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Implementing Professional Learning Communities in a High-Performing School District to Address Stagnating Student Performance

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This study explored the implementation of professional learning community (PLC) teams as a primary strategy for school improvement in the immediate schools (grades 3-6) and middle school (grades 7 & 8) of a high performing school district. The study used program theory as an evaluation approach (Chen and Rossi, 1992; Rogers, Petrosino, Huebner & Hacsi, 2000; Weiss, 1996). Through the use of a logic model, program theory was used to retrospectively investigate the PLC implementation steps taken by principals that were intended to change teachers’ practices and lead to higher levels of student achievement. The evaluation of the PLC implementation tested the program theory to see if it realized the desired outcomes and to identify what attributed to the outcomes. Analysis revealed a mixed alignment between the principals’ actions to the three main phases of the logic model (creating the conditions for success, collaboration and results). The results phase that assessed changes in teachers’ practices and increases in student achievement was least aligned. Over the four years, evidence suggested that instructional practices were discussed by teachers in PLC teams and were mostly implemented in the classroom. Student achievement scores remained mostly flat and student performance in writing actually declined during the period of the study. Recommendations for practice include specific steps that districts and principals can take in order for professional learning community teams to support changes in teachers’ practices and improved student achievement.
Implementing Professional Learning Communities in a High-Performing School District to Address Stagnating Student Performance

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Educational Doctorate Dissertation

Implementing Professional Learning Communities in a High-Performing School District to Address Stagnating Student Performance

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Raising Student Achievement in High-Performing School Districts

The capacity of countries to compete in the global economy is related to the quality of education provided to develop their workforce (McKinsey & Company, 2007; Spring, 1998). Unfortunately, the mediocre performance of American students on the National Assessment of Educational Progress (NAEP), the Trends in International Mathematics and Science Study (TIMSS) and the Program for International Student Achievement (PISA) (Cavanagh, 2012), foreshadow a serious economic downturn for our country. For this reason, developing an educated and highly skilled U.S. workforce is a key strategy for avoiding a future economic crisis (Alliance for Excellent Education, 2008; Edwards, Chronister, & Bomster, 2012; Kirsch, Braun, Yamamoto, & Sum, 2007; National Center on Education and the Economy, 2007). As President Barack Obama declared, “It is an undeniable fact that countries who out educate us today are going to out compete us tomorrow.” (The White House, 2011).

Problem

The No Child Left Behind (NCLB) legislation and the Race to the Top reform agenda underscore the importance of providing excellent educational programs in American schools as a way for our country to maintain its prominence in the global economy (Commission on No Child Left Behind, 2007, McKinsey & Company, 2010; OECD, 2011). Despite its promise, the reform effort catalyzed by NCLB has had limited success in increasing the math achievement of 4th graders and 8th graders and it has had no impact on improving reading achievement for either group (Dee & Jacob, 2010). Race to the Top legislation has yet to realize success.

According to the 2009 PISA results (OECD, 2010), the United States’ high school graduation rates rank near the bottom among developed nations belonging to the Organization for Economic Cooperation and Development (OECD). Of the thirty-four OCED countries, only
eight have a lower high school graduation rate than the U.S. On the PISA test, 15-year-old students in the United States scored at the average of the OCED countries in reading and science and below average in mathematics. This level of performance reflects stagnation in PISA scores for U.S. students over the past decade.

An analysis of student performance on the NAEP between the years 1990 and 2011 reveals only marginal improvements in math and continued stagnation in reading scores at the 4th grade and 8th grade levels (National Center for Education Statistics, 2011). In terms of achievement on the NEAP assessment in 2011, just over one-third of all 4th and 8th grade students were considered “proficient” in math and reading.

The pervasive problem of “stagnation” that exists on the national level also exists in Connecticut. Student achievement scores on Connecticut’s state assessments have remained relatively flat for the past decade. For grades three through eight, between the years 2006 and 2013, the total increase in the percentage of students in the state who scored at or above goal was 7.5% in reading, 7.5% in mathematics and only 2.1% in writing. Most troubling is the persistent and heavily documented achievement gap in Connecticut that is most evident between schools in poor and wealthy districts.

Although many DRG H and DRG I school districts in Connecticut are struggling to address issues related to low student performance, schools in districts where students historically register high scores on standardized tests – also referred to as “high-performing districts” – (DRG A and DRG B) face a different problem. Even though students in these higher performing

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1 DRG is a classification of districts whose students’ families are similar in education, income, occupation, need, and have roughly similar enrollment. The nine groups are labeled A through I. The most affluent and low-need districts, as measured by the indicators, are grouped in DRG A while the poorest and highest need districts are grouped in DRG I.

2 For the purposes of this study, a school district is considered high performing when at least 80 percent of its students are at or above goal in all three areas (math, reading & writing) on state assessments for two or more consecutive years.
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districts often score above the 90th percentile in proficiency on state assessments, their scores are stagnating. For example, between the years 2006 and 2013, student achievement scores for students in DRG A and DRG B towns on the Connecticut Mastery Test (CMT) have shown little growth. For grades 3-8, the total increase in percentage of DRG A and DRG B students who scored at or above goal was 3.3% in reading, 5.6% in mathematics and only 1% in writing.

In Castle, an affluent DRG B town that is considered a high-performing school system, student achievement has plateaued. In spite of many attempts at reform, student scores on the CMT in 2006 are comparable to those in 2010. For example, during this five-year period, the number of students in grades 3-8 that achieved goal in writing increased by only 0.2% from 81% in 2006 to 81.2% in 2010. As high-performing districts such as Castle work to address the problem of improving stagnating levels of student achievement, they find limited guidance on successful reform pathways to improvement because most of the current research literature focuses on how to help poorly performing schools improve. Little research exists on how high performing schools become better schools by increasing student achievement. To help address this gap in the literature and to gain insights on how a specific educational reform effort worked in a stagnating school district, this study will explore the improvement efforts of a high-performing district by examining how teachers’ practice and student achievement were influenced by the district implementation of professional learning communities.

Conceptual Frame

I put forth a conceptual frame to represent the theorized interdependence of the PLC strategy with principal leadership and professional learning, and to understand how PLCs can positively, if at all, impact teaching practices and student achievement. The conceptual framework (Figure 1) illustrates four key elements reflected in the research that can support a
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high-performing school district’s improvement strategy as it aspires to increase student achievement. According to this framework, a school district can improve (and thus address stagnation) by realizing higher levels of student achievement through (1) focusing the organization on the instructional core (Cohen & Ball, 1999; Doyle, 1983; Elmore, 2008; Elmore, & Burney, 1997). The strategy for achieving this focus is (2) through the implementation of professional learning communities across the district (Barth, 2001; DuFour et al., 2005; Eaker et al., 2002; Fullan, 2001). The successful implementation of the PLC strategy is informed by (3) the influence of principals and teachers as adult learners (Clarke & Elen, 2006; Deci & Ryan, 2000; Garet, Porter, Desimore, Birman, & Yoon, 2001; Markham & Gentner 2001; Sheckley 2003); and, (4) the effective leadership of principals through a sophisticated and coherent theory of instructional leadership (Elmore, 2002; Hightower, 2002; Lemons & Helsing 2008; Rosenholtz, Bassler, & Hoover, 1986).

Figure 1. Framework for District Improvement.3

The framework illustrates a theoretical systems approach to improving student achievement in a high-performing school district. The map identifies two theoretical lenses for

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3 Figure 1 is a schematic outline used to organize the discussion that follows. Specifics and details of the framework will be added to the framework based on the data collected and the analyses conducted in the study.
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change (adult learning and leadership) that reinforce one another to support the district strategy (professional learning communities) for improving student achievement. The framework attempts to develop coherence by (a) connecting the instructional core with the district-wide professional learning community strategy for improvement; (b) suggesting that the theoretical lenses (adult learning and leadership) can support or hinder effective implementation; and, by (c) illustrating interdependencies among the elements.

Implementing PLCs requires a theory of change that reflects an understanding of why and how the PLC strategy can achieve results. This study explores these issues through its methodology. Prior to describing the methods, I offer a brief summary of the relevant literature that undergirds the conceptual frame and informs the study.

Background Literature

**Instructional Core.** Research indicates that the most successful organizations maintain a sharp focus on their core mission. In the business world, Collins (2009) found that the *Good to Great* companies that his research team studied all exhibited a commitment to a simple clear concept (mission) that guided all their efforts. Comparative companies that did not make the jump from *Good to Great* did not exhibit this characteristic. For example, the research considered the case of Walgreens versus Eckerd Drugstores. In the early 1980s the two companies had virtually identical revenues ($1.7 billion). Over the next ten years, Walgreens adhered to its fundamental principle of providing the most convenient tightly clustered drugstores (preferably corner lots), with high profit per customer visits. Eckerd, on the other hand, opted to grow through the haphazard acquisition of stores with no cohesive single organizing idea and expanded itself into the home video market. Ten years later, sticking to its
fundamental principle, Walgreens had grown to over twice the revenues of Eckerd. Twenty years later, Walgreens was going strong while Eckerd ceased to exist as a company.

The mission of reform in the public schools is their ability to focus intently on the instructional core. The instructional core represents the important work that takes place in the classroom between the student, the teacher and curricular content (Cohen & Ball, 1999; Elmore 2000; Elmore & Burney, 1997; Hawkins, 1974). Research indicates that (a) meaningful educational reforms or initiatives affect the instructional core and (b) the capacity for change lies in the interactions between the teacher, student, and content (City, Elmore, Fiorman, & Teitel, 2009; Cohen & Ball, 1999). The center of Figure 1 represents the instructional core, the core focus and mission of a school.

