986; Okpala, Bell, & Tuprah, 2007). Thus, I could conclude for the data in this sample there was no unusual combination of environmental school factors and individual teacher factors that made a unique contribution to collective teacher efficacy.

Conclusions about Collective Teacher Efficacy and its Future Roll in Building Strong School Climates

The strongest linear composite that described collective teacher efficacy involved all 10 factors, explaining over 75% of the variance in the construct. The age of a school adds the least to this statistical composite. However, looking at the descriptive statistics for school age, Gwinnett County's mean elementary school age is half of the national average of 40 years (U.S. Department of Education, 2000). An avenue for future research might be to compare teachers from different districts with extreme differences in facility age. In Gwinnett County, facilities are comparatively new and perhaps this is why age contributed insignificantly to the linear composite describing collective teacher efficacy.

Similarly, teacher path to credential, non-professional teaching experience, highest level of educational attainment, and CRCT results in reading contributed very little to the linear composite of collective teacher efficacy. The limited contribution made by the CRCT reading scores is possibly due to shared variance with CRCT math scores and student socioeconomic status, as evidenced by high correlations between student achievement in math, reading, and school socioeconomic status. School enrollment, school age, total teaching experience, teacher experience at their current location, non-teaching professional experience, teacher path to credential, and teacher highest level of educational attainment accounted for 7% of the variance in the linear composite in my study. The primary contributions to describe collective teacher efficacy were made by student achievement and socioeconomic status.

Case study research may be valuable in gaining a deeper understanding of how collective teacher efficacy can create effective faculty in our schools. Recently collective teacher efficacy has been theorized as an element of larger organizational constructs like academic emphasis, academic optimism, and faculty trust (Brown et al., 2011; Lee, Zhang, & Yin, 2011). Case study research may be an avenue to clarify these theoretical models.

Several schools from this study would specifically be ideal for case study research. For example, one school was first in total collective teacher efficacy, first in CRCT reading and second in CRCT math. Yet this school was in the second quartile of school wide socioeconomic status. Conversely, several schools scored high in collective teacher efficacy, yet didn't necessarily have the highest test scores or the lowest percentage of free and reduced price lunch. Deep qualitative studies with schools in this study that demonstrated both high and low collective teacher efficacies may inform the literature comprehensively.

Another avenue for additional study is the contribution of collective teacher efficacy to the overall climate of a school. This would integrate the role of leadership into collective teacher efficacy studies. According to Cohen, Pickeral, and McCloskey (2008), a growing body of research affirms the importance of learning climate. Although collective teacher efficacy may weave through more than one of the four dimensions of school climate—safety, teaching and learning, interpersonal relationships, and institutional environment—its impact may be further clarified with qualitative research.

Finally, the mediating role of collective teacher efficacy and employee job satisfaction is another avenue for future research. Champlain (2008) concluded that teaching is a stressful occupation, yet Klassen (2010) suggested that teachers' collective teacher efficacy may lower teachers' stress attributed to student behavior. The mechanism by which this might be accomplished was offered as "when teachers experience challenges and failures that may raise stress and lower job satisfaction, these setbacks may be ameliorated by beliefs in the schools collective capacity to effect change" (p. 342). It was suggested validity evidence for measures of collective teacher efficacy and teacher's job related beliefs are rare, and little is known about how collective capabilities may influence teacher's job stress (Klassen, 2010). This is another possible direction for collective teacher efficacy research.

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APPENDIX A

Survey Instrument

Collective Teacher Efficacy Questionnaire: Mark an X in the box that best describes your perception of this school.	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
1. Teachers in in this school are able to get through to the most difficult students.						
2. Teachers here are confident they will be able to motivate their students.						
3. If a child doesn't want to learn, teachers here give up.						
4. Teachers here don't have the skills needed to produce meaningful student learning.						
5. Teachers in this school believe that every child can learn.						
6. These students come to school ready to learn.						
7. Home life provides so many advantages that students here are bound to learn.						
8. Students here just aren't motivated to learn.						
9. Teachers in this school do not have the skills to deal with student disciplinary problems.						
10. The opportunities in this community help insure that these students will learn.						
11. Learning is more difficult at this school because students are worried about their safety.						
12. Drug and alcohol abuse in this community make learning difficult here.						

