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The Relationship Between School Growth in Achievement and Professional Learning Communities Among Elementary Teachers

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Abstract

This dissertation explores the relationships between school growth, teacher collaboration, collective teacher efficacy, teacher perceptions of Professional Learning Communities (PLC,) and Free and Reduced Lunch rates (FRL) within a school district where the implementation of a PLC model was optional. Results demonstrated that FRL is by far the strongest predictor of English Language Arts or mathematics growth. Collective teacher efficacy and teacher collaboration were positively correlated. PLCs and teacher collaboration were also positively correlated. Results inform educators and policy makers about how collaboration between teachers and equity issues both impact school growth and student learning.

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THE RELATIONSHIP BETWEEN SCHOOL GROWTH IN ACHIEVEMENT AND PROFESSIONAL LEARNING COMMUNITIES AMONG ELEMENTARY TEACHERS

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This dissertation explores the relationships between school growth, teacher collaboration, collective teacher efficacy, teacher perceptions of Professional Learning Communities (PLC,) and Free and Reduced Lunch rates (FRL) within a school district where the implementation of a PLC model was optional. Results demonstrated that FRL is by far the strongest predictor of English Language Arts or mathematics growth. Collective teacher efficacy and teacher collaboration were positively correlated. PLCs and teacher collaboration were also positively correlated. Results inform educators and policy makers about how collaboration between teachers and equity issues both impact school growth and student learning.

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"Education is for improving the lives of others and for leaving your community and world better than you found it." – Marian Wright Edelman

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Chapter One: Introduction

Background

This dissertation examined the relationship between teacher collaboration, collective teacher efficacy, Free and Reduced Lunch rates, the use of Professional Learning Communities, and school growth in a specific school district. The decision to adopt and implement a Professional Learning Community (PLC) structure is often made by school district personnel, and implementation then follows a prescribed timeframe and procedure. Within the school district that is the focus of this study, the implementation of PLC structures was a school-based decision. In this specific case, school-based decisions to utilize collaborative structures resulted in varied implementation both in degree and methodology. As such, this district provided a unique opportunity to study how school growth relates to teacher collaboration and PLCs specifically.

Correlational methodology was used to examine the relationship between collective teacher efficacy, teacher collaboration, and teacher perceptions of PLCs using survey data from teachers and principals. Alignment between teacher and principal perceptions of PLCs was determined through correlational analysis. Four questions addressed basic demographic information, and four questions were asked of teachers to gather their perceptions of Professional Learning Communities (PLCs). All other survey questions came from two existing surveys to measure teacher collaboration and collective teacher efficacy. One question was posed to the principal of each school: whether or not

their school uses a PLC to plan instruction. Median Growth Percentile of English Language Arts and mathematics served as the dependent variable. Free and Reduced lunch rates served as another variable in the examination of the relationship between each of the aforementioned variables. The first part of this chapter reviews the background context for this study. The dissertation then presents the research questions and significance of the study.

Background Context

In an effort to continuously adapt the American public educational system to the changing needs of society, including demographic shifts and technological change, many educational researchers, leaders, and policy makers continuously examine the practices that contribute to academic growth for all students. Schools that attain strong student growth, especially those that serve large numbers of traditionally underrepresented sub-groups, may employ practices that could add to the knowledge base regarding how school growth occurs, beyond that which are explained by student achievement measures alone.

Both federal and state lawmakers continue to pass initiatives intended to spur educational reform in schools. The background that informed the current educational system stems from the Elementary and Secondary Education Act, which was later reauthorized as the No Child Left Behind Act (NCLB) of 2001. This law established methods of school accountability, measurement, and comparison, including reporting by demographic subgroups. Because of this legislation, the comparison of school and district achievement based on student performance data significantly influenced educational research, policy, and the formation of public perceptions. While focused on

measuring student achievement and eventually school and student growth, this approach neglected to account for methods schools employ to create sustainable academic growth while also addressing other critical components of each student's development.

The No Child Left Behind (NCLB) Act of 2001 intended to eliminate the achievement gaps between subgroups of students, schools, and districts, and it promoted a performance-based, compliance model. The unintended consequences caused educational researchers, leaders, and policy makers to seek deeper knowledge regarding how organizations achieve sustained positive results while addressing the needs of the whole child (Government Accountability Office, 2007; Noddings, 2007).

As educational researchers examine the attributes of schools that contribute to academic growth, they continue to build their understanding of the complex nature of education and the variety of factors that influence the context of schools. Values, beliefs, cultures, structures, professional learning, and instructional practices contribute to success for all students (Leithwood, Day, Sammons, Harris, & Hopkins, 2006). As noted by Hargreaves and Fink (2006), "Sustainable educational leadership and improvement preserves and develops deep learning for all that spreads and lasts, in ways that do no harm to and indeed create positive benefit for others around us, now and in the future" (p. 17). It is also important to consider that "leadership is second only to classroom teaching in its potential to generate school improvement. However, much less is known about how leaders impact outcomes" (Bush & Glover, 2014, p. 567). Results of this study will add to the knowledge base of effective practices and how those relate with school growth.

Information from this study can be factored into decision-making by school leaders regarding best practices to support student growth.

Rationale and Significance of the Study/Purpose of the Study

The NCLB Act of 2001 promoted a compliance-based model through the implementation of research-based instruction, intervention, data-driven decision-making, and the ongoing monitoring of students' progress, which was reflected in federal and state accountability measures. Adequate Yearly Progress (AYP) was calculated for each student, based on a comparison of their growth to that of their grade level peers. The NCLB Act stipulated that all students must score at the proficient level on state assessments by 2014. As such, 2002 state assessment scores formed the baseline for all students to score at the proficient or advanced levels by 2014. This act embedded the notion that all students should meet the same proficiency level, which required a standardized curriculum (Noddings, 2007, p. 209). The 2007 evaluation of NCLB revealed that 2,790 Title I schools were either restructuring or in corrective action, and as 2014 approached, more schools fell into these categories (Government Accountability Office, 2007, p. i-4).

While the No Child Left Behind Act of 2001 focused on outcomes, the growth measure (or value added measure) focuses on gains made by students from one school year to the next. While measurement allows for the comparison of classrooms, grade levels, schools, and districts, shifting from measures based on student performance (outcomes-focused) to practice-focused measures deepens the understanding of the structures and behaviors that create successful schools (Noddings, 2007). How teachers

and school administrators work together, collaborate, and continually refine the systems within their respective schools are components of the improvement cycle that warrant ongoing analysis. Various research teams, including the Wallace Foundation (2010), Day, Gu, and Sammons (2016), and Tschannen-Moran (2007) studied specific methods schools use to improve instructional practice and sustain student achievement. Their research blends broad-based knowledge about effective leadership structures and practice within the specific contexts of schools.

Collective teacher efficacy and teacher collaboration are integral to educational systems that foster student academic growth and professional learning for staff members. Hoy and Miskel (2003), DiPaola and Tschannen-Moran (2005), and Tschannen-Moran (2004, 2009, 2014) have dedicated much of their research to identifying aspects of systems that promote collective teacher efficacy and teacher collaboration as mechanisms that facilitate the deprivatization of instructional practice between teachers. These concepts are necessary elements to ongoing improvement and innovation of our educational system.

Existing research suggests that teacher collaboration positively affects school achievement scores, but it does not speak to results within school districts that allow each school to determine whether they implement a PLC structure or not. This study will examine the differences between schools that have and have not implemented a PLC structure and the effects on school growth, teacher perceptions of PLCs, collective teacher efficacy, and teacher collaboration. Results will help district leaders determine if

PLC structures and training, as well as resources allocated for PLC work, contribute to increases in school growth, teacher collaboration, and collective teacher efficacy.

Context for this specific school district

The school district at the focus of this research serves 85,000 students and is located in the Rocky Mountain West. This district includes 85 elementary, 5 kindergarten through 8th grade, 17 middle, 12 option, 15 charter, and 17 high schools spanning 175 square miles. The nearest urban center is approximately 15 miles away. The average Free and Reduced Lunch rate includes 32% of the students. Twenty-six elementary schools receive Title I funds. Up to 95% of the student population in some schools qualify for Free and Reduced Lunch, while in others, only 2% qualify. Mobility rates also vary widely between 30% and 5%. As occurs in other school districts, the affluent areas tend to serve fewer ethnic minority students and fewer students who qualify for Free and Reduced Lunch, and the population generally experiences less mobility.

This school district has endured significant turmoil within the last ten years. After having decades of highly stable and consistent district and school leaders, a majority of new school board members won an election based on their beliefs regarding how schools should operate, which were significantly different from established practices. The long-serving superintendent resigned, and a replacement was quickly instated. Change at the district level generated additional turnover at the school level as many teachers and principals sought out and found positions in neighboring school districts. The community accomplished a successful recall of the new school board members, but at

great financial and emotional expense. A newly elected board hired a different superintendent who stabilized the rate of change and the staff turnover. The transition at all district levels forced individual schools to fend for themselves, which contributed to the varied implementation of PLCs and other district initiatives.

For many decades, schools and neighborhoods within this school district had been allocated resources differently. In principle, the district funds each school equally based on student enrollment, and each school makes decisions regarding how to allocate funds. In practice, the schools that are situated in affluent or middle-class communities financially benefit from the payment of student fees and from fundraising conducted by parent-teacher associations to bolster the resources for the school. While the district funding formula has been adjusted to slightly favor schools with higher Free and Reduced lunch rates, and Title I funds add additional revenue for very low income schools, those monies do not overcome the disparity in funding presented by fundraising at the school level, leaving schools that work with traditionally underserved populations to operate with significantly more limited resources. Although each community strives to assist their respective schools, the disparity between the funding has magnified the differences among other issues, in facilities, technology allocation, and teacher-to-student ratios for each school. As this has played out over decades, the differences between the schools have compounded. Unlike some other school districts in this metro area, this district has yet to adopt and apply a large-scale equity lens to all of its work, including facilities, resources (technology, materials, and staffing), funding, and hiring. Schools with significant disparities exist within a few miles of each other, and those that have

innovative facilities, technology, and teachers typically serve more students that are affluent and their families.

The voters within this district recently passed a budget and bond election, which provides funds for each student to have a personal Chromebook. Distribution of these devices will continue across grade levels 5-12 for the next few years. This one-to-one initiative serves as an example of a school district initiative intended to provide equal access for all students. However, there are many other aspects of the school district and the learning experience where discrepancies persist; they have not been a high enough priority to allocate resources equitably. While the Chromebook alone does not close the digital divide, this school district partnered with internet providers to allocate vouchers for free internet service for students who qualify for Free and Reduced Lunch. This arrangement serves as an example of how this school district addresses equity issues.

Eight years ago, Professional Learning Communities were introduced to the schools as a way to design differentiated instruction, increase teacher collaboration, and in turn, affect collective teacher efficacy. School principals were given the option to adopt or not to adopt PLCs. Schools that elected to use a PLC model brought leadership teams, including teacher leaders, to district-level trainings. Content that was learned was then repeated in similar trainings for each participating school. During early implementation, schools typically allocated 45 minutes a week to PLC meetings. From additional training came the suggestion to allocate 90 minutes a week for instructional planning and many schools then created schedules to extend teacher co-planning time. In some elementary schools, teacher-librarians and art, music, and physical education

teachers worked with students while classroom teachers planned using PLC models. While some schools used resources to extend teacher planning time, others continued to not implement a PLC structure or extend teacher planning.

The school district employed a few staff members who visited, observed, and provided feedback to principals about PLCs. Additionally, the school district contracted with an outside consultant who provided training for administrators regarding effective implementation of PLCs. Summative data and interim data were used to track this improvement initiative, which included data from the Partnership for Assessment of Readiness for College and Career/Colorado Measures of Academic Success testing and from Measures of Academic Progress testing. As district leadership changed, the support for PLC work also shifted. It continues to be supported and encouraged by building-level leadership, reflected by the fact that 78% of elementary schools have implemented a PLC model, although they remain optional.

Chapter Two: Literature Review

This chapter reviews the existing research on collaboration theory, collective teacher efficacy, Professional Learning Communities, and school growth as a means of exploring and building background knowledge for this study. Although distinct from each other, these theories represent critical aspects of effective schools. Each theoretical concept describes structures and processes intended to support ongoing instructional improvement.

Collaboration Theory

International surveys of teacher working conditions indicate that teachers involved in collaborative learning report using more innovative practices and display more job satisfaction and efficacy (Teaching and Learning International Survey, 2013). Collaboration among staff members is a mechanism to instill organizational learning and ensure alignment between various facets of the school. Building upon Drucker's (1988) research, organizational theorists have elaborated on the concept of flat hierarchical structures to create teams of teachers who are creative and improvisational (Sorrenti & Crossan, 1995; Weick, 2001). Leadership research has concluded that self-managing teams are more effective at problem-solving, especially in changing environments, and that creative solutions are a direct result of the interactional process of the group (Sawyer, 2006; Shein, 1992). Goddard, Goddard, and Tschannen-Moran (2007) found a significant positive association between higher levels of student academic performance

and teacher collaboration. Their study was unique in terms of its focus on connections between teacher collaboration and student achievement. Collaboration allows teachers to work creatively while aligning with other aspects of the school and unifying the work of many teams within the same organization.

Heckscher, Kwon, and Adler's (2008) theory of collaborative community is a leadership structure intended to loosen a traditional bureaucratic structure to promote partnership and flexibility. As explained by Hartley (2010), "Faced with unstable markets, increased competition and ever-changing technological complexity, the routine rigidities of bureaucracy are thought to admit few advantages, for they function best when conditions are stable and certain" (p. 346). As the rate of educational change continues to accelerate, bureaucratic structures become increasingly cumbersome and challenging to maintain. Heckscher and Adler (2006) identified two typologies of collaboration: local and extended. The concept of local collaboration is founded on consistent group memberships that work to maintain stability, security, and consistency. Juxtaposed to the local typology is the concept of extended or mutual support, which incorporates a diversity of skills, participation, and broad cooperation beyond narrow boundaries to create extended collaboration (Hartley, 2010). Fluid and ever-changing memberships define extended collaboration (Hartley, 2010).