In its assessments of how the world’s best-performing school systems come out on top, McKinsey & Company (2007)4 studied twenty-five of the world’s school systems including the top ten performing school systems. School systems were selected on the basis of their student performance on PISA, TIMSS or NAEP. The report analyzed the achievement of these best-performing school systems, reviewed over 500 pieces of literature and interviewed over one hundred policymakers and practitioners. One of the major conclusions of the report was that the only way to improve student-learning outcomes in these highest performing systems was to improve instruction through improving the quality of the interaction between teachers and students. The report asserts, “all the evidence from high-performing systems shows that the most effective way to deliver sustained and substantial improvements in outcomes is through sustained and substantial improvements in instruction” (p. 32). For example, the report highlights Boston Public Schools’ commitment to providing teacher professional development to improve

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4 McKinsey & Company is an 87-year-old American global management consulting firm and advisor to the world's leading businesses, governments and institutions. It is widely considered one of the most prestigious management consulting firms in the world.
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instruction as having a dramatic impact on student achievement. In just six years, Boston increased the number of its students meeting the NCAS standard from 25% to 74% in Math and from 43% to 77% in English. Specifically, the report suggests four lessons from high-performing school systems to help teachers improve instruction: (a) build practical skills during training; (b) place coaches in schools to support teachers; (c) develop instructional leadership; and, (d) have teachers learn from each other.

In their follow-up report, “How the world’s most improved school systems keep getting better,” McKinsey & Company (2010) analyzed twenty systems from around the world, all with improving but differing levels of performance. The report examined how each school system achieved significant, sustained and widespread gains in student outcomes, as measured by international and national assessments. Thirty-nine different international assessments that covered a variety of grade levels and multiple subjects were administered over a twelve-year time period (1995-2007). Based on more than 200 interviews with system stakeholders and an analysis of some 600 interventions carried out by these systems, the report identified the reform elements that helped to move school systems through the four stages of performance: poor to fair, fair to good, good to great and great to excellent. The report found the existence of six interventions common to all performance stages across the entire improvement journey. One of the common successful interventions evident in all performance stages was a school system’s ability to build the instructional skills of teachers and principals to affect the instructional core.

The authors found that as systems progressed through the various stages of performance, the engine for improving the instructional core was instructional practices. Specific common interventions that focused on improving the instructional core through instructional practices were also evident at each stage of development. For instance, for districts making the good to
great journey, instructional coaches worked with teachers in those districts to strengthen their pedagogical skills and the professional development experiences provided teachers more opportunity for self and peer learning. An example of this could be found in the good to great journey of Long Beach Union School District (LBUSD). In supporting the instructional core, LBUSD exhibited a commitment to creating specialized curriculum coaches for teachers in an attempt to have a common language and expectation around what constitutes good teaching. LBUSD’s results on the California’s state examinations showed that it had achieved 20%-75% improvements in grades two to five between the years 2004 to 2009.

Waters & Marzano’s (2006) meta-analysis study of 2,714 districts and the achievement scores of 3.4 million students found a statistically significant correlation between district leadership and student achievement ($r = 0.35$, $p<0.05$) when district administration established and monitored nonnegotiable goals for instruction. The districts involved had each adopted a broad common framework for classroom instructional design and planning that supported the instructional core.

The analysis by Rosenholtz et al. (1986) of 1,213 teachers in 78 elementary schools examined teachers’ perceptions of the school conditions that provided the greatest opportunities for professional development. The study revealed that one of the six reasons for 67% of the variance in teachers’ perceptions of their skill acquisition was explained by the school’s instructional coordination and goal setting. Schools with a strong normative environment focused on goals within the instructional core that promoted a view of teaching as a body of knowledge and skills that can be learned and developed over time. Rosenholtz also found that principals who exhibited a high level of confidence about teaching practices “seem able to galvanize their faculties for specific, goal-directed endeavors, increasing teachers’ clarity about what to pursue”
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(p. 69). The benefits of the principal being involved in the design and implementation of curriculum, instruction and assessment are supported by other authors (Stein & D’Amico, 2000, Marzano, Water & McNulty, 2005, The Wallace Foundation, 2012).

Over the past fifty years, there have been numerous theories of curriculum, instruction and assessment that have supported the work of the instructional core (Danielson, 2007; Marzano, 2007; Stiggins, Arter, Chappuis, & Chappuis, 2006; Wiggins & McTigh, 2005; Tomlinson 1999, Jacobs 1997). Despite these theories, the challenges for teachers and leaders of good systems pertaining to the instructional core are still to define what good instruction looks like, to establish clear guidelines about instruction and curriculum and to create meaningful opportunities for teachers to engage in collaborative dialogue about the instructional core (Elmore 2000, Lemons & Helsing 2008, McKinney & Company, 2007; Rosenholtz et al., 1986; Schmoker, 2006). For school districts that are seeking to improve, however, the research does not identify the barriers to impacting the instructional core that districts may encounter as they try to address stagnating student achievement.

According to City et al (2009), there are many forces in schools that pull the focus away from the instructional core and, in doing so, decrease the likelihood of instructional improvement. Schmoker (2006) suggests that there is a culture of privacy and non-disruption of the instructional core that supports the status quo and makes change in schools difficult. Elmore (2000) describes how buffers or barriers protect the instructional core “from outside inspection, interference or disruption” (p. 6). Sarason (1996) claims that the failure of school reforms is that they are not focused on teaching and learning in the classroom. Other educational critics have also warned about the detrimental effects of losing focus of what actually goes on in the classroom (Goodlad, 1984; Little, Gearheart, Curry & Kafka, 2003; Lortie, 1975; Little, 1990).
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The research reviewed in this section indicates that successful organizations maintain a sharp focus on their core mission. As this research applies to how high-performing school districts might improve, it suggests that schools could be successful in addressing the problem of stagnation in student achievement by focusing their work more sharply on the school’s instructional core. This study will explore the influence of professional learning communities as a district-wide strategy to focus on the instructional core in order to change teacher practice and increase student achievement.

Professional Learning Communities. There is a growing body of literature that supports the implementation of professional learning communities (PLCs) by school districts across the nation as a strategy to increase teacher professional knowledge and student learning (Annenberg Institute for School Reform, 2004; Darling-Hammond, 1996; DuFour & Eaker, 1998; Schmoker, 2002).

Historically, the concept of PLCs developed from the work in the early 1990s to re-culture schools as learning organizations to improve teachers’ work in order to make a difference in student achievement (Rosenholz, 1989; Newcomb, 2003; Little, 2003; Louis, 2006). Although there is no universal definition of a PLC (Stoll et al., 2006; Williams, Brien, Sprague & Sullivan, 2008), there are common characteristics of PLCs that emerge from the research. They are: (a) shared values and vision between teachers and administrators that focuses on student learning and decision making about instructional practice and collaborative learning efforts (DuFour, 2004; Hord, 1997; Kruse, Louis, & Bryk, 1994); (b) a collaborative culture that provides a mechanism for sharing responsibility for student learning and a means to work together toward a common purpose (Bolam et al., 2005; Kruse, Louis, & Bryk, 1994; DuFour & Eaker, 1998); (c) a focus on examining outcomes to improve student learning through a
commitment to continuous improvement and results-oriented thinking (DuFour, 2004; Kruse, Louis, & Bryk, 1994; Louis, 2006); (d) supportive and shared leadership between teacher leaders and administrators (Hord, 1997; Kruse, Louis, & Bryk, 1994; Louis & Kruse, 1995; McREL, 2003) PLCs; and, (e) shared personal practices that results from teachers working and learning together through collective inquiry (Hord, 1997; Kruse, Louis, & Bryk, 1994; Dufour 2004).

Improvement in student performance through changes in teacher practice is at the center of PLC work; however, there is limited empirical research to back up this claim. Only recently has literature begun to focus on the empirical evidence of changes in teachers’ practices and students’ learning as a result of PLCs.

For example, Supovitz (2002) reported on the Cincinnati Public Schools four-year effort between the fall of 1996 and the spring of 2000 to systematically improve instruction and student performance through the implementation of teaming structures in its schools. The study involved multiple sources of data and approximately 3,000 staff members in 79 elementary, middle and secondary schools across the district. The author reported the communities that developed were generally not communities engaged in instructional improvement. A survey was administered in each of the three years (1998, 1999 & 2000) that utilized a 5-point agreement scale ranging from Never to All or most of the time. Results showed the team-based schooling initiative had clear effects on the culture of schools. For example, in the spring of 2000, after four years of implementing teaming, the means of team-based and non-team-based responses showed that teachers in the team-based schools felt more involved in a variety of school-related decisions ($M_{tb}$=2.95 verses $M_{ntb}$=2.88, $p<.01$), had higher levels of collaboration with their peers ($M_{tb}$=3.06 verses $M_{ntb}$=3.01, $p<.05$), and reported significantly more interaction with their peers
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(Mt=3.51 verses Mn=3.38, p<0.01). However, the authors did not find that the culture characteristics translated into greater instructional focus. Overall, neither the individual teacher instructional practice (frequency that individual teachers employ instruction preparation and strategies) nor group instructional practices (frequency individual teachers worked with at least one other teacher on instruction) in the team-based schools were significantly different than those of teachers in the non-team-based schools. For example, in 2000, the mean score for individual instructional practice was Mt=3.81 verses Mn=3.81. The mean score for group instructional practice was Mt=3.39 verses Mn=3.37. Within the team-based schools, the authors found that only about a quarter of the teams across the district were frequently practicing academic preparation strategies, collective teaching practices and student grouping strategies.