13. At the end of the **current school year**, how many years **total experience** will you have as a paid contract teacher?

14. At the end of the **current school year**, how many years **experience** will you have as a paid contract teacher at your **present location**?

15. How many years of **professional work experience** do you have **outside of education** rounded to the nearest full year?

16. Select how you obtained your **teaching credential**. Mark an X through the box that *best* describes your **path to teaching certification.**	**Traditional Route** through a state approved institution-including interstate reciprocity.	Career change from another industry through **Alternative Routes.**	International Exchange **Teacher Route.**	**Permit Route** to teach in special circumstances.
17. What is the highest degree you hold? Mark an X through the box.	Bachelors	Masters	Specialist	Ed.D or PhD

APPENDIX B

Letter to the Principal

Brent Robertson
201 Shore Drive
Suwanee GA, 30024

Dear Esteemed Colleague:

My name is Brent Robertson, and in addition to working in the district as a mathematics instructor at Norcross High School, I am also pursuing my PhD from the University of Georgia in Workforce Education. My area of research is collective teacher efficacy. This is a faculty's shared belief that together, they can be successful in their mission to educate our children. Collective teacher efficacy is a construct that shows promise in promoting effective schools and high student achievement (Tschannen-Moran & Barr, 2004). Despite the promising statistics, current research is often not generalizable to other populations due to the unit of measurement being the school and not the individual. More research is called for in this emerging construct (Fives & Looney, 2009; Hoy, Sweetland, & Smith, 2002). Gwinnett County makes a perfect research site due to its size and recognized quality of academic excellence.

I am attempting to sample all certificated faculty in the 78 elementary schools in the district. Any and all responses from your faculty would be greatly appreciated. I hope that you can disseminate these 17-item questionnaires with the information in lieu of consent letter to your faculty and return as many forms back to me in the enclosed self-addressed stamped envelope. In a pilot test done at Norcross High School, the average time for a teacher to complete a questionnaire was 7 minutes. There is no need to sign a consent form other than to read the information on the information in lieu of consent. I have stapled this letter to the back of the self addressed stamped envelop for your convenience.

Once the questionnaires are returned, I have designed a multiple correlation analysis where I will describe collective teacher efficacy in terms of five school related factors (Enrollment, facility age, SES, previous/current student achievement based on College and Career Readiness Performance Index protocols) and five teacher factors (years of experience, years of experience at this school, years of professional experience outside of education, path to credential, and highest level of educational attainment). With this design, I will be looking to identify factors and groups of factors that describe collective teacher efficacy. My hope is that this emerging construct may play a role in the pending growth models (SGP) and teacher performance evaluations. If we can identify factors that lead to strong collective teacher efficacy, then we can encourage, design, and organize protocols to help our students and ultimately help our schools to succeed.

Can I count on you to take the brief time with your faculty to participate in this study? All responses are strictly confidential. There is no need for any participant to identify himself or herself. I will look forward to sharing my research results with you. Any and all completed and all blank forms returned to me by Friday March 15th would be greatly appreciated.

Sincerely,

Brent Robertson

Brent Robertson
678-977-1013

Enclosures: n questionnaires
1 Information letter in lieu of consent form
1 district file ID 2013-29

APPENDIX C

Information letter in lieu of consent

Dear Esteemed Colleagues:

I am a PhD student under the direction of Professor Jay Rojewski in the Department of Workforce Education at The University of Georgia. I invite you to participate in a research study entitled Collective Teacher Efficacy in Elementary Schools. The purpose of this study is to correlate student achievement plus four school and five individual characteristics with a measure of collective teacher efficacy in order to describe this emerging construct. Collective teacher efficacy has been shown to statistically affect student achievement in a positive way regardless of socio-economic status of the students (Bandura, 1993; Goddard, 2001; Hoy, Sweetland & Smith, 2002).