The impetus for collaborative communities is both societal and economic in nature. Hartley (2010) references the consistent erosion of public trust in politicians and the increase of corporate corruption as contributors to the decline in collective societal trust. He suggests a broad restoration process that builds moral consensus, particularly

through schools and the public media, as initial steps to reestablish societal trust. The economic impetus for collaborative culture unites trust and community to create a knowledge economy where collective and individual orientations co-exist. Shared values, identity, and organization are three identifiable dimensions of collaborative community. The locus of knowledge and expertise contributes to a solutions-creating process (Hartley, 2010). "Interdependent process management" is a solutions-creating process used to promote conscious collaboration and collaborative interdependence within an organization (Hartley, 2010). Collaborative work forms a unique social identity. Collaborative communities rest on the fundamental notion of trust within an organizational system. Hartley (2010) states, "What seems to be emerging now is a new accommodation between democracy and capitalism, or between collaboration and competition" (p. 359).

While many policy makers and researchers have employed an accountability lens to create measurements of school success, some attention has focused on collaboration among teachers, the role of the administrator, and the relationship between collaboration and student achievement. Teacher collaboration is a disciplined, ongoing practice that engages teachers with learning and the improvement of instructional practices (Honingh & Hooge, 2014). Honingh and Hooge (2014) further defined teacher collaboration as "involving intellectual interaction between teachers concerning issues of curriculum and instruction" (p. 80).

Promotion of a normative, managerial rhetoric is the primary criticism of collaborative cultures (Hartley, 2010). Hartley (2010) theorizes that collaborative

communities ultimately use the concept of collaboration as a tool to analyze performance. Collaborative communities are fragile and consistently at risk because they are founded on a core, central group of workers, and "if structures are not put in place to mitigate the differences between the core and non-core workers, disharmony would occur within the organization" (Hartley, 2010, p. 358). As a result, some people may feel insecure and resort to practices in isolation. Individuals are also likely to interpret the concepts of collaborative community in varying ways, resulting in potential fracturing. Collaborative communities demand flexibility and engagement from all participants.

In an attempt to conceptualize teacher collaboration, Woodland, Lee, & Randall (2013) created a scale to measure use of data, decision-making, action, and evaluation as sub-constructs of teacher collaboration. For the purpose of this research study, teacher collaboration is defined as, "teachers working together, and engaging in reflective dialogue, with a common goal of improving practice and increasing student learning" (p. 443). The next section discusses each factor of teacher collaboration as defined by Woodland et al. (2013).

Dialogue

Highly effective teacher teams use dialogue to design instruction for each student. Individualizing instruction uses results from formative and intermediate assessments to make ongoing instructional adjustments. Teachers dialogue to share instructional practice and evaluates its effectiveness based on student data. Through this dialogue, teams of teachers make decisions to adapt instruction and eliminate ineffective instructional practices. Less effective teams of teachers have discussions that deviate to

grouping, curriculum pacing, test taking strategies, or managerial tasks. Dialogue is the mechanism by which teacher collaboration can occur and effective instructional design can be consistently pursued (Woodland et al., 2013).

Decision making

How teachers use collective dialogue and information to reach agreement and make instructional decisions is a critical component of teacher collaboration. Valli & Buese (2007) determined that the most important decisions teacher teams make is about the quality and merit of their individual and collective instructional practices and how each affects student learning. General practices of agreeing on similar resources, using similar instructional strategies, or agreeing upon management strategies does not generate instructional improvement. Together, teachers are capable of determining differences between their instructional practice and evaluating how these differences affect student learning.

Action taking

Mutually agreed upon instruction must be implemented by each member of a teacher team. Delving into discussion about similarities and differences in instructional practices requires conscious decisions to move beyond surface level or managerial discussions. When teachers examine instructional practice together, they can glean instructional strengths from each other, monitor the effects on student learning, and truly continuously improve.

Evaluation

Examination of the effects the team's instructional decision making has on student learning is the often-neglected component that completes the cycle of inquiry. A systematic collection, analysis, and use of data helps teachers evaluate the effectiveness of their instructional design. Woodland et al. (2013) states that,

> Teachers in high-functioning teams will systematically collect and analyze both quantitative information (such as scores on formative and summative assessments) and qualitative information (such as notes taken during a classroom observation of a colleague and student written work), whereas less effective teacher teams tend to rely on anecdotes, hearsay, and general recollections to inform their dialogue and decision making. (p. 445)

This study used the survey created by Woodland et al. (2013) and collected data on each of the sub-structures of teacher collaboration.

Professional Learning Communities

A Professional Learning Community (PLC) is a structure intended to promote the use of student data to inform instructional design, teacher collaboration, and differentiated instructional planning and to sustain organizational learning (DuFour, 2004). DuFour and Eaker's (1998) book, *Professional Learning Communities at Work: Best Practices for Enhancing Student Achievement*, is utilized by many schools, in the United States and abroad, as a guide for implementing collaborative learning communities. Within the implementation process, reflective inquiry is utilized to discuss curriculum, instruction, and student growth (Ellis, 2018). The intended outcome of effective PLCs is improved student learning, teacher learning, and instructional practices (Ellis, 2018).

To implement a PLC structure, teachers use a cyclical process of student data analysis, dialogue, decision-making, action taking, and evaluation to design instruction throughout the school year. Examination of student work or student data is a reiterative process, which in turn forms the foundation for responsive instruction. This structure promotes teacher collaboration as an integral component of instructional design. Goddard, Goddard, and Tschannen-Moran (2007) identified teacher collaboration as a statistically significant predictor of variation among schools with respect to student achievement in reading and mathematics. Specifically, a .08 SD in math achievement and a .07 SD in reading achievement was associated with a one standard-deviation increase in teacher collaboration at the school level (Goddard, Goddard, and Tschannen-Moran, 2007). The specific components of a PLC, as described by DuFour and Eaker (1998), include shared mission, vision, and values; collective inquiry; collaborative teams; action orientation and experimentation; continuous improvement; and results orientation. Hord and Sommers (2008) concluded that the presence of indicators of a PLC positively affects student achievement.

Early proponents of PLCs, such as Louis et al. (1996), Newmann et al. (1996), and Hord (1997), tied specific characteristics to the dimensions of PLCs. The first characteristic emphasizes the importance of a community in which members share a common vision and common values. The second promotes the importance of professionalism and ownership of student learning. Teacher learning through reflective inquiry and participation to improve student learning is the focus of the third characteristic. The fourth uses group activities to accomplish goals. Group and

individual learning are emphasized in the fifth. The sixth, seventh, and eighth elevate the importance of community within the school to support student learning. Researchers helped conceptualize PLCs and educators worked to transfer these concepts into practice.

Professional Learning Communities are a mechanism for developing norms for collaboration and shared beliefs among teachers. Initially introduced in the 1990s (DuFour, 2010), three integrated concepts were promoted as aspects of school culture: professionalism, learning, and community (Lomos, Roelande, & Bosker, 2011). As noted by Lomos et al. (2011), "however, the extensive number of interpretations of these sociological concepts, such as community and professionalism, illustrate the difficulty in defining and operationalizing this concept" (p. 123). Furthermore, it is also worth noting that "there is no universal agreed-on definition of professional learning communities" (Lomos et al., 2011, p. 123). De Neve et al. (2015) defined a PLC as, "a school organization in which a group of teachers share a question of practice from a critical point of view. This questioning happens in an ongoing, reflective, collaborative, and inclusive way" (p. 32). Within a PLC structure, teachers consistently apply questions (what do we want students to learn, how will we know when each student has learned it, and how will we respond when a student experiences difficulty learning) to plan differentiated, responsive instruction (DuFour, 2004). This structure intends to redefine the work of teachers, moving away from creating and refining instruction in isolation to opening the phases of instructional design, instructional implementation, and ongoing professional learning to collaboration, critique, and collective learning for teachers. These learning teams "form a bridge between the task of learning and instruction:

teachers need to learn in order to improve their instruction and thus enhance student learning" (Vangrieken et al., 2013, p. 90).

Some educational researchers believe Professional Learning Communities have become overused as a term and misinterpreted as a concept. Hord and Sommers (2008) stated that "many claim to have a PLC in place at their schools but cannot give a precise explanation of what it is" (p. 8). Critics of PLCs point out a lack of empirical evidence of their impact on increasing student achievement (Saunders et al., 2009; Visscher & Witzers, 2004). Examples of effective PLCs vary greatly in terms of definitions, practices, and degrees of implementation (DuFour, 2004; Vesico et al., 2008). Gates and Robinson (2009) argue that teacher collaboration often takes place away from teaching, as opposed to sharing instructional practice in each other's presence. Little (2002) offers the perspective that the political nature of education can reveal or conceal discussion on certain aspects of teachers' work. Building upon this perspective, some researchers believe teacher collaboration is a "disguise" for managerial and organizational control (Hargreaves, 1994; Laive, 2006). Laive (2006) offered an additional viewpoint that teacher collaboration and empowerment are often viewed as an improvement strategy or as a tool for establishing social relationships that are underpinned by a democratic process and social justice values. Laive believes discourse allows staff members to engage in critical examination of core values and as "a technology for improving teaching and learning" (p. 796). Lack of conceptual clarity makes studying PLCs extraordinarily challenging and makes operationalizing PLCs elusive. As a result, different researchers interpret the same terms to mean different things. Researchers then

design models based on their own interpretation(s) and draw different conclusions. Although many researchers incrementally clarify PLCs, using qualitative and quantitative research designs, a lack of clarity and consistency remains (Lomos et al., 2011).

Given the lack of a clear, finite definition for this work, many researchers continue to try to clearly define PLCs. They identified the following gaps in the research base regarding PLCs: whether PLC is a construct or a concept; the lack of theorization on the conditions and contexts, which enable or constrain PLC work; and the causalities or effects of PLCs. Bolam et al. (2005) identified characteristics of PLCs, which includes values and vision, collective responsibility, reflective inquiry, group collaboration, and individual learning. Effective Professional Learning Communities incorporate all of these characteristics. Recent research continues to address the gaps and nebulous nature of PLCs. To answer some of the questions about PLCs and provide a concrete definition for the concept, Hairon et al. (2017) states the need to establish

> methodological rigor in understanding the PLC construct, along with its attendant relationship with conditions and contexts of PLCs, and the outcomes of PLCs such as teacher and organizational capacities (e.g. school culture, supporting structures, etc.) teacher practice and learning outcomes. (p. 76)

While significant writing and discourse exists about the theoretical analysis of PLCs, additional work must operationalize the construct. This work focuses on the following questions: “How do teachers learn?” (Hammerness et al., 2015, p.), “What do professionals do?”, and “What does a professional mean?” (Hairon et al., 2017). Although PLCs lack a consistent, agreed upon definition, Vesico et al. (2008) concluded,

> the collective results of these studies offer an unequivocal answer to the question about whether the literature supports the assumption that

> student learning increases when teachers participate in professional learning communities. The answer is a resounding and encouraging yes. (p. 87)

Using the findings of Vesico et al. (2008) as the foundation for their research design, Lomos et al. (2011) conducted a meta-analysis of secondary schools to examine the relationship between professional communities and student achievement. Using reflective dialogue, deprivatization of practice or feedback on instruction, collaborative activity, shared sense of purpose, and collective focus on student learning as variables to examine PLCs, they concluded that each individually predicts student achievement (Lomos et al., 2011). They suggest additional research to examine underlying latent constructs before integrating the variables into one concept: that of professional communities.

For the purposes of this study, PLC is defined as teacher teams using the questions initially promoted by DuFour and Eaker (1998) to collaboratively plan instruction. Teachers use the common purpose of ongoing instructional improvement to conduct planning meetings. In doing so, they uphold the values of the organization and build community between those invested in instructional design.

Collective Teacher Efficacy

As a construct, collective teacher efficacy began as individual teacher efficacy. Recent research continues to examine the relationship between individual efficacy and collective efficacy to determine if their relationship is reciprocal and which contexts within schools build or erode collective teacher efficacy. Collective teacher efficacy has

recently been examined in relation to teacher collaboration and student achievement and found to positively relate with each (Tschannen-Moran & Barr, 2004).

For the purpose of this study, the definition of collective teacher efficacy is that of Bandura (1997): "a group's shared belief in its conjoint capabilities to organize and execute courses of action required to produce given levels of attainment" (p. 477). Belief in collective efficacy affects the aspirations of the group, the level of persistence of its members, and the resilience of the group when faced with challenges (Bandura, 2000). A variety of researchers continues to explore collective teacher efficacy and its relation to other variables.

Ongoing efforts discern the difference between individual and collective teacher efficacy in hopes of understanding the precursors required for each so that school leaders and teachers can better attend to the development of both types of efficacy. Social cognitive theory suggests that each individual teacher's efficacy affects the collective efficacy and the vision of his or her respective school (Ninkovic, 2018). The relationship between self-efficacy and collective efficacy is mediated by the teacher's assessment that all staff members contribute successfully to the realization of the school's vision and mission. In other words, "if teachers believe that the school principal, colleagues, students and parents act in accordance with their commitments, it can contribute strongly to their perception of collective efficacy" (Ninkovic, 2018, p. 53).

Understanding collective teacher efficacy is a worthy pursuit for researchers and educators. Hattie (2018) determined collective teacher efficacy has an effect size of 1.57, which is the second highest effect size the author has been able to identify. School staffs

with positive collective efficacy believe students are willing and capable learners and that they are motivated to find careers or continue to study in post-secondary education. High levels of teacher collective efficacy influence social norms of the school, which are reflected in teacher behaviors and beliefs (Goddard, Goddard, & Tschannen-Moran, 2007). The collective efficacy of the staff influences how students are instructed, how classrooms are managed, and the relationships that are formed with students (Tschannen-Moran & Barr, 2004).

Additional research has focused on the relationship between collective teacher efficacy and student achievement and between self-efficacy and student achievement. Some studies demonstrated that teacher efficacy predicted greater teacher collaboration (Goddard & Skrla, 2006; Gray & Summers, 2016). Voelkel and Chirspeels (2017) found a positive correlation between PLC implementation and collective teacher efficacy. Additionally, higher levels of perceived implementation of PLC variables, specifically setting collective goals and using data to design interventions, predicted higher levels of teacher collective efficacy, which aligns with findings from Lee et al. (2011) and Moolenaar et al. (2012). While the research presented in this section serves as an initial indicator of a relationship between teacher collaboration and student achievement, the complexity and the changing nature of schools requires ongoing research to renew and deepen our understanding, especially of the relationship between teacher collaboration, collective teacher efficacy, and school growth.