The author also found no significant differences in student achievement between the team-based and non-team-based schools. In an analysis of 1999-2000 student achievement of students in Grades 3 through 8 in writing, reading, mathematics, and science, only two of the 20 regression results (10%) were statistically significant in favor of students in team-based schools. These scores were in 7th grade mathematics (β=0.09, p<.01) and science (β=0.06, p<.01); however, the author did find a relationship between the use of group instructional practices and increased student achievement in reading, writing, math, and science across the four grade levels. In 11 of the 20 (55%) of tests there was a positive and statistically significant relationship between group instructional practices and student achievement.

The study found that the team work in Cincinnati did not revolve around instructional practice, in part, because teams did not have the instructional process modeled for them. Virtually all the professional development available to teams focused on team processes, not instructional content. Without the instructional focus, the authors suggest that PLCs may have a
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positive effect on culture and teachers’ feelings of well-being, but not necessarily on student achievement. The authors conclude, “the results suggest that although these types of organizational reforms may succeed in improving the culture within which teachers teach, they alone are unlikely to improve instruction and student learning.” (p.1591).

These findings concur with the findings from Vescio, Ross and Adams (2008) whose analysis of 11 empirical studies published between 1990 and 2005 that focused on the impact of PLCs on teaching practice and student learning concluded that finding changes in teachers’ practice was “a relatively elusive activity” (p. 83) as only five studies (Dunne, Nave, & Lewis, 2000; Englert & Tarrant, 1995; Hollins, McIntyre, DeBose, Holins & Towner, 2004; Louis & Marks, 1998; Strahan, 2003) mentioned specific changes teachers made in their classrooms. In all of the studies, the authors found a general perception by teachers that their practices had changed; the studies provided much more specific information on how the culture had changed as a result of teachers’ participation in a professional learning community. Eight of the 11 studies (Berry, Johnson & Montgomery, 2005, Bolam et al., 2005, Hollins et al., Louis & Marks, 1998; Phillips, 2003, Strahan, 2003, Supovitz, 2002; Supovitz & Christman, 2003) found that student achievement increased in the schools where teachers participated in PLCs. Additionally, in five of the studies, the authors found that “student achievement gains varied with the strength of the plc in the school or with the specific focus of the efforts of teams or small communities of teachers” (p. 87).

Lomos, Hofman and Bosker (2011) also found evidence of increases in student achievement in their meta-analysis that investigated the effect of professional communities on student achievement at the secondary level (student ages 11-18). The meta-analysis of five studies conducted between 1995 and 2005 included 1355 schools from three countries, namely
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USA, England and The Netherlands. The effects sizes of the five individual studies were varied, but positive, ranging from small (d= 0.22) to medium (d=0.58). The meta-analysis resulted in a summary effect of $d= 0.25$, $p < 0.05$, suggesting an overall positive and significant relationship between professional learning communities and student achievement.

In times of greater accountability and limited resources, it is important that school systems be able to show how PLCs change, not only culture, but teaching practices and student achievement. The growing body of research suggests that this may be possible, but it is not yet common practice. As applied to this Capstone Project, the literature suggests that the implementation of professional learning communities has the potential to address the stagnation in student performance through changes in teacher practices.

**Professional Learning.** Realizing higher levels of students’ academic achievement requires creating the conditions where both principals and teachers have the opportunity for continual learning (Clarke & Elen 2006; Darling-Hammond, 1997; Deci & Ryan, 2000; DuFour & Marzano, 2009; Garet et al., 2001; Markham & Gentner, 2001; Patterson et al., 2008; Sheckley, 2003).

Research suggests that professional development experiences are more likely to improve student achievement if they are sustained, promote coherence by alignment to other reform efforts, focus on student learning, are connected to teachers’ prior experiences, and engage individuals in meaningful discourse (Garet et al., 2001; Knapp, 2003; Supovitz, Mayer, & Kahle, 2000). For example, using regression analyses based on a survey of 1,027 mathematics and science teachers Garet et al. (2001) found that the most important professional development features for increasing knowledge and skills were a focus on content knowledge ($\beta=0.33$, $p<0.001$), opportunities for hands-on, active learning ($\beta=0.14$, $p<0.001$), and greater coherence
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of professional development activities with other learning experiences ($\beta=0.42$, $p<0.001$). Additionally, increased knowledge and skills ($\beta=0.44$, $p<0.001$) and coherence of professional development activities ($\beta=0.21$, $p<0.001$) had positively influenced changes in classroom practice. Longer time spans and more content hours for professional development had a substantial positive influence on opportunities for active learning ($\beta=0.30$ and $\beta=0.31$, both $p<0.01$) and coherence ($\beta=0.26$ and $\beta=0.16$, both $p<0.001$). The authors concluded: “To improve professional development, it is more important to focus on duration, collective participation and the core features (i.e., content, active learning, and coherence) than type. Similarly, in a review of nine studies, Yoon, Duncan, Lee, Scarloss & Shapley, 2007) found that sustained and intensive professional development was related to student achievement. Teachers who received substantial professional development, an average of 49 hours in the nine studies, increased their students’ achievement by about 21 percentile points (ESm=0.54). The three studies of professional development lasting 14 or fewer hours showed no effects on student learning, whereas other studies of programs offering more than 14 hours of sustained teacher learning showed significant positive effects (ESm=0.59). The largest effects (ESm = 2.39, ESm = 1.11, ESm = 0.97) were found for programs offering between 30 and 100 hours spread over 6-12 months.

Research also suggests that professional development experiences for teachers and principals are most successful when they are designed in accordance with principles of how adults learn best (Darling Hammond & Richardson, 2009; Garet, Porter, Desimon, Birman, & Yoon, 2001; Sheckley, Lemons, Kehrhahn, & Grenier, 2009; Sousa, 2009). According to the research, adults learn best when learning experiences require them to construe and make sense of situations based on the mental models they use to guide their practice (Brooks, 2007; Ertmer &
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Newby, 1996). These mental models are then used to make sense of and compare new situations in terms of prior experiences and to inform new mental models (Hofstader, 2001; Seel, 2006). Through this sense-making process, guided by their mental models, adults self-determine and self-regulate their actions to meet their innate needs for competence, autonomy and relatedness (Deci & Ryan, 2000).

Since learning is a by-product of reasoning and doing (Markham & Gentner, 2001; Mintzberg, 2005; Sheckley, 2003), adults learn best by engaging in direct experiences where they use new information instead of participating in training sessions where they hear about new information (Bennis, 1997; Block, 2003; Elmore, 2003). Deep learning occurs most often when individuals engage in direct, action-oriented experience (Mintzberg 2005). Engaging adults in new learning experiences helps to provide them with explicit and tacit knowledge to guide their performance on complex tasks (Clark & Elen, 2006; Reber, 1993). For example, the research by Saylor and Kehrhahn (2003) illustrated how middle school teachers successfully achieved technology literacy through focused, embedded professional learning experiences that included ongoing deliberate practice, technical support and social support for the team of teachers. Before the study, many of the 65 teachers had barely touched a computer. By the end of the first year of the three-year study, 79% of the teachers had reached or exceeded the technology literacy goals.

Changing the working environment also provides a powerful way for adults to learn (DuFour, Dufour, Eaker, & Karhanek, 2010; Patterson et al., 2008; Taylor & LaBarre, 2006). According to the research, the working environment can increase learning when it promotes constructive controversy where (a) inquiry is the norm (Alper, Tjosvold, & Law, 1998), and (b) new learning is fostered as a complex social process that occurs between individuals and within groups (Cress & Hesse, 2006). From a survey of 544 employees that included 69 teams, Alper,
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Alper, Tjosvold and Law (1998), studied the effectiveness of self-managed teams through the goal-setting process and the behavioral interactions of team members. They found that existence of both cooperative team goal setting and constructive controversy resulted in team confidence ($\beta = 0.64, p<0.01$), and greater team effectiveness ($\beta = 0.63, p<0.01$). Goal interdependence also had a positive effect on team confidence ($\beta = 0.15, P<0.05$). Additionally managers and team members viewed constructive controversy as an important factor in rating a team’s effectiveness ($b=0.63$ and $0.43$ respectively, both $p<0.01$). The findings suggest that the relationships and interactions within teams can greatly impact the overall success of teams.

Constructing the work performed in schools around collaboration and teams versus the individual, a growing trend in education (Carroll, 2009; Dufour, DuFour, & Eaker, 2008; Fullan 1993; Langer; 2000, Senge, Kleiner, Roberts, Ross & Smith, 1994; Smith, Hofer, Gillespie, Solomon & Rowe, 2003), has been shown to significantly improve individual and team performance (Gully, Incalcaterra, Joshi & Beaubien, 2002; Alper, Tjosvold & Law, 1998). For example, in a 5-year qualitative study of 25 school districts (44 teachers in 14 high-performing schools and 11 average-performing schools) that were attempting to improve students' literacy abilities, Langer (2000) concluded that the effective schools and districts were those that focused not on individual teachers but on groups of teachers within schools. Teachers within these schools participated in a variety of professional learning communities. In their research on adult education, Smith et.al, (2003) found that teachers from the same adult education program changed their thinking and practices more after participating together in professional development, as compared to teachers who participated without other teachers from their own workplace.
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Similarly, in a meta-analysis of sixty-seven studies yielding 256 effect sizes, Gully et al, (2002) found that effect sizes at the team level (ESsm=0.39) were nearly double those at the individual level (ESsm=0.20). At the team level, both team efficacy (the belief that the team has in its capacity to accomplish a specific task or realize a goal) and potency (the team’s general belief in its ability to be successful no matter what the task) not only supported collaborative efforts but they positively related to increased team performance (ESsm =0.41 and 0.37, respectively).

