

The Relationship between Professional Learning Communities
and Student Achievement in Virginia

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ABSTRACT

Many K–12 schools across the US have embraced the philosophy of professional learning communities (PLC) as a school improvement measure; however significant quantitative research is lacking on the effectiveness of this phenomenon. Survey data were collected from a purposeful sample of elementary school principals or designees from four large school divisions in three metropolitan areas in Virginia. The survey incorporated questions regarding demographic information, including pass rates on the Virginia English and Math SOL tests for 2015-2016, the percentage of students classified as economically disadvantaged, the school's experience as a PLC, as well as Hord's (1996) School Professional Staff as Learning Community Questionnaire (SPSLCQ) instrument, to determine functionality as a PLC. Of the 158 surveys distributed, 74 were returned for a 47% return rate. The collected data were analyzed using descriptive and inferential statistics, including a hierarchical multiple regression analysis. The results of the hierarchical multiple regression support a predictive relationship between English SOL pass rates and the independent variables of economically disadvantaged students and the degree of functionality of PLCs. The model significantly predicted English SOL pass rates ($F(2,71) = 70.86, p < 0.001, \text{adjusted } R^2 = 0.66$). Second, the results of the hierarchical multiple regression support a predictive relationship between Math SOL pass rates and the independent variables of economically disadvantaged students and the degree of functionality of PLCs. The model significantly predicted Math SOL pass rates ($F(2,71) = 33.21, p < 0.001, \text{adjusted } R^2 = 0.47$). Lastly, there was no statistically significant relationship between the number of years a school had operated as a PLC and the functionality of the PLC ($r = 0.16, p = 0.17$). The findings may assist school leaders in determining the benefits of PLCs on student achievement as measured by pass rates on Virginia's English and Math SOL tests.

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GENERAL AUDIENCE ABSTRACT

Many K–12 schools across the US have embraced the philosophy of professional learning communities (PLC) as a school improvement measure; however significant quantitative research is lacking on the effectiveness of this phenomenon. PLCs are collaborative teams that work toward achieving common student learning goals. Survey data were collected from a sample of elementary school principals or designees from four large school divisions in three metropolitan areas in Virginia. The survey incorporated questions regarding demographic information, including pass rates on the Virginia English and Math SOL tests for 2015-2016, the percentage of students classified as economically disadvantaged, the school's experience as a PLC, as well as Hord's (1996) School Professional Staff as Learning Community Questionnaire (SPSLCQ) instrument, to determine functionality as a PLC. The collected data were analyzed using statistics, including a hierarchical multiple regression analysis that predicts how much change the variables have on an outcome. The results of the hierarchical multiple regression support a predictive relationship between English SOL pass rates and the independent variables of economically disadvantaged students and the degree of functionality of PLCs. The analysis showed that 66% of the change in the English SOL pass rates could be attributed to both percentage of economically disadvantaged students and the effectiveness of PLCs with 5% of the change coming from the effectiveness of PLCs. Second, the results of the hierarchical multiple regression support a predictive relationship between Math SOL pass rates and the independent variables of economically disadvantaged students and the degree of functionality of PLCs. The analysis showed that 47% of variation in the Math SOL pass rates could be attributed to both percentage of economically disadvantaged students and the effectiveness of PLCs with 5% of the change coming from the effectiveness of PLCs. Lastly, there was no reliable relationship between the number of years a school had operated as a PLC and the functionality of the PLC. The findings may assist school leaders in determining the benefits of PLCs on student achievement as measured by pass rates on Virginia's English and Math SOL tests.

Dedication

This paper is dedicated to all those individuals whose steadfast encouragement helped push me through this journey. First and foremost, I would not be here without my best friend, my soul mate, and the one who completes me, my husband, Craig. Your words of encouragement, your problem solving skills, and your wealth of knowledge have been an anchor throughout this journey. Even more important, you have willingly taken on many of my household and family responsibilities to allow me to dedicate my time to take this journey. Without your support, none of this would be possible. Secondly, my children have inspired me to stretch myself beyond my own expectations with their encouragement and cheering. It was my daughters' entrance into college that actually inspired me to go back to college. Jessi and Alli's unwavering support and encouragement have spurred me on, even when I did not really want to continue. Being the only child at home, Jake has probably sacrificed the most for this journey. Yet no matter how many soccer games or other events I missed because of this commitment, he always reminded me that it was temporary, he was proud of me, and he could not wait to have both his parents be doctors. This encouragement and support from what matters most in life – my family is what motivated me to keep going and keep working to be my best.

This journey is also dedicated to my mother, father, and brother. My mom and dad always pushed me to work to my fullest potential. Throughout my childhood, they inspired me to be the best at whatever it was I was doing and that has transcended throughout my life as a daughter, wife, mother, and educator. Though my mother is no longer here with us, I hope she is smiling down from heaven knowing that she taught me that I could accomplish anything I set my mind to do.

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Chapter 1

Introduction

As our society has evolved, expectations for schools have been transformed repeatedly (Christensen, Horn, & Johnson, 2008; Urban & Wagoner, 2000). Our education system has shifted from believing that equal opportunity in education is strongly correlated to each child's family background and socioeconomic status (Coleman, 1968) to believing that all children can learn and should make progress despite their race, socioeconomic status, or disability status (Every Student Succeeds Act, 2015). This philosophical shift has been replicated in our schools by the shift from an industrialized model that employs a one-size-fits-all approach (Urban & Wagoner, 2000) focused on teaching to a personalized model that emphasizes learning outcomes for all children regardless of their demographic characteristics (Every Student Succeeds Act, 2015). To meet the accountability requirements of the Every Student Succeeds Act (ESSA), new strategies and resources are necessary and professional learning communities (PLCs) are examples of one such strategy being used to meet this challenge (Christensen et al., 2008).

Schools worldwide have been creating PLCs that have developed from a business model utilized by W. Edwards Deming, who created collaborative teams via his System of Profound Knowledge that transformed industry in the 1980s (Lohr, 2015). These collaborative teams were charged with identifying problems, analyzing them, and generating solutions to produce better products. Coupled with Senge's (1990) work, which argued that successful organizations are composed of teams that demonstrate a desire for continuous learning and a willingness to embrace innovation in the name of improvement, PLCs began to take hold in education in the 1990s, as Hord (2015) identified PLCs as "the most powerful structure and strategy for enhancing educators' effectiveness and increasing students' successful learning" (p. 38).

Over the past 25 years, PLCs have continued to evolve and have become increasingly difficult to define, as the term has become popular among various collaborative groups that have a common focus (DuFour, DuFour, Eaker, & Many, 2010). However, Vescio, Ross, and Adams (2008) have defined a PLC as a school community with the capability of nurturing and sustaining professional learning with a collective focus on student learning and continuous school improvement. Successful PLCs have six key elements according to Hord (2009), which include an appropriate organizational structure, supportive relational conditions, supportive

peers, a shared vision and values, intentional collaboration, and shared leadership. For the purposes of this study, the definition described above served as the foundation of this research.

Through his initial work as a high school principal in the Midwest, DuFour (and colleagues) (2010) have championed PLCs as “an ongoing process in which educators work collaboratively in recurring cycles of collective inquiry and action research to achieve better results for the students they serve” (p. 11). DuFour et al. (2010) further described the essential characteristics of PLCs:

- shared mission, vision, values, and goals;
- collaborative teams focused on learning;
- collective inquiry;
- action orientation and experimentation;
- commitment to continuous improvement; and
- results orientation.

They integrated all of these characteristics into “Three Big Ideas” to drive PLCs: (a) a focus on high levels of learning for all students, (b) a collaborative culture, and (c) a clear focus on results. They advanced the idea that the focus on learning can be accomplished by centering on four critical questions:

- 1) What are the specific learning outcomes for all of our children? This focus ensures that there is a realistic, guaranteed curriculum that all students receive no matter the teacher.
- 2) What evidence will demonstrate the desired learning? Common assessments are generally utilized to ensure that they require the same outcomes.
- 3) How will we provide remediation for those children who do not initially demonstrate proficiency? Teams collectively analyze the learning of these students and craft appropriate interventions to help demonstrate mastery.
- 4) What enrichment will be provided for the children who more quickly master the desired outcomes? Teams create enrichment opportunities for the children who have already demonstrated the desired outcomes. These enrichment opportunities must not accelerate through the curriculum to prevent learning gaps for those children still working to master the current focus (DuFour et al., 2010).

This shift, from teachers working in isolation to teachers working collaboratively, can have a profound effect on the mindset of both school leaders and teachers. It requires school leaders to take on multiple key roles (Hord & Hirsch, 2009) in their approach to PLCs, beginning by exuding confidence that their school personnel have the capabilities to collectively overcome any challenge presented. Moreover, principals must set clear expectations that all staff, including both school leaders and teachers, are collectively apprised of the best instructional practices and apply them to appropriate situations. In addition, while it is vital for principals to take the lead with implementation, they must use a gradual release of responsibility approach with ultimately the team becoming self-sufficient with minimal support from principals. However, for this to occur, principals must ensure not only appropriate access to instructional data but also that the teams have the appropriate skillset, including effectively interpreting and applying instructional data to make sound decisions. Furthermore, job-embedded professional development must be supplied for areas that do not develop naturally, such as conflict management and collaborative problem solving. Finally, principals must ensure that the teams have other crucial resources, such as time during the school day, to safeguard the success of PLCs (Hord & Hirsch, 2009).

Overview of the Study

This study explored to what degree elementary schools from four geographically varied school divisions in Virginia were using PLCs. The purposeful sample included elementary school principals or designees from four large school divisions representing the Northern Virginia, Richmond, and Hampton Roads metropolitan areas. Quantitative survey data, collected electronically, were used to assess to what degree each principal felt his or her elementary school was functioning as a PLC. Subsequent analysis was conducted to examine any predictive relationships between student achievement as measured by each school's self-reported pass rate on the English and Math SOL tests, poverty status, and functionality of each school's PLC. Additionally, analysis was conducted to determine whether a relationship existed between the length of time the schools functioned as PLCs and the functionality of PLCs.

Statement of the Problem

As the accountability era for schools continues and the expectation remains that schools will ensure all children learn regardless of their demographic associations, the need for

innovative strategies to meet this challenge is necessary (DuFour & DuFour, 2010). PLCs are one such strategy that shifts the focus from teachers' instruction to students' learning (DuFour et al., 2010). While narrative data show improvement in student learning, there is a lack of empirical data to support such a claim (DuFour & Marzano, 2011).

Significance of the Study

Through examining the predictive relationships between student achievement as indicated by each school's pass rate on the English and Math SOL tests, student poverty, and each principal's perception of how effectively his or her school functions as a PLC, this study better equips school leaders with data to determine the impact of PLCs on student learning. Additionally, the examination of whether or not the length of implementation impacts principals' perceptions of how effectively their schools are functioning as PLCs can provide additional empirical data to assist school leaders with leading PLCs. While there is a good deal of qualitative data to demonstrate that PLCs positively impact student achievement, more empirical quantitative research is needed to determine the impact PLCs have on student achievement (Nadelson, Harm, Croft, McClay, Ennis, & Winslow, 2012; Ronfeldt, Farmer, McQueen, & Grissom, 2015)

Purpose of the Study

The purpose of this study was to identify what predictive relationship, if any, existed between student achievement as measured by each school's pass rate on Virginia's English and Math SOL tests and the degree to which the school functions as a PLC when controlling for the percentage of economically disadvantaged students. This study also sought to determine if a relationship existed between the length of time a school functioned as a PLC and the functionality of the school as a PLC.

Justification for the Study

This study contributes to the research on PLCs and student achievement in elementary school settings. The data collected can provide researchers with empirical data to help school leaders determine the feasibility of utilizing PLCs to improve student outcomes.

In order to explore this topic, data were collected on the common characteristics of PLCs and three research questions were formulated:

1. What is the predictive relationship, if any, between student achievement (as measured by pass rates on Virginia's English SOL tests) and the degree to which schools function as PLCs (as measured by principals' perceptions) in elementary schools from four large school divisions in Virginia when controlling for the percentage of economically disadvantaged students?
2. What is the predictive relationship, if any, between student achievement (as measured by pass rates on Virginia's Math SOL tests) and the degree to which schools function as PLCs (as measured by principals' perceptions) in elementary schools from four large school divisions in Virginia when controlling for the percentage of economically disadvantaged students?
3. What is the relationship, if any, between the degree to which schools function as PLCs (as measured by principals' perceptions) and the length of time schools have operated as PLCs (as reported by principals) in elementary schools from four large school divisions in Virginia?

Conceptual Framework

Contemporary educational leaders can generally exhibit a number of leadership styles, including distributed leadership, instructional leadership, transformational leadership, and shared leadership. These leadership styles may potentially lead school leaders to utilize PLCs as a school improvement strategy. When PLCs focus on the big ideas and essential characteristics of PLCs, the roles and responsibilities of school leaders, and job-embedded professional development, their functionality increases (DuFour et al., 2010; Hord, 2009b). As a PLC's functionality increases with more experience, enhanced student achievement becomes evident.

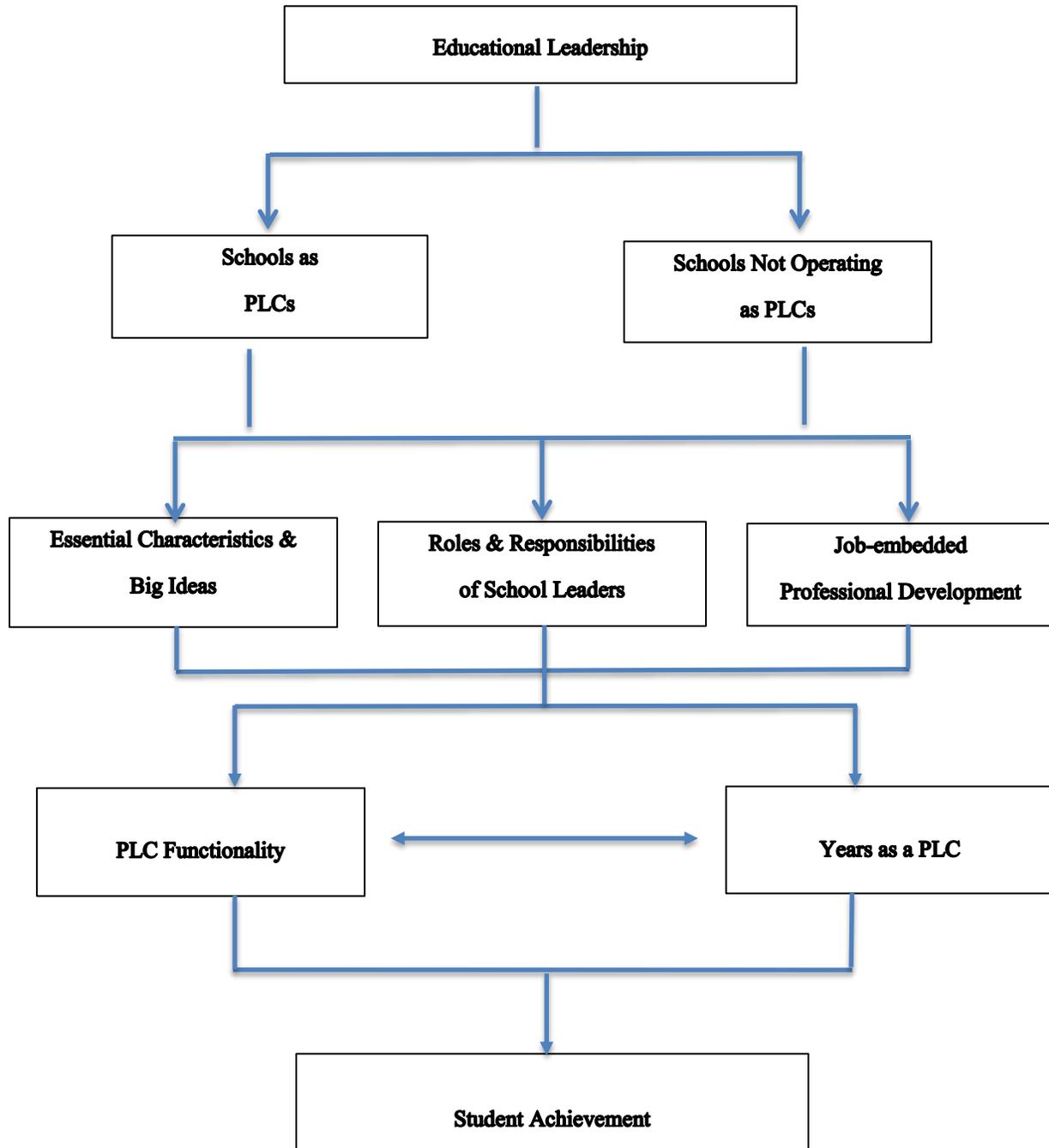


Figure 1. Conceptual framework.

Definition of Terms

For clarity and to facilitate understanding, key terms in the study are defined below.

Action research. Action research “is a form of disciplined inquiry that practitioners conduct to improve practices in educational settings” (Erkins & Twadell, 2012, p. 177). Using both qualitative and quantitative methodologies, teachers identify questions to be researched, criteria for success, data collection tools, and protocols for their research that ultimately lead to findings.

Collaboration. The systematic process in which a group of teachers “work together, interdependently, to analyze and impact their profession practice in order to improve individual and collective results” (DuFour et al., 2010, p. 120). PLC collaboration focuses on four critical questions that identify specific learning targets, criteria for mastery, strategies for remediation for students who do not initially reach the target, and enrichment and extension strategies for those who reach proficiency with the initial instruction (DuFour, DuFour, & Eaker, 2008)

Collective inquiry. Collaborative teams examine best practices in teaching and learning in reoccurring cycles to refine their practices. They work collectively to “arrive at consensus on vital questions by building shared knowledge rather than pooling opinions” (DuFour et al., 2010, p. 12).

Economically disadvantaged. In Virginia, a student is considered economically disadvantaged if he or she is eligible for free or reduced-price meals, his or her family receives Temporary Assistance for Needy Families (TANF), or is eligible for Medicaid Additionally, a student is considered economically disadvantaged if he or she becomes homeless or is considered a migrant at any time during the school year (www.doe.virginia.gov).