School Growth v. Student Achievement

Although the relationship between student achievement, teacher collaboration, collective teacher efficacy, and use of PLCs has been established, this study sought to gain insight into this relationship using school growth instead of student achievement. A similar relationship was hypothesized.

The No Child Left Behind Act set out to have all students attain grade level standards by 2014. Student achievement continues to be used as a raw score on PARCC/CMAS tests. Not all students were able to meet grade level standards. As a result, an additional measurement was written that accounted for the gains each student made from one year to the next. Additionally, school growth was calculated based on student gains. Similar to achievement data, growth was reported by student, grade level, class, and overall school growth. To calculate growth, each student was grouped into a cohort with similarly scoring students the first year they completed the assessment, which established a baseline for future comparisons. As students continued to take the assessment each year, their growth was compared to their peers. Each student was then assigned a category of low, middle, and high growth. This was calculated and reported for English Language Arts and mathematics.

Borrowing from other fields, value-added or growth measurements have been added in many states. Some use growth scores as a significant percentage of teacher evaluations (Collins & Amerin-Beardsley, 2014). Although growth models are widely adopted across the United States, debate continues among policy makers, statisticians, and educators regarding how to account for teachers who serve specific student

populations such as gifted students or English Language Learners. Additionally, ongoing conversation includes accounting for formative data use. This serves as an example that states continue their interest in summative data but fail to recognize and account for use of proactive information about student learning that is integral to formative data (Collins & Amerin-Beardsley, 2014).

This research study used Median Growth Percentiles for English Language Arts and math, which served as dependent variables for hierarchical linear regression. Teacher collaboration, collective teacher efficacy, Free and Reduced Lunch rate, and teacher perceptions of their use of PLCs served as independent variables.

Conceptual Framework

The design of this study began with the literature review, which included teacher collaboration, collective teacher efficacy, and use of PLCs and how these relate with school growth and Free and Reduced Lunch rates. Through the review of relevant literature, social learning theory (Bandura, 1993, 1997) was identified as the theoretical basis for this research. Social learning theory posits that learning occurs in a social context (Bandura, 1993; 1997). Within an organization, each person's behavior and decisions contribute to the context of the working environment in which social learning transpires (Bandura, 1993; 1997). Self-efficacy, which reflects a person's level of confidence in their ability to complete their job, is a specific aspect of social cognitive theory (Bandura, 1997), which was also used in this research. The literature review informed the selection of Tschannen-Moran's (2004) and Woodland's (2013) surveys to measure the constructs of teacher collaboration and collective teacher efficacy,

respectively. Given the varied implementation of PLCs within this school district, questions were added to gather teacher perceptions about the use and effectiveness of PLCs. School growth was specifically identified as a dependent variable, instead of student achievement, to determine if relationships that exist between student achievement and the other variables hold true for school growth. The growth calculation is intentionally designed to focus on the gains within each academic year instead of a raw achievement score; relating these variables to growth was theorized to negate or at least diminish the effect of Free and Reduced Lunch rate.

Although teacher collaboration is defined in different ways by different researchers, each researcher states that teacher collaboration encompasses teams working to learn strategies to improve learning for every student. Through their teamwork, a social identity and sense of community is formed (Honingh & Hooge, 2014; Sawyer, 2006). Woodland, Lee, and Randall's (2013) Teacher Collaboration Assessment Scale served as a reliable and valid tool to measure this construct.

PLCs are challenging to clearly define. Research regarding effective PLCs consistently identifies that it is a cyclical process that uses reflective inquiry to discuss and design effective instruction (Ellis, 2018). This process embodies professionalism, learning, and community (Lomos, Roelande, & Bosker, 2011). The survey used for this study included four PLC questions to glean the teacher's perceptions regarding the usefulness of PLCs and the degree to which they implement the instruction designed in PLC meetings.

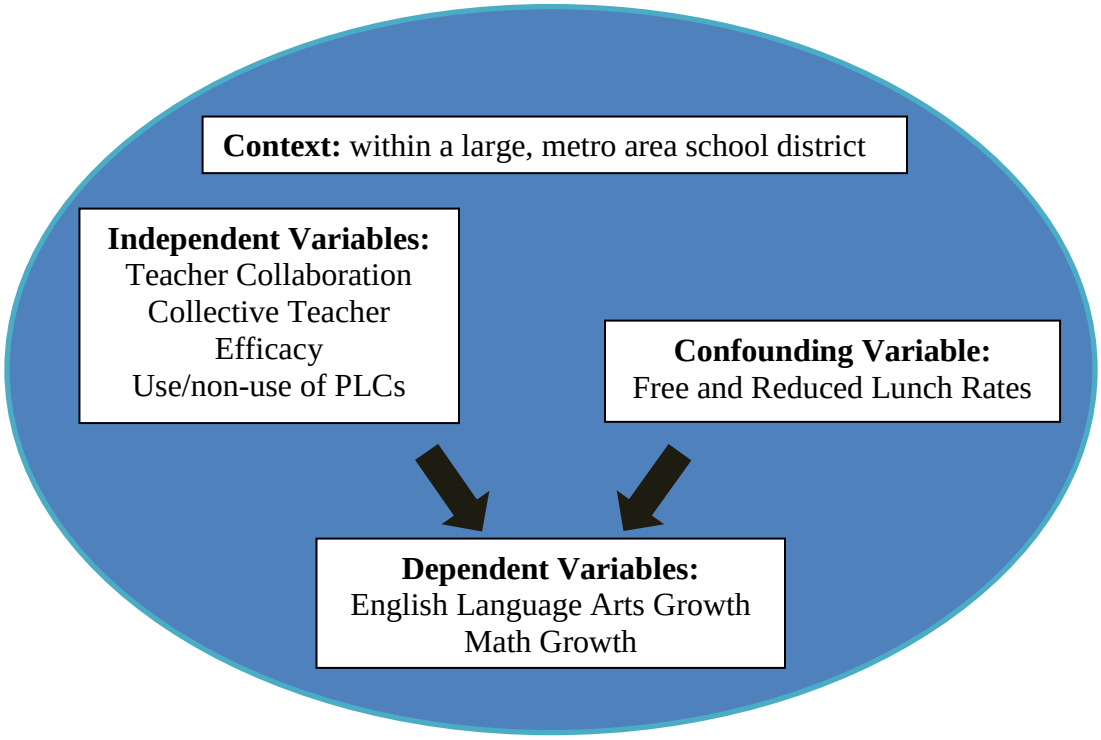
Using meta-analysis, Hattie (2018) examined a variety of teaching strategies and interventions with the intent of prioritizing which ones have the largest and smallest effect sizes. Hattie concluded that teacher collective efficacy has the largest effective size, 1.57, which warrants the understanding and pursuit of school and district leaders. Collective teacher efficacy is generally accepted as a group's common belief in its combined abilities, perseverance, and resilience when faced with challenges (Bandura, 1997). This study used Tschannen-Moran and Barr's (2007) Collective Teacher Belief's Assessment Scale as a reliable and valid tool to measure collective teacher efficacy in this school district.

Inclusion of Free and Reduced Lunch rate as a variable allowed the researcher to determine to what degree Free and Reduced Lunch is able to predict English Language Arts and math growth compared to the other variables.

Teacher collaboration served as the overarching lens through which all data and analysis occurred. Should this school district focus on teacher collaboration that includes the four sub-constructs (data, decision-making, action taking, and evaluation) as non-negotiable instead of PLCs? Within this expectation, teacher collaboration could occur through PLCs or through a different instructional planning structure. Providing teachers choices regarding how they collaborate honors their professional decision-making but also aligns the expectations of the school district for collaborative teacher planning.

Equity served as the other overarching lens through which the collection of data and analysis occurred. The design of this study set out to determine to what degree, if any, Free and Reduced Lunch had an effect on the other variables and school growth.

Figure 1: Visualizing the Variables



Chapter Three: Methodology and Research Design

Introduction

This chapter describes the design for this research study, which was constructed to answer three research questions. The first question addressed the relationship between collective teacher efficacy, teacher collaboration, and teacher perceptions of PLCs. The second examined aggregate teacher perceptions about the use of PLC structures to predict math and English Language Arts growth while controlling for Free and Reduced Lunch rates and teacher survey responses (collective efficacy and collaboration). The last question addressed the agreement between teachers and principals regarding the use of PLC structures for instructional planning. Sections within this chapter address the methodology, participants, instrumentation, procedures, data analysis, and delimitations.

The conceptual framework described in Chapter Two serves as the guide for the analysis process. Examination of practice within this specific school district provides a unique opportunity to study the relationship between school growth and collective teacher efficacy, teacher collaboration, and use of PLC structures to promote collaborative instructional design and if these are significant predictors of school growth in mathematics and English Language Arts. Given the preponderance of evidence established by previous research on the relationship between these variables and student achievement, this study sought to determine if the same relationship exists between the same variables and school growth (Tschannen-Moran & Barr, 2007; Wenglinsky, 2000).

School growth served as an exogenous (dependent) variable whereas use/non-use of a PLC structure, teacher collaboration, and teacher efficacy were endogenous (independent) variables. The Teacher Collaboration Assessment Survey (TCAS) and Teacher Beliefs Scale (TCBS) yielded latent variables that measured the operationalization of the four main attributes of teacher collaboration, which include dialogue, decision-making, action taking, evaluation, and collective efficacy.

Philosophical & Theoretical Foundations

Postpositivism and constructivism informed the approach used to conduct this research. Postpositivism was the philosophical lens through which the initial strand of quantitative data was analyzed. School growth and achievement data for each elementary school was the first stage of data analysis. Two existing surveys were used to measure teacher collaboration and efficacy. Four additional questions addressed teacher perceptions of PLCs for collaborative planning. While this study initially identified schools using existing data, correlational methodology using survey results reflects a post-positivist perspective.

Collaboration among teachers has been studied since the early 1980s (Hord, 1997; Rosenholtz, 1991). Goulet, Kroutz, and Christiansen (2003) theorize that collaboration has the potential to provide an alternative to "how we think and theorize about educational improvement, but also how we experience teaching, learning, and change" (p. 338). Effective leaders understand that schools have different paths of improvement. As a result, instructional and transformative leadership strategies guide schools and their respective leaders on their unique paths (Day, Qu & Sammons, 2016; Shields, 2017).

Research Design

Two existing scales were used to measure teacher collaboration and collective teacher efficacy. The TCAS survey addressed the constructs of teacher collaboration dialogue, decision making, action, and evaluation. A second scale, TCBS, determines teacher beliefs in the collective ability of their school to handle a variety of issues commonly found in schools, such as including creativity in instructional design or addressing student behaviors. A quantitative research design enabled the examination of the relationship between the variables: school growth, teacher collaboration, collective teacher efficacy, teacher perception of PLCs, and a comparison of schools that employ a PLC structure to those that do not. Free and Reduced Lunch served as a control variable.

Teacher data was collected through a survey that measured the degree to which teachers, within their specific school, collaborate with each other to design instruction, are collectively efficacious, and believe the PLC structure helps the instructional design process. The technical merit of the teacher collaboration measure, the teacher perception measure, and school growth measurement are reviewed in the instrumentation section of this chapter.

Research Questions

1. What is the relationship between teacher collaboration, collective teacher efficacy, and teacher perception of the use of PLCs?
2. Do aggregate teacher perceptions about the existence of a PLC in their school predict math and English Language Arts growth, controlling for Free and

Reduced Lunch (FRL), and collective teacher efficacy and teacher collaboration?

3. Do principals and teachers agree regarding whether the school uses a PLC structure to plan instruction?

Hypotheses

It is hypothesized that use of a formal structure for instructional planning (PLC), positively relates with teacher collaboration and collective teacher efficacy, and both PLC and teacher survey responses significantly predict school growth when controlling for Free and Reduced Lunch rates. Further, a significant positive relationship is predicted between collaboration and collective efficacy and PLC perception.

Population

The school district with the population of interest for this research has invested considerable resources in developing an improvement initiative to implement a PLC model for instructional design. This study focused on 8 elementary schools and 5 kindergarten through eighth grade schools. The school district included 155 schools that encompass 178 square miles of urban, suburban, and mountain neighborhoods. The ethnic composition of the students within this school district were as follows: .6% of students identified as American Indian/Alaska Native, 3.2% Asian/Pacific Islander, 1.2% Black, 24.6% Hispanic, 66.2% White, and 3.9% Multiple Races. The total percentage of students in the district eligible for free and reduced lunch for the 2018-19 school year was 31.7%. Twenty-six elementary schools receive Title I funds.

Forty-nine of the sixty-three total elementary and kindergarten through eighth grade schools implement a PLC structure for teacher planning within this specific school district, as reported by the principal of each school. During the 2015-16 and 2016-17 school years, the district conducted professional development on the Professional Learning Community model with schools that expressed interest. Each school participating in the district initiative applied the PLC model to instructional planning to ensure effective instructional design and aligned planning between teachers. A building-level leadership team, which included representation from teachers, the instructional coach, and administration, served as a guiding coalition for the implementation of this work. Members attended district-level training throughout the school years. The school teams then implemented similar training at each school with all teachers. Members of these teams were specifically trained on the guiding questions used for instructional design. They also learned how to examine student work for common strengths and weaknesses to then identify instructional next steps.

Feedback sessions regarding the implementation process included informal conversations and brainstorming next steps for further implementation. This process also included district staff observing teacher planning meetings and then providing feedback to the instructional coach, teacher leaders, and/or administration.

This study focused on schools that serve all students. Schools that employed entrance criteria or that excluded students based on behavior or academics were excluded from this research study.