According to Fullan (1993), “without collaborative skills and relationships, it is not possible to learn and to continue to learn” (p18). Teachers and principals work in an environment that provides them with opportunities to make sense, work as members of a team, develop new mental models and actually do the work.

As applied to the Capstone Project, the literature suggests that the implementation of professional learning communities would be most successful when supported by the research on professional learning and how adults learn best.

Principal Leadership. Research in the last decade on school reform and effective schools has been very clear in its claim that school improvement and increased student achievement are significantly influenced at the building level by the school principal (Marzano, Waters, & McNulty, 2005; Leithwood et al., 2007). The evidence suggests significant effects of leadership actions on student learning across the spectrum of schools, which includes high-ye performing schools (Louis et al, 2010). Today, principal leadership is one of top priorities for school reform. For example, a survey of school and district administrators, policy makers and others in the field of education, named principal leadership second only to teacher quality when
they were asked to rank in importance 21 contemporary educational issues (Simkin, Charner & Suss, 2010, p. 9-10).

In their report of research to The Wallace Foundation5, Leithwood, Louis, Anderson, and Wahlstrom (2004) found that there is “little doubt that both district and school leadership provides a critical bridge between most educational-reform initiatives, and having those reforms make a genuine difference for all students” (p. 14). A report issued by the Southern Regional Board of Education suggests that “a principal can impact the lives of anywhere from a few hundred to a few thousand students during a year” (Schmidt-Davis & Bottoms, 2011, p4).

A review of numerous research studies and over 70 reports published by the Wallace Foundation since 2002 found “a particularly noteworthy finding is the empirical link between school leadership and improved student achievement” (Wallace Foundation, 2013, p. 5). Several other studies have identified how principals play an essential role in leading effective schools. For example, in a study of 145 California elementary schools serving largely low-income students, Williams, Kirst and Haertel (2005) found that student achievement levels were as much as 250 points higher on the state’s academic performance index where principals undertook and led the school reform process. In a meta-analysis conducted by Waters and Cameron (2007) that examined 69 studies involving 2,802 schools, the ratings for principal’s leadership were positively correlated ($r = 0.25$, p<0.05) with more than 1.4 million student achievement scores.

According to the authors, “the study validates the opinions expressed by leadership theorists for decades that leadership competencies have shown a statistically significant relationship between school leadership and student academic achievement” (p. 41).

5The Wallace Foundation is a 92 year old national philanthropy that seeks to improve education for disadvantaged children in the US by funding projects to test innovative ideas for solving important social problems, conducting research to find out what works and what doesn’t and to fill key knowledge gaps – and then communicating the results to help others.
Research on theoretical frameworks designed to identify behaviors that link principals’ leadership and increased academic achievement (Davis, Darling-Hammond, LaPointe & Meyerson, 2005; Department of Education and Training, Victoria, 2007; Elmore, 2000, Marzano, Waters, & McNulty, 2005; Waters & Cameron, 2007) suggest common themes that link principal behaviors to increased academic achievement. For example, important elements of these frameworks include a school’s ability to assume the collective ownership for student learning in the culture of the school (Dufour, Dufour, & Eaker, 2008; Lee & Smith; 1996); developing trust between teachers and principals (Bryk & Schneider, 2002; Dufour, Dufour, & Eaker, 2002; Goodlad, 1984); developing coherence of internal and external elements to support teaching and learning (Childress, Elmore, Grossman, & King, 2006; Elmore, 2002; Marzano, 2003; Marzano & Schmoker, 1999; Newman, Smith, Allenswoth, & Bryk, 2001; Runyan & Cater, 2005); and, instituting an urgency for change (Kotter, 2002; Maxwell, 1998).

Specifically, the most recently published report by The Wallace Foundation (2013) that reviewed the research and field practices, suggests five practices that are central to effective school leadership: (1) Shaping a vision of academic success for all students, one based on high standards; (2) Creating a climate hospitable to education in order that safety, a cooperative spirit and other foundations of fruitful interaction prevail; (3) Cultivating leadership in others so that teachers and other adults assume their part in realizing the school vision; (4) Improving instruction to enable teachers to teach at their best and students to learn at their utmost; and, (5) Managing people, data and processes to foster school improvement. According to the authors, “research shows that most school variables, considered separately, have at most small effects on learning. The real payoff comes when individual variables combine to reach critical mass. Creating the conditions under which that can occur is the job of the principal” (p. 5).
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One of the most popular emerging themes in the research is a call for instructional leadership (Leithwood, Jantzi & Steinbach, 1999; Marzano et al., 2005; Rorrer, Skrla & Scheurich, 2008). The literature indicates that a high-performing school district can address stagnating student performance and realize higher levels of student achievement by building the capacity of principals to have a sophisticated and coherent theory of instructional leadership (Elmore, 2002; Hightower & McLaughlin, 2006; Lemons & Helsing, 2008; Rosenholtz, Bassler, Hoover & Dempsey, 1986). For example, (Louis et al, 2010, p37) found that school leadership practices targeted at improving instruction indirectly had a statistically significant effect on student achievement.

Also, a characteristic of high-performing schools is their ability to build the instructional skills, knowledge and abilities of their teachers in order to improve student achievement (Rosenholtz et al., 1986). Improving student learning, even within an already high-performing school system, is only possible through improving the quality of instruction (Lemons & Helsing, 2008; McKinsey & Company, 2007) and developing cultures within schools that support the use of effective instructional practices (Augustibe, Gonzalez, Schulyler-IKemoto, Russell, & Zellman, 2009). This emphasis on instruction requires principals to acquire a greater sophisticated understanding of the instructional leadership (Elmore 2002; Hightower, 2002, Lemons & Helsing 2008; Spillane, Halverson, Diamond, 2001; Rosenholtz et al, 1986).

The literature also calls for effective principal leadership of professional learning community teams (Dufour et al., 2008; Louis, Leithwood, Wahlstrom, & Anderson, 2010; Marzano, Waters, & McNulty, 2005); however, there is limited empirical evidence that administrators’ actions in a professional learning community directly impact teacher practices and increase student achievement. In a national study of 601 elementary schools and over
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700,000 third-grade students, Byrd, Huffman and Johnson (2007) identified the actions of administrators in professional learning communities that significantly impacted students’ reading achievement over the four-year period between the time the students entered kindergarten in 1998-99 and when the students were third graders in 2001-2002. The results of the multilevel analysis revealed that principals’ direct impact on student reading achievement was not statistically significant ($t = -0.315, p=0.75$); however, the authors found that principals who created a climate of collective learning and sense of belonging among teachers had the greatest positive impact on student achievement ($t = 2.003, p = .025$). The study suggests that “the indirect effect of principals in creating professional learning communities is relevant to increasing student achievement” (p. 26). This finding concurs with the findings of Cotton (2003), who, citing the research of colleagues, concluded that while a small portion of the principals effect on student achievement may be direct and influential—most of it is indirect, mediated through teachers and others (p. 58). It is also consistent with the findings of Louis, Leithwood, Wahlstrom & Anderson’s (2010) four-year study of the effects of leadership on state student achievement tests for literacy and mathematics in 43 school districts, and 180 elementary, middle and secondary schools. The authors found that when principals share leadership with teachers, (a) teachers’ working relationships with one another are stronger and student achievement is higher and (b) teachers feel attached to a professional community and are more likely to use instructional practices that are linked to improved student learning.

According to the research, effective leadership is about creating the conditions for success. According to Waters, Marzano & McNulty (2003, p. 2), “effective leadership means more than knowing what to do—it’s knowing when, how, and why to do it.” As applied to this
Capstone Project, the literature suggests that the implementation of professional learning communities would be most successful when supported by the research on principal leadership.

**Research Questions**

The research suggests that implementing professional learning communities in a school district as a strategic strategy to address stagnating student performance has the potential to impact teacher practice and increase student achievement. This study will investigate the type of influence that PLCs may have had on teacher practice and student achievement in the Castle school district by answering the following research questions. In one high-performing school district:

1. In what ways, if any, did the implementation of professional learning communities change teachers’ practice?

2. In what ways, if any, did the implementation of professional learning communities lead to increases in student achievement?

**Methods**

The study adopts an exploratory case study approach that triangulates multiple sources of evidence (Yin, 1994) and uses program theory (Rodgers et al., 2000) as an analytic technique to examine the lessons learned from the implementation of PLCs in Castle. This section describes the details of the district, the PLC initiative, the analytic strategy, the data sources, and the data analysis used to answer the research questions.

**Setting**

The town of Castle is primarily an upper middle-class, residential community. Although it has evolved into a suburban town, Castle maintains much of its traditional rural character. According the United States Census 2012, Castle has a population of 11,316. The median
household income in castle is $86,433 with only 1.3 percent of the population living below the poverty line and an unemployment rate of 6.0%. Castle is a relatively homogeneous town. Its population is roughly 91 percent white/Caucasian, 4.0 percent Hispanic, 2.0 multi-race, 1.0 percent Asian and 1.0 black/African American, and 2.0 other/multi-race.

Castle Public Schools serves 2,100 students. The school district has one high school (grades 9-12), one middle school (grades 7-8), two intermediate schools (grades 3-6), and one primary school (grades pre-K- 2). The student composition is 94% white, approximately 7% of the student population is eligible for free/reduced meals and 8% of the students receive special education services.

Castle is in Connecticut’s District Reference Group B, which means it is one of twenty-one school districts considered by the state as the most affluent and low-need districts. District Reference Groups (DRGs) is a classification system in which school districts that have public school students with similar socioeconomic status (SES) and needs are grouped together. The nine groups are labeled A through I. The most affluent and low-need districts, as measured by the indicators, are grouped in DRG A while the poorest and highest need districts are grouped in DRG I. DRG B includes twenty-one of the 169 school districts in Connecticut. These twenty-one districts are high SES communities. Their median family income, education level and percent in managerial or professional occupations are second only to schools districts in DRG A.