Elementary schools. Schools serving grades kindergarten through fifth grade in various configurations.

ESSA. The Every Student Succeeds Act (ESSA) reauthorized the 50-year-old Elementary and Secondary Education Act, as US education law sets high academic standards to ensure college and/or career readiness for students, establishes educational accountability standards for schools, and promotes access to high-quality preschool (Every Student Succeeds Act, 2015).

Fully accredited. This rating is given to schools with pass rates of at least 75% in English and 70% in mathematics, science, and history/social science (School report card: Accountability terminology, 2016).

Job-embedded professional development. Job-embedded professional development for teachers is centered around improvements in day-to-day teaching practices that improve student learning outcomes and teachers' content-specific instructional practices (Darling-Hammond & Mclaughlin, 1995).

SOL. Student learning and achievement expectations set by the Virginia Board of Education for all subjects taught in K–12 public schools in Virginia (School report card: Accountability terminology, 2016).

Limitations and Delimitations

Limitations include principals' responses, which may be potentially biased. To maintain anonymity, principals were asked to self-report their schools' pass rates and percentage of economically disadvantaged students, which made misreporting possible.

Delimitations of the study involved the collection of quantitative data from public elementary schools in four large school divisions in Virginia. Therefore, the researcher chose not to analyze middle or high schools. Additionally, only principals or designees were asked to participate in this purposeful sample.

Organization of the Study

This dissertation is organized into five chapters. In this chapter, the researcher has provided an overview of PLCs as well as the three research questions to be investigated. Chapter 2 offers a review of the literature on PLCs, including essential characteristics, big ideas, roles and responsibilities of school leaders, job-embedded professional development, and student achievement. Chapter 3 outlines the research design and methodology of the study, including a description of the survey instrument and procedures used throughout the study. Data analysis and a discussion of the data are reported in Chapter 4, while the research findings, conclusions, and recommendations are highlighted in Chapter 5.

Chapter 2

Review of the Literature

Despite school accountability having been in vogue since the early 1990s, it has never been stronger than it is today for schools and educators (*A Nation at Risk*, 1983; Reese, 2005). These growing challenges require schools to ensure that constantly evolving twenty-first century students are learning an increasingly more rigorous curriculum. This accountability requires that teachers employ innovative strategies to ensure high levels of learning from a diverse population of students who not only come from a wide variety of backgrounds and experiences, but also have a broad range of abilities. This shift in expectations requires that schools be willing to reflect on the effectiveness of current practices and to continuously explore new strategies and tools that could prove more effective. Teachers “can and should model for their students the collaborative learning and knowledge construction that is at the core of the 21st century competencies” (Carroll, Fulton, & Doerr, 2010, p. 4).

Embracing a PLC mindset and process gives schools the opportunity to work collaboratively to encourage student achievement. Now more than ever, teachers are open and willing to work collaboratively to make learning a reality for their students; and have, in fact, expressed interest in working in schools with high levels of collaboration (*MetLife Survey of the American Teacher: Collaborating for Student Success*, 2010). However, further research is necessary to determine the effectiveness of the PLC process on the primary objective of schools—student achievement. An analysis of the existing literature shows the PLC concept was in its infancy in the late 1920s and has transcended to the present as a vehicle that may help schools meet the challenge of learning for all in the twenty-first century. While there is limited research showing a positive impact of PLCs on student achievement, there is a need to expand the body of research on this phenomenon to further explore its impact on student achievement.

Search Process

The review of the literature, from 1983 to the present, on the impact of PLCs on student achievement was conducted utilizing the following search keywords: education history, education reform, educational improvement, learning communities, professional communities, professional learning communities, learning organizations, leadership, leadership styles, instructional leadership, shared leadership, distributive leadership, supportive leadership,

transformational leadership, shared leadership, professional development, staff development, action research, reflective dialogue, deprivation of practice, shared norms and values, decision making, collaboration, teacher collaboration, academic achievement, reading achievement, student achievement, student learning, and math achievement. For the purposes of this literature review, 118 scholarly articles and dissertations were reviewed, 44 of which were included based on their relevancy to this topic.

The following databases and academic libraries were consulted during the search of the current literature: EBSCO, ERIC, Google Scholar, ProQuest, and the Virginia Tech University Library System.

The resulting research was classified into eight themes: education history; school reform; educational leadership, including distributive leadership, transformational leadership, and shared leadership; the historical development of PLCs; the essential characteristics of PLCs; roles and responsibilities of the principal; professional development; and finally, student achievement.

History of Education

Public schools have been tasked with a wide array of missions throughout our country's history, including preserving democracy, providing education for all, maintaining American competitiveness, and most recently, eliminating poverty (Christensen, et al., 2008). Despite the evolving mission of American schools, "schools actually have been improving" (Christensen et al., 2008, p. 51). Notwithstanding Jefferson and Webster's early vision for universal public education as a means to preserve our newly formed democracy, the concept of universal public education to preserve democracy did not become a reality until the 1830s, when Horace Mann and others' common school movement succeeded in formalizing schooling, with many students receiving at least an elementary school education (Christensen et al., 2008).

As the country entered the 1890s and early 1900s, during the Industrial Revolution, the focus of education shifted to building a system of schools that ultimately relied on a more hierarchical bureaucratic approach to fit modern society while providing free public education through high school to all children to prepare them for the workforce (Christensen et al., 2008). Schools began to organize around age grading, more standardized courses of study, and the superintendency. Also, kindergarten as well as vocational and university studies were integrated into the vision to complete the continuum of a more specialized education system (Urban &

Wagoner, 2000). Public schools were expected to perform this new role in addition to their original mission of preserving the democratic principles of the country. This shifting dynamic required high school curricula to change to accommodate the changing demographics of the growing number of students who attended high school with the desire for a wide range of post-secondary outcomes (Christensen et al., 2008)

School Reform

In the early 1900s, Dewey led the way for reform with the progressive movement and a shift in philosophy toward a child-centered and more holistic approach, until two landmark events occurred in the 1950s: the desegregation of schools and the launch of Sputnik by the Soviet Union. The progressive movement was chided by traditionalists as the cause for the US falling behind Russia in the early space race; as a result, the movement was shelved in favor of more rigorous math and science courses (Christensen et al., 2008; Reese, 2005). By the 1970s, enrollment and subsequent graduation rates continued to climb to unprecedented highs, the number of course offerings in high schools soared to 2,100, and participation in kindergarten grew. Generally, “while not all public schools were equal – certainly some urban and rural schools did not match the breadth and depth of those in suburban areas – virtually all improved” (Christensen et al., 2008, p. 57).

Nearly 25 years later, another mission was imposed on public schools with the publication of a report from President Reagan’s National Commission on Excellence in Education: *A Nation at Risk: The Imperative for Educational Reform* (1983). The report served as a catalyst for the Excellence Movement with its observation, “The educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a nation and as a people” (*A Nation at Risk*, 1983, p. 6). This latest reform focused on providing increased instructional time and more homework, which resulted in continued stagnant student achievement. The lack of progress was primarily blamed on a hierarchical structure with directives implemented by bureaucrats without educational expertise (Urban & Wagoner, 2000). Public schools were asked to make the country more economically competitive with Japan and Europe by focusing on core academic classes and, ultimately, increasing student performance on standardized tests (Christensen et al., 2008).

With a new president in 1989, a new agenda for education was launched. In collaboration with the nation's governors, President George Bush crafted Goals 2000, which imposed higher expectations on schools, including increased kindergarten readiness, improved graduation rates, greater competency in the foundational curriculum, the elimination of substance abuse and violence in schools, and increased parental involvement.

While these goals reflected many of the societal issues of the day, they were broad and lacked any specific proposals. As a result, the reforms of the 1980s became the reforms of the 1990s with Clinton's presidency, which reissued virtually the same goals as Goals 2000 (Urban & Wagoner, 2000). In the 1980s, the Excellence Movement attempted to improve the existing educational system; however, the Restructuring Movement in the 1990s, which called for a completely different structure and perspective for public education, once again failed to produce the desired results (DuFour & Eaker, 1998).

In 2005, another directive was issued to public schools when George W. Bush, during his State of the Union address, rolled out his proposed revision to the Elementary and Secondary Education Act (ESEA). His revision, the No Child Left Behind Act (NCLB), was described by Reese (2005) as "Yet another classic underfunded mandate, which required mandatory testing of children in grades three through eight in basic subjects, invoked penalties on schools with persistent low performance, and largely defined schools by their test scores" (p. 325). This proposal had bipartisan support and was seen both as a quest for excellence in American schools and as an opportunity to ensure equitable education for subgroups, including minorities, the economically disadvantaged, and students with disabilities. Each school that accepted federal funding was expected to eliminate achievement gaps in all subgroups by reaching annual, measurable objectives with the goal of 100% proficiency by 2014. Progress was to be measured by annual assessments in both reading and math for all children in grades three through eight. Despite widespread concerns voiced by educators regarding the intense focus on standardized testing, these targets remained the requisite goals until Obama took office in 2009.

In 2010, the Obama Administration identified a new vision for our nation that was focused on ensuring that every student was college and career ready and that the achievement gaps for minority children, children living in poverty, and children with disabilities were closed by 2020 (Carroll et al., 2010) as part of the reauthorization of the ESEA. In 2011, with congressional efforts stalled, Arnie Duncan, the US Department of Education Secretary, began

offering waivers to NCLB requirements for states that were striving toward improved academic achievement with innovative strategies. These waivers were not without conditions. States that requested these waivers had to incorporate conditions into their proposals that included tying student achievement to teacher and principal evaluations, among other prerequisites. This policy, along with all of the previous ones mentioned, relied primarily on standardized testing to measure the effectiveness of schools.

In late 2015, Obama signed into law an overhaul of NCLB, referred to as the Every Student Succeeds Act (ESSA) (Every Student Succeeds Act, 2015). This law focused on reducing the amount of testing, yet still required school accountability systems to monitor the learning of all students, including subgroups, to close achievement gaps. Additionally, it distributed much of the decision making back to the states and limited federal authority. It has been viewed as an improvement to NCLB, although much remains to be seen as the regulations are further developed.

Educational Leadership

While there are a wide variety of ways that school reforms seek to improve teaching and learning, their success is contingent on the motivation and effectiveness of their leaders (Leithwood, Louis, Anderson, & Wahlstrom, 2004). When considering all of the factors that contribute to student learning, the leading factor is effective classroom instruction; however, strong leadership also has a powerful influence on learning, despite being underestimated (Leithwood et al., 2004; Waters, Marzano, & McNulty, 2003).

Researchers at Mid-Continent Research for Education and Learning (McREL) conducted a meta-analysis (Waters et al., 2003) that studied the effects of leadership practices on student achievement. Using 21 identified leadership practices associated with student learning as a framework called balanced leadership, the researchers examined 70 quantitative studies completed over a 30-year period. The combined sample included 2,894 schools, approximately 1.1 million students, and 14,000 teachers. The findings demonstrated that there was a statistically significant positive relationship between school leadership and student achievement, with an average effect size of 0.25; when leadership was enhanced, so too was student achievement. Additionally, the 21 identified leadership practices were associated with statistically significant positive gains in learning. The strongest correlations—which were considered small, yet still

significant—were noted in situational awareness (ES = 0.33), intellectual stimulation of staff (ES = 0.32), change agent (ES = 0.30), welcoming input from staff (ES = 0.30), and creating a culture around shared beliefs (ES = 0.29). Waters et al. (2003) concluded that two primary variables were key in the determination of leadership impact: the focus of change and the order of change. It was deemed essential that leaders choose to focus on the change most urgently required to positively impact student learning (Elmore, 2003). Additionally, successful leaders were those able to provide clarity regarding the benefits of changes that connect more easily with the stakeholders' experiences or first-order changes. When second-order changes were necessary, the benefits were not obvious to stakeholders, which forced leaders to work harder to implement changes, as these can “confront group identities, change working relationships, challenge expertise and competencies, and throw people into stages of ‘conscious incompetence,’ none of which is conducive to cooperation, cohesion, and a sense of well-being” (Waters et al., 2003, p. 8).

In a literature review conducted on behalf of the Wallace Foundation, Leithwood et al. (2004) investigated the role of leadership in improving student learning. The researchers examined the literature in response to five questions (p. 4):

1. What effects does successful leadership have on student learning?
2. How should the competing forms of leadership visible in the literature be reconciled?
3. Is a common set of “basic” leadership practices used by successful leaders in most circumstances?
4. What else, beyond the basics, is required for successful leadership?
5. How does successful leadership exercise its influence on the learning of students?

Leithwood et al. (2004) found that only classroom instruction had more of an impact on student learning than leadership, with the sum of direct and indirect effects correlating with about 25% of the variation in student learning. Generally speaking, the literature revealed that the more difficult the challenge, the more impact leadership had on learning. Leadership was clearly the catalyst for school improvement.

In response to question of how leaders were to reconcile the competing forms of leadership, Leithwood et al. (2004) explained that the different forms of leadership, such as instructional, transformational, distributive, shared, etc., represent different styles that each strive to meet the same objectives, which include setting the direction for the organization and moving

stakeholders in that direction. Effective leadership did not lose sight of these objectives regardless of the style utilized. Furthermore, the term *instructional leadership* needed to be more clearly defined with specific leadership practices to be effective. Moreover, Leithwood et al. (2004) cautioned leaders to give more consideration to the meaning and application of distributive leadership to ensure an appropriate match between the task and the particular level at which leadership is distributed.

Leithwood et al. (2004) identified three core practices of successful leaders. First, they set a clear direction for the organization and clearly communicate their vision to gain stakeholders' buy-in to the identified goals and expectations. Second, successful leaders recognize that people make a difference, not programs. Such leaders invest in developing people intellectually and effectively with the appropriate support and resources. Third, successful leaders continuously strengthen and adapt school culture through collaborative processes to meet ever-changing conditions.

While all successful leadership relies on the three core practices, Leithwood et al. (2004) espoused that the context of the organization, student population, and education policy significantly impacted the application of these practices. Different contexts require leaders to mitigate how these practices are utilized.

Finally, Leithwood et al. (2004) concluded that leaders have mostly an indirect impact on student learning through their influence on other stakeholders and the school climate. They further explained that the evidence suggested key areas that school leaders should primarily focus on, such as pedagogical content knowledge, PLCs, shared vision, and professional development. Ultimately, the researchers surmised that more research was necessary to better understand how leadership practices can result in specific improvements to schools and districts. Despite the indirect effect of leadership on student learning, the leadership of principals is essential to the development of PLCs and, ultimately, school improvement (Mullen & Hutinger, 2008). Leadership in itself does not produce learning; however, the absence of leadership certainly can inhibit student learning (Leithwood et al., 2004).

Leithwood, Harris, and Hopkins (2008) conducted a subsequent literature review as an extension of Leithwood and Jantzi's review (2005). The review summarized key findings in multiple empirical studies on the effects of leadership. The researchers made seven assertions about successful school leaders:

1. With the exception of classroom instruction, school leadership has the most influence on student achievement. Qualitative and quantitative studies showed the combined direct and indirect effects of school leadership on student learning to be between 12 and 20%, in addition to other school conditions. Additionally, multiple recent quantitative studies have shown the statistically significant positive impact of transformational school leadership on student engagement, which in turn results in student learning.
2. The same core leadership practices were demonstrated by nearly all successful leaders. The research was based on the assumption that the primary objective of school leadership is improving employee performance, which is generally a composite of employee beliefs, values, motivations, knowledge base, and working conditions. The evidence was classified into four categories: building vision and setting directions, developing human resources, refining/changing the organization, and instructional leadership.
3. The application of these core leadership practices is varied according to the context of the situation rather than being a static, one-size-fits-all approach to all situations.
4. School leaders' influence on staff motivation, commitment, and working conditions results in stronger indirect improvement in teaching and learning, rather than direct improvement in teachers' content knowledge.
5. Widely distributed leadership has more of an impact on schools and students. Leithwood et al. (2008) reported findings from Leithwood and Mascall (2008) that demonstrated the total leadership from all stakeholders across the school setting accounted for 27% of the variance in student achievement.
6. The patterns illustrated that leadership with high levels of influence across all stakeholders had the highest levels of student outcomes.
7. Several core personal traits accounted for a large portion of variation in leadership effectiveness. Successful leaders were described as being open-minded, flexible, persistent, resilient, and optimistic, with high levels of efficacy.

Distributive leadership. Distributive leadership, which is akin to shared, collaborative, democratic, and participative leadership, encompasses a belief that authority is shared by all

people at all levels of the organization, although to varying degrees (Leithwood et al., 2004). Leithwood et al. (2004) described two different types of distributed leadership conceived by leadership scholar, Peter Gronn: additive and holistic. Additive distributed leadership embraces the belief that all stakeholders are leaders without regard to the interactions between these stakeholders. Conversely, holistic distributive leadership emphasizes the interdependence of all stakeholders in making effective decisions. As opposed to more authoritative leadership, distributed leadership provides opportunities for stakeholders' reciprocal learning (Leithwood et al., 2004).

Leithwood, Mascall, Strauss, Sacks, Memon, & Yashkina (2007) reported on the qualitative stage of a two-stage, multimethod study. The researchers explained that the concepts of distributed, shared, collaborative, democratic, and participative leadership greatly overlap. However, they further clarified that distributed leadership assumes a set of practices utilized by people at all levels of the organization. The study was conducted in a large, growing urban/suburban district in Ontario with a diverse student population of more than 100,000 students. Phase 1 of the study included a blend of elementary and secondary schools, totaling eight schools. District staff specifically selected each school based on their commitment to shared or distributed leadership over the previous three years. The researchers reported "distributed leadership in this district to be a probable example of 'best practice' at the present time - not perfect, but likely more mature than average by a significant degree" (p. 62).