The school district selected for this study provides a unique opportunity to examine the effects of school growth and teacher collaboration because implementation of formal meeting structures, such as PLCs, was a school-based decision. Many school districts included in other research studies adopted and mandated the implementation of PLC structures. Therefore, much of the research conducted on the effects of PLCs has occurred in districts where schools implemented PLCs in a similar timeframe and manner. In this district, seventy-eight percent of the elementary schools utilized a formalized structure to encourage collaboration between teachers. The other schools either employed an informal structure or no consistent structure for instructional planning. Data were examined to determine the relationship between teacher collaboration (existing survey), school growth (Median Growth Percentile for English Language Arts and mathematics), teacher perceptions of a PLC structure, principal reports of use of a structure for instructional planning meetings (dichotomous value), and Free and Reduced Lunch rates.

Instruments

Permission was granted to the researcher to use Tschannen-Moran and Barr's Collective Teacher Beliefs Scale (TCBS) (2004) to measure collaboration between teachers. The 12-item survey is an adaptation of the original 21-item scale developed by Goddard, Hoy, and Hoy (2000) to measure the collective efficacy of a group. Goddard (2002) established criterion-related validity by examining the relationship between the 12-item surveys against the 21-item survey. Scores were highly related (r = .98). Two constructs containing positive and negative aspects yielded four factors. Two factors

focused on what Goddard titled Task Analysis (TA), which are the perceptions of barriers and opportunities that affect the task. These include belief about student abilities and motivators and the level of support students have from their home and community. The third and fourth factors relate to what Goddard (2002) titled Group Competence (GC). These included teacher perceptions about skills and capabilities of the faculty members. Table 1 indicates the factor loadings. Cronbach's alpha, which measured internal consistency for the 12-item scale, is .94. Goddard (2002) used hierarchical linear modeling to show the scale is a positive predictor of schools' variability in student achievement scores, accounting for .64 of the variance based on a single factor. Tschannen-Moran and Barr (2004) made further adaptations to Goddard's (2002) abbreviated 12-item survey.

Table 1. *Factor Matrix for the Collective Efficacy Scale Reported by Goddard (2002)*

Number	Item	GC+	GC-	TA+	TA-	Structure Coefficient
Q1	Teachers in this school are able to get through to the most difficult students	X				0.79
Q2	Teachers are confident they will be able to motivate their students	X				0.91
Q3	If the child doesn't want to learn, teachers here give up		X			0.67
Q4	Teachers here don't have the skills needed to produce meaningful learning		X			0.73
Q5	Teachers in this school believe that every child can learn	X				0.76
Q6	These students come to school ready to learn			X		0.91
Q7	Home life provides so many advantages that students here are bound to learn			X		0.75
Q8	Students here just aren't motivated to learn				X	0.84
Q9	Teachers in this school do not have the skills to deal with student disciplinary problems		X			0.73
Q10	The opportunities in this community help ensure that these students will learn			X		0.80
Q11	Learning is more difficult at this school because students are worried about their safety				X	0.86
Q12	Drug and alcohol abuse in the community make learning difficult for students here				X	0.82

This study used Tschannen-Moran and Barr's (2004) adapted 12-item scale. Respondents were asked to rate items on a rating scale ranging from "nothing" to "a great deal." The questions include the following:

Q1. How much can teachers in your school do to produce meaningful student learning?

Q2. How much can your school do to get students to believe they can do well in schoolwork?

Q3. How much can teachers in your school do to help students master complex content?

Q4. How much can teachers in your school do to promote deep understanding of academic concepts?

Q5. How much can teachers in your school do to help students think critically?

Q6. How much can your school do to foster student creativity?

The subscale scores that address student discipline include the following questions:

Q7. To what extent can teachers in your school make expectations clear about appropriate student behavior?

Q8. To what extent can school personnel in your school establish rules and procedures that facilitate learning?

Q9. How well can teachers in your school respond to defiant students?

Q10. How much can school personnel in your school do to control disruptive behavior?

Q11. How well can adults in your school get students to follow school rules?

Q12. How much can your school do to help students feel safe while they are at school?

According to Tschannen-Moran and Barr (2004), Cronbach's alpha for this twelve-item scale was .97. The instructional strategies subscale generated a reliability of .96 and the discipline subscale a reliability of .94. A significant relationship was revealed between teacher's perceptions of collective efficacy and student achievement. A significant positive relationship was found between reading, writing, and math student achievement and perceptions of collective teacher efficacy.

The Teacher Collaboration Assessment Survey (TCAS) operationalizes the attributes of teacher collaboration that are promoted by implementing a PLC structure. University faculty and school district leaders piloted the measure in multiple school districts in the Mid-Atlantic and Northeast regions of the United States. This survey includes questions on a rating scale measuring implementation of dialogue, decision-making, action taking, and evaluation. Some school districts continue to use this survey annually to inform teachers, principals, and district leaders about the effectiveness of teacher collaboration. The TCAS survey was validated by Woodland, Lee, and Randall in 2013. This study examined the internal structure, response processes, relations to other variables, and convergent and discriminant evidence. This validation recommended investigating the predictive validity of this scale on improved instructional practices and student learning.

Statements related to each of the four constructs of teacher collaboration were embedded in the rating-type items. Eleven statements regarding dialogue, action taking, and evaluation and ten regarding decision-making were included. A 5-point scale was used ranging from Strongly Agree to Strongly Disagree.

School Growth Measures

Growth scores measured progress of each student and groups of students toward meeting the Common Core State Standards for English Language Arts and mathematics using the Colorado Measures of Academic Success assessment. For each student, growth was calculated by comparing how a student's performance changes over consecutive school years relative to a group of similar grade level peers. Students were aligned with a peer group the first time they took the assessment, which typically occurred during their third-grade year. Using quartile regression, the student's growth percentile reported how well their test scores compared to other similar students (who attained similar scores the previous year). Using cut scores, students were grouped into high (65^{th} percentile or higher), typical (35^{th}-64^{th} percentile), or low (below the 34^{th} percentile) groups. This comparison model assigned each student a growth percentile. Median Growth Percentile indicated how well a student, group of students, or school grew in comparison to other students, groups, or schools. Median Growth Percentile informed how much growth that specific person or group made in one school year. A Median Growth Score of 50 was considered average growth. For the purposes of this study, the English Language Arts and mathematics Median Growth Percentile for three consecutive school years was extracted from CDE's database.

Additionally, Free and Reduced Lunch rates for the same three consecutive school years were also extracted from CDE's database. The average for each variable across the three consecutive years was calculated, and that average served as the variable used in the analysis in this study.

Participants

Elementary school principals responded to only one question: whether or not their teachers used a PLC structure to support instructional design. No further data was gathered from principals. Teacher participants included fourth and fifth grade teachers. Four demographic questions were included at the beginning of the survey. The results of these questions include:

Table 2. *Highest Degree of Education*

	Frequency	Percent
B.A.	47	33.8
M.A.	90	64.7
Doctorate	2	1.4
Total	139	100.0

Table 3. *Years of Teaching Experience*

	Frequency	Percent
0-10 years	63	45.3
11-20 years	51	36.7
21-30 years	24	17.3
30+ years	1	.7
Total	139	100.0

Table 4. *Gender*

	Frequency	Percent
Male	13	9.4
Female	125	89.9
Prefer not to answer	1	.7
Total	139	100.0

Table 5. *Ethnicity*

	Frequency	Percent
African-American	1	.7
Hispanic	8	5.8
Caucasian	126	90.6
Multiple	1	.7
Prefer not to answer	3	2.2
Total	139	100.0

Procedures

School Growth and FRL. The sampling procedure for this study involved accessing publicly available Colorado Measures of Academic Success school growth data from the Colorado Department of Education website. A school codebook that contains the coding system for each school was created. Codes were created to remove specific school identifiable information for each school. This codebook was maintained by the researcher. Each school's Median Growth Percentile for English Language Arts and mathematics and Free and Reduced Lunch rate was input to an Excel spreadsheet for the 2015-16, 2016-17, and 2017-18 school years.

Teacher Data. Permission to conduct this study was granted by the University of Denver's Institutional Review Board in February 2019. Following university approval, permission was granted from the school district's research and assessment office to administer the survey. Surveys were administered to fourth and fifth grade teachers in April 2019. Information that was presented prior to beginning the survey included the purpose of the study, the researcher's contact information, and how the data would be used. Survey participants were assured that their identity and that of their school would be coded and remain confidential. Participants were informed that participation was

voluntary, and they could opt out at any point without penalty. Teachers were emailed a link to the survey.

A survey was created using existing measures from Tschannen-Moran (2004) and Woodland (2008). Four basic demographic questions were asked to determine the highest educational degree attained, years of teaching experience, gender, and ethnicity of each teacher respondent. Four additional questions addressed the use of a PLC structure for instructional planning: (1) to what degree does your team use a PLC structure for instructional planning, (2) do you believe using a PLC structure is helpful, (3) do you use the instructional plans you create during PLC meetings, and (4) do you believe the PLC structure helps you design differentiated instruction?

Qualtrics, which is a secure survey platform, was used to create and distribute the survey. With permission from the school district's assessment and research department, each teacher's email address was added, and teachers received a link to the survey that coded them to their specific school. Qualtrics includes a feature that allows the researcher to see response rates and which responders started and did not complete the survey, which responders opted out of the survey, and which responders opened but never started the survey. These results were used to contact teachers who started and opened the survey but did not finish. Teachers in this category were sent another link to their original survey along with an email requesting that they complete the survey. One hundred thirty-eight teachers or twenty-six percent from 63 schools completed the survey.

Principal Data. With permission from the school district's research and assessment office, principals were contacted through their district email with an explanation of the study and a request to respond to one question: whether or not their school uses a PLC structure for instructional planning (coded as 1/0). Emails from each principal were saved in a folder. Each principal's response was added to the Excel database. Sixty-three principals responded. Implied consent was completed prior to each participant completing the survey, which explained the purpose of the study and how the data would be used for analysis.

Results of the survey data are accessible to the researcher and can be used in the presentation and publication of this study. All data will be maintained for the required length of two years following the conclusion of this study. The assessment and research office of the school district and the creators of each survey (TCAS and TCBS) received an executive summary of the findings.

Data Preparation

Teacher survey responses, school growth data (ELA and math), the percentage of students who qualify for Free and Reduced Lunch, and use of a PLC structure were operationalized at the school level. Each school's mean growth score for ELA and math for fourth and fifth grade was entered into SPSS. The data in their original form were maintained, as well as the recoded data, so all steps could be retraced. Codebooks were maintained to explain how codes were generated. SPSS was used to conduct the initial analysis of the data, including frequencies, initial trends, and distributions.

Initial data analysis utilized the explore feature in SPSS to check for accuracy of the data, including missing data, and to create a histogram and normality plots. The exclude list cases setting was used to determine if any data were missing. Data were examined for descriptive statistics including the mean and minimum and maximum values within the range. Each variable was studied separately for skewness. Tests for normality, a histogram, and a Q-Q Plot were examined. Scatterplots were examined for normality, homoscedasticity, and independence of data. Outliers were identified to determine if they have high influence on the regression parameters.

Linearity and error variance around the regression line was analyzed. Pearson's *r* was calculated to determine the relationship between collective teacher efficacy, teacher collaboration, teacher perceptions of PLCs, and school growth (ELA and math). Independence of errors was examined to ensure errors associated with one observation were correlated with errors of another observation. Multicollinearity, specifically examination of the Variation Inflation Factor (VIF), revealed if variables were strongly related.

Tables that summarize data and allow for comparisons were included in the results chapter. The researcher anticipated including tables that include the mean, standard deviation, skewness, and kurtosis for collective teacher efficacy and school achievement, each subscale, and each measure of school growth (English Language Arts and mathematics). A table for correlational analysis of teacher collaboration, collective teacher efficacy, and perceptions of PLCs was included, showing the significance of each. Tables with results of regressions were included to summarize results of predictive

significance of teacher collaboration, collective efficacy, and perceptions of PLCs in schools that do and do not use a PLC model for math and English Language Arts.

Throughout this process, data were checked for accuracy when coding and entering data into SPSS. Cross-checking against the coding book occurred throughout to maintain accurate data entry.

Data Analysis

This study included five independent variables: principal view of PLC/no PLC, Free and Reduced Lunch rate, teacher collaboration, collective teacher efficacy, and teacher perceptions of a PLC structure to plan instruction. This study also included two dependent variables: the aggregate of school growth (MGP for English Language Arts and mathematics on CMAS tests).

During the first phase of the study, each school's CMAS (Colorado Measure of Academic Success) growth data for English Language Arts and mathematics for the 2015-16, 2016-17, and 2017-18 school years were input into Excel and then the Statistical Package for the Social Sciences (SPSS). Free and Reduced Lunch rates were also added to the data file.

Tschannen-Moran's Collective Teacher Beliefs Scale (2004) and Woodland's Teacher Collaboration Assessment Survey (2013) were administered to fourth and fifth grade teachers to measure the degree of teacher collaboration, collective efficacy, and teacher perceptions within each school (research question one). The surveys maintained all of the questions that Tschannen-Moran and Barr (2004) and Woodland (2013) originally included in their scales. Teacher response to the four questions about PLCs

was compared to the principal response regarding whether or not their school uses a PLC structure for instructional planning, which addresses the third research question. The examination of academic growth data and survey data occurred in 63 elementary schools and included 148 responses, of which 138 completed the entire survey. Using the results from the TCBS survey questions, the mean score was calculated by averaging the teacher responses to the 12 items. The mean of each construct of the TCAS survey regarding teacher collaboration (dialogue, decision-making, action, and evaluation) was included for each school. The average response to the four questions that address use of a PLC was calculated. An average of three consecutive years of Free and Reduced Lunch rate was used in the analysis. Whether the principal responded that the school does or does not use a PLC was used in the analysis.

Correlations were calculated using Pearson *r* to determine the relationship between teacher collaboration, collective teacher efficacy, teacher perception of PLCs, and tests of school growth (MGP for English Language Arts and mathematics). An independent samples t-test was used to determine whether principals and teachers agreed about the implementation of a PLC structure in their school. Hierarchical linear regression was used to determine the combined independent effect of Free and Reduced Lunch rate, teacher collaboration and collective teacher efficacy, and use of PLCs on school growth (English Language Arts and mathematics MGP). Correlations were calculated between collective teacher efficacy, teacher collaboration, and teacher perceptions of the use of PLCs for planning.