Castle’s education operating budget at the commencement of this study in the fall of 2009 was $26,250,004. The subsequent three-year average operating budget increase that covered the time period of the study was 0.88 percent. In the annual Connecticut Public Schools Expenditure Report (2009-2010), that ranks 166 towns from the highest to the lowest Net Current Expenditure Per Pupil (NCEP), Castle’s 2009-2010 NCEP was $11,805. It ranked 142nd out of
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166 districts, meaning that it spent less on education per pupil than 141 of the other school districts.

The data collection will focus on the time period from the fall of 2009 through June 2013. This time period coincides with the district strategy to implement professional learning communities across the district and with my tenure as Superintendent of Schools. Grades 3-8 are covered by the study. The two intermediate schools and the middle school is the setting. The two intermediate schools and middle schools are located in the center and north end of the town. These three schools were chosen to limit the scope of the study. Specifically, it made the collection of data manageable; it did not include the high school since the high school had already been implementing professional learning with dedicated team time since 2006; and, the study only included the two elementary schools that administered the Connecticut Mastery Tests to measure student achievement. The K-2 primary school does not use CMTs.

Table 1 compares the enrollment and demographics of the three schools and the district during the four-year time period of the study. The data reveals an 8% decline in enrollment across the district. The percentage of students receiving special education services remained relatively steady in the two intermediate schools and district; however, the middle school showed a 2.7% increase. Most significant is the change in the percentage of students eligible for free/reduced meals in the district (from 3.8% to 8.5%) and in the Intermediate School B which reflects a 7.5% increase (from 5.1% to 13.8%).
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Table 1

Enrollment and demographic information for the two intermediate schools, middle school and district (2009-2013)

<table>
<thead>
<tr>
<th></th>
<th>Intermediate School A</th>
<th>Intermediate School B</th>
<th>Middle School</th>
<th>District</th>
</tr>
</thead>
<tbody>
<tr>
<td>student enrollment</td>
<td>350</td>
<td>315</td>
<td>331</td>
<td>315</td>
</tr>
<tr>
<td>% of students eligible for free/reduced meals</td>
<td>4.3%</td>
<td>8.6%</td>
<td>5.1%</td>
<td>13.8%</td>
</tr>
<tr>
<td>% of students enrolled in special education</td>
<td>8.1%</td>
<td>10.7%</td>
<td>9.4%</td>
<td>8.0%</td>
</tr>
</tbody>
</table>

Table 2 illustrates student academic performance of each school prior to the study. It shows, with few exceptions, that student achievement on the CMT was relatively compatible between both intermediate schools. Overall, students in the middle school scored consistently higher than the students in the intermediate schools. Also, more students performed better in math and reading in grades 3-8 over the four-year period than they did in writing. On average, during this time period, only 12.5 percent of students did not make goal in math, only 12.5 percent of students did not make goal in reading versus 19 percent of students that did not make goal in writing.

Table 2

Percent of students at or above goal or higher on the CMTs between 2006 and 2009

<table>
<thead>
<tr>
<th></th>
<th>Intermediate School A</th>
<th>Intermediate School B</th>
<th>Middle School</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Math</td>
<td>Reading</td>
<td>Writing</td>
</tr>
<tr>
<td>2006</td>
<td>82</td>
<td>76</td>
<td>76</td>
</tr>
<tr>
<td>2007</td>
<td>82</td>
<td>81</td>
<td>78</td>
</tr>
<tr>
<td>2008</td>
<td>85</td>
<td>78</td>
<td>81</td>
</tr>
<tr>
<td>2009</td>
<td>90</td>
<td>87</td>
<td>80</td>
</tr>
</tbody>
</table>

When compared against other high-performing schools in the DRG, the data reveals that while student achievement is high in some years for some disciplines, it tends to be erratic and
inconsistent. For example, when compared to the DRG, the district’s academic achievement lags behind some of the other schools. Out of the twenty-one districts in the DRG, some higher-performing districts have exhibited a general ability for their students to consistently perform in the top twenty-five percent of the DRG when comparing their district performance on standardized tests at nearly every grade level for every type of test administered. Castle has not been able to achieve this same level of consistency for student performance. Rather, yearly student achievement data tends to fluctuate across grade levels and subjects. Table 3 shows the fluctuation in district student achievement and the inability of the student achievement to be consistently ranked in the top 25% of the DRG on the Connecticut Mastery Test between the years 2006 and 2009. For example, over the four-year period, student performance only managed to be in top 25% of the DRG in 53% of all of the tests administered.

Table 3

*Castle’s percentile ranking in the DRG for the total number of students at or above goal on the CMTs between 2006 and 2009*

<table>
<thead>
<tr>
<th></th>
<th>Grade 3</th>
<th>Grade 4</th>
<th>Grade 5</th>
<th>Grade 6</th>
<th>Grade 7</th>
<th>Grade 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math</td>
<td>98</td>
<td>53</td>
<td>63</td>
<td>98</td>
<td>97</td>
<td>97</td>
</tr>
<tr>
<td>Reading</td>
<td>98</td>
<td>23</td>
<td>48</td>
<td>83</td>
<td>71</td>
<td>92</td>
</tr>
<tr>
<td>Writing</td>
<td>83</td>
<td>13</td>
<td>3</td>
<td>38</td>
<td>97</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>83</td>
<td>48</td>
<td>73</td>
<td>93</td>
<td>97</td>
<td>97</td>
</tr>
<tr>
<td>Reading</td>
<td>58</td>
<td>43</td>
<td>28</td>
<td>83</td>
<td>92</td>
<td>82</td>
</tr>
<tr>
<td>Writing</td>
<td>43</td>
<td>38</td>
<td>78</td>
<td>68</td>
<td>82</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>43</td>
<td>58</td>
<td>53</td>
<td>98</td>
<td>97</td>
<td>82</td>
</tr>
<tr>
<td>Reading</td>
<td>78</td>
<td>33</td>
<td>80</td>
<td>83</td>
<td>92</td>
<td>71</td>
</tr>
<tr>
<td>Writing</td>
<td>58</td>
<td>28</td>
<td>8</td>
<td>53</td>
<td>82</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>98</td>
<td>48</td>
<td>98</td>
<td>98</td>
<td>71</td>
<td>79</td>
</tr>
<tr>
<td>Reading</td>
<td>83</td>
<td>10</td>
<td>88</td>
<td>88</td>
<td>76</td>
<td>71</td>
</tr>
<tr>
<td>Writing</td>
<td>78</td>
<td>28</td>
<td>63</td>
<td>83</td>
<td>76</td>
<td>13</td>
</tr>
</tbody>
</table>
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Despite stagnating and inconsistent student achievement, prior to 2009, strong, consistent and effective superintendent leadership resulted in good things happening in the district. For example, Castle High School has been recognized as a 2006 Connecticut State Department of Education Vanguard High Performing School and the June 2008 edition of The Hartford Magazine rated Granby number one for education in the small suburban town category. There was also much community support for education as evidenced by completed construction projects at all of the schools and the successful adoption of annual operating budgets without the need for referendums.

Professional Learning Communities Initiative

Castle Public Schools officially embarked upon a district-wide implementation of professional learning communities in the fall of 2009. As outlined in Table 4, between 2002 and 2009, the high school was the only school in the district that had been implementing PLC practices. As the principal of Castle High School from 2002-2008, I was responsible for the implementation of PLCs as the high school’s main strategy for school improvement. Since the implementation of PLCs at the high school, student achievement of high school students has shown encouraging growth. For example, as illustrated in Table 5, between 2002 and 2009, the
percent of students at or above goal on the Connecticut Academic Performance Test (CAPT) rose by 15.1% in math, 11.4% in science, 17% in Reading Across the Disciplines, and 9% in Writing Across the Disciplines. Also, in 2006, Castle High was recognized by the Connecticut State Department of Education as the first Connecticut Vanguard High Performing School for its high level of student achievement best instructional practices. The schools accomplishments as a PLC were also profiled on the http://www.allthingsplc.info/ website and in the book: Revisiting professional learning communities at work: new insights for improving schools (DuFour, Dufour, & Eaker, 2008).

Table 5
Percentage of 10th grade students at goal on the Connecticut Academic Performance Test.

<table>
<thead>
<tr>
<th>Year</th>
<th>Math</th>
<th>Science</th>
<th>Reading</th>
<th>Writing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>64.4</td>
<td>62.8</td>
<td>56.3</td>
<td>70.3</td>
</tr>
<tr>
<td>2009</td>
<td>79.5</td>
<td>74.2</td>
<td>73.3</td>
<td>79.5</td>
</tr>
</tbody>
</table>

Significant professional development activities that preceded this study included in 2003, the provision of one hour of dedicated team time for all high school teachers, and in 2005, the high school was the host site for a three-day PLC National Summer Institute.

I was appointed the Superintendent of Castle Public Schools in the fall of 2008 and as part of the Board’s strategic plan, in 2009, all of the schools began to implement the same PLC structures and practices in their schools with the specific focus on the use of collaborative teams to improve instruction and student learning, specifically by addressing the four questions of a PLC (DuFour, DuFour, Eacher, 2008) as the integral work of the teams:

1. What do we want students to know and be able to do?
2. How will we know when they have learned it?
3. How do we respond when they don’t learn?
4. How do we respond when they already know it?
All teachers in the district became members of PLC teams and were trained in team processes, goal setting, data driven decision making, and common formative assessments. Table 6 below outlines some of major implementation actions and professional development activities that have taken place from 2009-2013.