Teachers in all eight schools were asked to identify non-administrative colleagues as teacher leaders according to the prescribed definition. This identified pool was then further reduced to 19 individuals. Nine district administrators were selected based on their role in promoting distributive leadership practices and their knowledge base with respect to the district's initiative for change. A total of 67 interviews were conducted with the various stakeholders and resulted in many instances of planned alignment being reported for the highest priority initiative, with a significant decrease in lower priority initiatives. The evidence suggested that "effective forms of distributed leadership may well depend on effective forms of focused leadership - leading the leaders" (p. 55). The evidence also suggested that some specializations in leadership functions were necessary to ensure utilization of particular positions or special expertise. Informal leaders were more likely to be engaged in managerial tasks versus direction-setting functions, which remained with the most senior administrators. Further evidence revealed that

the district did not vary the number of people involved according to the complexity of the task, as the researchers had hypothesized. Moreover, most people nominated as non-administrative colleagues were in fact designated leaders by the school. Finally, the characteristics attributed to both formal and informal leaders were similar and focused on personal qualities and commitment to the initiative.

Heck and Hallinger (2009) examined the effects of distributed leadership on student math achievement in 195 elementary schools from a western US state over a four-year period in a multilevel, non-experimental design. The study framed two research questions that explored the relationship between distributed leadership and academic capacity over time and explored how distributed leadership and academic capacity impacted school improvement—more specifically, math achievement. Surveys were given to teachers, fifth grade students, and randomly selected parents from each school in Years 1, 3, and 4 of the study to capture changes in school processes. Achievement data were collected in Years 2, 3, and 4.

The data revealed that the initial level of academic capacity was significantly related to a change in distributed leadership (standardized $Y = .19, p < .05$); inversely, the levels of distributed leadership were significantly related to a change in academic capacity (standardized $Y = .14, p < .05$). This model demonstrated that schools with stronger perceived distributed leadership are better able to improve academic capacity. The data also demonstrated that a change in distributed leadership was moderately and significantly related to academic capacity (standardized $Y = .46, p < .05$). Changes in academic capacity were significantly related to student growth (standardized $Y = .18, p < .05$). This effect size implied that a school growth rate of nearly 40% could be expected. Finally, the indirect effects of distributed leadership through academic capacity on student growth were significant (standardized $Y = .09, p < .05$).

Instructional leadership model. Instructional leadership focused on improving teaching practices in the classroom translates to improved student learning (Leithwood et al., 2004). Robinson, Lloyd, and Rowe (2008) conducted a meta-analysis of 27 published studies from 1978 and 2006 to examine the impact of leadership on student achievement. They selected their studies from published US research, as well as eight studies from other countries. A variety of school contexts were incorporated, including 16 studies on elementary schools, four studies on high schools, and seven from a combination of all levels. The breadth of this study was wider than the meta-analysis of Waters et al. (2005), in which only 10 of the 70 studies were published;

and Witziers et al. (2003), which only included 15 published studies. The results demonstrated a moderate effect size ($ES = 0.42$) of instructional leadership on student outcomes. Additionally, the study examined the effect of five dimensions of leadership on student outcomes, including setting goals and expectations ($ES = 0.42$), resourcing strategically ($ES = 0.31$), planning, coordinating, and evaluating teaching and curricula ($ES = 0.42$), promoting and participating in teacher learning and development ($ES = 0.84$), and establishing an orderly and supportive environment ($ES = 0.27$). Robinson et al. (2008) concluded, “the closer educational leaders get to the core business of teaching and learning, the more likely they are to have a positive impact on student outcomes” (p. 664). Instructional leadership had three to four times the impact of transformational leadership. The focus on the quality of relationships between leaders and followers did not necessarily correlate to improved student performance.

In a quasi-experimental study, Goddard, Goddard, Kim, and Miller (2015) explored the relationship between principals’ instructional leadership and teacher collaboration in terms of student outcomes, the relationship between teacher collaboration and collective efficacy, the indirect impact of instructional leadership on collective efficacy through teacher collaboration, the correlation of collective efficacy and students’ mathematics and reading achievement, and the relationship of instructional leadership and teacher collaboration to student achievement through collective efficacy. The study employed baseline data from the School Leadership Improvement Study. The sample included 93 rural, low socioeconomic elementary schools from the Midwest. The survey focused on teachers’ perspectives of principals’ instructional leadership, classroom instruction monitoring, and shared leadership. Teacher collaboration was analyzed by assessing formal structures for collaboration, collaboration frequency, and teacher input on instructional policy development. Additionally, collective efficacy was measured by analyzing perceptions of group competence and teaching tasks. The results demonstrated a significant positive correlation between principal leadership and teacher collaboration ($ES = 0.70$). Teacher collaboration was also a significant predictor of collective efficacy ($ES = 0.27$ for math; $ES = 0.28$ for reading). Consequently, there was a significant indirect relationship between instructional leadership and collective efficacy. Ultimately, collective efficacy was positively and significantly associated with both math ($ES = 0.35$) and reading ($ES = 0.45$), while achievement and instructional leadership were correlated with math achievement ($ES = 0.06$) and reading achievement ($ES = 0.09$) through collaboration and collective efficacy. In schools in which there

was strong support and monitoring of teacher collaboration by the principal, collaboration increased, leading to increased collective efficacy and, most significantly, student achievement.

Transformational leadership. Transformational leadership is focused on an expansive array of issues to improve learning in both the classroom and larger school context (Leithwood et al., 2004). In a study examining the direct and indirect impact of transformational leadership on student achievement, researchers (Sun & Leithwood, 2012) conducted a meta-analysis supplemented by vote counting and narratives of previous research to examine the moderating effects of school level, school type, and leadership in 70 unpublished theses or dissertations. Using six different transformational leadership models, the researchers examined 11 specific leadership practices that were common to all models. The effects on student achievement of two practices were small, but significant: developing a shared vision and building goal consensus ($ES = 0.17$) and providing individualized support ($ES = 0.15$). However, findings on modeling behaviors, the provision of intellectual stimulation, the maintenance of high-performance expectations, the provision of contingent rewards, management by exception, the development of collaborative structures, the strengthening of school culture, engagement with communities, and the improvement of instructional programs were not significant (Sun & Leithwood, 2012, p. 428).

Another quantitative study (Quin, Deris, Bischoff, & Johnson, 2015) investigated whether there was a difference in transformational leadership practices between principals in high-performing schools and principals in low-performing schools. Teachers from schools identified as high performing or low performing were randomly sampled from 10 school districts in Mississippi. The participants completed Kouzes and Posner's Leadership Practices Inventory to address the research question: "What is the difference between high and low performing schools on the five variables of leadership practices (modeling the way, inspiring a shared vision, challenging the process, enabling others to act, and encouraging the heart)?" (p. 76). *T*-tests demonstrated that, in fact, there were significant differences in all five leadership practices. The results showed that there were differences with respect to modeling the way ($t(90) = 2.81, p < .006$), inspiring a shared vision ($t(90) = 3.67, p < .001$), challenging the process ($t(90) = 4.04, p < .001$), enabling others to act ($t(90) = 3.19, p < .002$), and encouraging the heart ($t(90) = 3.62, p < .001$).

Leithwood and Jantzi (2005) conducted an analysis of 32 published studies that examined transformational leadership in school settings and used vote counting to summarize the results. All of the incorporated studies relied on some version of either Bass's Multifactor Leadership Questionnaire, Leithwood and Jantzi's review (2005), or on others' extension of Bass' work. In these studies, three broad categories of transformational leadership behaviors were examined, including setting directions, helping people, and redesigning the organization. A fourth category, transactional and managerial aggregate, was excluded due to evidence showing little to no impact. Very little research has been conducted on the antecedents of transformational leadership within a school context, which Leithwood and Jantzi (2005) indicated as an area in need of further study. Forty-four variables were divided into four wide-ranging categories of variables, including characteristics of leaders' colleagues, leaders' characteristics, students' characteristics, and organizational structures and processes, and were found to affect the impact of transformational leadership across all 32 of the studies. However, few variables were constant across studies, as only 12 of them were included in three to five of the studies.

A pattern demonstrating the effects of transformational leadership was identified, which was supplemented by prior student achievement, family support, organizational culture, shared school goals, and consistent policies; meanwhile, the evidence showed that teachers' age, gender, and experience had no moderating effect on transformational leadership (Leithwood & Jantzi, 2005). Additionally, the review found that 29 of the studies investigated how leaders exercised their leadership, although only 12 intercessors (school culture, organizational commitment, job satisfaction, changed teacher practice, planning and strategies for change, information collection and decision-making processes, participatory decision-making structures, school policies and procedures, pedagogical or instructional quality, organizational learning, and collective teacher efficacy) were included in a minimum of three studies, all of which demonstrated positive effects on these variables.

Lastly, 15 of the 33 studies examined the effects of transformational leadership on students, specifically achievement and engagement. Results were mixed in this area, with some showing significant positive impacts (six studies) and others showing non-significant results (three studies). Five studies assessed the effects of transformational leadership on engagement, all of which showed significant positive—albeit modest—effects. Leithwood and Jantzi (2005)

concluded that there was an urgent need for additional research on the effects of transformational leadership on student achievement.

Shared leadership. Shared leadership, also referred to as democratic or participative leadership, focuses on the distribution of authority and power in schools in regard to decision-making priorities and processes (Leithwood et al., 2004). According to Wahlstrom and Louis (2008), shared leadership can be defined as the inclusion of stakeholders by principals in making school-wide decisions (p. 461). Wahlstrom and Louis (2008) examined the impact of principals' leadership on classroom instructional practices and PLCs in a quantitative study developed for the national research project, Learning from Leadership. A stepwise linear regression model was utilized to explore how principals' leadership, peer relationships, and individual efficacy affect teachers' instructional practices. Using the Teacher Survey from the Learning from Leadership project, the researchers conducted a factor analysis of 17 teaching practices, which resulted in three distinct instructional practices: standard contemporary practice, which is focused on using complex real-world applications to teach problem solving; focused instruction, which includes student engagement and pacing of instruction in very specific learning activities; and flexible group practices, which center on responsive instruction in the classroom. Principals' leadership behaviors centered on trust and shared leadership. Several characteristics associated with PLCs were identified: reflective dialogue, collective responsibility, deprivatized practice, and shared norms. The results showed that principals' leadership behaviors had a relatively weak impact on instruction for standard contemporary practice ($r^2 = 0.03$) and flexible group practices ($r^2 = 0.04$). However, principals' leadership did have a significant effect on focused instruction ($r^2 = 0.14$). Additionally, the results supported including other stakeholders in the decision-making process to help improve instruction and suggested that different principals' behaviors may be required in different levels of schools.

In their findings, Wahlstrom and Louis (2008) revealed that reflective dialogue, shared norms, and deprivatized practice all positively contributed to the various instructional practices. Teachers' sense of efficacy had significant effects on focused instruction and moderate effects on instructional grouping.

Leithwood and Mascal (2008) explained that despite the bureaucratic nature of schools (with the ultimate accountability resting with school leaders), leadership is necessary from multiple stakeholders to obtain the necessary results. They found that when there was a more

equitable distribution of power between principals and teachers, instruction was positively impacted and instructional practices were enhanced (Wahlstrom & Louis, 2008). Shared leadership in which the best ideas were sought and implemented by all stakeholders was identified as one of the key characteristics of a vibrant PLC that furthered student achievement (Louis & Wahlstrom, 2011).

Poverty

Researchers studied the relationship between verbal scores and poverty in a non-experimental study of a sample of 128 gifted fifth graders from five schools (Kaya, Stough, & Juntune, 2016). These students were classified into two groups: economically disadvantaged students who received meal benefits (31.4%) and non-economically disadvantaged students (68.6%). The analysis produced a statistically significant difference between economically disadvantaged students and non-economically disadvantaged students that accounted for 19% of the variance in performance on verbal intelligence and academic measures: $F(5, 115.00) = 5.43$, $p < .05$; Wilks' $\lambda = .809$; $\eta^2 = .19$.

When studying the fairness of using student achievement scores as a measure of proficiency for middle administrator evaluations, researchers explored non-school factors contributing to student achievement in approximately 300 middle schools in New Jersey (Tienken, Colella, Angelillo, Fox, McCahill, & Wolfe, 2017). The findings revealed that three variables from communities were reliable predictors of end-of-year assessments: the percentage of families with incomes over \$200,000, the percentage of families in poverty, and the percentage of people with bachelor's degrees; these predictors accounted for 50% of the variances in scores. Higher poverty rates resulted in lower student achievement.

As part of a study examining the impact of diversity on elementary student achievement in Virginia, Clayton (2011) included poverty as one of the independent variables in her hierarchical multiple regression analysis. The correlations produced as part of the analysis demonstrated statistically significant negative correlations between all economically disadvantaged racial groups and reading pass rates. Additionally, a strong negative relationship was found between white economically disadvantaged students and math pass rates, with $p < .001$. Effect sizes ranged from -.12 to -.47.

Professional Learning Communities (PLCs)

History. While the labels attached to PLCs have certainly changed over the years, the concept has not. Learning communities date back to the late 1920s with Alexander Meiklejohn's two-year Experimental College at the University of Wisconsin. The Experimental College embraced a collaborative philosophy of teaching and learning for its students and faculty and shared John Dewey's belief that learning needed to be student-centered and applicable to the real world, not just school. This represented a shift for teachers from a focus on teaching to a focus on learning, which is the cornerstone of PLCs. Although the philosophy was relatively short lived due to its radical perception by surrounding communities, it nonetheless offered an early glimpse of student-centered learning utilizing collective inquiry (Ivy, Herrington, Kristsonis, & Tanner, 2008).

Peter Senge (1990) brought learning communities forward by focusing on organizations and their capacity to learn in the business world and also declaring the importance of effective teams for organizational improvement. He explained that successful organizations are made up of teams of people continually willing to expand their knowledge base and skillset to get the desired outcomes by continuously learning together and demonstrating a willingness to innovate in the name of improvement.

As a result of the beginning of the school reform movement in the 1990s and as interest on the impact of teachers on student learning increased, PLCs began to rise in popularity as a model for school reform (Lomos, Hofman, & Bosker, 2011). PLCs have been identified as "the most powerful structure and strategy for enhancing educators' effectiveness and increasing students' successful learning" (Hord, 2015, p. 38). This reform was initially recognized as a vehicle for professional development (DuFour, 2004)

Over the past 25 years, PLCs have become increasingly difficult to define, as the term has been persistently used to label various combinations of educators who share common interests and ideals and who work collaboratively on school improvement (DuFour, et al., 2010). Creating further confusion, a number of terms have become synonymous with PLCs, including collegiality, teachers' collaboration with colleagues, professional communities, teacher networks, learning communities, professional learning groups, collaborative learning communities, critical friends groups, communities of practice, lesson studies, and lesson research. Consequently, the

PLC term is ambiguous, and that ambiguity has created a challenge for researchers in clearly understanding precisely what a PLC is.

More recently, PLCs have been defined as a community “with the capacity to promote and sustain the learning of all professionals in the school community with the collective purpose of enhancing student learning” (Vescio, Ross, & Adams, 2008, p. 80). This definition is based on two assumptions: (a) knowledge comes from shared critical reflection of daily experiences, and (b) teachers actively engaged in PLCs will increase professional learning and student learning (Vescio et al., 2008). Additionally, according to Wahlstrom and Louis (2008), PLCs are built on shared values, a focus on learning, collaboration on curriculum and instructional practice, and reflective dialogue.

It is important to recognize that while the term PLC is part of the common vocabulary of educators, its foundational practices are not. Many schools consider themselves to be PLCs but do not actually employ the basic tenets of the process (DuFour & DuFour, 2010).

Essential characteristics and big ideas. While the definition of a PLC may be broad and open to debate, many researchers consider it to be a systems-oriented approach that focuses on the structural and cultural aspects of schools as they relate to professional learning and growth (Lomos, et al., 2011). Hord (2009) believed that there were six key elements of successful PLCs: appropriate structural conditions, supportive relational conditions, peers supporting peers, shared values and vision, intentional collaborative learning, and shared and supportive leadership. Other common structural elements of PLCs can include shared beliefs, values, and visions; distributive and supportive leadership; collective learning and its application; and engagement with teaching practices, such as reflective dialogue, instructional feedback, collaboration on curriculum and pedagogy, and the analysis of student outcomes, as described by Nadelson et al. (2012).

DuFour et al. (2010) dispelled the notion that a PLC is a program, asserting that only the staff itself can truly implement this structure. Additionally, a PLC is a larger organization, and smaller collaborative teams, such as grade-level teams or departments, comprise the larger PLC (DuFour et al., 2010). DuFour and colleagues defined PLCs as “an ongoing process in which educators work collaboratively in recurring cycles of collective inquiry and action research to achieve better results for the students they serve” (2010, p. 11). PLCs assume that the way to improve student outcomes is by providing ongoing professional learning for educators.

While there is overlap, DuFour et al. (2010) defined the essential characteristics of PLCs slightly differently from those described by Nadelson et al. (2012). The six essential characteristics include (a) shared mission, vision, values, and goals; (b) collaborative teams focused on learning; (c) collective inquiry; (d) action orientation and experimentation; (e) commitment to continuous improvement; and (f) results orientation.

In a quantitative study involving 30 elementary principals in Kansas, Gillespie, Wells, and Panzer (2010) examined the impact of leadership characteristics on shaping organizational culture in an established PLC. Using descriptive statistics, this research analyzed six critical constructs necessary to sustain school improvement initiatives as identified in Lambert's Leadership Capacity School Survey: shared vision, inquiry-based use of data, broad involvement/collaboration, reflective practice/innovation, high or steadily improving achievement, and broad-based participation that is in alignment with the essential characteristics of a PLC (DuFour et al., 2010). The principals in this study reportedly relied most often on the following domains, as indicated by the mean score of 3.7 on a 5-point Likert scale: broad-based skillful participation, inquiry-based use of information to inform shared decisions and practice, and high or steadily improving student achievement. The construct identified as reflective practice/innovation was the least commonly practiced, with a mean score of 3.25. Several weaknesses of this study included a relatively small sample size, the inclusion of schools that had been working as a PLC for only three years, and the simplistic use of descriptive statistics. The authors suggested that incorporating a comparative study for high- and low-achieving schools would have increased the meaningfulness of their findings.

Shared mission, vision, values, and goals. DuFour (2004) explained that it is important for staff members to have a stake in creating and understanding what type of school they are working to create and ultimately what it would look like, what important components would be included, and how it would be determined that success had been achieved. Louis and Wahlstrom (2011) found that it was imperative for both principals and teachers to provide support to preserve what is important to them in improving both school culture and student learning.