Your participation will involve completing the 17 item questionnaire enclosed within. The questionnaire is purposefully anonymous. In collective teacher efficacy the unit of analysis is the group and not the individual. Completion should only take about 7 minutes. Your involvement in the study is voluntary, and you may choose not to participate or to stop at any time. The results of the research study may be published, but your name will not be used. In fact, the published results will be presented in summary form only. Your identity will not be associated with your responses in any published format. The findings from this project may provide valuable information on collective teacher efficacy.

There are no known risks or discomforts associated with this research. If you have any questions about this research project, please feel free to call me, Brent Robertson, at 678-977-1013 or send an e-mail to brobert@uga.edu. Questions or concerns about your rights as a research participant should be directed to The Chairperson, University of Georgia Institutional Review Board, 629 Boyd GSRC, Athens, Georgia 30602; telephone (706) 542-3199; email address irb@uga.edu.

By completing and returning this questionnaire in the envelope provided, you are agreeing to participate in the above described research project.

Thank you for your participation!

Sincerely,

Brent Robertson
Brent Robertson

APPENDIX D

District IRB Approval

February 8, 2013

Brent Robertson
201 Short Drive
Suwanee, Georgia 30024

Re: File ID 2013-29

Dear Mr. Robertson:

This is to advise you that your revised research application, ID Number 2013-29, "Collective Teacher Efficacy in Elementary Schools" has satisfactorily met GCPS Research Standards and was approved by the Institutional Review Board. The IRB notes the following comments and/or limitations:

- The proposed study will inform leadership development efforts.

Please note that schools and teachers may elect not to participate in your research study, even though the district has granted permission.

Important: When contacting schools regarding this research, it is your responsibility to provide a copy of this approval letter to the principal. In addition, it is your responsibility to provide your sponsors and project officers or managers with a copy of this approval letter. Be sure to use the file ID number issued above when contacting schools or district level personnel regarding this research study.

Please forward a copy of your results to me when they are completed.

Best wishes for a successful research project. Please call me at (678) 301-7090 if I may be of further assistance.

Sincerely,

Colin Martin

Colin Martin, Ph.D., Executive Director
Research and Evaluation

cc: Brent Robertson, brentandpam@charternet.net
      Dr. Jay Rojewski, rojewski@uga.edu

Appendix E

University of Georgia IRB Approval Form

The University of Georgia

Office of The Vice President for Research
DHHS Assurance ID No. : FWA00003901

APPROVAL FORM

Date Proposal Received: 2012-09-27   **Project Number:** 2013-10280-0

Name	Title	Dept/Phone	Address	Email
Dr. Jay W. Rojewski	PI	Dept. of Workforce Education 210 Rivers Crossing 2639 706-542-4461		rojewski@uga.edu
Mr. Brent Robertson	CO	WELSF 678-977-1013	201 Shore Drive Suwanee, GA 30024	brobert@uga.edu

Title of Study: Individual and School Factors Influencing Collective Teacher Efficacy in Elementary Schools

45 CFR 46 Category: Administrative 2
Parameters:
Approved for Institutions with Authorization Letters on File;

Change(s) Required for Approval:
Revised Application;
Revised Consent Document(s);

Approved : 2013-02-20   Begin date : 2013-02-20   Expiration date : 2018-02-19

NOTE: Any research conducted before the approval date or after the end data collection date shown above is not covered by IRB approval, and cannot be retroactively approved.

Number Assigned by Sponsored Programs: **Funding Agency:**

Your human subjects study has been approved.

Please be aware that it is your responsibility to inform the IRB:
. . . of any adverse events or unanticipated risks to the subjects or others within 24 to 72 hours;
. . . of any significant changes or additions to your study and obtain approval of them before they are put into effect;
. . . that you need to extend the approval period beyond the expiration date shown above;
. . . that you have completed your data collection as approved, within the approval period shown above, so that your file may be closed.

For additional information regarding your responsibilities as an investigtor refer to the IRB Guidelines.
Use the attached Researcher Request Form for requesting renewals, changes, or closures.
Keep this original approval form for your records.

Chairperson or Designee,
Institutional Review Board