Table 6

<table>
<thead>
<tr>
<th>Action</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rick &amp; Rebecca DuFour staff summer institute</td>
<td>summer 2009</td>
</tr>
<tr>
<td>PLCs implemented in all schools</td>
<td>fall 2009</td>
</tr>
<tr>
<td>PLC team protocols and continuum developed</td>
<td>fall 2009</td>
</tr>
<tr>
<td>PLC expectations for administrators established</td>
<td>fall 2009-2013</td>
</tr>
<tr>
<td>SMART goal and common assessment professional development for all staff</td>
<td>fall 2009</td>
</tr>
<tr>
<td>Schedule changes made at all schools to accommodate for PLC teams</td>
<td>fall 2010</td>
</tr>
<tr>
<td>Administrator PLC training during summer institutes</td>
<td>summer 2010 &amp; 2011</td>
</tr>
<tr>
<td>Team &amp; administrator on-site coaching provided by PLC consultant</td>
<td>spring 2010</td>
</tr>
<tr>
<td>Data driven decision-making professional development provided to all PLC teams</td>
<td>fall 2011</td>
</tr>
<tr>
<td>PLC Team protocols and rubrics revised and implemented</td>
<td>winter 2011</td>
</tr>
<tr>
<td>BOE PLC study commissioned</td>
<td>fall 2013</td>
</tr>
<tr>
<td>Recommendations from the BOE PLC study presented</td>
<td>spring 2014</td>
</tr>
</tbody>
</table>

Some of the most important professional development events that occurred during this timeframe included: in 2009, Richard and Rebecca DuFour (national authors and leaders in the field of PLC) provided two days of onsite district wide PLC professional development; between 2009 and 2013; all principals attended PLCs Summer Institutes; in 2010, all schools made changes to their schedules to accommodate dedicated time for the PLC team meetings; and, in
2010, PLC teams and administrators received on-site coaching and training by a PLC consultant who visited the district for two days. This visit resulted in the development of new PLC team protocols and rubrics that have been utilized districtwide to guide the work of the teams. Annual PLC expectations developed by the superintendent of schools for all administrators outlined the critical leadership role that principals are expected to play in implementing PLC teams. For example, excerpts from the 2009 *Expectations for Administrators* requires principals to:

- Model culture, values, expectations, and knowledge of professional learning communities;
- Build shared knowledge about PLCs with staff, parents and the community;
- Engage *all* teachers in collaborative teams of teachers that meet regularly during the school day with the focus of increasing student learning;
- Ensure that PLC teams of teachers focus on instruction and student learning with measurable and achievable goals (SMART goals) that are aligned to the district achievement goals;
- Use data, formative common assessments (at least 8) in PLC teams and best practices to make decisions about instruction, curriculum and RTI interventions for students;
- Monitor, support and provide feedback on the work of collaborative teams;
- Identify ongoing PLC professional development needs for your building; and,
- Create rituals and celebration that recognize the work of teachers and students in a professional learning community.

The implementation of the culture and practices of a professional learning community remains today as the district’s strategy for improving student achievement; however, a formal evaluation of the success of the PLC initiative has not been undertaken. The research questions in this study help provide some evidence as to the challenges and success of the core academic PLC teams in grades 3-8.

**Analytic Strategy**

The study will use analytic techniques of program theory to examine changes in teachers’ practice and changes in student achievement through the implementation of professional learning community teams.
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Program theory has two essential components, one conceptual and one empirical. It consists of an explicit theory or model of how the program causes the intended or observed outcomes and an evaluation that is at least partly guided by this model. A key element in program theory is the idea that theory-based evaluations could be used to strengthen the validity of evaluation without random assignment (Weiss, 1998). Program theory is being utilized in this study as an evaluation tool for retrospectively learning lessons about the implementation of the professional learning community strategy in Castle Public Schools. The evaluation of the implementation will test the program theory to see if it had the desired outcome and to identify what it is about program theory that attributed to the outcomes. Using a logic model (see Appendix A), it attempts to explain how and why the professional learning community strategy is supposed to change teachers’ practice and lead to higher levels of students achievement.

Data Sources

Four data sources will be used in the proposed study to answer the research questions that guide this study. They include interview data from superintendents and administrators with leadership experience, primary documents as they relate to the work of PLC teams, instructional data from PLC teamwork and principals’ feedback, and survey data that assesses teachers’ perceptions about their school’s PLC progress. (See Appendix F for the alignment of the data sources and research questions.)

District primary documents. The research included the analysis of several district primary source documents between 2009 and 2013, including Board Goals, Strategic School Profiles, district newsletters, District Improvement Plans, School Improvement Plans, Administrators’ Theories of Action, Agendas and Minutes from Administrative Council
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Meetings and PLC team meetings, PLC team logic model and rubric, PLC team SMART goals and end-of-year PLC teams’ feedback. The documents used are listed in Table 7 below:

Table 7

<table>
<thead>
<tr>
<th>Artifact</th>
<th>Description</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLC Protocols and Continuum</td>
<td>District established protocols and rubrics to guide the work of the PLC teams.</td>
<td>2009</td>
</tr>
<tr>
<td>Agendas &amp; minutes from Leadership Team</td>
<td>Each school has a leadership team that oversees each school’s administration of school-wide interventions.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>Observation of PLC teams</td>
<td>Observations of PLC teams are regularly made by the superintendent, district administrators and principals. Periodically, video is also used to analyze the work of the teams.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>Ad Council Retreats</td>
<td>Agendas from annual administrative retreats.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>Professional Development Plan</td>
<td>PLC professional development provided to teachers and PLC teams.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>Professional Development Evaluations</td>
<td>Staff evaluations of the professional development activities offered by the district to support professional learning communities.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>Ad Council Agendas</td>
<td>The administrative team meets at least twice a month (once as a full administrative team and once as an elementary &amp; secondary team).</td>
<td>2009-2013</td>
</tr>
<tr>
<td>CMT Scores</td>
<td>Student achievement scores on the Connecticut Mastery Test.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>GPA Scores</td>
<td>Middle School 4th Quarter GPA Scores.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>Student CAPT Scores</td>
<td>Student achievement scores on the Connecticut Academic Performance Test.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>PLC Study Survey</td>
<td>PLC survey administered to entire K-12 staff as part of a report commissioned by the BOE.</td>
<td>2013</td>
</tr>
<tr>
<td>PLC Team Survey</td>
<td>Annual PLC survey administered to all district staff that assesses the progress made towards indicators reflected in the PLC district graphic and rubric.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>End-of-Year PLC Team Report</td>
<td>Each PLC team submits an annual report on their progress and identifies next steps.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>Board Agendas &amp; Minutes</td>
<td>Monthly agenda items and board minutes.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>SMART Goals</td>
<td>Evidence of written Team SMART goals that specifically address student learning.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>PLC Team Minutes</td>
<td>Evidence from written PLC team minutes.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>Artifact</td>
<td>Description</td>
<td>Year</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>District Improvement Plan</td>
<td>The district improvement plan is an annual administrative document that describes the goals and strategic actions for the district. It is reviewed and updated annually.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>School Improvement Plans</td>
<td>Annually, each school develops written school improvement plans.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>Superintendent’s Expectations for Administrators</td>
<td>Annual performance expectations for administrators distributed by the superintendent to guide the work of district administrators.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>Common Formative Assessments</td>
<td>Written student common formative assessments are developed and administered regularly as an integral part of the PLC team work.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>Classroom Walkthroughs</td>
<td>District walkthroughs are classroom visits by administrators and teachers. The evidence here specifically refers to those classroom visits that were tied specifically to the work of the PLC teams.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>PLC Feedback</td>
<td>Email feedback provided by a principal to PLC teams.</td>
<td>2010</td>
</tr>
<tr>
<td>PLC Team Time Study</td>
<td>A PLC survey administered to all staff that solicited feedback on the time provided for PLC team meetings.</td>
<td>2012</td>
</tr>
<tr>
<td>PLC Board Presentation</td>
<td>The BOE periodically receives updates on the work of the PLC teams.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>Student Achievement Report to the BOE</td>
<td>Annually, the administration makes presentations to the Board on student achievement and achievement gaps.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>Agendas &amp; minutes from SITs</td>
<td>Each school has a student intervention team that addresses individual student interventions and action plans.</td>
<td>2009-2013</td>
</tr>
<tr>
<td>BOE PLC Study</td>
<td>A BOE commissioned report to evaluate PLCs and review recommendations for providing PLC teams with quality time to do their work.</td>
<td>2013</td>
</tr>
</tbody>
</table>

**Survey Results (secondary data).** The research will also include the survey results from the district PLC survey that has been administered to teachers annually. The survey assesses teachers’ perception of their school’s progress in the following PLC areas: (a) mission & vision, (b) value statements, (c) goals, (d) collaborative teacher culture, (e) collaborative administrator culture, (f) celebration, (g) continuous improvement, (h) action research/experimentation, and (i) focus on results. A Likert survey will be administered using random sampling to teachers from each school and grade level in the district. The survey will assess teachers’ responses as to
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whether or not they changed teaching practices as an outcome of their participation on a PLC team.

**Supplementary Data Sources**

Additional data were collected over the course of the EdD program that will inform the results of this inquiry project. Specifically, the research used two sets of structured interviews conducted during my doctoral coursework in adult learning and in leadership. Interviews were used to find out what is on someone else’s mind and to gather their stories (Patton, 2002). The structured interviews followed an approved modified protocol. The semi-structured interview protocol provided a structure of prepared questions but allowed for the opportunity to ask probing questions, develop rich responses and explore connections that are not necessarily directly reflected in the interview protocol. All interviews were conducted in person. Interviews from the adult learning course were transcribed. Interviews from the leadership course were taped and transcribed. Field notes were also taken as part of the leadership interviews. The interview transcription and field notes provided a comprehensive and cumulative interpretation of the data. In conducting a cross-case analysis, numbering the lines in the transcribed transcripts will allow me to quickly access and compare the different responses to questions.