Collaboration. Collaborative teams are at the center of PLCs, as they must work interdependently to drive continuous improvement (DuFour & Marzano, 2011). Teams must use a systematic process that incorporates accountability into the school structure that will provide the appropriate time and support for this collaboration.

In Donner, Mandzuk, and Clifton's (2008) qualitative study of seven middle-school teams, the researchers analyzed the development of professional learning teams over a two-year period using Karl Weick's four stages of collaborative work. Data were collected through journal entries, focus-group discussion, and individual interviews, and were organized around the four developmental stages of collaboration: diverse ends, common means, common ends, and diverse means. The group members found the focus-group discussion key to ensuring that individual behaviors were aligned to the group's goals. The researchers noted that by adopting norms to address conflict, the group's work was enhanced because of the passionate sharing of differing views. However, they reported the need for balance in vigorous discussions that stimulates intellectual debate without creating destructive tension by creating group problem-solving procedures. The data also suggested that gradually stimulating conflict in the beginning stages of collaboration was key to overcoming later tensions.

In the first study linking teacher collaboration to student achievement on high stakes assessments, Goddard, Goddard, and Tshannen-Moran (2007) collected data from a sample of 47 elementary schools with 452 teachers and 2,536 students in one Midwestern school district to determine to what extent teachers' collaboration was related to student achievement. Surveys were administered to the faculties, with one-half of the staff receiving the survey on collaboration and the other half receiving a survey with other questions. Student scores from the district office were provided for the current year's fourth-grade state assessment in reading and math and on the prior year's third-grade scores on the Metropolitan Achievement Test for reading and math. All of the tests had appropriate reliability and validity. Hierarchical linear modeling was employed, and it was determined that even after controlling for student characteristics and school social context, teacher collaboration was a significant positive predictor of differences for student achievement, with a nearly one-standard-deviation increase in both mathematics achievement ($SD = 0.08$) and reading achievement ($SD = 0.07$) scores on the fourth-grade state assessments. These findings were moderate and limited in their generalizability.

Collective inquiry. Collaborative teams must relentlessly reflect and question the status quo by seeking ways to continuously improve teaching and assessment practices that in turn improve student learning. This collective inquiry process requires teams to take chances and try

new ideas through action orientation and experimentation, with the end goal of continuous improvement focused on tangible results and outcomes.

Big ideas. DuFour et al. (2010) synthesized all of the characteristics of PLCs into “Three Big Ideas”: (a) a focus on high levels of learning for all, (b) a collaborative culture, and (c) a clear focus on results. DuFour and colleagues explained that a focus on learning can be accomplished by addressing four critical questions: (1) What is it that we want our students to know at the end of the unit, grade level, course, etc.? This question ensures that the team crafts a viable curriculum. (2) How will we know if the students have learned what we have identified as a viable curriculum? Common assessments are created, utilized, and analyzed to determine learning outcomes. (3) What will we do for students who have not learned it? Teams must provide and implement appropriate interventions to ensure that struggling students who do not learn at first can ultimately demonstrate mastery. (4) What will we do for those students who demonstrate learning early? Teams must determine enrichment options to provide deeper learning and extension for students who have already demonstrated mastery of the learning target rather than continuing on in the curriculum (p. 14). The Professional Learning Community at Work process that DuFour et al. (2010) backed is based on these three big ideas. These ideas represent a profound shift from teaching in classrooms to actual learning in classrooms because ultimately it does not matter how good a particular lesson is if students do not learn it. By embracing the PLC process as a vehicle to improve student learning, teachers are no longer left alone to figure out how to improve student outcomes for themselves and their individual groups of students; they can collectively work for the benefit of all students. This process has been best described as a multitude of strategies and processes that overlap and occur simultaneously to foster school improvement (Hipp, Huffman, Pankake, & Olivier, 2008).

Roles and responsibilities of school leaders. While it is apparent that PLCs require school leaders to embrace a shared leadership philosophy, the distribution of power does not negate the importance of school leaders. The school leader’s roles and responsibilities are paramount to any successful PLC. Noted professional development gurus and early PLC creators Hord and Hirsh (2009) identified seven key roles for principals to successfully introduce PLCs to schools. Principals must first express confidence that their staff already have the expertise necessary to overcome any challenges the school might face when their collective expertise is pooled. Second, principals must set the expectation that teachers must remain up-to-date in the

field through the collaborative work of the professional learning team. Third, principals must ultimately guide professional learning teams toward self-governance. While the principal may need to take more of the lead initially, he or she should have a plan that empowers other members of the team with important roles to ultimately assume primary leadership of the team. This empowerment is essential to the proliferation of the PLC philosophy even when school leadership changes. Hord and Hirsh also explained that principals must ensure that the necessary data are available to the teams to guide their work. Additionally, teams may need the principal to access professional development resources to better understand and utilize the data. It is also crucial that the principal facilitates a clear understanding of discussions and decision-making skills that are not necessarily natural skills for teachers. A full understanding of the difference between these two skillsets enables teams to work more effectively and efficiently. Furthermore, it is the principal's responsibility to share current research on the benefits of PLCs with teachers. Hord and Hirsh (2009) demonstrated that when teachers assume a collective responsibility for student learning, there is a greater understanding of the role of the teacher regarding student learning, collegial feedback and support, and professional restoration. Finally, it is important that principals take sufficient time to build trust and relationships with and between staff members. Certainly, providing teachers with the appropriate resources, guidance, and practice throughout the development of the PLCs cultivates that trust.

Job-embedded professional development. Continuous professional development is quintessential to school improvement: "One hallmark of excellent teaching is a perpetual restlessness to improve" (Berry, Johnson, & Montgomery, 2005, p. 59). In 2000, Guskey provided a clear definition, "Professional development is defined as those processes and activities designed to enhance the professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of students" (2000, p. 16). This definition clearly identified the purpose of professional development: to improve instructional expertise and ultimately student learning. Darling-Hammond and McLaughlin (2011) explained that the accountability movement brought a shift from short-term workshop models to professional development that is responsive to teacher and learner needs. They believed that "The vision of practice that underlies the nation's reform agenda requires most teachers to rethink their own practice, to construct new classroom roles and expectations about student learning and to teach in

ways they have never taught before – and probably never experienced as students” (Darling-Hammond & McLaughlin, 2011, p. 81).

From pre-service education to throughout a teacher’s entire career, effective professional development must continuously build the teacher’s understanding of content areas and the learning process of students. Professional development must actively engage these professionals both as teachers and life-long learners and be based on inquiry and reflection. It must focus on the concrete aspects of teaching, including curriculum, instruction, and assessment, in a collaborative manner that emphasizes the collective practices of these professionals. Additionally, professional development must be connected to actual work with students and be supported by continuous modeling, coaching, and collaborative problem solving to address challenges and build teachers’ capacity to effectively teach:

Teachers learn by doing, reading, and reflecting (just as students do); by collaborating with other teachers; by looking closely at students and their work; and by sharing what they see. This kind of learning enables teachers to make the leap from theory to accomplished practice. (Darling-Hammond & McLaughlin, 2011, p. 83)

As Darling-Hammond and McLaughlin (2011) observed, “Structures that break down isolation, that empower teachers with professional tasks, and that provide arenas for thinking through standards of practice are central to this kind of (effective) professional growth” (p. 84). Furthermore, Darling-Hammond and McLaughlin (2011) made the point that professional development opportunities are abundant throughout schools when framed appropriately. As one example, routine grade-level and staff meetings provide opportunities for professional learning when utilized to reflect on collective teaching practices and their effects on student learning: “Few schools are structured to allow teachers to think in terms of shared problems or broader organizational goals” (Darling-Hammond & McLaughlin, 2011, p. 87).

The research on increasing student achievement was inconsistent when professional development was focused on content knowledge. However, several studies showed positive relationships between increased pedagogical content knowledge and student achievement (Nadelson et al., 2012). These findings represent a shift from a need to learn content knowledge for practice to a need to gain knowledge of teaching practices for teaching (Vescio et al., 2008). Darling-Hammond and Richardson (2009, p. 6) explained that research supports professional development in the following ways:

- Deepens content knowledge and pedagogy.
- Helps teachers understand the student learning process in specific content areas.
- Provides opportunities for engaging, practical learning.
- Provides teachers with opportunities to increase knowledge, apply it in the classroom, and then reflect collaboratively with the team.
- Is inclusive of a plan of school reform that links curriculum and assessment to professional development.
- Is collaborative and collegial as well as intensive and sustainable over time.

The PLC process encompasses all of the components of effective professional development in job-embedded learning that improve student outcomes.

Furthermore, additional research demonstrated the importance of collaboration in collegial learning environments to implement sustainable change in schools (Darling-Hammond & Richardson, 2009). When grade levels, departments, or schools were engaged in collegial learning environments, a critical mass for change was created that provided built-in support groups for teachers and promoted collective work (Darling-Hammond & Richardson, 2009). Mullen and Hutingler (2008) shared their belief that job-embedded professional development leads to the increased application of new learning for teachers. According to Van Lare and Brazer (2013), “Schools that pursue continuous improvement do so by having teachers collaborate in PLCs to understand their teaching challenges more deeply and by adopting best practices to address those challenges” (p. 381). The PLC emphasis on improving the collective capacity of the school with job-embedded professional development only reiterated the importance of teachers by creating conditions for continuous professional learning (DuFour & Marzano, 2011). As cited in DuFour and Marzano (2011), Michael Fullan championed the idea that organizations must build collective capacity rather than individual capacity to succeed.

Effective, job-embedded professional learning takes many forms, foremost of which are the collaborative teams in PLCs. However, researchers have found that collaborative teams involve more than simply bringing teachers together. In fact, the process of forming teams can be slow and difficult (Darling-Hammond & Richardson, 2009). However challenging the process is, forming collaborative teams is the engine that drives continuous improvement (DuFour & Marzano, 2011). While collaborative teams provide a multitude of job-embedded professional development opportunities (as they engage in an ongoing cycle focused on improving student

learning), PLCs also provide other occasions for learning, such as peer observations, analysis of student work and data, and study groups within the PLCs.

Student achievement. The ultimate goal for all schools is student learning. While there has been an increase in research to determine if PLCs positively impact student achievement, there is no conclusive evidence to support this theory (Lomos et al., 2011). However, there are indications that schools that become PLCs experience improvements in learning, as demonstrated in some of the more recent studies.

Vescio, Ross, and Adams (2008) conducted a literature review that explored the impact of PLC practices on student learning. They reviewed 10 studies from the US and one study from England to answer the identified research questions:

- In what ways does teaching practice change as a result of participation in a PLC? And, what aspects of the PLCs support these changes?
- Does the literature support the assumption that student learning increases when teachers participate in a PLC? And, what aspects of the PLCs support increased student learning?

Additionally, all of the schools in these studies demonstrated the five essential characteristics of a PLC as described in Vesico et al. (2008). While the findings showed modest evidence for the impact of PLCs on teaching, eight of the 11 studies found that student learning improved when teachers participated in a PLC. Berry et al. (2005) followed the progress of a rural elementary school over four years. Student achievement on grade-level assessments went from slightly less than 50% at or above grade level to more than 80% meeting or exceeding grade-level standards. Phillips' research (2003) demonstrated academic improvements on state-standardized tests in all core subjects at a middle school, improving from an overall pass rate of 50% to over 90%. Strahan (2006) also demonstrated significant gains in three struggling elementary schools, where test scores improved from 50% proficiency to more than 75%. Hollins, McIntyre, DeBose, Hollins, and Towner (2004) investigated the impact of PLC practices on struggling African-American students, again demonstrating significant gains. Lastly, studies by Bolam, McMahon, Stoll, Thomas, & Wallace (2005), Louis and Marks (1998), Supovitz (2002), and Supovitz and Christman (2003) all revealed gains in academic achievement; however, the gains varied with the strength of the PLC at the school. Louis and Marks (1998)

explored the premise that schools with the strongest PLCs exhibit the strongest gains, demonstrating that the strength of the PLC accounted for 85% of the variance in achievement.

In June 2011, Lomos et al. (2011) conducted a meta-analysis of five quantitative empirical research studies, three of which were included in Vescio's literature review, that were selected based on the criteria that they had to have been performed on different or independent datasets, had focused on secondary education, had a clear conceptualization and operationalization of the PLC concept, and had used explicit measures of student achievement. The studies selected included Bolam et al. (2005), Lee and Smith (1996), Louis and Marks (1998), Supovitz (2002), and Visscher and Witziers (2004). All of these studies demonstrated a range from small to medium effects of PLCs on student learning—all positive significant relationships (Lomos et al., 2011).

In Mississippi, a quantitative study was conducted that investigated the implementation of PLCs, the functionality of school PLCs, the relationship between functionality and student achievement as measured by the Mississippi Quality Distribution Index, and the relationship between the frequency of PLC meetings and student achievement (Linton, 2014). Linton's study found that while 98% of the respondents indicated that their schools operated as PLCs as tools for school improvement, there was no significant relationship between the functionality of a school's PLC ($r(90) = .19, p = .07$) and student achievement or between the frequency of PLC meetings and student achievement ($r(90) = -.04, p = .71$). His suggestions for further research included investigating the potential relationship between the number of years a school has functioned as a PLC and the functionality of the PLC.

A two-year quantitative study was conducted using teacher surveys and administrative data from the nation's fourth-largest school district, Miami-Dade County Public Schools, to determine the types of collaboration in the district, teacher perceptions of the helpfulness of the collaborations, differences in collaboration by schools and teacher characteristics, and the association between collaboration and student achievement (Ronfeldt et al., 2015). Over 9,000 surveys were collected on topics including school climate, leadership, instructional resources, and collaboration. The school district provided additional demographic data about students, teachers, and schools. Fifty-five percent of the schools surveyed were elementary schools, 18% were middle schools, 14% were high schools, and the remainder were some other grade configurations. Approximately 90% of respondents rated their instructional teams as helpful or

very helpful. Teachers reported that collaboration covered all instructional domains to some extent, with the greatest attention given to reviewing formative assessments and developing instructional strategies. Collaboration in developing instructional strategies was reported to be the most helpful domain. The two perceived least helpful and least covered domains were “addressing classroom management/discipline issues” and “reviewing classroom work.” It was apparent that teams devoted the most collaborative time to the areas they perceived to be the most beneficial. The data suggested that there were significant differences in collaboration within schools that might not be discovered in between-school comparisons. Elementary school teachers reported better-quality collaboration on instructional strategies and students. The quality of elementary and secondary school collaboration on assessments was similar. Teachers from larger schools responded that collaboration about instructional strategies/curricula was greater; however, collaboration about students was weaker. Additionally, teachers of differing demographics experienced different kinds of instructional collaboration. Female teachers indicated better collaboration about instructional strategies and assessments. Black teachers reported the highest levels of collaboration over Hispanic and White teachers in all areas except for instructional strategies and curriculum. Teachers with only a bachelor’s degree reported stronger collaboration, and teachers with more than 15 years of experience also indicated stronger collaboration. Ultimately, the analysis showed that schools that reported better collaboration also had higher student achievement outcomes in both reading and math. Students of teachers who reported high-quality general collaboration and, more specifically, collaboration on assessments did in fact have higher math gains. Additionally, students of teachers at schools with high-quality collaboration achieved higher gains in math. In terms of reading achievement, only collaboration about instructional strategies/curriculum was statistically significant at the teacher level. Teachers’ rate of improvement increased more so when they worked in schools with enhanced collaboration than when they worked in schools with inferior collaboration. The data imply that better-quality collaboration can positively impact both teacher and school performance and ultimately result in increased student achievement. While the research on the impact of PLC practices on student achievement is not abundant, there is data to indicate that PLC practices do positively impact student achievement. Further research is needed to conclusively determine these findings.

Summary

This review of the literature revealed an array of information. The increased demand for contemporary accountability in schools highlights the need for schools to evolve to meet the needs of some of their most challenged learners. This review covered research that showed that educational leadership has an important albeit indirect impact on student learning, accounting for as much as 25% of the improvement in student learning (Waters et al., 2003). Furthermore, research conducted by Goddard et al. (2015) demonstrated a strong positive relationship between principals' leadership and teacher collaboration, one of the hallmarks of PLCs.

The literature review also suggested that PLCs were a strategy schools could use to meet the needs of diverse learners. It was revealed that challenges existed in terms of achieving consensus on the meaning of PLCs, which can take on a multitude of different configurations. Despite variances in its definition, PLCs have several widely accepted characteristics as reflected in the literature. Exploration of the types of job-embedded professional development opportunities focused on collaboration as well as peer observation, analysis of student work and data, and study groups demonstrated positive outcomes on student learning. The literature also revealed a positive relationship between job-embedded professional development that targets pedagogical knowledge and student achievement (Nadelson et al., 2012). Moreover, the research validated the argument that teacher collaboration was a significant, positive predictor of student learning (Goddard et al., 2007).

Lastly, the literature demonstrated the relative lack of quantitative research on the impact of PLC practices on student achievement; however, a growing body of quantitative evidence does indicate a positive impact. Berry et al. (2005), Bolam et al. (2005), and Ronfeldt et al. (2015) all suggest a positive effect of PLCs on student achievement, although additional research is needed to substantiate these findings.

Chapter 3

Methodology

With the school accountability movement having gained prominence since the 1990s, schools have had to continually investigate instructional practices in the name of improving school effectiveness (Reese, 2005). PLCs are an example of a practice that many schools are employing in the name of school improvement. Hord (2015) referred to PLCs as “the most powerful structure and strategy for enhancing educators’ effectiveness and increasing students’ successful learning” (p. 38). The purpose of this study was to identify what predictive relationship, if any, exists between student achievement as measured by a school’s pass rates on the English and Math SOL tests and the functionality of a school’s PLC when controlling for economically disadvantaged students. This study also sought to determine if a relationship exists between the length of time a school has functioned as a PLC and the functionality of a school as a PLC.

This chapter provides a description of the research process used for this study. The chapter contains the following sections: the statement of the problem, the research questions and null hypotheses, the research methodology, the research design, the population and the sample, the sampling procedures, the instrumentation, the data collection procedures, and the data analysis procedures.