Building upon the analysis procedure used by Barr and Tschannen-Moran (2004) and that which was used by Woodland et al. (2013), collective teacher efficacy, teacher collaboration, teacher perception of PLCs, and school growth data were aggregated at the school level. Teacher survey responses, the principal response, and school-specific data were analyzed at the school level. Hierarchical regressions included Free and Reduced Lunch rates, collective teacher efficacy survey responses, teacher collaboration survey responses, and perception of PLCs as independent variables and math and ELA three-year aggregate growth means as dependent variables, with separate regressions for each dependent variable. Aggregate teacher means, perceptions of PLCs, and Free and Reduced Lunch deviations were included as predictors of school growth.

Descriptive and inferential analyses were conducted using SPSS. Correlations were calculated using Pearson *r* to determine the relationship between teacher collaboration, collective teacher efficacy, and perceptions of PLCs and each of the two measurements of school growth. Mean values computed for each school's teacher collaboration and school growth were used to create a scatterplot. This scatterplot helped the researcher determine if school growth was linearly associated with teacher collaboration. A scatterplot was created using school growth in ELA and a separate scatterplot for school growth in math. The effect of implementation or non-implementation of a formal structure of instructional planning, specifically PLCs and teacher collaboration and collective teacher efficacy, on school growth were examined.

Analysis occurred at 1) the teacher level to estimate correlations among collective efficacy, collaboration, and perception of PLC, 2) school level PLC—principal point

biserial correlation, and 3) hierarchical regression at school level for a) Free and Reduced Lunch rates, b) collaboration and collective efficacy (means), and c) PLC (means) with the three-year aggregate of math and English Language Arts growth as dependent variables. Principals who reported using a PLC structure were coded as one. Principals who reported not using a PLC were coded as zero. The hypothesis that use of a PLC structure would predict higher collective teacher efficacy, teacher collaboration, and growth scores guided this analysis process. Each school's Median Growth Percentile in English Language Arts and mathematics for the past three consecutive school years was entered into SPSS. An average Median Growth Percentile was calculated for each school for English Language Arts and mathematics. Likewise, each school's Free and Reduced Lunch rate was entered into SPSS and averaged.

Research Question 1: A simple correlation was used to determine the relationship between the variables of teacher collaboration, collective teacher efficacy, and teacher perceptions of PLCs.

Research Question 2: Hierarchical linear regression was used to determine the effectiveness of the model to predict whether the aggregate of teacher perceptions about PLCs predict English Language Arts and mathematics growth while factoring out/controlling for the teachers' survey responses and Free and Reduced Lunch rates. A block design within a hierarchical linear regression was used. The first block included Free and Reduced Lunch rate. The second block included collective teacher efficacy and teacher collaboration. The third block included teacher perceptions of PLCs. A hierarchical linear regression was conducted using average growth in English Language

Arts as the dependent variable and then again using mathematics as the dependent variable. Results indicated how much each independent variable contributed to the variability in the model for each block.

Research Question 3: Descriptive statistics were analyzed to examine the count, skewness, and kurtosis. An independent samples t-test was used to determine the difference between the schools that use and do not use a PLC structure for instructional planning. Levene's test for equality of variances was examined to see if a statistically significant difference existed between the groups.

Reporting

Analysis focused on answering the research questions: What is the relationship between school academic growth, teacher collaboration, collective teacher efficacy, and teacher perceptions of PLCs? Do aggregate teacher perceptions about the existence of a PLC in their school predict English Language Arts and mathematics growth, controlling for Free and Reduced Lunch rates and results of each survey's scores? Do principals and teachers agree regarding whether the school uses a PLC structure to plan instruction? Interpretations were checked against research questions and initial expectations for results. A table of the means by PLC (use v. non-use) was included to help the reader understand which differences, if any, are associated with the use of PLCs.

Potential Ethical Issues

Maintaining confidentiality of the district and respondents was one ethical issue in this study. Codes were created to maintain the anonymous identity of each school, protecting the identities of survey respondents so they could respond accurately and

without fear of results being linked to them. Coding allows participants to respond honestly. Initial codes were maintained by the researcher for two calendar years following the conclusion of the study in a locked file cabinet within the residence of the researcher.

Delimitations

The school district that was the focus of this study was selected based on the fact that implementation of PLCs was a school-based decision as opposed to a district-based decision. Within this district, elementary schools were selected for this study because they are the most likely to implement PLCs. Fourth and fifth grade teachers were included because students within these grade levels attain growth scores, which attribute to school growth score for English Language Arts and mathematics. Teacher collaboration, collective teacher efficacy, perceptions of PLCs, and Free and Reduced Lunch rates were selected because previous research has identified a positive relationship between each and student achievement measures. For this study, school growth was specifically selected to determine the relationship that exists between it and the other variables to see if the same relationship exists as with student achievement measures.

Challenges

The timing of the academic year during which this survey was administered impacted response rates. During the spring, teachers were engaged with end-of-the-year activities and administration of required annual assessments. Additionally, the researcher worked as an employee of the school district where this survey was administered, which

may have also affected the response rate. The survey was not administered to the staff at the elementary school where the researcher served as principal.

Teachers answered four questions about PLCs. Principals answered a single question: whether or not their teachers use a PLC structure for planning, which was coded as a dichotomous value indicating either presence or absence of a formalized process. Given the complex nature of teacher planning, some school teams might utilize a similar structure, but may not characterize it as a professional learning community or a formalized structure. If this study included qualitative data collection, such as observing teacher planning in each school, and used a rubric to determine if a consistent structure for planning is used, this process would have created more robust data that values both quantitative and qualitative perspectives. Additional limitations are expanded upon in Chapter 4.

Chapter Four: Results

Organization of Data Analysis

This chapter provides information about the data, organization of the data, and analyses for this study. As previously described, this study used Median Growth Percentile Scores (English Language Arts and mathematics) and Free and Reduced Lunch rates for each school, which were compared to the survey responses from teachers and principals to determine the relationship between these variables. The researcher expected to find a positive relationship between the Median Growth Percentile, teacher collaboration, and teacher collective efficacy and teacher responses regarding use of a PLC structure for instructional planning.

Results are presented in three sections related to each of the three research questions and corresponding analysis. The section titled "Research Question One" presents the results of the analysis of the following question: What is the relationship between teacher collaboration, teacher efficacy, and teacher perception of the use of PLCs? The section titled "Research Question Two" addresses the findings related to the following question: Do aggregate teacher perceptions about the existence of a PLC in their school predict English Language Arts and mathematics growth, controlling for Free and Reduced Lunch and results from each survey's scores? In the third section, "Research Question Three," the findings are presented related to agreement between principal and teachers regarding the use of a PLC.

Descriptive statistics and results of assumption testing are included at the beginning of each section. This chapter begins with the data preparation to answer the research questions and explain how missing data were addressed.

Data Preparation and Missing Data

One hundred thirty-nine or 26% of teachers responded to the survey, in whole or in part, from 63 schools. For the purpose of comparative analysis, two data files were created from the responses. One maintains the raw teacher responses (N=139) titled, "Teacher Data File." Within the "School Averages Data File," the responses to questions and surveys from teachers who teach at the same school were averaged (N=63 schools). For research questions related to teacher perceptions, the teacher data file was used. When a research question dealt with school performance, the school data file was used. The normality of each variable was examined, and each was found to be normally distributed.

Normality tests indicated normal data with a skewness that ranged between -1 and 1 for all variables except mean PLC questions, which generated a skewness of -1.13. Sixteen individual questions from the teacher efficacy and teacher collaboration survey generated skewness outside of the -1 to +1 range, which are included in the appendix. These were minimally outside of the normal range and were not considered sufficiently skewed to warrant variable transformations.

Table 6. *Descriptive Statistics of School Averages*

	N	Mean	Std. Deviation	Skewness	Kurtosis
Degree Earned	63	1.65	.40	-.65	-1.16
Years Experience	63	1.72	.64	.95	1.33
PLC Perceptions	63	6.68	1.51	-1.13	1.31
Teacher Efficacy	63	7.30	.54	-.27	-.34
Teacher Collaboration	63	3.76	.51	-.15	-.71
Decision-Making	63	3.89	.62	-.65	.38
Action	63	3.83	.55	-.79	1.79
Evaluation	63	3.27	.70	-.58	1.63
Dialogue	63	3.69	.54	-.62	.98
ELA Growth Avg.	63	56.21	8.95	.06	-.32
Math Growth Avg.	63	54.50	8.17	.12	-.06
FRL Avg.	63	35.56	26.49	.68	-.60

Research Question 1:

What is the relationship between teacher collaboration, collective teacher efficacy, and teacher perception of the use of PLCs? This analysis was conducted by correlating the teacher collaboration, collaborative teacher efficacy, and the PLC survey results from the teacher data file. The data revealed a correlation between the teacher collaboration and perceptions of PLCs, $r = .53$, $p < 0.01$. Teacher collaboration correlated with teacher efficacy, $r = .36$, $p < 0.01$. Perceptions of PLCs and teacher efficacy were not significantly correlated, $r = .13$, $p = .14$ (see Tables 7 and 8).

Table 7: *Teacher Descriptive Statistics*

	Mean	Std. Deviation	N
Teacher Collaboration	3.65	.64	128
Teacher Efficacy	7.31	.96	131
PLC Perceptions	6.73	1.70	138

Table 8: *Teacher Correlations*

		Teacher Collaboration	Teacher Efficacy	PLC Perceptions
Teacher Collaboration	Pearson Correlation	1		
	Sig. (2-tailed)			
	N			
Teacher Efficacy	Pearson Correlation	.36**	1	
	Sig. (2-tailed)	<.001		
	N	128	131	
PLC Perceptions	Pearson Correlation	.53**	.13	1
	Sig. (2-tailed)	<.001	.140	
	N	128	131	138

Note. ** Correlation is significant at the 0.01 level (2-tailed).

Research Question 2:

Do aggregate teacher perceptions about the existence of a PLC in their school predict English Language Arts and mathematics growth, controlling for Free and Reduced Lunch and results of each survey's scores?

This question was answered by conducting hierarchical linear regressions to determine whether teacher perceptions of a PLC predicted English Language Arts and/or mathematics growth. In this study, the term Free and Reduced Lunch refers to the percentage of students who qualify for Free and Reduced Lunch, which is used as a proxy for the socio-economic status of the student population. Free and Reduced Lunch rate, school mean teacher efficacy, school mean teacher collaboration, and the school mean responses to the PLC questions were included in the model using either English Language Arts growth or mathematics growth as the dependent variable. Free and Reduced Lunch rate was assigned to the first block. The second block included the

results of the teacher collaboration survey and the teacher efficacy survey. The third block included the aggregate of teacher responses to the PLC questions. The analysis was completed once for each growth measure, using the school averages data file.

Descriptive statistics

The descriptive statistics of the school average data file is included in the table below.

Table 9: *Descriptive Statistics School Average*

	Mean	Std. Deviation	N
ELA Growth Avg.	56.21	8.95	63
FRL Avg.	35.56	26.49	63
Teacher Efficacy	7.30	.54	63
Teacher Collaboration	3.69	.54	63
PLC Perceptions	6.68	1.52	63

English Language Arts Growth Analysis of Data

Hierarchical regression is a comparative method. The degree to which each variable contributes a statistically significant amount of variance in the dependent variable is explained by this method. In this model, Free and Reduced Lunch and English Language Arts Growth were negatively correlated (r = -.52, p < .001). The PLC Perception mean positively correlated (r = .59, p < .001) with teacher collaboration. PLC perceptions negatively correlated with ELA growth (r = -.21, p < .05) and Teacher Collaboration (r = -.21, p < .05). No other variables were statistically significantly correlated.

Table 10. *School Average Data Correlations (ELA)*

	ELA Growth Avg	FRL Avg	Teacher Efficacy	Teacher Collaboration
ELA Growth Avg	1.00			
FRL Avg	-.52***	1.00		
Teacher Efficacy	-.02	-.01	1.00	
Teacher Collaboration	-.12	.10	.05	1.00
PLC Perceptions	-.21*	.14	-.21*	.59***

School average data file model summary analysis

Using the school average data file, the model summary indicates 27% of the variability in ELA Growth rate is attributable to Free and Reduced Lunch rate (Table 11). Adding the teacher collaboration and teacher efficacy mean scores to the model added 0.005 to the R^2, corresponding to only 0.5 percent of the variability in the outcome. Adding the PLC variable explained an additional 1.9% of the variability in the outcome. The ANOVA table indicates significance in all three models, but only because the significance of Free and Reduced Lunch in the first model accounted for the majority of variance in the dependent variable. The coefficients table (Table 12) verifies these conclusions. The standardized beta for Free and Reduced Lunch is -.495, which is the only statistically significant variable in the model when all variables are included and English Language Arts Growth is the dependent variable. The unique contribution of Free and Reduced Lunch to the ability to predict English Language Arts growth rates in this model outweighs the contribution of the other variables, which are not significant.

Table 11. *School Average Model Summary (ELA)*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.52[a]	.27	.25	7.73	.27	22.09	1	61	.00
2	.52[b]	.27	.23	7.84	.01	.20	2	59	.82
3	.54[c]	.29	.24	7.80	.02	1.53	1	58	.22

Table 12. *Coefficients Table (ELA)*

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	62.41	1.64		38.08	<.001
	FRL Avg	-.17	.04	-.52	-4.70	<.001
2	(Constant)	68.72	14.79		4.65	<.001
	FRL Avg	-.17	.04	-.51	-4.56	<.001
	Efficacy	-.31	1.84	-.02	-.17	.87
	Collaboration	-1.11	1.87	-.07	-.60	.55
3	(Constant)	74.27	15.39		4.83	<.001
	FRL Avg	-.17	.04	-.50	-4.43	<.001
	Efficacy	-1.03	1.92	-.06	-.54	.59
	Collaboration	.67	2.35	.04	.28	.78
	PLC Perception	-1.06	.85	-.18	-1.24	.22

Mathematics Growth Analysis of Data

The school average data file indicates correlations in the model between the percentage of Free and Reduced Lunch and mathematics growth (r = -.56, p < .001). Restating the results of the analysis using ELA Growth as the dependent variable, the PLC Perception mean positively correlated (r = .59, p < .001) with teacher collaboration and negatively correlated with ELA growth (r = -.212, p < .05). Though ELA Growth

and PLC perceptions were correlated, math growth and PLC perceptions are not correlated.