The first source of interview data is collected from the adult learning course and included four superintendents who were selected from high-performing school districts from within the local region (see Appendix B for the Interview Consent Form and Appendix C for the Interview Protocol). All of the superintendents were from high-performing districts and all were highly respected by their peers and communities. Over a period of at least five years, they have all exhibited an ability to sustain exceptionally high levels of student performance in their districts.
and, in some cases, they have increased improvement upon already high levels of student achievement. The interviewees provided a variety of perspectives on the processes by which superintendents led district improvement efforts and utilized adult learning in their districts.

The second source of interview data was collected during the leadership course and included three district administrators from one of the consistently highest-performing school districts from within the local region (see Appendix D for the Interview Consent Form and Appendix E for the Interview Protocol). These administrators were strategically positioned in the district to provide a variety of perspectives on the processes the district used to implement district improvement efforts.

These data will be considered as a backdrop to the analysis of the Castle district and considered within the context of the results from the Castle analysis.

**Connecticut Mastery Test & Connecticut Academic Performance Test Data**

I utilized the test data from the Connecticut Mastery Test that is administered to students in grades 3 through 8 and the data from the Connecticut Academic Performance Test that is administered to students in grade 10. The data will reflect the academic achievement of students between the years 2006 and 2013 (see Appendix G for the test data results).

**Trustworthiness and Credibility**

The data for this study was collected over a four-year period that provided me with the opportunity to reflect and make sense of the data in light of new research, new experiences and input from the other members of the doctoral cohort. By their nature, qualitative findings are highly context and case dependent. The recommendations of this study will be limited by its design, context and assumptions.
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First, the study focuses on one school district in Connecticut over a relatively short time period and it includes the purposeful selection and interviews of only six administrators from five other school districts to help make sense of the Castle findings; therefore, it will pose somewhat limited transferability of its findings to different settings and populations.

Second, the study’s design is not well equipped to validate a cause-effect relationship between PLCs and changes in teachers’ practice or student achievement scores. The retrospective design relies on post hoc analysis and no cleanly manipulated PLC intervention; the design cannot adequately isolate the influence of PLCs on the outcomes of relevance here. There are myriad possible other influences on teacher practices and student achievement that may be at play during this time period. In searching for treatment effects, it is very difficult to tease apart the independent influence of reform initiatives in a highly complex social environment like schools.

Third, I am an active participant and researcher. Specifically, I am also the superintendent of the school district to be studied. My familiarity with the district and the leadership position that I hold poses significant challenges to biases of power and influence that may serve as a limitation to acquisition of accurate responses and the non-biased interpretation of information; hence, I have included a more comprehensive statement of my biases as a subjectivity statement (see Appendix H for subjectivity statement).

Finally, the varied data sources that the study relies on were collected at different points in time and for admittedly varying purposes; hence, to pull the data sources all together at the end is challenging and compromises the research methods and the study’s findings. Recognizing the limitations inherent in this study, the use of interpretive qualitative methods within a causal logic frame does provide for an in-depth examination of the research questions
from a unique vantage point. The study offers holistic understandings and contextual examples (Patton, 2002) on the culture, conditions and practices related to school improvement efforts and, in particular, professional learning communities.

**Data Analysis and Results**

This study examines the implementation of PLCs as a primary strategy for school improvement. As noted above, program theory will be used as an analytic heuristic to juxtapose the district’s theory of change in respect to PLCs with its theory in action. For many years now, researchers have recommended theory-driven evaluation approaches to studies (Chen and Rossi, 1992; Rogers et al, 2000; Weiss, 1998). Program theory, through a case study approach, allowed me to investigate the PLC implementation processes that actually influenced the reasoning and behavior of the teachers and the outcomes to the two research questions. Professional learning communities are inherently social processes. Whether or not they work depends on how districts create the conditions for success and how teachers make sense of and choose to respond to the activities, expectations and choices before them. Program theory research helps us understand these issues by surfacing and articulating the working assumptions how the program is intended to lead to the proposed outcomes. This was represented by the different steps of an implementation chain represented by a graphical logic model. I used representative pieces of evidence collected between 2009 and 2013 as my data to test and analyze each of the six steps in the program theory, seeking insights as to what worked and what did not work, and attempting to illustrate how outputs in the chain were affected.

Inductive qualitative research techniques were also used to analyze the data (Caelli, Ray, & Mill, 2003; Merriam & Associates, 2002), unpack the meanings that participants attributed (Marshall & Rossman, 1999) to leading school reform via PLCs and provide useful insights into
the complex and interrelated factors framed by the two research questions. These insights enabled me to develop a set of recommendations for the problem of practice in Castle.

In analyzing the interview data that I had collected, I used a coding process that is evident in the grounded theory approach to qualitative research (Strauss & Corbin, 1998; Creswell, 1998). As recommended by Auerbach and Silverstein (2003), I kept a copy of the concept framework, logic model and research questions in front me during the coding process to help keep me focused and help with coding decisions. The process helped to categorize the data as it pertained to the research questions being asked. As outlined in Figure 2, I used closed coding – the process of preselecting topics and categories based on the literature review, research questions and program theory logic model. I categorized my data into the three major themes evident in the PLC logic model. After organizing the data by each of the themes, I cited evidence from the source documents, surveys and interviews. I then indicated the degree to which the preponderance of evidence supported the alignment to the action or outcome. I coded the degree of determination as follows: the preponderance of evidence that generally supported alignment to the action/outcome (coded with +); the preponderance of evidence was generally neutral/conflicting on the alignment to the action/outcome (coded with +/-); or, there is a lack of preponderance of evidence aligning to the action/outcome (coded with -). The determination for each of the three themes was made based on the triangulation of corroborating data points. Triangulating the data from the units of analysis (interviews, primary documents, surveys, and student achievement data) help me discover insights, patterns and themes in the data as they pertained to the research questions being asked. The process of triangulation strengthens a study by combining methods or data (Patton, 2002).
The professional learning community logic model in Appendix A shows six steps in the implementation chain of Castle’s program theory for PLCs that, if well implemented, would lead to improved teaching which, in turn, would lead to increased student learning. Table 8 encapsulates the three main stages of PLC implementation represented by the steps in the program theory logic model. Corroborating evidence collected during the duration of the study was used to seek alignment to each of the three phases of the program theory implementation and the lessons learned through the alignment and implementation process.
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Table 8

*The Three Implementation Stages of the Program Theory Logic Model*

<table>
<thead>
<tr>
<th>Creating the Conditions</th>
<th>Collaboration</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logic Model Steps 1-2</td>
<td>Logic Model Steps 3-4</td>
<td>Logic Model Steps 5-6</td>
</tr>
<tr>
<td>Teams and meeting time established</td>
<td>Protocols and expectations provided</td>
<td>Professional Development Provided</td>
</tr>
</tbody>
</table>

The first phase in the program theory of PLC implementation is the principal’s ability to provide the conditions for the professional learning community teams to be successful. This phase includes Steps 1-2 in the logic model chain. The second phase in the program theory of PLC implementation is the professional collaboration that takes place in teams. This phase includes Steps 3-4 in the logic model chain. The third phase in the program theory of PLC implementation represents the impact stages which are the results and realization of the intended outcomes; specifically, changes in teachers’ practice (research question number 1) and changes in student achievement (research question number 2).

This chapter looks at these three stages (principals creating the conditions, collaboration and results) in the logic model in more detail through representative pieces of evidence collected over the four year period between 2009 and 2013. While the logic model suggests a linear progression through each of these steps, it is recognized that the PLC is a complex and dynamic process with interdependence between the stages.
Creating the Conditions for Success

The first phase in the program theory of PLC implementation required principals to create the conditions for the PLC teams to be successful. Steps 1-2 in the logic model address the principals’ ability to create the conditions for the PLC teams to be successful. There was a district expectation that principals would establish these conditions by creating teams; providing time for PLC teams to meet; establishing expectations and team protocols for the work of the teams; and, providing teachers with professional development around the nature of the PLC team work.