Statement of the Problem

Under the pressure of accountability, schools have been charged with utilizing the most effective research-based strategies to obtain learning outcomes for all children and ensure equity and excellence for all students as well (*A Nation at Risk*, 1983; Every Student Succeeds Act, 2015; Reese, 2005). Today’s students face more challenges today than ever before, as evidenced by significant achievement gaps linked to both race and socioeconomic status (DuFour & Marzano, 2011). All of these rigorous learning expectations are required to be met despite downward trends in funding for K–12 education (DuFour & Marzano, 2011). DuFour and Marzano (2011) argued that the failure of schools to improve with each reform effort has not been because of a lack of motivation from educators; rather, “the problem, instead, is that they have lacked the collective capacity to promote learning for all students in the existing structures and cultures of the systems in which they work” (p. 15). PLCs represent a paradigm shift that

builds this collective capacity and can be described as “an ongoing process in which educators work collaboratively in recurring cycles of collective inquiry and action research to achieve better results for the students they serve” (DuFour et al., 2010, p. 11).

The body of research on the impact of PLCs on student achievement generally shows a positive relationship between PLCs and student achievement (East, 2015; Goddard et al., 2007; Hollins et al., 2004; Hord, 1997; Lomos, et al., 2011; Ronfeldt et al., 2015; Strahan, 2006; Vescio, Ross, & Adams, 2008; Wells & Feun, 2013). However, much of the research reflects qualitative methodologies. Therefore, there is a need for more quantitative data to further validate these findings and provide practitioners with more guidance in selecting effective school improvement strategies. In a quantitative study of Mississippi schools by Linton (2014), it was concluded that no significant statistical relationship existed between the degree of functionality of schools as PLCs and student achievement. Linton recommended further research to determine if a correlation exists between the length of time a school has operated as a PLC and student achievement.

A study of elementary schools operating as PLCs across multiple large school divisions in Virginia that collects demographic information on the geographical location of the schools, school participation in PLCs, length of time as a PLC, the number of years in current job assignment, pass rates on the English and Math SOL tests, the percentage of economically disadvantaged students, and the functionality of PLCs in schools could provide information to school leaders to help them determine whether using the PLC framework justifies the concomitant investment in capital and human resources by positively impacting student learning outcomes. An ex post facto, non-experimental, quantitative research study was selected to better understand “what factors or variables influence an outcome” (Creswell, 2014, p. 111). To help answer these questions, data were collected on common characteristics of PLCs and three research questions were posed:

1. What is the predictive relationship, if any, between student achievement (as measured by pass rates on Virginia’s English SOL tests) and the degree to which a school is functioning as a PLC (as measured by the principal’s perception) in elementary schools from four large school divisions in Virginia when controlling for the percentage of economically disadvantaged students?
2. What is the predictive relationship, if any, between student achievement (as measured

- by pass rates on Virginia’s Math SOL tests) and the degree to which a school is functioning as a PLC (as measured by the principal’s perception) in elementary schools from four large school divisions in Virginia when controlling for the percentage of economically disadvantaged students?
3. What is the relationship, if any, between the degree to which a school is functioning as a PLC (as measured by the principal’s perception) and the length of time a school has operated as a PLC (as reported by the principal’s perception) in elementary schools from four large school divisions in Virginia?

Null Hypothesis

H₀₁ – There is no statistically significant relationship between student achievement as measured by a school’s pass rate on the English SOL test and the degree to which a school is functioning as a professional learning community.

H₀₂ – There is no statistically significant relationship between student achievement as measured by a school’s pass rate on the Math SOL test and the degree to which a school is functioning as a professional learning community.

H₀₃ – There is no statistically significant relationship between the degree to which a school is functioning as a professional learning community and the length of time a school has operated as a professional learning community.

Research Methodology

When conducting research to answer a question or advance knowledge, the researcher has three broad research methods to consider depending on the nature of the problem being studied: qualitative, quantitative, and mixed methods (Creswell, 2014). Qualitative research describes the humanistic side of a problem and often tells a story with words. Quantitative research tests a theory or looks for relationships between variables with data that can be statistically analyzed, while mixed methods involves a combination of qualitative and quantitative research (Creswell, 2014).

After considering the problem being studied, determining whether any predictive relationships exist between the degree of functionality of schools as PLCs and student achievement, and determining whether a relationship exists between the degree of functionality

of schools as PLCs and the length of time they have used a PLC framework, an ex post facto, non-experimental, quantitative research design was selected to investigate the research problem. This research design was selected to explore any potential relationships between the degree of functionality of schools as PLCs (independent variable), the percentage of economically disadvantaged students (controlling independent variable), and student achievement (dependent variable), as well as any relationships between the length of time the PLC framework has been used (independent variable) and the degree of functionality of schools as PLCs (dependent variable). Linton (2014) previously conducted a quantitative research study in Mississippi similar to this study that employed descriptive and correlational statistics. However, the present study extended Linton's research by examining whether a relationship exists between the length of time a school has functioned as a PLC and functionality as recommended by Linton's suggestions for further research; moreover, the present study also examined whether any predictive relationships the percentage of economically disadvantaged students and student achievement in Virginia when taking into account the percentage of economically disadvantaged students (Linton, 2014).

Research Design

An ex post facto, non-experimental, quantitative design was used to determine whether a predictive relationship exists between the functionality of a school as a PLC and student achievement when controlling for percentage of economically disadvantaged students; and additionally to determine whether a relationship exists between the length of time a school has operated as a PLC and the degree of functionality of schools as PLCs.

This study used Hord's (1996) instrument, the School Professional Staff as Learning Community Questionnaire (SPSLCQ), which has previously been shown to be valid and reliable (Meehan, Orletsky, & Sattes, 1997) for gathering data about the functionality of schools as PLCs as well as demographic information collected at the beginning of the survey (see Appendix D). The researcher analyzed the data collected from the study using the Statistical Package for Social Sciences (SPSS). First, descriptive statistics were calculated on the self-reported demographic data collected for interval data. More specifically, the mean and range of ratings were calculated for the pass rates on the English and Math SOL tests, the percentage of economically disadvantaged students, the length of time the PLC framework has been employed,

and the number of years in the current job assignment. Schools were classified as either using the PLC framework or not using the PLC framework. All schools self-identified as using the PLC framework; therefore, only schools with incomplete responses on the SPSLCQ were eliminated from the regression analysis. To determine if predictive relationships existed between the identified variables, a simple regression was run to determine any potential relationships between each independent variable (functionality as a PLC, percentage of economically disadvantaged students, and length of time as a PLC) and the dependent variables (student achievement and functionality as a PLC). Additionally, a multiple regression was run to determine whether predictive relationships existed between the functionality of a PLC, the percentage of economically disadvantaged students, and student achievement.

There were multiple quantitative variables identified for this study. To address the first two research questions, the first independent variable was the principal's rating of the degree of functionality as a PLC. Next, the percentage of economically disadvantaged students was the second controlling independent variable. Lastly, the dependent variable was student achievement as measured by the pass rates on the English and Math SOL tests. In answering the third research question, the independent variable used was the length of time the school has functioned as a PLC, according to the principal, and the dependent variable used was the functionality of the PLC.

Population and Sample

The objective of this quantitative study was to gather data from elementary schools in four large school divisions in Virginia regarding the utilization of PLCs to make instructional decisions and the impact on student achievement from using the PLC framework. The population used were elementary school principals in Virginia, with a purposeful sample of 158 elementary school principals from the selected school divisions. Eighty-one principals responded, for a response rate of 51%. Seven respondents included incomplete answers on the functionality of PLCs and were thus excluded, leaving a sample of $N = 74$. While only four school divisions were selected for efficiency purposes, they represented three metropolitan areas: Northern Virginia, Richmond, and Hampton Roads, which are among the largest in the state and thus maximized the sample size.

Sampling Procedures

Once permission to proceed with the research was granted from the Virginia Polytechnic Institute and the State University Institutional Review Board (IRB), four school divisions were selected based on their population and research requirements, and permission was sought from the appropriate points of contact from each division. Once permission was granted from each school division, a database was created for the elementary school principals in each division with contact information and assigned study codes. Next, introduction emails with a link to the electronic survey and the assigned study codes were sent to the elementary school principals in the participating school divisions with assurances of anonymity, as the only identifying information reported in this research were the areas of the state to which the principals self-identified. Study codes were collected only for the purposes of monitoring responses and were kept confidential. A response database was also maintained to track respondents. Two reminder emails were sent to principals who had not responded after one week, and then again after two weeks. The return rate was then reported.

Data Collection Procedure1

The researcher successfully completed the Training in Human Subjects Protection certification exam on September 4, 2014 (see Appendix A). Permission was requested and granted from the Southwestern Education Development Laboratory (SDEL) to use the SPSLCQ (Hord, 1996) (see Appendix B).

Subsequent to receiving permission from the SDEL and the successful completion of the prospectus exam, the study was submitted to the Virginia Polytechnic Institute and State University Institutional Review Board (IRB) (see Appendix C) for permission to proceed with the study. Permission was sought for elementary school principals to participate in the study from the designated points of contacts in the four selected school divisions in Virginia, which was granted after fulfilling each division's research requirements.

After obtaining permission to proceed from both Virginia Tech's IRB and each of the authorized agents from the selected school divisions, an email embedded with the link to the electronic survey (see Appendix D) was sent to the 158 elementary principals in the sample. Email addresses were obtained from the Virginia Department of Education's website. The email included an introduction to the study, the purpose of the study, and how the study could provide

additional data to determine whether there was a relationship between high-functioning PLCs and student achievement. The email also explained that no identifying information from the survey other than the respondents' metropolitan area was going to be included in the dissertation and that study codes were used only for tracking purposes. Participants were asked to respond within 30 days, and completed responses were tracked through a database with reminder emails generated after one week and two weeks. The survey collected the following information:

1. Metropolitan Area (Northern Virginia, Richmond, or Hampton Roads)
2. Grade configuration of school
3. Number of years in current position
4. Pass rate for English SOL test for 2015-2016
5. Pass rate for Math SOL test for 2015-2016
6. Percentage of economically disadvantaged students for 2015-2016
7. School participation in PLC (Yes or No)
8. Length of time as a PLC
9. Functionality of PLC in the school

Study codes were kept confidential and were only used to track respondents; all respondents remained anonymous, although basic demographic information about the schools was collected, including grade configuration, geographic region, student population, length of time as a PLC, if any, length in current position, and pass rates for the English and Math SOL tests for the 2015-2016 school year, as well as the percentage of students considered economically disadvantaged for the same year. Additionally, each principal was asked to indicate whether or not his or her school operated as a PLC. Principals who responded negatively completed the survey at this point. Principals who responded positively continued on to Part II of the SPSLCQ survey (Hord, 1996).

Information was collected to determine the functionality of the school as a PLC as measured by the SPSLCQ (Hord, 1996) as well as student achievement as reflected through each school's pass rates on the English and Math SOL tests, the percentage of students considered economically disadvantaged, and the length of time each school had functioned as a PLC. This information was used to investigate whether there was a predictive relationship between the functionality of the PLC and student achievement as measured by the results of the English and Math SOL tests when taking into account the impact of poverty. Additionally, the information

was analyzed to determine whether a relationship existed between the length of time the school had functioned as a PLC and the functionality of the school's PLC.

Instrumentation

Permission was granted from the Southwest Educational Development Laboratory (SEDL) to use the SPSLCQ survey created by Hord (1996), which employs a 5-point Likert scale to assess the functionality of schools as PLCs. The instrument, piloted and field-tested by the Appalachia Education Laboratory (Meehan et al., 1997), was central in Hord's research, which demonstrated that PLCs were a major factor in school improvement (Hord, 1997).

The instrument contains two sections: Part I and Part II. Part I includes questions aimed at gathering demographic information regarding the use of PLCs in schools, the length of time using PLCs, school pass rates on the English and Math SOL tests, the percentage of economically disadvantaged students, and the leadership style used in PLC meetings. Part II includes questions about the seven indicators of PLCs established by Hord (1996). Each of these indicators is covered by two to five questions, for a total of 17 items, designed to determine the degree to which a school functions as a PLC. Descriptor scores range from a low rating of 1 to a high rating of 5. The total PLC score ranges from a low of 17 to a high of 85.

Part II of the SPSLCQ survey was field-tested by the Appalachia Educational Laboratory to assess its reliability and validity (Meehan et al., 1997). Using 690 teachers from 21 schools, the field test resulted in Cronbach's alphas for all five internal consistency reliabilities in the mid 0.80s, with a Cronbach's alpha of 0.94 for all 17 items. Concurrent validity was assessed through the parallel administration of a school climate instrument to high school teachers and demonstrated concurrent validity on the matching assessment of 0.75. Construct validity was also measured for a group of teachers known to be a part of a PLC, who showed significantly higher scores on the five dimensions and the total scores. Lastly, exploratory factor analysis showed that 54% of the variance was accounted for by a unitary factor of all 17 questions (Meehan et al., 1997). The data from this research suggested that the instrument could be useful for assessing the functionality of schools as PLCs.

Data Analysis

The data were exported from the Qualtrics electronic survey platform to SPSS for analysis. Descriptive statistics were calculated to determine mean scores from the demographic information and from the SPSLCQ. To determine significant differences in the responses based on the functionality of schools as PLCs and student achievement as determined by pass rates on the English and Math SOL tests, inferential analyses, hierarchical multiple regression analysis were conducted. This analysis determined whether any predictive relationship existed (a) between PLC functionality and student achievement, (b) between the percentage of economically disadvantaged students and student achievement, (c) between a combination of PLC functionality, economically disadvantaged students, and student achievement, and (d) between the length of time as a PLC and the functionality of the PLC.

Summary

This chapter includes the statement of the problem, the research questions, and the null hypotheses. Additionally, the chapter describes the research methodology used in the ex post facto, non-experimental, quantitative research design study. The data collection instrument used was the SPSLCQ, a previously validated tool employed to assess the functionality of PLCs, and the resulting data were analyzed, producing mean scores and predictive values to determine whether any relationships existed between the independent and dependent variables. The resulting data are reported in Chapter 4.

Chapter 4

Results of the Study

The purpose of this study was to identify what predictive relationship, if any, existed between student achievement as measured by a school's pass rates on the Virginia English and Math SOL tests and the degree to which a school functions as a PLC when controlling for the percentage of economically disadvantaged students. This study also sought to determine whether a relationship existed between the length of time a school had functioned as a PLC and the functionality of a school as a PLC. This study increases the body of quantitative research on the potential impact of PLCs on student achievement in Virginia and extends Linton's research by examining the relationship between the length of time a school has functioned as a PLC and a school's functionality as a PLC (Linton, 2014).

Virginian elementary schools from four large school divisions in three metropolitan areas were surveyed using Hord's SPSLCQ (1996), with several additional questions included to collect information on common features of PLCs such leadership, experience as PLCs, and frequencies of meetings for a more detailed snapshot of the population surveyed. Additionally, this survey collected data on five indicators: shared power, authority, and decision making; shared vision; teacher involvement in school improvement; opportunity for peer review and feedback; and supportive conditions and capacities. Descriptive statistics on the common features of PLCs and these survey indicators were utilized to assist in answering the following three research questions:

1. What is the predictive relationship, if any, between student achievement (as measured by pass rates on Virginia's English SOL tests) and the degree to which a school functions as a PLC (as measured by the principal's perception) in elementary schools from four large school divisions in Virginia when controlling for the percentage of economically disadvantaged students?
2. What is the predictive relationship, if any, between student achievement (as measured by pass rates on Virginia's Math SOL tests) and the degree to which a school functions as a PLC (as measured by the principal's perception) in elementary schools from four large school divisions in Virginia when controlling for the percentage of economically disadvantaged students?

3. What is the relationship, if any, between the degree to which a school functions as a PLC (as measured by the principal's perception) and the length of time a school has operated as a PLC (as reported by the principal's perception) in elementary schools from four large school divisions in Virginia?

Analyzing the functionality of PLCs, the percentage of economically disadvantaged children, and the pass rates on Virginia's English and Math SOL tests for elementary schools for any predictive relationships can potentially provide valuable insights for principals in their school improvement efforts. Similarly, analyzing the relationship between the functionality of a school's PLC and the length of time it has been used can guide principals as they lead their schools' PLCs.

Description of the Population

For the purposes of this study, an elementary school was defined as any school serving kindergarten through fifth grade or any combination of these grade levels. During the 2015-2016 school year, the population consisted of 1,156 elementary school principals in Virginia, as provided on Virginia's Department of Education website. A representative population of 158 elementary principals or their designees from four large school divisions across the state were electronically surveyed using Qualtrics. Eighty-one principals responded, for a response rate of 51%. Seven respondents included incomplete answers on the functionality of PLCs and were thus excluded, leaving a sample of $N = 74$. To achieve a medium effect size with at least a 95% confidence level, the regression analysis with two independent variables required at least 66 responses to be able to generalize the findings (Green, 1991).

Sample Characteristics

Respondents in this study included elementary principals or designees from three metropolitan areas of the Commonwealth of Virginia. Descriptive information related to region, experience in current assignments, utilization of PLCs as a framework for school improvement, years as a PLC, the degree of participation, and PLC leadership was collected. Additionally, the school pass rates on the 2015-2016 English and Math SOL tests and the percentage of economically disadvantaged students (as indicated by the percentage of children receiving free or reduced-priced lunches) were gathered from respondents.

Metropolitan areas. Seventy-three elementary school principals completed the survey in its entirety. Northern Virginia represented 60% of the sample, Richmond represented 7%, and Hampton Roads represented 34%.

Table 1

Frequency of Regional Participation

Region	<i>N</i>	%
Northern Virginia	44	59.5
Richmond	5	6.8
Hampton Roads	25	33.8
Total	74	100.0

Years in current assignment. Respondents were asked to classify the number of years they had served in their current assignments (e.g., 1-2 years, 3–5 years, or more than five years). Twenty-four percent of respondents indicated that they had 1-2 years in their current assignment. Forty-six percent reported 3–5 years in their current assignment, while 30% reported more than five years in their current position. The commonly selected range for years in the current assignment was 3–5 years with a mode of 2.

Table 2

Current Assignment Frequency Data

Years in Assignment	<i>N</i>	%
1-2 years	18	24.3
3–5 years	34	45.9
More than 5 years	22	29.7
Total	74	100.0

PLC participation. All 74 respondents specified that their schools utilized a PLC framework as a tool in school improvement. Thirty percent of respondents classified their school as being a PLC for 1-2 years; 51% reported utilizing the PLC framework for 3–5 years; and 18%

indicated utilizing PLCs for more than five years. One respondent did not report years of participation.