Table 13. *School Averages Data File Pearson Correlations (Math)*

	Math Growth Avg	FRL Avg	Teacher Efficacy	Teacher Collaboration
Math Growth Avg	1.00			
FRL Avg	-.56***	1.00		
Teacher Efficacy	-.063	-.01	1.00	
Teacher Collaboration	-.077	.10	.054	1.00
PLC Perceptions	-.051	.14	-.21*	.59***

Model summary data analysis

R^2 indicates that Free and Reduced Lunch rate alone contributes 31% of the variability of the outcome (Table 14). When the results of mean teacher collaboration and mean teacher efficacy are added, these accounted for 0.005 R^2 change, corresponding to a 0.5% change in predictability. Adding teacher responses to PLC questions added 0.001 to the variability of the model. Within this model, the Free and Reduced Lunch rate was the only significant predictor of school growth.

Table 14. *School Average Model Summary (Math)*

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.56[a]	.31	.30	6.8	.31	27.55	1	61	.00
2	.56[b]	.32	.28	6.9	.01	.23	2	59	.80
3	.56[c]	.32	.27	7.0	.00	.09	1	58	.77

a. Predictors: (Constant), FRL Avg
b. Predictors: (Constant), FRL Avg, Q.4.1-4.12, Q5.1-8.11
c. Predictors: (Constant), FRL Avg, Q.4.1-4.12, Q5.1-8.11, Q3.1-3.4
d. Dependent Variable: Math Growth Avg

Table 15. *Coefficients Table (Math)*

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	60.62	1.45		41.81	<.001
	FRL Avg	-.17	.033	-.56	-5.25	<.001
2	(Constant)	69.33	13.08		5.30	<.001
	FRL Avg	-.17	.03	-.56	-5.15	<.001
	Efficacy	-1.05	1.63	-.07	-.64	.52
	Collaboration	-.29	1.65	-.02	-.18	.86
3	(Constant)	68.14	13.78		4.95	<.001
	FRL Avg	-.17	.03	-.56	-5.11	<.001
	Efficacy	-.89	1.72	-.06	-.52	.61
	Collaboration	-.67	2.10	-.044	-.32	.75
	PLC Perceptions	.23	.76	.042	.30	.77

Each model was statistically significant (F = 27.55 for Model 1, 9.103 for Model 2, and 6.744 for Model 3). However, the coefficients (Table 15) confirm that Free and Reduced Lunch rate was the only variable that makes a statistically significant contribution to this model.

Research Question 3

Do principals and teachers agree regarding whether their school uses a PLC structure to plan instruction?

Principals were asked whether or not their school uses a PLC structure to plan instruction. Teachers were asked four questions about use of PLC structures. Analysis was conducted to determine agreement between principal and teacher responses. The researcher hypothesized that teacher and principal perceptions would align. One hundred thirty-eight teachers from 63 schools responded to the four questions about PLCs, and all

of the principals of those schools responded regarding the use/non-use of PLCs, which was recorded as a dichotomous value.

Table 16. *School Averages PLC Questions*

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Degree of Implementation	63	1.00	9.00	6.34	1.87	-.90	.90
Is a PLC helpful?	63	3.00	9.00	7.03	1.57	-.87	.47
Use of plans created in PLCs	63	1.00	9.00	6.89	1.95	-1.28	1.36
Differentiated Instruction	63	1.00	9.00	6.45	1.57	-1.09	1.81

Forty-nine of the principals who responded indicated that their school uses a PLC structure for instructional planning. Fourteen indicated they do not use a formal PLC structure. An independent samples t-test was used to determine the difference in the means for teacher perception by principal response. Levene's test, used to determine if variances were homogeneous for the two groups, was not significant, supporting homogeneity. The difference between the means of the two groups (M = 5.69, SD = 1.91 no PLC/M = 6.946, SD 1.27 PLC) was statistically significant, $t(16.44) = -2.34$, $p = .03$. There was a significant difference between the teacher responses about their PLC perceptions and the responses in which principals indicated use or non-use of PLCs. These results indicate that there was some alignment between principal and teacher perceptions of use of PLC structures in schools that do and do not use this structure for instructional planning.

Table 17. *Group Statistics for PLC Perceptions*

	Prin. Response	N	Mean	Std. Deviation	Std. Error Mean
PLC Perceptions	No	14	5.69	1.91	.51
	Yes	49	6.96	1.27	.18

Summary of Results

The current chapter presents results of the analyses used to answer the following research questions: (1) what is the relationship between teacher collaboration, teacher efficacy, and teacher perception of the use of a PLC; (2) do aggregate teacher perceptions about the existence of a PLC in their school predict math and English Language Arts growth, controlling for Free and Reduced Lunch and results of each survey's scores; and (3) do principals and teachers agree regarding whether the school uses a PLC structure to plan instruction? Correlation revealed the relationship between teacher efficacy, collaboration, and perceptions of PLCs. Hierarchical linear regression allowed for the examination of the data and the unique contribution of each variable to the variance of English Language Arts growth and then mathematics growth, using the teacher data file and the school averages file. An independent t-test established the alignment between principal and teacher view of PLC.

After examining the data and the contribution of each variable to the model, the following conclusions were reached:

- In schools where principals indicate use of PLCs, principal and teacher perceptions of PLC use are somewhat aligned.
- As a variable within this model, Free and Reduced Lunch rate contributed the greatest amount of variance when predicting the dependent variables (English Language Arts growth or mathematics growth), with no other predictor being statistically significant.

- Teacher collaboration positively relates to teacher efficacy. Teacher collaboration positively relates to perception of PLCs. However, teacher efficacy did not relate to PLC perception.

The following chapter discusses these results within the context of the existing literature. This discussion will present arguments for why a relationship does not exist between teacher collaboration behaviors, school growth, and Free and Reduced Lunch rates.

Chapter Five: Discussion

A synopsis of this study is provided in this chapter, including the research questions that prompted the review of relevant literature and the subsequent study. Findings from Chapter 4 and relevant research are discussed. Conclusions from this study, connections to existing literature, and possible areas for future research are presented. Any further clarification or remaining questions for new research are included.

Summary of the Study

This study adds to an existing theoretical and research base that continues to explore how teacher collaboration and collective teacher efficacy relate to the use of Professional Learning Communities for instructional planning. Building upon existing research that established a link between teacher collaboration, collective teacher efficacy, and student achievement, this study sought to understand if a similar relationship exists between these variables and school growth. Existing research has identified a positive relationship between teacher efficacy, collective teacher collaboration, and the use of PLCs. The following research questions specifically guided this study: (1) What is the relationship between collective teacher efficacy, teacher collaboration, and teacher perceptions of PLCs? (2) Do aggregate teacher perceptions about the existence of a PLC in their school predict mathematics and ELA growth, controlling for Free and Reduced

Lunch rates and teacher survey scores? and (3) Do principals and teachers agree regarding whether the school uses a PLC structure to support instructional planning?

The school district that was the focus of this research allowed individual schools to determine whether they would implement PLC structure to support teacher planning. Varied implementation across the schools provided a unique opportunity to explore the relationship between these variables in schools. This research informs additional decision-making about promoting a weekly delayed start or early release for schools that use PLC structures, which is a strategy for improvement that is currently being considered by this school district to provide additional time for teacher collaboration and planning.

A positive correlation between student achievement scores and collective teacher efficacy has been established by several researchers (Bandura, 1993; Goddard, 2001; Hoy et al., 2002; Tschannen-Moran & Barr, 2004). For several decades, iterative research regarding collective teacher efficacy, teacher trust, and student achievement has occurred between the Ohio State University and the College of William and Mary. Their research built upon Bandura's (1986) conceptual model of triadic reciprocal determinism in which beliefs affect behavior and the environment. Within Bandura's (1986) model, personal factors, behavior, and external factors influence human functioning. Goddard, Hoy, and Woolfolk-Hoy (2004) expanded upon Bandura's model and created a model of teacher collective efficacy in which efficacy affects achievement and achievement affects efficacy. These researchers seek to understand how collective teacher efficacy was established and is sustained. This research study intended to expand upon the established

relationship between student achievement and collective teacher efficacy to determine if a similar relationship exists between school growth scores and teacher collective efficacy, collaboration between teachers, and use of a PLC structure.

Professional Learning Communities are structures that intend to establish, promote, and sustain teacher collaboration regarding instructional planning (Vesico, 2015). A significant amount of research has addressed the relationship between use of a PLC structure and student achievement (Little, Gearhart, Curry, & Kafka, 2003; Zito, 2011). In response to the nebulous nature of teacher collaboration, Woodland, Lee, and Randall (2013) conceptualized teacher collaboration into a survey measure (Teacher Collaboration Assessment Scale) based on the components of a data decision-making model, including data use, dialogue, action, and evaluation, which serve as subscales. This scale has been used annually to evaluate teacher collaboration in several school districts on the East Coast of the United States. These school districts use TCAS survey results to guide specific components of teacher collaboration.

The survey utilized in this research study included Tschannen-Moran and Barr's (2004) measure of collective teacher efficacy and Woodland, Lee, and Randall's (2008) measure of collaboration. In addition, four PLC questions and four demographic questions were asked of teachers. The principal of each school indicated whether their school used a PLC model to plan instruction. Results of this study may serve as a step toward establishing an empirical link between (1) teacher behaviors that create effective instruction, (2) school growth (ELA and math), and (3) Free and Reduced Lunch rate.

Findings

This section discusses the findings of this overall study for each research question. A relationship was found between two of the three variables in research question 1: What is the relationship between collective teacher efficacy, teacher collaboration, and teacher perceptions of PLCs? Low to moderate correlations were identified between teacher collaboration and teacher efficacy, (r = .53) but the correlation between teacher efficacy and teacher perceptions of PLCs (r = .13) was low and nonsignificant. Although correlational relationships do not indicate causality, use of PLCs as they currently exist in this school district does not appear to increase the collective efficacy of teachers. Use of PLCs does relate to higher levels of teacher collaboration.

Hierarchical linear regression was the most statistically appropriate approach to answer the second research question: Do aggregate teacher perceptions about the existence of a PLC in their school predict English Language Arts and mathematics growth, controlling for Free and Reduced Lunch and results of teacher surveys? This statistical analysis allowed the researcher to control for collective teacher efficacy and collaboration, teacher perceptions of PLCs, and Free and Reduced Lunch rate. A preponderance of variance in the dependent variable was attributable to Free and Reduced Lunch rate. Twenty-seven percent of the variability in English Language Arts growth was attributable to Free and Reduced Lunch rate. When collective teacher efficacy, collaboration, and perceptions of PLCs were added to this model, together, they accounted for a mere 2.4 percent of the added variance in English Language Arts growth.

Hierarchical linear regression was again utilized to examine the relationships between mathematics growth and the same variables. Similar results were found. Thirty-one percent of the variance in math growth was attributable to Free and Reduced Lunch rate. Teacher survey responses and perceptions of PLCs added only 0.5 percent to the variance in mathematics growth. The results and how they related to the hypothesis are discussed later in the conclusions section.

In response to the third research question, principal and teacher perceptions of PLCs were found to align. Teachers who work at schools whose principals reported using a PLC had a higher mean response about their use of PLCs in planning and delivering instruction than teachers working at schools whose principals did not report use of a PLC. Implementation of the PLC structure varied significantly across the school district.

Conclusions

In a district with an approach to PLCs that varied at the school level, this study examined the relationship between teacher perceptions of PLCs, teacher collaboration, collective teacher efficacy, Free and Reduced Lunch rates, and school growth. Conclusions are included in this section.

What is the relationship between collective teacher efficacy, teacher collaboration, and teacher perceptions of PLCs? Previous research identified a positive relationship between collective teacher efficacy and teacher collaboration (Chester & Beaudin, 1996; Ross, 1992). Collaboration between teachers influenced teacher efficacy through school climates that promoted joint problem-solving, help

seeking, and instructional experimentation (Ross, Hogaboam-Gray, & Gray, 2004). This research study found a positive relationship between collective teacher efficacy and teacher collaboration and between teacher collaboration and perceptions of PLCs. These results are in accord with previous research that identified a positive relationship between teacher collaboration and collective teacher efficacy and teacher collaboration and implementation of PLCs (Bolman et al., 2005) and were as hypothesized. The lack of a statistically significant relationship between collective teacher efficacy and perceptions of a PLC was contrary to what was hypothesized.

The lack of a statistically significant relationship between collective teacher efficacy and teacher perceptions of PLCs may reflect the varied implementation of PLCs within this specific school district. Logically, if teachers are collaborating while engaging in meetings that use a PLC structure, a statistically significant relationship between efficacy and perceptions of PLCs would exist. Depending upon teacher understanding and confidence, some teachers consistently implement a PLC structure, where others are dependent on formalized weekly meetings that are facilitated by the instructional coaches or an administrator. Some of the comments that were voluntarily provided to the researcher by teachers conveyed frustration because PLCs are an organic process that needs to occur at the discretion of teachers, as opposed to a regularly scheduled meeting. If teachers are not feeling empowered to utilize the PLC structure independent of instructional coaches and administrators, they may feel that PLC meetings are separate and contrived as opposed to occurring when they naturally need to design responsive instruction. Other survey respondents volunteered their perceptions of the

current implementation and their understanding of PLCs after completing the survey, with comments such as, “Now I know what we are supposed to be doing during our PLC meetings.” Others offered feedback about the survey questions, stating that the questions provided clarification about the purpose of each structure: data review, decision-making, action taking, and evaluation and how each process is supposed to inform instructional decision-making and design. Some of the teacher comments may offer insights regarding how PLCs are currently implemented in this district. PLCs, the overall purpose of PLCs, and substructures are intended to support a responsive instructional design process. Providing principals and teachers with clear definitions and expectations of PLC work, as they relate to each substructure of the data decision-making model, would form a common understanding among schools that use PLCs. After a common understanding of PLCs, including the substructures that support the data-decision making model, is established, empowering teachers who have an accurate knowledge of PLCs and trusting them to design responsive instruction is a potential next step toward making the use of PLCs a naturally occurring process within instructional design.