Table 3

Experience as PLC

Years as PLC	<i>N</i>	%
1-2 years	22	29.7
3–5 years	38	51.4
More than 5 years	13	17.6
Missing	1	
Total	73	100.0

Degree of PLC participation. Seventy-three of the 74 respondents in the sample rated the degree to which their schools participated in a PLC. Four percent reported that the PLCs met as needed; 18% reported that the PLCs met 1-2 times per month, either outside of or during the school day; 57% reported meeting at least one time per week, either outside of or during the school day; and 20% reported meeting between 3–5 days each week during the school day.

A one-way analysis of variance was conducted to evaluate the null hypothesis that there was no difference between the functionality scores of PLCs and the frequency of PLC meetings. The independent variable, frequency of PLC meetings included four groups: As needed ($M = 64.33$, $SD = 5.51$, $N = 3$), one to two times per month ($M = 68.46$, $SD = 5.65$, $N = 13$), one time per month ($M = 66.62$, $SD = 5.85$, $n = 42$) three to five times per ($M = 72.93$, $SD = 8.05$, $N = 15$). Assumptions of normality and homogeneity of variances were met. The ANOVA was significant, $F(3,69) = 4.07$, $p = .01$, to reject the null hypothesis and conclude that there was a difference between PLC functionality scores and the frequency of PLC meetings. Post hoc comparisons to evaluate pairwise differences among group means were conducted using Tukey HSD tests. Tests revealed significant differences between mean scores of PLCs that met one time per week and PLCs that met three – five times per week, $p = .01$. There were not any significant differences between the other groups, $p > .05$.

Table 4

Degree of PLC Participation

Meeting Frequency	<i>N</i>	%
3 - Regular meetings are scheduled one to two times per month. Meetings may be job-embedded or scheduled before or after school.	13	17.6
4 - Committed to meeting at least once per week. Meetings may be job-embedded or scheduled before or after school.	42	56.8
5 - Part of the culture - job-embedded - Teachers are scheduled in PLCs three to five days per week during the school day.	15	20.3
Missing	1	
Total	73	100.0

PLC leadership. When asked to identify the facilitator of the PLC meetings, 9% responded that administrators facilitated their PLCs; 18% reported that leadership was rotated within the PLC; 22% stated that their PLC had co-leaders; and 51% responded that teacher leaders facilitated the groups.

A one-way analysis of variance was conducted to evaluate the null hypothesis that there was no difference between the functionality scores of PLCs and leaders of PLC meetings. The independent variable, leaders of PLC meetings included four groups: Administrators ($M = 63.14$, $SD = 3.39$, $n = 7$), rotating leaders ($M = 64.92$, $SD = 7.39$, $n = 13$), co-leaders ($M = 69.29$, $SD = 8.37$, $n = 16$), and teacher leaders ($M = 69.45$, $SD = 5.63$, $n = 38$). Assumptions of normality and homogeneity of variances were met. The ANOVA was significant, $F(3,70) = 3.11$, $p = .03$, to reject the null hypothesis and conclude that there was a difference between PLC functionality scores and PLC leadership. Post hoc comparisons to evaluate pairwise differences among group means were conducted using Tukey HSD tests. While the overall ANOVA was significant, the pairwise differences did not reveal any significant variances between the means of each group.

Table 5

Summary Data of Facilitator of PLC Meetings

PLC Leadership	<i>N</i>	%
2- Administrator facilitates the groups.	7	9.5
3- Leadership is rotated within the PLC group.	13	17.6
4 - Leadership is shared among teachers with the PLC group (co-leaders)	16	21.6
5 - Teacher leaders facilitate the groups	38	51.4
Total	74	100.0

Instrument Validation and Variables

The SPSLCQ, originally developed by Hord (1996), has been field-tested and piloted by the Appalachia Educational Laboratory to assess its reliability and validity (Meehan et al., 1997). Using 690 teachers from 21 schools, the field test resulted in Cronbach's alphas for all five internal consistency reliabilities in the mid 0.80s, with a Cronbach's alpha of 0.94 for all 17 items. Concurrent validity was assessed through the parallel administration of a school climate instrument to high school teachers and demonstrated concurrent validity on the matching assessment of 0.75. Construct validity was also measured by a group known to be a part of a PLC, who showed significantly higher scores on the five dimensions and the total scores. Lastly, exploratory factor analysis showed that 54% of the variance was accounted for by a unitary factor of all 17 questions (Meehan et al., 1997). The data from this research suggested that the instrument could be useful for assessing the functionality of a school as a PLC.

PLC indicator variables. Seventy-three elementary school principals or designees completed the SPSLCQ on the seven indicators of PLC as established by Hord (1996). Each of these indicators had two to five questions, for a total of 17 items, designed to determine the degree to which a school was functioning as a PLC. Descriptor scores ranged from a low rating of 1 to a high rating of 5. The total PLC score ranged from a low of 17 to a high of 85. The total PLC scores were one of the two independent variables used in this research.

Table 6

Functionality as PLC Frequency Data

PLC Indicator Scores	No. of Items	Minimum Score	Maximum Score	<i>M</i>	<i>SD</i>
Total Shared Power	2	6	10	8.18	0.998
Total Shared Vision	3	9	15	12.85	1.71
Total Teacher Involvement	5	13	25	20.32	2.37
Total Peer Review	2	2	9	5.54	1.84
Total Supportive	5	13	25	21.12	2.35
Total Sum PLC	17	50	84	68.01	6.76

Economically disadvantaged. The percentage of students was used as a second independent variable in this study. Students receiving meal benefits ranged from a low of 2.00% to a high of 90%, with a mean of $M = 36.11$.

Table 7

Economically Disadvantaged Student Profile of Participating Elementary Schools

% Eligible for Free/Reduced Lunch	<i>N</i>	%	Mean	<i>SD</i>
0–15.0	28	38.84		
15.1–30.0	10	13.51		
30.1–45.0	8	10.81		
45.1–60.0	6	8.11		
60.1–75.0	13	17.57		
75.1–90.0	9	12.16		
Total	74	100	36.01	27.71

School-wide English and Math SOL pass rates. The dependent variables for this study were school pass rates on the 2015-2016 English and Math SOL tests as reported by the participants. A summary of student achievement data on the English and Math SOL assessment is provided in Table 8. Pass rates are provided in Appendix E.

Table 8

Summary of SOL Pass Rates for Participating Elementary Schools

2015-2016 Pass Rates	Minimum	Maximum	<i>M</i>	<i>SD</i>	State Avg.
English SOL	60	95	81.99	7.83	77.82
Math SOL	63	96	84.32	7.92	79.60

Note. $N = 73$

The mean ($M = 81.99$) for English pass rates was above the state average score of 78%. Additionally, the mean ($M = 84.32$) for Math pass rates was also above the state average score of 80%. The range of passing scores for English was from 60% to 95%, and the range of passing scores for Math was from 63% to 96%.

As part of evaluating the assumptions required to run a hierarchical multiple regression analysis, a Pearson product-moment correlation was run to help determine any significant, individual relationships between the variables; a correlational analysis was conducted between the degree of functionality of PLCs as reported on the SPSLCQ, the percentage of economically disadvantaged students, and student achievement as evidenced by school pass rates on the English and Math SOL tests. Details of the analysis are provided in Table 9 below.

Table 9

Intercorrelations for Student Achievement, Poverty, and Functionality of PLCs

Correlations	English Pass Rate ($N = 73$)	Math Pass Rate ($N=73$)	EDS ($N = 73$)	PLC Total ($N = 73$)
English Pass Rate	-			
Math Pass Rate	.87**	-		
EDS	-.78**	-.66**	-	
PLC Total	.08	.09	.20	-

Note. ** $p < .001$. English Pass Rate = school-wide SOL pass percentages on English SOL Tests; Math Pass Rate = school-wide SOL pass percentages on Mathematics SOL Tests; EDS = economically disadvantaged students as represented by the percentage of meal benefits; PLC Total = total score on SPSLCQ.

For participating schools in this research, a significant positive correlation was found between the pass rates on the English and Math SOL tests ($r = .87, p < .001$), indicating that a relationship is likely between performances on both assessments. Additionally, a significant negative relationship was found between economically disadvantaged students and performance on both the English SOL ($r = -.78, p < .001$) and Math SOL assessments ($r = -.66, p < .001$). As the percentage of economically disadvantaged students increased, the pass rates on both the English and Math SOL assessments declined. Additionally, there was no correlation between total PLC scores and English and Math SOL pass rates, suggesting no relationship between these variables.

Research Question 1

What is the predictive relationship, if any, between student achievement (as measured by pass rates on Virginia's English SOL tests) and the degree to which a school functions as a PLC (as measured by the principal's perception) in elementary schools from four large school divisions in Virginia when controlling for the percentage of economically disadvantaged students?

To answer this research question, a hierarchical multiple regression analysis was conducted using the percentage of economically disadvantaged students and the total score of the degree to which a school functions as a PLC as independent variables, and the pass rates on Virginia's English SOL assessments as the dependent variable, from a sample of elementary schools. The null hypothesis was established that there is no predictive relationship between the percentage of economically disadvantaged students, the degree a school functions as a PLC, and student achievement in English in elementary students in Virginia. This hypothesis was tested using SPSS statistical software with an alpha level of .05 set for the analysis.

Through the analysis, it was established that all eight necessary assumptions were met (Laerd Statistics, 2015). Specifically, the analysis resulted in a Durbin-Watson score of 1.94, indicating an independence of residuals. Figures 2, 3, and 4 suggest that the assumption of linearity, normality, and homoscedasticity were also met.

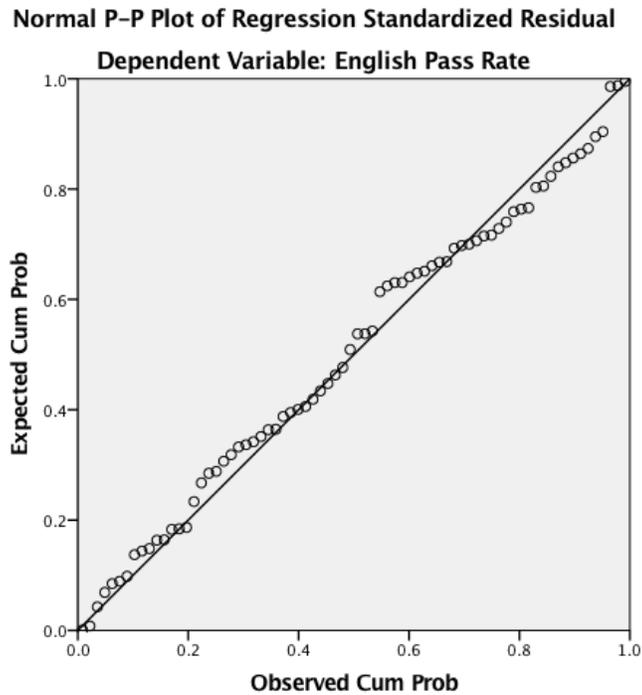


Figure 2. Normal probability plot of English SOL pass rates with the combined SES and PLC degree scores.

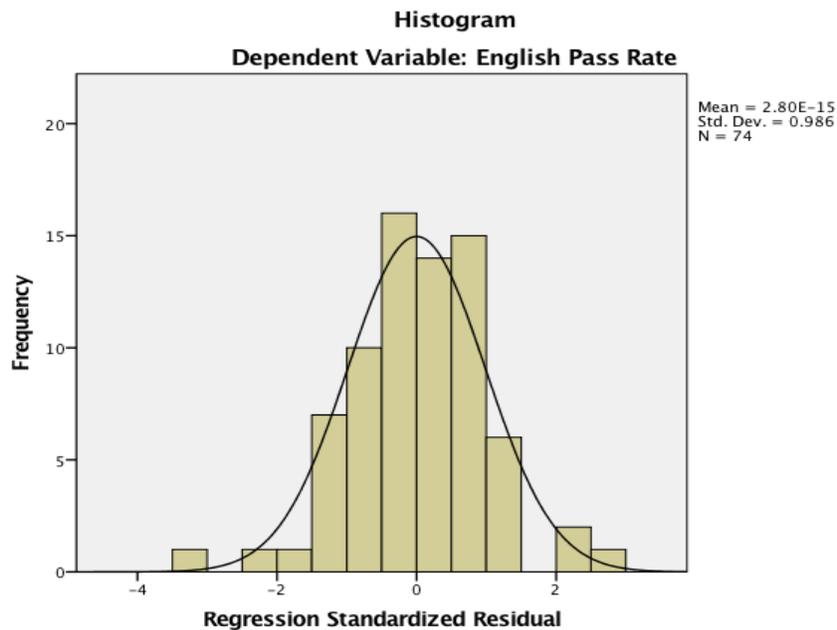


Figure 3. Histogram of the standardized residual scores with the SES and PLC degree scores.

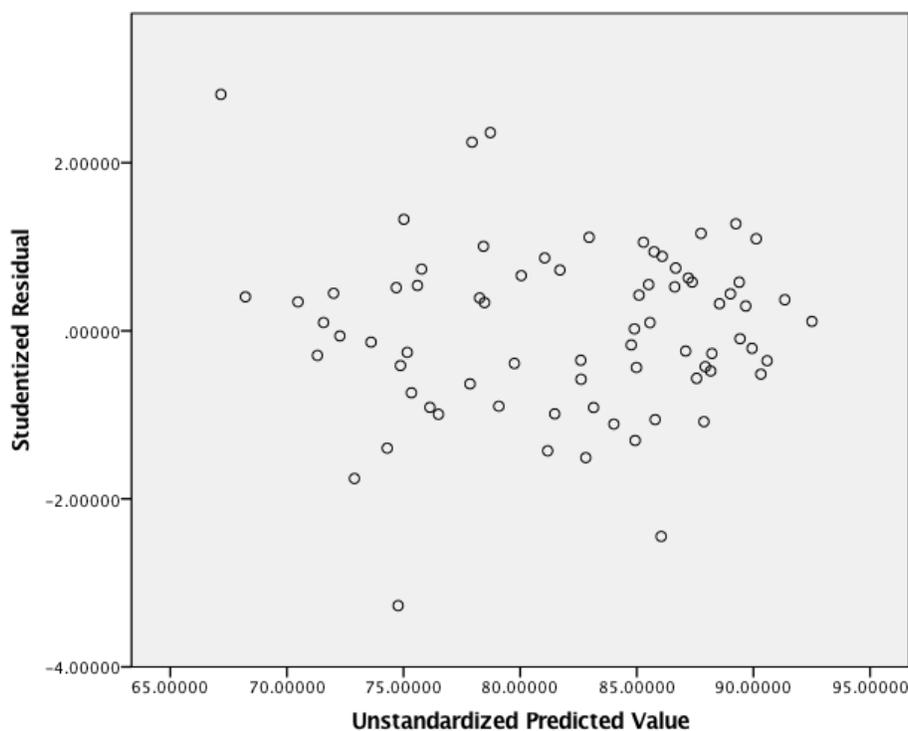


Figure 4. Scatterplot of the studentized residual scores with the combined SES values and PLC degree scores as the independent variables.

Additionally, collinearity statistics, tolerance, and Variance Inflation Factors (VIF) are reported in Table 10. There is no collinearity problem, as evidenced by a tolerance value of 0.94, which is greater than the minimum acceptable score of 0.10 to indicate multicollinearity (Laerd Statistics, 2015). Moreover, the VIF level was 1.04, which is less than the identified criterion of 10 as an indicator of a multicollinearity concern. None of the tolerance levels and VIFs exceeded these measures; thus, multicollinearity was not considered a concern.

Table 10

Collinearity Statistics

Independent Variable	Tolerance	VIF
SES	0.96	1.04
PLC Degree	0.96	1.04

Further, the data were examined for outliers via Casewise Diagnostics. One potential outlier was identified with a standardized residual of -3.22, which was outside of the identified \pm

3 standard deviations. Further analysis of the leverage value and the Cook's Distance revealed that this outlier did not have a large leverage value or influence; thus, the researcher decided to include it in the dataset (Laerd Statistics, 2015).

Once all of the assumptions for hierarchical multiple regression were met, it was determined that the analysis was appropriate for the data. The percentage of economically disadvantaged students controlled for in model 1, accounted for 61% of the variability in student achievement ($F(1, 72) = 112.83, p < .001, R^2 = .61$). The Standardized β scores illustrated the amount of variance in the dependent variable (Howell, 2013). In model one, percentage of economically disadvantaged students was significant ($-0.78, p < .001$) and indicated a negative relationship between EDS and student achievement. The results of the hierarchical multiple regression support a predictive relationship between the predicted English SOL pass rates and the independent variables of economically disadvantaged students and the degree of functionality of PLCs. Model two significantly predicted English SOL pass rates: $F(2, 71) = 70.86, p < 0.001$, adjusted $R^2 = 0.66$. Both variables added to the prediction significantly ($p < 0.001$), as detailed in Table 11 below. The overall R^2 (0.66) suggested 66% of the variance in the dependent variable; student achievement could be attributed to the combined effects of the independent variables, economically disadvantaged students, and the degree of functionality of PLCs. The addition of PLC functionality as an independent variable was significant ($F(1, 71) = 11.87, p < .001, R^2 = .67$) and accounted for an additional 5.6% of the variance in English SOL pass rates.

Table 11

Summary of Hierarchical Multiple Regression Analysis for PLC Degree Levels Predicting Math SOL Pass Rates (N = 74)

Predictor	Model 1				Model 2			
	<i>B</i>	<i>SE B</i>	β	R^2	<i>B</i>	<i>SE B</i>	β	R^2
Control Variable				0.61				0.66
EDS	-0.22	0.02	-0.78**		-0.23	0.02	-0.83**	
Exp. Variable								
PLC Degree					0.28	0.08	0.24**	

Note. ** $p < 0.001$

Research Question 2

What is the predictive relationship, if any, between student achievement (as measured by pass rates on Virginia's Math SOL tests) and the degree to which a school functions as a PLC (as measured by the principal's perception) in elementary schools from four large school divisions in Virginia when controlling for the percentage of economically disadvantaged students?

To answer this research question, a hierarchical multiple regression analysis was conducted using the percentage of economically disadvantaged students and the total score of the degree to which the school functions as a PLC as independent variables, and the pass rates on Virginia's Math SOL assessments as the dependent variable, from a sample of elementary schools. The null hypothesis was established that there is no predictive relationship between the percentage of economically disadvantaged students, the degree of a school functioning as a PLC, and student achievement in Math in elementary schools in Virginia. This hypothesis was tested using SPSS statistical software with an alpha level of .05 set for this analysis.

Through the analysis, it was established that all eight necessary assumptions were met (Laerd Statistics, 2015). Specifically, the analysis resulted in a Durbin-Watson score of 1.97, indicating an independence of residuals. Figures 5, 6, and 7 indicate that the assumptions of linearity, normality, and homoscedasticity were also met.

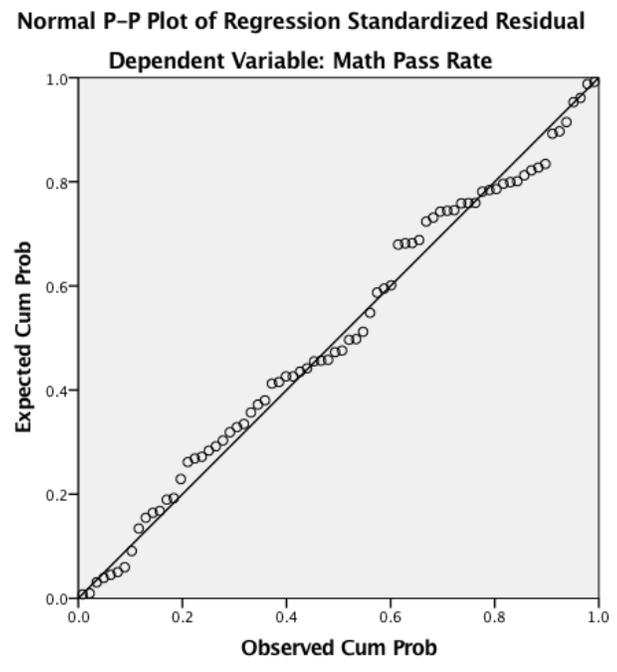


Figure 5. Normal probability plot of Math SOL pass rates with the combined SES and PLC degree scores.

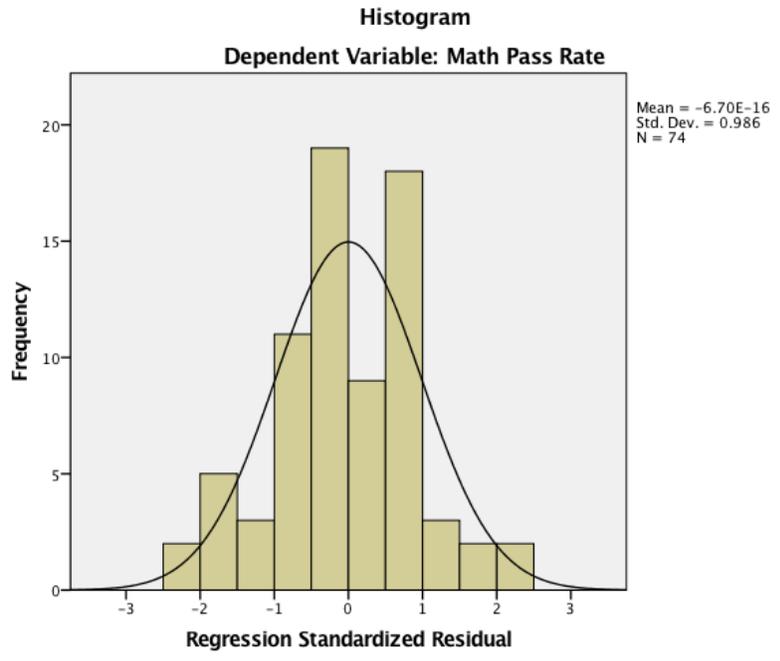


Figure 6. Histogram of the standardized residual scores with the SES and PLC degree scores.

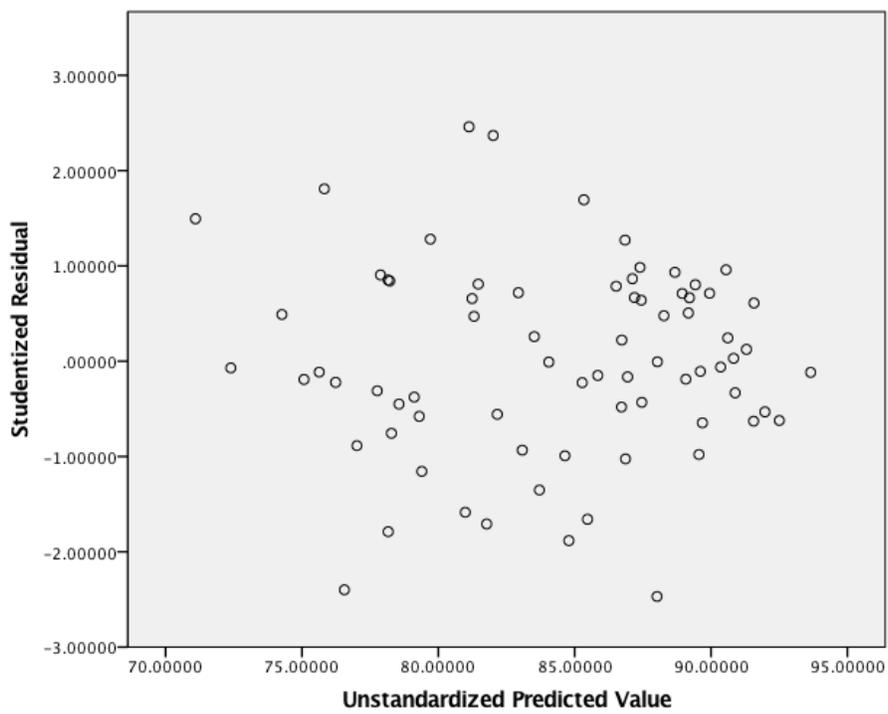


Figure 7. Scatterplot of the studentized residual scores with the combined SES values and PLC degree scores as the independent variables.

Additionally, collinearity statistics, tolerance, and VIFs are reported in Table 12. There is no collinearity problem, as evidenced by a tolerance value of 0.94, which is greater than the minimum acceptable score of 0.10, indicating multicollinearity (Laerd Statistics, 2015). Moreover, the VIF level was 1.04, which is less than the identified criterion of 10 as an indicator of a multicollinearity concern. None of the tolerance levels and VIFs exceeded these measures; thus, multicollinearity was not considered a concern.

Table 12
Collinearity Statistics

Independent Variable	Tolerance	VIF
SES	0.96	1.04
PLC Degree	0.96	1.04

Once all of the assumptions for hierarchical multiple regression were met, it was determined that the analysis was appropriate for the data. The percentage of economically disadvantaged students controlled for in model one, accounted for 42% of the variability in student achievement on SOL Math pass rates ($F(1, 71) = 54.83, p < .001, R^2 = .42$). The Standardized β scores illustrated the amount of variance in the dependent variable (Howell, 2013). In model one, percentage of economically disadvantaged students was significant ($-.66, p < .001$) and indicated a negative relationship between EDS and student achievement. In model two, the results of the hierarchical multiple regression support a predictive relationship between predicted Math SOL pass rates and the independent variables of economically disadvantaged students and the degree of functionality of PLCs. The model significantly predicted Math SOL pass rates: $F(1,71) = 7.02, p < 0.01, R^2 = 0.48$. Both variables add significantly to the prediction ($p < 0.001$), as detailed in Table 13 below. Specifically, PLC functionality accounted for an additional 5.1% of the variance in SOL Math pass rates. The overall R^2 (0.42) suggested 42% of variance in the dependent variable; student achievement could be attributed to the combined effects of the independent variables, economically disadvantaged students, and functionality of PLCs.

Table 13

Summary of Hierarchical Multiple Regression Analysis for PLC Degree Levels Predicting Math SOL Pass Rates (N = 74)

Predictor	Model 1				Model 2			
	<i>B</i>	<i>SE B</i>	β	R^2	<i>B</i>	<i>SE B</i>	β	R^2
Control Variable				0.42				0.47
EDS	-0.19	0.03	-0.66**		-0.20	0.03	-0.70**	
Exp. Variable								
PLC Degree					0.27	0.10	0.23*	

Note. * $p < 0.05$ ** $p < 0.001$

Research Question 3

What is the predictive relationship, if any, between the degree to which a school functions as a PLC (as measured by the principal's perception) and the length of time a school has operated as a PLC (as reported by the principal's perception) in elementary schools from four large school divisions in Virginia?

A one-way analysis of variance (ANOVA) was conducted to test the null hypothesis that there is no difference between the number of years a school has functioned as a PLC and its functionality as a PLC ($N = 73$). The independent variable included three groups: 1-2 years ($M = 66.40$, $SD = 4.86$, $n = 22$), 3-5 years ($M = 68.29$, $SD = 7.10$, $n = 38$), and more than five years ($M = 69.54$, $SD = 8.49$, $n = 13$).

The assumption of normality was tested using histograms and found tenable for all groups. The assumption of homogeneity of variances was tested and found tenable using Levene's Test: $F(2, 70) = 2.43$, $p = 0.10$. The ANOVA was not significant: $F(2, 70) = 0.97$, $p = 0.38$. There is sufficient data to accept the null hypothesis that there is no significant difference between the functionality of a school's PLC and the number of years it has operated as a PLC: $p > 0.05$.

A Pearson's product-moment correlation was run to assess the relationship between a school's experience level as a PLC and its degree of functionality as a PLC. No significant correlations were found between the degree to which a school functions as a PLC and the length of time a school has operated as a PLC: $r = 0.16$, $p = 0.17$. This suggests that there is no relationship between the experience levels of schools as PLCs and the functionality of their PLCs.

Table 14

Correlations between Years of Experience

	Years as PLC ($N = 73$)	PLC Total ($N = 74$)
Years as PLC	-	.163
PLC Total	.163	-

Note. $p = .17$. Years as PLC = number of years operating as a PLC; PLC Total = score indicating functionality of PLC from the SPSLCQ.

Summary

The purpose of this study was to identify what predictive relationship, if any, existed between student achievement as measured by a school's pass rates on Virginia's English and Math SOL tests, the percentage of economically disadvantaged students, and the degree to which a school functions as a PLC. This study also determined whether a relationship existed between the length of time a school functioned as a PLC and the functionality of a school as a PLC. This study sought to extend the research completed by Linton (2014) and contribute to the body of quantitative research on the impact of PLCs on student achievement.

Elementary school principals from four large school divisions in Virginia were surveyed via Qualtrics using Hord's (1996) SPSLCQ, which quantifies the functionality of a school's PLC. The total scores from this survey were regressed against pass rates for both the English and Math SOLs while controlling from percentage of economically disadvantaged students to determine the predictive relationship, if any, between the functionality of PLCs and student achievement. A total of 158 elementary principals were surveyed, with 81 (51%) responding. Seven surveys were found to be incomplete and were discarded, leaving fewer surveys to be analyzed ($N = 74$). Data regarding schools' population of economically disadvantaged students were also collected from principals via the percentage of students who were receiving free or reduced-price lunches ($M = 36.01$, $SD = 27.71$).

To present a clearer vision of the functionality of the PLCs in these schools, more descriptive data were collected and analyzed. Of the respondents, 60% identified their division as being located in Northern Virginia; 7% disclosed that their division's location was in Central Virginia; and 34% indicated that their division was located in Southeastern Virginia. All schools (100%) reported utilizing the PLC framework as a tool for school improvement. Of the 74 surveys included in the final population, 24% of the respondents indicated having been in their current assignment for 1-2 years; 46% reported serving in their current assignment for 3-5 years; and 30% responded that they had served in their current assignment for more than five years. When reporting the number of years schools had utilized the PLC framework, 30% of the respondents reported their schools' experience as a PLC in the 1-2 year range; 51% recounted working as a PLC for 3-5 years; and 18% stated that they had used the PLC framework for more than five years; one response was incomplete. Additionally, the survey requested information on the frequency of PLC meetings and the leadership of those meetings. Few schools reported

meeting as needed, for approximately once per quarter or semester (4%); 18% indicated that their PLCs met 1-2 times per month; 57% described meeting once per week; and 20% specified meeting 3–5 times per week during the school day. Administrators were identified as the facilitators of the meetings 10% of the time; rotating leadership was reported 18% of the time; 22% of the meetings were facilitated by co-leaders; and teacher leaders facilitated the meetings 51% of the time. Finally, scores on the SPSLCQ ranged from 50–84, with a potential range from 17–85 ($M = 68.01$, $SD = 6.76$).

The results of the hierarchical multiple regression support a predictive relationship between English SOL pass rates and the independent variables of economically disadvantaged students and the degree of functionality of PLCs. The model significantly predicted English SOL pass rates ($F(2,71) = 70.86$, $p < 0.001$, adjusted $R^2 = 0.66$). Second, the results of the hierarchical multiple regression support a predictive relationship between Math SOL pass rates and the independent variables of economically disadvantaged students and the degree of functionality of PLCs. The model significantly predicted Math SOL pass rates ($F(2,71) = 33.21$, $p < 0.001$, adjusted $R^2 = 0.47$). Lastly, there was no statistically significant relationship between the number of years a school had operated as a PLC and the functionality of the PLC ($r = 0.16$, $p = 0.17$). These results suggest that increasing a school's functionality as a PLC does contribute to an increase in student achievement measures as evidenced by the English and Math SOL pass rates. The findings and implications from this research are presented in Chapter Five.

Chapter 5

Summary and Conclusions

As stated earlier, the purpose of this study was to determine whether a school's functionality as a PLC impacted student achievement and to explore if experience as a PLC had any impact on functionality in elementary schools in Virginia. A review of the literature provided considerable qualitative data to suggest that PLC functionality has a positive impact on a number of factors in schools. Currently, there is limited quantitative research available on this topic. This study analyzed the total scores on a PLC functionality survey and the pass rates on the English and Math SOL tests for 2015-2016. Additionally, this study analyzed the number of years of experience schools had with PLCs and their functionality. To further explore these questions, an ex post facto, non-experimental study was used to investigate the following three research questions:

1. What is the predictive relationship, if any, between student achievement (as measured by pass rates on Virginia's English SOL tests) and the degree to which a school functions as a PLC (as measured by the principal's perception) in elementary schools from four large school divisions in Virginia when controlling for the percentage of economically disadvantaged students?
2. What is the predictive relationship, if any, between student achievement (as measured by pass rates on Virginia's Math SOL tests) and the degree to which a school functions as a PLC (as measured by the principal's perception) in elementary schools from four large school divisions in Virginia when controlling for the percentage of economically disadvantaged students?
3. What is the relationship, if any, between the degree to which the school functions as a PLC (as measured by the principal's perception) and the length of time a school has operated as a PLC (as reported by the principal's perception) in elementary schools from four large school divisions in Virginia?

After collecting complete data using Hord's (1996) survey to assess PLC functionality from 74 elementary school principals in Virginia, a hierarchical multiple regression was completed to determine the predictive relationship of PLC functionality on pass rates for the English and Math SOL assessments. The design attempted to control for the impact of being

economically disadvantaged on SOL scores. A Pearson product-moment correlation was also conducted to examine any relationship between the experience level of a school as a PLC and functionality. This chapter details and reflects on the data extracted from this research to provide findings and implications for school leaders using PLCs as a tool for school improvement.

Summary of Findings

Finding one: When controlling for the percentage of economically disadvantaged students, the degree of functionality of PLCs had a statistically significant impact on student achievement as evidenced by English SOL rates. The results of the hierarchical multiple regression supported a predictive relationship between predicted English SOL pass rates and the independent variables of economically disadvantaged students and the degree of functionality of PLCs. The full model of economically disadvantaged students and functionality of PLCs was statistically significant, predicting English SOL pass rates: $F(2,71) = 70.86, p < 0.001$, adjusted $R^2 = 0.66$. The addition of PLC functionality to the prediction in Model 2 also led to a statistically significant increase in the R^2 of .05, $F(2, 71) = 70.87, p < .001$. The overall R^2 (0.66) suggested a large amount of variance in the dependent variable; student achievement could be attributed to the combined effects of the independent variables, economically disadvantaged students, and the degree of functionality of PLCs.

These findings support the results of Rondfeldt et al.'s (2015) study that PLCs with strong teacher collaboration result in increased student achievement. Student achievement in math increased by 9%, with a one-standard-deviation increase in school level collaboration. Similarly, reading achievement increased by 8%, with a one-standard-deviation increase in school level collaboration. Additionally, Lomos et al. (2011) conducted a meta-analysis of six quantitative studies that examined the effects of PLCs on student achievement. All six studies analyzed had significant positive relationships ranging from .22 to .56. With an overall significant result, the overall summary effect size was .25.

Finding two: When controlling for the percentage of economically disadvantaged students, the degree of functionality of PLCs had a statistically significant impact on student achievement as evidenced by Math SOL pass rates. The results of the hierarchical multiple regression supported a predictive relationship between predicted Math SOL pass rates and the independent variables of economically disadvantaged students and the degree of

functionality of PLCs. The model significantly predicted Math SOL pass rates: $F(2,71) = 33.21$, $p < 0.001$, adjusted $R^2 = 0.47$. The overall R^2 (0.42) suggested a moderate amount of variance in the dependent variable; student achievement could be attributed to the combined effects of the independent variables, economically disadvantaged students, and the degree of functionality of PLCs. The addition of PLC functionality to the prediction of Model 2 also led to a statistically significant increase in the R^2 of .05, $F(2, 71) = 33.21$, $p < .01$.

Similar to the first finding, this finding is supported by previous research on PLCs and student achievement (Goddard et al., 2007; Strahan, 2006). Goddard et al. (2007) studied the impact of PLCs on student achievement in a Midwestern state involving 452 teachers from an urban district. Their findings indicated that an increase of .08 *SD* in math achievement on the Metropolitan Achievement Test (seventh edition) was associated with a one-standard-deviation increase in the effectiveness of PLCs. Additionally, these findings demonstrated a similar increase in reading achievement of .07 *SD* with the same one-standard-deviation increase in the effectiveness of PLCs. Strahan (2006) explained how the test scores of three elementary schools improved from 50% to more than 75% proficiency when schools utilized PLCs as a tool for school improvement.