Hattie’s (2018) meta-analysis work identifies collective teacher efficacy as having an effect size of 1.57 on student achievement outcomes. Prioritizing teacher collective efficacy is a worthy pursuit for this school district, but assuming a causal link between PLCs and teacher collective efficacy may be errant. As this district considers modifying student contact hours to increase teachers’ weekly PLC time, if they are doing so in hopes of directly increasing collective teacher efficacy, additional sources of information should be taken into account prior to making this decision. District level

leaders need to clearly understand the benefits and potential consequences of decreased student contact hours in exchange for increased PLC time. To understand benefits and potential consequences requires as clear of an understanding about teacher collaboration and PLCs as can possibly be ascertained. A quantitative measurement tool, such as the TCBS survey, would provide quantifiable data that could be evaluated before, during, and after changing instructional hours. Qualitative data could be collected from observing PLCs and gathering verbal feedback regarding its effectiveness from a variety of schools. Based on the results of this study, increasing teacher PLC time will likely lead to teachers feeling positively about their collaboration and devoting more time to doing PLC work, but the question regarding their clarity of PLCs and collective teacher efficacy should be posed. A structure to account for qualitative and quantitative data should be established and utilized throughout this change process. A structure such as this would be able to provide feedback throughout the implementation process that could allow the school district to adjust professional development accordingly.

Do aggregate teacher perceptions about the existence of a PLC in their school predict English Language Arts and mathematics growth, controlling for Free and Reduced Lunch and results of teacher surveys? Results from hierarchical linear modeling identify Free and Reduced Lunch rates as significantly predicting school growth while the other variables included in this model were nonsignificant. The modeling that was used for this analysis controlled for collective teacher efficacy and collaboration, teacher perception of PLCs, and Free and Reduced Lunch rate. Twenty-seven percent of the variability in ELA growth and thirty-one percent for math growth

was explained by Free and Reduced Lunch rate. The researcher hypothesized that schools that implemented PLCs would have higher teacher collaboration, collective efficacy, and perceptions of PLCs regardless of Free and Reduced Lunch rates. The results indicate that Free and Reduced Lunch rates in this school district are the most significant predictors of school growth in both English Language Arts and mathematics.

Early research that used Tschannen-Moran and Barr's (2004) Collective Teacher Efficacy Beliefs Scale also found a significant negative relationship between student achievement in math, writing, and English Language Arts and the schools' percentage of students receiving Free and Reduced Lunch (p. 202). The higher the percentage of students receiving subsidized meals, the lower the achievement on state assessments. That study showed collective teacher efficacy made a positive significant contribution to the writing assessments independent of Free and Reduced Lunch rates but not to math or reading scores (p. 203). Other studies were able to show a positive correlation within the moderate range between teachers' perceptions of collective efficacy and student achievement in reading, writing, and math (Bandura, 1993; Goddard, Hoy, & Woolfolk Hoy, 2000; Hoy et al., 2002). The fact that collective efficacy and collaboration and teacher perceptions of PLCs did not explain a greater percentage of the variance in mathematics and English Language Arts growth over and above Free and Reduced Lunch rates in this study warrants additional research, specifically regarding school growth. These findings are contrary to the established link between teacher collaboration, collective efficacy, and student achievement (Vesico, Ross, & Adams, 2008). Since a positive relationship between these variables has been found in prior research, conducting

similar research that includes both school growth and student achievement would allow the two measures to be compared in terms of how each relates to teacher collaboration, collective efficacy, and perceptions of PLCs. Some possible explanations regarding the lack of relationship between growth and the other variables might have to do with the way school growth is calculated. Student achievement is a raw score attained each year that a student takes PARCC, now CMAS, whereas growth is a comparative measure that compares the annual growth made by each student to a cohort peer group. Another potential explanation might be the need for iterative research to identify a link between school growth and these variables. Iterative research might eventually be able to establish a positive relationship.

Given the fact that the only statistically significant variable in this study generated an inverse relationship between school growth and students who qualify for Free and Reduced Lunch speaks to a need for this school district to examine why traditionally underserved students still have low growth. An examination of the school district vision regarding equity, cultural competence, and cultural proficiency is suggested. Work of this scale requires training that builds an understanding of equity at the district level, at the school level, and with the greater community. School districts that have embraced an equity lens apply it to every aspect of their work including in departments and schools and with students each day. Equity, cultural proficiency, and culturally responsive work in other districts has helped them understand inherent biases in the educational system and how those biases have affected resource distribution, training, access, and the overall learning experiences for traditionally underserved students. Although developing and

embracing an equity lens is significant work for a school district, this work should be prioritized to address inequities that this research may have illuminated. Once training occurs, the staff members within the organization can engage in a conscious examination of practices using an equity lens.

Large-scale initiatives that address equity, cultural proficiency, and cultural competence often require multiple years of training and follow-through. Change of this scale requires adaptation of the school-district vision and tactic work. This work would require significant organization, planning, oversight and monitoring to determine the effectiveness of implementation. Systems changes of this nature require ongoing measurement and guidance from a coalition of people who are passionate about this work and analytical in terms of applying measurements to track progress and set goals. Persistence, determination, and dedication are required for this work to become an integral part of the work at all levels of the school district.

This study specifically focused on collective efficacy as opposed to individual efficacy. Significant research has been conducted on collective efficacy in schools, which supported the decision-making for this research. The assumption that teams within schools are more adept at addressing the student's needs than individual teachers underlies the focus on collective teacher efficacy. If this study had measured individual teacher efficacy, it may have yielded different results. This is a decision worthy of consideration for future research.

Do principals and teachers agree regarding whether their school uses a PLC structure to plan instruction? Given the varied implementation of PLCs within this

school district, this research question was important to include in discerning the alignment between principals and teachers. Results indicate a statistically significant difference between teacher groups whose principals identified the school as implementing PLCs and those who reported not using a PLC structure. Alignment between teacher and principal perceptions about the use of PLCs does seem to exist. Regarding the work in this school district, these results indicate that teachers and principals in their respective schools are knowledgeable regarding presence of a PLC or lack thereof. Whether accurate or inaccurate understanding of effective PLCs exists in this district, these results indicate simple alignment between the principals and teachers.

The mean of teacher perceptions of PLCs was 6.96 out of 9.0 for the schools whose principals indicated use of PLCs. Interestingly, the mean in the schools whose principals reported they do not use a PLC was 5.69. In schools that report not using PLCs, a much lower score might reasonably be expected. The limited difference between the means of schools that reported using a PLC as opposed to those that reported not using a PLC may reflect the varied implementation. Additionally, this school district is highly promoting the use of PLCs, which could contribute to teachers feeling pressure to respond positively, leading to Hawthorne effects and overrepresentation of positive responses to questions regarding PLC perceptions. Teacher comments reflect a lack of specific understanding about the components of PLC work and collaboration to design effective instruction. Teachers and principals would benefit from extended training that includes examples of effective PLCs and use of measurement tools to examine current practice and set goals for improvement.

Implications

Teacher collaboration and teaming has theoretically and empirically been linked with improved teacher knowledge and skills, instructional quality, and student achievement (Desimone, Porter, Birman, Garet, & Yoon, 2002). Wenglinsky (2000) stated, "Teacher collaboration has been found to account for as much variance in science and math student achievement as socio-economic status" (p. 31). Increases in student achievement and decreases in student dropout rates have been linked to urban schools where strong relationships exist between staff members who collectively targeted specific instructional improvement (Darling-Hammond, Ancess, & Ort, 2001; Wasley et al., 2002). Goddard, Goddard, and Tschannen-Moran (2007) concluded that teacher collaboration served as a statistically significant predictor of student achievement in reading and math. The results of this study stand in contrast to the existing body of research. The examination of the same variables substituting school growth for student achievement did not yield a positive relationship. Instead, the strongest predicting variable of English Language Arts and mathematics growth was Free and Reduced Lunch. Additional research is suggested to discern more about the relationship between these variables.

An operationalized construct and definition of teacher collaboration continues to be a focus of educational researchers (Woodland, Lee, & Randall, 2013). As Woodland, Lee, and Randall (2013) state, "Relatively few can say with certainty what teacher collaboration looks and feels like, how to determine if structural, procedural, and inter-professional relationships between teachers is healthy, or how to make them better" (p.

443). Educational researchers continue to refine the construct and elements of teacher collaboration. Teacher collaboration is currently understood as teachers with a common instructional goal using the cycle of dialogue, decision-making, action taking, and evaluation to design instruction. Through this cycle, teachers build capacity and make substantial changes to their instructional practice (City, Elmore, Fiarman, & Teital, 2009; Darling-Hammond et al., 2002; DuFour, 2004; Pounder, 1998; Wasley et al., 2000; Zito, 2011). Using the Teacher Collaboration Assessment Scale, Zito (2011) examined the relationship between the scale scores and instructional improvement and student achievement and administrative support. High quality teacher collaboration and greater changes in teacher instructional practice were found to be associated. Additionally, higher quality teacher collaboration was associated with higher levels of student achievement. Specifically, the relationship between teacher collaboration and changes to instructional practice generated a moderate and statistically significant correlation between perceived instructional improvement and teacher dialogue (r =. 41, $p < .001$), decision-making ($r = .46$, $p < .001$), action taking ($r = .46$, $p < .001$), and evaluation of practices ($r = .43$, $p < .001$) (Zito, 2011). Although TCAS is a tool used to assess teacher collaboration, the operationalization of teacher collaboration continues to be a pursuit for educational researchers.

Because this study did not attend to qualitative data, school and district leaders within this particular district may benefit from a clear vision and definition of teacher collaboration and PLC work. Although educational researchers continue to pursue clear conceptual definitions and practice of teacher collaboration and PLCs, clarity regarding

these concepts between district leaders, principals, instructional coaches, and teachers is critical. Additionally, this study focused on school growth. As student achievement increases, attaining high growth is more difficult. Research that examines both student achievement and school growth is recommended.

Although widely implemented across many countries, a concrete definition of PLCs remains elusive. In a review of research on the impact of PLCs on teaching practice and student learning, Vesico, Ross, and Adams (2008) concluded that, "well-developed PLCs have a positive impact on both teaching practice and student learning" (p. 80). An intense focus on student learning and achievement was the outcome of PLC work that benefitted student achievement. A small number of studies found that higher student achievement was related to the extent that schools maintained strong PLCs (Bolam et al., 2005), and measurable improvement in student achievement only occurred in schools that had PLCs that were focused on changing instructional practice (Supovitz, 2002, 2003). Vesico et al. cautioned about the Hawthorne effect, in which the positive findings are a result of teacher interest in an innovation as opposed to benefits that specifically result from participation in a PLC. The same concern could be applied to this study. Because the school district is promoting PLCs and it has become a more common practice, teachers could have responded more positively. Teachers' responses may have also been influenced as a modified schedule that includes more planning time is under consideration to allow teachers more time to engage in PLC work. Vesico et al. stated, "Working collaboratively is the process not the goal of PLC. The goal is enhanced student achievement" (p. 89).

Recommendations for Future Research

Based on the fact that many states are utilizing student and school growth measures to determine teacher evaluation ratings, more research is needed to determine the relationship between school growth and teacher collaboration, collective teacher efficacy, and use of PLCs. Additional work that explores the relationships between these variables needs to honor both qualitative and quantitative research approaches. Comprehensive research cannot be created without both perspectives. The following suggestions are offered as recommendations for future research:

- Designing research that maintains the same structure as this study but changes one variable. For example, instead of using collective teacher efficacy, focus on individual teacher efficacy and see how the variables relate
- Quantitative and qualitative research that documents changes in teachers' perceptions of the professional culture of the school
- Longitudinal research that documents changes in instructional practices and measures these with school growth as a result of PLC work
- Qualitative research on teacher conversations as they examine student work and how the quality of student work and teacher discussion changes over time
- Quantitative research regarding the changes in school growth over time as teachers use PLCs to improve instruction.

Other countries that study these variables may offer varying approaches to conducting research. For example, PLC research conducted in China examined five strands: characteristics of PLCs, practices from different regions, structural teacher-

collaboration in implementation-orientated education systems, the role of university researchers, and educational leadership in PLC work (Qiao, Yu, & Zhang, 2018). This research revealed that PLCs form in different ways: via informal groups, networked communities of practice, and teaching research groups. Some of these groups form organically between professionals; others form because of a mandate from their school or district leadership. Exploration and examination of a variety of PLCs, how they are formed, how they are maintained, and how each relates with school growth and student achievement might be a worthy pursuit for future research.

Limitations

Limitations for this research study include the small sample size from which these results were drawn. The schools included in this study serve elementary students only, expanding to middle and high school might yield different results. Only classroom teachers and principals were included in this study, which neglects the perspective of other staff members such as interventionists, instructional coaches, and other support staff members. The inclusion of perspectives of other staff members might alter the results. The timing of the administration of the survey likely affected the response rate of teachers. Significant student testing and end-of-the-year activities often consume teacher attention at the end of the school year, which is when this survey was administered. Additionally, administering the survey a few times during the school year might reveal seasonal variance in PLC perceptions, teacher efficacy, and teacher collaboration.

Achievement tests and school growth measurements assess specific attributes of student learning, which may neglect other aspects of school culture. This research study

focused on one specific school district. Results that are more generalizable would have occurred if this study included several school districts. This study administered the survey once, neglecting the benefits of using repeated measures. Gathering qualitative data, such as interviews or written feedback, would have added to the depth of this study. Mixed methodology that examines the use of PLCs and school growth over time might reveal a link between school growth and the other variables. Further, if larger sample sizes were obtained, both in number of schools and number of respondents per school, hierarchical linear modeling could potentially be used as a more effective analysis given the nested nature of the data.

This study focused on collective efficacy as opposed to individual teacher efficacy. It is possible that individual teacher efficacy could yield different results.

Summary of Discussion

This current study explored the relationship between collective teacher efficacy, teacher collaboration, teacher perceptions of PLCs, Free and Reduced Lunch rates, and school growth (English Language Arts and mathematics). Additionally, the principal of each school was asked whether their school uses a PLC model or not for instructional planning. This study specifically focused on school growth as previous research established a positive relationship between these variables and school achievement scores while controlling for Free and Reduced Lunch rates. Results demonstrated that Free and Reduced Lunch rate contributed the largest percentage of variance when predicting either English Language Arts or mathematics growth. Although student achievement has an established positive relationship with collective efficacy, teacher collaboration, and

perceptions of PLCs, if the growth model is going to continue to be used to evaluate schools, and in the case of some states, as a factor for determining teacher evaluation ratings, additional research needs to be conducted to solidify the relationship between these variables and school growth.

This study also determined alignment between teacher and principal perceptions of use of a PLC structure to support instructional planning. Data from this study revealed alignment between teachers and principals regarding implementation of PLCs. This alignment reveals a starting point from which this school district could provide additional training to clarify the expectations and definitions of PLC work including the four components of teacher collaboration.

A positive, statistically significant relationship exists between collective efficacy and teacher collaboration and between teacher perceptions of PLCs and teacher collaboration. However, a statistically significant relationship does not exist between teacher efficacy and teacher perceptions of the use of PLC structures within this specific school district. If this district intends to make decisions to increase collective teacher efficacy, these results do not reveal that the current model of PLC is an answer.

Practical implications based on these findings reinforce the importance of balance in terms of which sources of knowledge inform the field. Balancing the perspectives of those who work in schools, with knowledge derived from research, and knowledge from policy makers should all inform each other so that each can benefit from the other. Prior to taking on significant initiatives, school district leaders and policy makers would be wise to consult educational research. Each should maintain strong, consultative ties with

the other such that information and knowledge flows equal from each to support the work of the other.

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Appendix A

Teacher Survey

Collaboration in Schools

Start of Block: Informed Consent

Q1.1 Welcome to my research study! I am interested in understanding teacher collaboration and teacher efficacy in schools. You will be asked some questions about teacher collaboration and use of a Professional Learning Communities structure for planning. Your responses will be kept completely confidential.

The survey should take approximately fifteen to twenty minutes to complete. Your participation in this research is completely voluntary. You have the right to withdraw at any point during the survey, for any reason, and without prejudice. If you would like to contact the Principal Investigator in the study to discuss this research, please e-mail or call Jennifer Pennell at jenniferjpennell@gmail.com; 303-667-9036.

By clicking the button below, you acknowledge that your participation in the study is voluntary, you are 18 years of age or older, and that you are aware that you may choose to terminate your participation in the study at any time and for any reason.

Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.

Start of Block: Informed Consent

Thank you for helping me!

- ○ I consent, begin the study (1)
- ○ I do not consent, I do not wish to participate (2)

End of Block: Informed Consent

Start of Block: Basic Demographic Questions

Q2.1 What is the highest degree of education you have attained?

- Bachelor's degree (1)
- Master's degree (2)
- Doctorate degree (3)

Q2.2 How many years have you been teaching?

- 0-10 (1)
- 11-20 (2)
- 21-30 (3)
- 30+ (4)

Q2.3 What is your gender?

- Male (1)
- Female (2)
- Prefer not to answer (3)

Q2.4 What is your ethnicity?

- African American/Black (1)
- Hispanic (2)
- Asian or Asian Pacific Islander (3)
- Native American (4)
- Caucasian (5)
- Multiple (6)
- Other (7)
- Prefer not to answer (8)

End of Block: Basic Demographic Questions

Start of Block: PLC Questions

Q3.1 To what degree does your team use a PLC structure for instructional planning?

- Not at all (1) (1)
- (2) (2)
- Very little (3) (3)
- (4) (4)
- Some degree (5) (5)
- (6) (6)
- Quite a bit (7) (7)
- (8) (8)
- A great deal (9) (9)

Q3.2 Do you believe using a PLC structure to plan instruction is helpful?

- Not at all (1) (1)
- (2) (2)
- Very little (3) (3)
- (4) (4)
- Some degree (5) (5)
- (6) (6)
- Quite a bit (7) (7)
- (8) (8)
- A great deal (9) (9)

Q3.3 Do you use the instructional plans you create during PLC meetings?

- Not at all (1) (1)
- (2) (2)
- Very little (3) (3)
- (4) (4)
- Some degree (5) (5)
- (6) (6)
- Quite a bit (7) (7)
- (8) (8)
- A great deal (9) (9)

Q3.4 Do you believe the PLC structure helps you create differentiated instruction for your students?

- Not at all (1) (1)
- (2) (2)
- Very little (3) (3)
- (4) (4)
- Some degree (5) (5)
- (6) (6)
- Quite a bit (7) (7)
- (8) (8)
- A great deal (9) (9)

End of Block: PLC Questions

Start of Block: Collective Beliefs

Q4.1 How much can teachers in your school do to produce meaningful student learning?

- None at all (1) (1)
- (2) (2)
- Very Little (3) (3)
- (4) (4)
- Some Degree (5) (5)
- (6) (6)
- Quite a Bit (7) (7)
- (8) (8)
- A Great Deal (9) (9)

Q4.2 How much can your school do to get students to believe they can do well in schoolwork?

- None at all (1) (1)
- (2) (2)
- Very Little (3) (3)
- (4) (4)
- Some Degree (5) (5)
- (6) (6)
- Quite a Bit (7) (7)
- (8) (8)
- A Great Deal (9) (9)

Q4.3 To what extent can teachers in your school make expectations clear about appropriate student behavior?

- None at all (1) (1)
- (2) (2)
- Very Little (3) (3)
- (4) (4)
- Some Degree (5) (5)
- (6) (6)
- Quite a Bit (7) (7)
- (8) (8)
- A Great Deal (9) (9)

Q4.4 To what extent can school personnel in your school establish rules and procedures that facilitate student learning?

- None at all (1) (1)
- (2) (2)
- Very Little (3) (3)
- (4) (4)
- Some Degree (5) (5)
- (6) (6)
- Quite a Bit (7) (7)
- (8) (8)
- A Great Deal (9) (9)

Q4.5 How much can teachers in your school do to help students master complex content?

- None at all (1) (1)
- (2) (2)
- Very Little (3) (3)
- (4) (4)
- Some Degree (5) (5)
- (6) (6)
- Quite a Bit (7) (7)
- (8) (8)
- A Great Deal (9) (9)

Q4.6 How much can teachers in your school do to promote deep understanding of academic concepts?

- None at all (1) (1)
- (2) (2)
- Very Little (3) (3)
- (4) (4)
- Some Degree (5) (5)
- (6) (6)
- Quite a Bit (7) (7)
- (8) (8)
- A Great Deal (9) (9)

Q4.7 How well can teachers in your school respond to defiant students?

- None at all (1) (1)
- (2) (2)
- Very Little (3) (3)
- (4) (4)
- Some Degree (5) (5)
- (6) (6)
- Quite a Bit (7) (7)
- (8) (8)
- A Great Deal (9) (9)

Q4.8 How much can school personnel in your school do to control disruptive behavior?

- None at all (1) (1)
- (2) (2)
- Very Little (3) (3)
- (4) (4)
- Some Degree (5) (5)
- (6) (6)
- Quite a Bit (7) (7)
- (8) (8)
- A Great Deal (9) (9)

Q4.9 How much can teachers in your school do to help students think critically?

- None at all (1) (1)
- (2) (2)
- Very Little (3) (3)
- (4) (4)
- Some Degree (5) (5)
- (6) (6)
- Quite a Bit (7) (7)
- (8) (8)
- A Great Deal (9) (9)

Q4.10 How well can the adults in your school get students to follow the rules?

- None at all (1) (1)
- (2) (2)
- Very Little (3) (3)
- (4) (4)
- Some Degree (5) (5)
- (6) (6)
- Quite a Bit (7) (7)
- (8) (8)
- A Great Deal (9) (9)

Q4.11 How much can your school do to foster student creativity?

- None at all (1) (1)
- (2) (2)
- Very Little (3) (3)
- (4) (4)
- Some Degree (5) (5)
- (6) (6)
- Quite a Bit (7) (7)
- (8) (8)
- A Great Deal (9) (9)

Q4.12 How much can your school do to help students feel safe while they are at school?

- None at all (1) (1)
- (2) (2)
- Very Little (3) (3)
- (4) (4)
- Some Degree (5) (5)
- (6) (6)
- Quite a Bit (7) (7)
- (8) (8)
- A Great Deal (9) (9)

End of Block: Collective Beliefs

Start of Block: Dialogue

Q5.1 The purpose of our collaboration is to systematically improve instruction to increase student learning.

- Strongly Disagree (1)
- Disagree (2)
- Neither disagree or agree (3)
- Agree (4)
- Strongly Agree (5)

Q5.2 The membership configuration of my primary teacher team is appropriate - the right people are members of this group.

- Strongly Disagree (1)
- Disagree (2)
- Neither disagree or agree (3)
- Agree (4)
- Strongly Agree (5)

Q5.3 Team meetings are consistently attended by ALL members.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q5.4 Agenda for team dialogue is pre-planned, written, and accessible to all in advance of meetings.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q5.5 Team meetings are purposefully facilitated and employ the use of protocols to structure and guide dialogue.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q5.6 A thoughtful, thorough and accurate account of team dialogue, decisions, and intended actions is recorded.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q5.7 Every member has access to running records of team dialogue, decisions, and subsequent actions to be taken.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q5.8 Inter-professional disagreements occur regularly - these disagreements are welcomed, openly addressed, and lead to new shared understandings.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q5.9 Team members participate equally in group dialogue; there are no "dominators" or "hibernators" in the group.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q5.10 Our dialogue is consistently focused on examination of evidence related to performance and the attainment of goals.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q5.11 The topic of dialogue is focused on our instructional practices and not other issues (e.g., school schedules, textbook purchases, fund raising, discipline, students' family issues, chaperoning).

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

End of Block: Dialogue

Start of Block: Decision Making

Q6.1 My team regularly makes decisions about what instructional practices to initiate, maintain, develop, or discontinue.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q6.2 All of our decisions are informed by group dialogue.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q6.3 The process for making any decision is transparent and adhered to - everyone knows what the decisions are/were and how and why they were made.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q6.4 The decisions we make are clearly and directly related to the improvement of instructional practice and the improvement of student learning.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q6.5 The team uses a specific process for every decision it makes (e.g., consensus, majority, or some other decision-making structure).

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q6.6 Team members regularly identify specific instructional practices that they will initiate or maintain to increase student learning.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q6.7 Team members regularly identify strategies they will change or discontinue.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q6.8 Our group regularly determines what information about instructional practice and student learning needs to be obtained.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither disagree or agree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

End of Block: Decision Making

Start of Block: Action

Q7.1 Each group member takes actions related to individual/team learning as a result of team decision making.

- Strongly Disagree (1)
- Disagree (2)
- Neither agree nor disagree (3)
- Agree (4)
- Strongly Agree (5)

Q7.2 As a result of group decision making, each one of us makes meaningful (pedagogically complex) adjustments to our instructional practice.

- Strongly Disagree (1)
- Disagree (2)
- Neither agree nor disagree (3)
- Agree (4)
- Strongly Agree (5)

Q7.3 Actions are directly related to student learning.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither agree nor disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q7.4 Each member knows what actions (related to learning) to take next at the end of the meeting.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither agree nor disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q7.5 Team member actions are coordinated and interdependent.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither agree nor disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q7.6 Each individual teacher discontinues less effective strategies.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither agree nor disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q7.7 Actions that are taken after or between meetings are distributed equitably among team members (i.e., every member takes steps to improve individual or team learning).

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither agree nor disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q7.8 Each member can name some aspect of instruction that we have stopped/started or changed as a result of the group decision making.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither agree nor disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q7.9 Each member of the team commits to carrying out team actions.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither agree nor disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

End of Block: Action

Start of Block: Evaluation

Q8.1 As a group we regularly collect and analyze quantitative data (e.g., numbers, statistics, scores) about member teaching practices.

- Strongly Disagree (1)
- Disagree (2)
- Neither agree or disagree (3)
- Agree (4)
- Strongly Agree (5)

Q8.2 As a group we regularly collect and analyze qualitative data (e.g., open-ended responses, interviews, comments) about member teaching practices.

- Strongly Disagree (1)
- Disagree (2)
- Neither agree or disagree (3)
- Agree (4)
- Strongly Agree (5)

Q8.3 As a group we regularly collect and analyze quantitative data (e.g., numbers, statistics, scores) about student learning.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither agree or disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q8.4 As a group we regularly collect and analyze qualitative data (e.g., open-ended responses, interviews, comments) about student learning.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither agree or disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q8.5 We observe the classroom instruction of our colleagues.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither agree or disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q8.6 We collect information on the quality of the instruction during our observation.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither agree or disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q8.7 We analyze data collected through peer observation of classroom instruction.

- Strongly Disagree (1)
- Disagree (2)
- Neither agree or disagree (3)
- Agree (4)
- Strongly Agree (5)

Q8.8 We use student performance data to evaluate the merit of our instructional practices.

- Strongly Disagree (1)
- Disagree (2)
- Neither agree or disagree (3)
- Agree (4)
- Strongly Agree (5)

Q8.9 We regularly share evaluation data on the effect of our instruction in our primary team.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither agree or disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q8.10 The accomplishments of our team are publicly recognized.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither agree or disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

Q8.11 Our team can accurately and thoroughly articulate and substantiate its accomplishment related to student learning over time.

- ○ Strongly Disagree (1)
- ○ Disagree (2)
- ○ Neither agree or disagree (3)
- ○ Agree (4)
- ○ Strongly Agree (5)

End of Block: Evaluation

Individual Question Skewness Report

Sixteen individual questions from the teacher efficacy and teacher collaboration survey generated skewness outside of the -1 to +1 range, which are included in the appendix. These included Q 4.1, -1.05, Q. 4.3 -1.30, Q. 4.4, -1.14, and Q. 4.12 -1.52, Q.5.1, -1.57, Q 5.2 -1.04, Q. 5.3, 1.46, Q. 6.1, -1.25, Q. 6.2, -1.31, Q. 6.3, -1.14, Q. 6.4, -1.41, Q. 6.6, -1.01, Q. 6.8, -1.26, Q.7.3, -1.01, Q.7.4, -1.05, Q. 8.3, -1.