Finding three: When testing only the predictive relationship between economically disadvantaged students and pass rates on the 2015-2016 English and Math SOL tests, a significant negative relationship was revealed. There was a negative relationship that was significant ($B = -.22$, $p < .001$), meaning that for every one-point gain on the English SOL pass rates, there was a reduction in the percentage of economically disadvantaged students by .22 points. Similarly, a significant negative relationship was found between economically disadvantaged students and pass rates on the Math SOL pass rates ($B = -.19$, $p < .001$).

This finding is supported by the current research on the impact of poverty on student achievement. Tienken et al. (2017) found that community factors involving wealth, poverty, and education levels accounted for over 50% of the variance in student scores on New Jersey's end-of-year assessments for middle schoolers, with poverty having a negative relationship. Poverty was found to be a significant predictor of performance for gifted children in poverty, accounting for 19% of the variance in verbal intelligence and student achievement measures (Kaya et al., 2016).

Finding four: There is no statistically significant relationship between the experience levels of schools as PLCs and the degree of functionality. A Pearson's product-moment correlation was run to assess the relationship between a school's experience level as a PLC and the degree of functionality as a PLC. No significant correlations were found between the degree to which a school functions as a PLC and the length of time a school has operated as a PLC: $r = 0.16$, $p = 0.17$. This suggests that there was no relationship between the experience levels of schools as PLCs and the functionality of their PLCs.

This finding contradicts existing research that regards PLC development as an ongoing and evolving process. Hipp et al. (2008) found that PLCs have "many things happening simultaneously, to greater or lesser degrees, at varying points in time over a period of years that seem to influence the development of a PLC" (p. 194). This finding also contradicts what we know about change theory and the stages of implementation of PLCs. In a literature review, Jones and Thessin (2015) found that there are three stages in the change process schools undergo as PLCs: developing, implementing, and sustaining. The stages imply that development is a process and takes time. Both Fullan (1998) and Stoll, Bolam, McMahon, Wallace, & Thomas (2006) supported the premise that PLCs are fluid and evolve over time with collective experiences.

Finding five: Virginian elementary schools examined in this study utilized the PLC framework as a tool for school improvement. A full 100% of the 74 participating elementary schools reported that they used the PLC framework as a tool for school improvement.

Existing research supports this finding. Due to the scarcity of quantitative research on PLCs, it is difficult to quantify widespread utilization of PLCs as a school improvement tool. However, there is research to support this finding. Lomos et al. (2011) reported that the increasing popularity of PLCs in the 1990s, which is supported by DuFour et al. (2010), has made the term PLC commonplace. Lastly, research conducted on PLCs in Mississippi indicated that nearly all schools (98%) identified themselves as PLCs (Linton, 2014).

Finding six: There was no difference in functionality when considering the actual leader of the PLC meetings. While the overall ANOVA was significant ($F(3, 70) = 3.11$, $p = .03$) between groups, there was not a significant finding ($p < .01$) in the Post Hoc tests for administrator led groups, rotated leadership groups, groups lead by co-teacher leaders, or teacher

led groups. There was, however, a significant difference at the .10 level, with the difference between administrator led and teacher led PLC meetings ($p = .09$).

DuFour et al. (2010) have expressed that one of the essential characteristic of PLCs is that principals utilize a shared leadership philosophy. Though shared leadership is necessary, Hord & Hirsch (2009) believe that principals must assume more of the responsibility in leading PLCs initially; however that responsibility must be shifted to other members of the team to ultimately become self-sufficient. This finding supports the principle that it is not necessarily the leader of the PLC that determines functionality.

Finding seven: There was a significant difference in means scores between PLCs that met frequently throughout the week and those that met less often. There was a significant difference between mean scores of PLCs that met one time per week and PLCs that met three – five times per week, ($F(3, 69) = 4.07, p = .01$).

Hord (2009) describes appropriate structural conditions as being necessary for PLCs to be successful. Subsequently, structural conditions include time embedded within the working day for teams to meet. This finding supports that providing sufficient time within the workday does contribute to the functionality of the PLCs.

Implications

The findings from this study have the following implications for principals and other school leaders either using or considering using a PLC framework for the purposes of school improvement:

Implication one: School leaders who want to increase English and Math pass rates should consider utilizing PLCs as tool for school improvement. Both findings one and two suggest that highly functioning PLCs positively impact student outcomes. This underscores the importance of being a PLC in more than name only. As suggested in the research, the process of developing a PLC takes time and the cultivation of a supportive culture (Hipp et al., 2008). Through professional development experiences, school leaders should seek out relevant resources to further understand how to lead a highly functional PLC and consider how best to utilize this tool for school improvement.

Implication two: School leaders should continuously seek resources and strategies that can be used to moderate or even eliminate the impact of poverty on student

achievement. Finding three found a significant negative relationship between poverty and student achievement, which is supported by research (Clayton, 2011; Kaya et al., 2016; Tienken et al., 2017). School leaders should continually stay abreast of research-based practices that mitigate the effects of poverty to help remove barriers to learning for economically disadvantaged students.

Implication three: School leaders should ensure that providing supportive conditions such as allocating time for PLCs to meet three – five times per week during the work day is a top priority to increase PLC functionality. Associated with findings four, six, and seven, years of experience as a PLC nor who served, as the leader of the PLC had a significant relationship with functionality. However, PLCs who had time embedded in their workday several times a week did increase their functionality as PLC which was ultimately associated with an increase in SOL pass rates in both English and Math.

Implication four: School leaders in schools not already utilizing this framework should cultivate conditions conducive to establishing PLCs in schools. As finding five demonstrated, PLCs are being used prevalently in elementary schools in Virginia. Findings one and two support that this school improvement tool is associated with nearly 6% of the variance in the English and Math SOL pass rates.

Implication five: School leaders of PLCs should monitor the functionality of PLC to further enhance effectiveness. Though finding four showed no significant relationship between the years of experience of a PLC and functionality, this contradicts much of the available research. To support the general theme that PLCs evolved over time; school leaders should monitor the functionality of PLCs and provide the appropriate resources and supports as the need becomes evident.

Implication six: Policy makers should explore resources that would provide job embedded time for collaboration in PLCs. Finding seven showed a significant difference between mean scores of PLCs who met three –five times per week indicating that PLC effectiveness is positively impacted by meeting more frequently. Policy makers should examine options to ensure that adequate resources are available to schools to provide this essential piece of effective PLCs.

Considerations for Future Research

The purpose of this study was to examine relationships between the functionality of PLCs and student achievement in English and Math and to determine any relationship between years of experience as a PLC and the functionality of the PLC. Several potential areas for future research have emerged through this research process. The following are suggestions appropriate for further research.

- Additional studies are recommended with an expanded focus on middle schools and high schools to explore any predictive relationships between these same variables. Additionally, the addition of the percentage of children with disabilities is recommended as an additional control variable.
- Future studies could investigate the predictive relationship between each of the indicators in Hord's (1996) survey and student achievement. This focus could look more closely at more specific areas of PLCs to give principals additional focal areas.
- This study focused on the principals' perceptions of functionality. Future studies could explore teachers' perceptions of functionality and any predictive relationships on student achievement.

Reflections

The purpose of this study was to examine whether the functionality of a school's PLC had any impact on student achievement. By controlling for the effects of poverty on student achievement, this research was able to illustrate that there was a significant predictive relationship between the functionality of a PLC and student achievement. With all of the respondents indicating that their schools operated using a PLC framework, these findings demonstrate that the investment of resources in developing PLCs can result in increased achievement outcomes for students.

In looking back, I would make three changes to the methodology of this research. On the survey, I would ask respondents to provide the number of years their schools had operated as PLCs instead of giving them a forced choice of ranges of years. This would have increased the range of experience and provided more specific data to be considered. Second, I would have added another control variable to account for students with disabilities. This additional variable would have better mediated the impact larger percentages of students with disabilities have on

SOL pass rates. Lastly, I would have utilized the scores for each indicator on Hord's (1996) survey instead of the total score. This more detailed analysis could have been narrowed if more specific indicators of PLCs had predictive relationships with student achievement.

In closing, I have learned a considerable amount about the research process, statistics, and a wide array of information on PLCs. Despite some setbacks, I have persevered and found a way to make each setback an opportunity to learn something—even if I did not want to at the moment. Having led my elementary school through the process of becoming a high-functioning PLC over the previous five years, I am encouraged to see that challenging work can make a difference for children and in learning.

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Training in Human Subjects Protection



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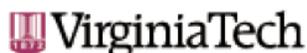
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Appendix C

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MEMORANDUM

DATE: December 14, 2016

TO: Carol S Cash, Kimberly Ann Pinello

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires January 29, 2021)

PROTOCOL TITLE: The Relationship Between Professional Learning Communities and Student Achievement in Virginia

IRB NUMBER: 16-921

Effective December 13, 2016, the Virginia Tech Institutional Review Board (IRB) Chair, David M Moore, approved the Amendment request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at: <http://www.irb.vt.edu/pages/responsibilities.htm>

(Please review responsibilities before the commencement of your research.)

PROTOCOL INFORMATION:

Approved As: **Exempt, under 45 CFR 46.110 category(ies) 2,4**
 Protocol Approval Date: **October 13, 2016**
 Protocol Expiration Date: **N/A**
 Continuing Review Due Date*: **N/A**

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals/work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Invent the Future

Appendix D
Survey Instrument

School and Professional Learning Community Information

Study Code: _____

Metropolitan Area: Northern Virginia

Richmond

Hampton Roads

1.a. What grade levels are served by your school? (ex. K-5, 3-4, etc.)

1.b. How many years in your current assignment?

2. What was your school's pass rate on the English SOL test for the 2015-2016 school year?

3. What was your school's pass rate on the Math SOL test for the 2015-2016 school year?

4. What percentage of your students was classified as economically disadvantaged during the 2015-2016 school year?

5. Teachers in this school participate in professional learning communities to some extent during the school year.

A. YES B. NO

If you answer NO to #5, STOP! You do not need to complete the remainder of the survey.

6. For how many years has your school utilize the PLC framework to guide your instructional program?

Please select the appropriate rating to best describe your school's participation as a PLC.

5. The degree to which teachers in this school participate in professional learning communities:

5- Part of the Culture – Job Embedded – Teachers are scheduled in PLCs 3 to 5 days per week during the school day

4 – Committed to meeting at least once per week (Meetings may be job embedded or scheduled before or after school)

3 – Regular meetings are scheduled for teachers one to two per month (Meetings be job embedded or scheduled before or after school)

2 – As Needed – PLC meetings are scheduled as needed – usually once per nine weeks or semester.

1 – Never – Finding time is difficult – PLCs do fit our work well for this school.

6. Professional learning communities in this school are led by

5 – A teacher leader facilitates the group

4 - Leadership is shared among teachers within the PLC group (co-leaders)

3 – Leadership is rotated within the PLC group

2 – Principal

1 – Varies – there is not a clear leader.

Please continue on to the School Professional Staff as Learning Community Questionnaire.

School Professional Staff as Learning Community Questionnaire

Directions: This questionnaire concerns your perceptions about your school staff as a learning organization. There are no right or wrong responses. Please consider where you believe your school is in its development of each of the five numbered descriptors shown in bold-faced type on the left. Each sub-item has a five-point scale. On each scale, circle the number that best represents the degree to which you feel your school has developed.

Date: _____

Name: _____

School: _____

1. School administrators participate democratically with teachers sharing power, authority, and decision making.	1a	5 _____ 4 _____ 3 _____ 2 _____ 1	Although there are some legal and fiscal decisions required of the principal, school administrators consistently involve the staff in discussing and making decisions about school issues.	Administrators invite advice and counsel from staff and then make decisions themselves.	Administrators never share information with the staff nor provide opportunities to be involved in decision making.
	1b	5 _____ 4 _____ 3 _____ 2 _____ 1	Administrators involve the entire staff.	Administrators involve a small committee, council, or team of staff.	Administrators do not involve any staff.

2. The staff shares visions for school improvement that have an undeviating focus on student learning, and these visions are consistently referenced in the staff's work.	2a	5 _____ 4 _____ 3 _____ 2 _____ 1	Visions for improvement are discussed by the entire staff such that consensus and a shared vision result.	Visions for improvement are not thoroughly explored; some staff members agree and others do not.	Visions for improvement held by the staff members are widely divergent.
	2b	5 _____ 4 _____ 3 _____ 2 _____ 1	Visions for improvement are always focused on students, teaching, and learning.	Visions for improvement are sometimes focused on students, teaching, and learning.	Visions for improvement do not target students, teaching, and learning.
	2c	5 _____ 4 _____ 3 _____ 2 _____ 1	Visions for improvement target high-quality learning experiences for all students.	Visions for improvement address quality learning experiences in terms of students' abilities.	Visions for improvement do not include concerns about the quality of learning experiences.

3. The staff's collective learning and application of the learnings (taking action) create high intellectual learning tasks and solutions to address student needs.	3a	5 _____ 4 _____ 3 _____ 2 _____ 1	The entire staff meets to discuss issues, share information, and learn with and from one another.	Subgroups of the staff meet to discuss issues, share information, and learn with and from one another.	Individuals randomly discuss issues, share information, and learn with and from one another.
	3b	5 _____ 4 _____ 3 _____ 2 _____ 1	The staff meets regularly and frequently on substantive student-centered educational issues.	The staff meets occasionally on substantive student-centered educational issues.	The staff never meets to consider substantive educational issues.
	3c	5 _____ 4 _____ 3 _____ 2 _____ 1	The staff discusses the quality of their teaching and students' learning.	The staff does not often discuss their instructional practices nor its influence on student learning.	The staff basically discusses non-teaching and non-learning issues.
	3d	5 _____ 4 _____ 3 _____ 2 _____ 1	The staff, based on their learnings, makes and implements plans that address students' needs, more effective teaching, and more successful student learning.	The staff occasionally acts on their learnings and makes and implements plans to improve teaching and learning.	The staff does not act on their learning.
	3e	5 _____ 4 _____ 3 _____ 2 _____ 1	The staff debriefs and assesses the impact of their actions and makes revisions.	The staff infrequently assesses their actions and seldom makes revisions based on the results.	The staff does not assess their work.
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4. Peers review and give feedback based on observing one another's classroom behaviors in order to increase individual and organizational capacity.	4a	5 _____ 4 _____ 3 _____ 2 _____ 1	Staff members regularly and frequently visit and observe one another's classroom teaching.	Staff members occasionally visit and observe one another's teaching.	Staff members never visit their peers' classrooms.
	4b	5 _____ 4 _____ 3 _____ 2 _____ 1	Staff members provide feedback to one another about teaching and learning based on their classroom observations.	Staff members discuss non-teaching issues after classroom observations.	Staff members do not interact after classroom observations.

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5. School conditions and capacities support the staff's arrangement as a professional learning organization.	5a	5 _____ 4 _____ 3 _____ 2 _____ 1	Time is arranged and committed for whole staff interactions.	Time is arranged but frequently the staff fails to meet.	Staff cannot arrange time for interacting.
	5b	5 _____ 4 _____ 3 _____ 2 _____ 1	The size, structure, and arrangements of the school facilitate staff proximity and interaction.	Considering the size, structure, and arrangements of the school, the staff are working to maximize interaction.	The staff takes no action to manage the facility and personnel for interaction.
	5c	5 _____ 4 _____ 3 _____ 2 _____ 1	A variety of processes and procedures are used to encourage staff communication.	A single communication method exists and is sometimes used to share information.	Communication devices are not given attention.
	5d	5 _____ 4 _____ 3 _____ 2 _____ 1	Trust and openness characterize all of the staff members.	Some of the staff members are trusting and open.	Trust and openness do not exist among the staff members.
	5e	5 _____ 4 _____ 3 _____ 2 _____ 1	Caring, collaborative, and productive relationships exist among all staff members.	Caring and collaboration are inconsistently demonstrated among the staff members.	Staff members are isolated and work alone at their task.

Hord, Shirley M. (1996). *School Professional Staff as Learning Community Questionnaire*. Available from:
 Southwest Educational Development Laboratory
 211 E. 7th St., Suite 200
 Austin, TX 78701-3253
<http://www.seidl.org>

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Appendix E

School Pass Rates and Economically Disadvantaged Students

School	English Pass Rate	Math Pass Rate	Economically Disadvantaged Students
1	89	95	69
2	79	79	79
3	88	95	64
4	65	63	76
5	75	74	27
6	74	86	81
7	79	73	78
8	75	78	18
9	60	68	68
10	75	72	62
11	90	94	10
12	88	95	39
13	79	76	37
14	81	74	31
15	75	72	46
16	72	87	63
17	77	76	31
18	80	86	65
19	86	92	10
20	77	83	60
21	83	84	18
22	73	72	67
23	90	91	3
24	95	96	5
25	80	79	25
26	90	93	14
27	81	83	61
28	73	83	64
29	74	74	58
30	95	95	12
31	83	87	55
32	86	94	13
33	93	89	2

School	English Pass Rate	Math Pass Rate	Economically Disadvantaged Students
34	83	81	22
35	84	91	17
36	89	89	10
37	90	92	28
38	86	94	11
39	72	77	78
40	88	88	4
41	90	94	8
42	93	93	9
43	88	91	15
44	90	93	13
45	86	86	12
46	78	79	36
47	87	84	12
48	72	76	61
49	78	77	74
50	83	85	50
51	72	76	62
52	89	91	15
53	81	85	15
54	80	84	51
55	91	89	2
56	72	75	87
57	68	76	70
58	92	92	2
59	70	74	78
60	76	84	42
61	93	93	3
62	72	75	90
63	85	88	20
64	85	85	40
65	85	88	11
66	79	85	19
67	89	92	8
68	79	86	27
69	70	72	90

School	English Pass Rate	Math Pass Rate	Economically Disadvantaged Students
70	87	89	7
71	91	90	6
72	89	91	9
73	90	88	4
74	85	84	36