As outlined in Table 9 below, there was mixed alignment between the activities of principals to the actions/outcomes in the PLC logic model. There was one area where principals’ actions aligned closely to the action step and two areas where principals’ actions somewhat aligned to the action step.
Table 9

Principals’ Actions to Create the Conditions for Successful PLC Implementations as Described by the PLC Logic Model

<table>
<thead>
<tr>
<th>Logic Model Actions Step</th>
<th>Degree of Alignment to Action Step</th>
<th>Data Sources Used In Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teams and meeting time established</td>
<td>+</td>
<td>• SMART Goals (2009-2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PLC Protocols and Continuum (2009)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• End-of-Year PLC Team Reports (2010-2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PLC Team Minutes (2010-2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PLC Team Surveys (2010-2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Observations of PLC Teams (2009-2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PLC Study Survey (2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• AD Council Retreats (2010-2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Superintendent’s Expectations for Administrators (2009)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Professional Development Plan (2009-2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• BOE PLC Study (2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PLC Time Study (2012)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PLC Board Presentation (2013)</td>
</tr>
<tr>
<td>Protocols, expectations &amp; support provided</td>
<td>+/-</td>
<td>• PLC Protocols and Continuum (2009)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Professional Development Plans (2009-2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SMART Goals (2010-2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PLC Team Surveys (2011-2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• End-of-Year PLC Team Reports (2009-2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PLC Study Survey (2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PLC Feedback (2010)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Superintendent’s Expectations for Administrators (2009)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• BOE PLC Study (2013)</td>
</tr>
<tr>
<td>Professional Development Provided</td>
<td>+/-</td>
<td>• End-of-Year PLC Team Reports (2009-2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Professional Development Plan (2009-2013)</td>
</tr>
<tr>
<td></td>
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<td>• BOE PLC Study (2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Ad Council Agendas (2010-2013)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• PLC Team Surveys (2010-2013)</td>
</tr>
</tbody>
</table>


**Evidence where principals’ actions aligned to the logic model action step.** According to the steps in the logic model, principals were to help create the conditions for success by establishing PLC teams and meeting times in their schools. The PLC Team Protocols and Continuum (2009), developed by Central Office, helped guide the work of the PLC teams. It required that every teacher be a member of a PLC team and that each “PLC team member have a common purpose to each other and to the PLC team goal.” The composition of the teams was a self-selection process by the core academic teachers (math, language arts, science, and social studies) that was overseen by the principal. Team SMART Goals between the years 2009-2013 reflected that PLC teams were generally comprised of four to five teachers. The actual number of team members and the composition of teams varied from school to school and they evolved in structure over time. For example, according the End-of-Year PLC Team Reports (2010) for the first year, all of the special education teachers in each building comprised a team; however, the special education teachers consistently indicated a preference to be a part of teams with regular education teachers. The End-of-Year PLC Team Reports (2012-2013), showed for the last few years in all three buildings, special education teachers became valued members of the core-subject or grade-level teams. This was a well-received modification to the structure of the teams as captured by this sentiment from a special education teacher in Intermediate School B:

> It is much better now that we are part of the PLC team with other classroom teachers and can make contributions to the SMART goal discussions. Before, we met infrequently as a PLC of resource teachers and it was not always productive (End-of-Year PLC Team Reports, 2011).

Each intermediate school had four PLC teams; one for each of the grade levels 3-6. Each PLC team in the intermediate schools was composed of core-subject teachers, and a special education resource teacher. A few teams also had a literacy or math specialist. The 3rd, 4th and 5th grade PLC teams were comprised of the same grade level teachers from within the same
school. Generally, the intermediate schools had the same team configuration for the entire four years, except in 2012-13. The End-of-Year PLC Team Reports (2013) showed that the intermediate school principals’ efforts to design PLC teams comprised of teachers from both schools and to provide them with time to meet together was most helpful. For instance, the principals established a 6th grade language arts PLC team and a 6th grade math/science PLC team with teachers from both intermediate schools. SMART Goals (2013), PLC Team Minutes (2013) and feedback on the 2013 PLC Study Survey indicated that teachers viewed this new team construct positively. As captured by a member of the 6th grade Math/Science team:

We were able to agree upon a goal that applied to our students in both math and science and that served them well in all problem solving areas. Examining the standards, the current practices, and the needs of our students led us to a plan of action to improve student problem solving in practical ways (PLC Study Survey, 2013).

Prior to 2010, the teams at the middle school predominantly had an interdisciplinary structure. There were two teams - the 7th grade team of teachers and the 8th grade team of teachers. Teachers did have other opportunities to meet as content departments but these meetings were not structured around the work of PLCs. The PLC Team Meeting Minutes (2010-2013) show the middle school principal organized the PLC teams across grade level by core disciplines. The 7th and 8th grade math teachers comprised one team as did the 7th and 8th grade language arts teachers, science and social studies teachers, respectively. In meeting as discipline-based teams, middle school PLC teams could address content for the students they shared within the same grade levels and they could also address the skills that were common across the two grade levels. For example, the 2012-2013 Middle School Math PLC SMART Goal targeted students’ ability to solve mathematical application problems. It allowed the teachers to focus on the math application skills of both 7th and 8th grade students.
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the teams by discipline was a departure from the conventional model for middle school teams that structured teams interdisciplinary.

Interestingly, despite the popularity and success of the middle school content area PLC teaming in the main content areas, the middle school unified arts classes (technology, art, music, and physical education) still met as an interdisciplinary team. Although principals have made some concerted efforts to structure the work of this interdisciplinary team around some common goals and skills, according to the annual PLC Team Surveys (2010-2013) and the End-of-Year PLC Team Reports (2010-2013), the unified arts’ teachers have been consistently concerned that the interdisciplinary design of the team is not the most productive, as reflected in the comments of one of teachers on the team:

Our PLC is comprised of eight teachers from different disciplines. It is very difficult to have so many different subjects in one PLC group. Since our subject-based areas are dissimilar with differing goals and missions, I feel our subject areas and student learning have actually been comprised (End-of-Year PLC Team Report, 2012).

The success of the grade-level teams at the intermediate school and the discipline-based teams at the middle school, combined with the struggles of the unified arts interdisciplinary team might suggest a preferred team structure.

Over the four years, leadership for the PLC teams emerged as a theme. Despite the absence of a district requirement to have designated team leaders for the PLC teams, all three principals established team leaders for their teams. PLC Team Meeting Minutes (2010-2013) and PLC End-of-Year Team Reports (2010-2013) indicated that team leaders were self-selected for each team by the individual teams themselves. Team leaders assumed responsible for setting the agendas, facilitating the meeting using a SMART goal and submitting weekly minutes for meetings. According to the District Professional Development Plan (2009-2013), there was no evidence during the four-year period of the study that PLC team leaders received any formal
training in team facilitation, nor were they expected to have any specified level of PLC expertise; however, it was clear from PLC team observations (2009-2013), the review of PLC Team Minutes (2010-2013) and the End-of-Year PLC Reports (2010-2013) that, over time, teams greatly benefited from having a team leader. A review of the PLC work that took place annually at Administrative Council Retreats (2010-2013) consistently identified the need to continue to invest in the professional development needs for PLC team leaders. The PLC Team SMART Goals (2010-2013) indicated that the position of team leaders were often assumed by the literacy coaches, math coaches or department chairs. The leadership skills of these key staff members in the areas such as team facilitation, data-driven decision making and common formative assessments directly benefited the productivity PLC teams.

Providing adequate time for teams to meet is widely accepted in the literature as a necessary condition for success and it is a recurring theme during the four-year time span of the study. The requirement to provide the time for PLC teams to meet was an explicate expectation of principals articulated in the Superintendent’s Expectations for Administrators (2009). Specifically, it required principals to “involve all teachers in collaborative teams of teachers that meet regularly during the school day with the focus of increasing student learning.” In the first year of implementation, 2009-2010, each school principal was responsible for establishing their own weekly planning time for their PLC teams. As shown in Table 10, below, and reported in the BOE PLC Study (2013), both intermediate schools provided their teams with a twenty-minute period per week of meeting time, while the middle school provided its teams with 45 minutes of teacher collaborative time every six days. In 2010-2011, the intermediate schools increased their teams’ meeting time to three 20-minute meetings per week. Three years later, the two intermediate schools increased their meeting time by 40 minutes to 60 minutes per week.
while the middle school time remained consistent at 45 minutes every six days. Over the course of year in 2012-2013, each middle school PLC team had 13.5 hours less time than the intermediate PLC teams.

Table 10

*The Amount of PLC team provided to teams between 2009 and 2013*

<table>
<thead>
<tr>
<th>School</th>
<th>2009-2010 PLC Time</th>
<th>2010-2012 PLC Time</th>
<th>2012-2013 PLC Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate</td>
<td>One meeting per week for 20 mins.</td>
<td>Three meetings per week for 20 mins.</td>
<td>One meeting per week for 60 mins.</td>
</tr>
<tr>
<td>School A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td>One meeting per week for 20 mins.</td>
<td>Three meetings per week for 20 mins.</td>
<td>One meeting per week for 60 mins.</td>
</tr>
<tr>
<td>School A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle School</td>
<td>One meeting every six (6) days for 45 mins.</td>
<td>One meeting every six (6) days for 45 mins.</td>
<td>One meeting every six (6) days for 45 mins.</td>
</tr>
</tbody>
</table>

According to the intermediate school teachers, it was difficult to get to quality work accomplished during the three 20-minute meetings. This provided the impetus for the intermediate school principals to provide their teams with one 60-minute meeting per week. As expressed by one intermediate school teacher:

PLC teams do not need more time to complete their work; rather, sustained time is required. Rather than three short 20 minute blocks per week, the time should be combined. It would allow the team more time to plan and address student needs (PLC Time Survey, 2012).

While the literature is clear about the need to provide time for PLC teams to meet, it is not clear about what constitutes the optimal amount of PLC meeting time per week. To effectively accomplish the work of the PLC teams, 98% of the teachers in the three schools reported on the 2013 PLC Study Survey that they still needed to meet for a longer period of time per week. Only 9% of teachers reported either needing less time or having enough time per week. The school with the highest percentage of teachers reporting either needing less time or having enough time per week was the middle school with 15% of the teachers. This is interesting given the middle school has the least amount of PLC team meeting time per week.
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(45 minutes every 6 days). All three schools provided some additional weekly time for non-PLC grade level or interdisciplinary teams to meet. In each school, the principal creatively utilized this additional time as an extension of the PLC meeting times by allowing teachers and teams to conduct PLC tasks that they did not have time to complete in their PLC meetings.

The resounding message from teachers from all three schools was the need for more time. Teachers feared that the district could not sustain its commitment to PLC without providing additional time. For example, these three comments from teachers in each of three schools are indicative of how teachers valued the time:

Ensuring common time for all team members to share information regarding goals, student progress, ideas to support student learning is imperative to ongoing progress. (End-of-Year PLC Team Report, 2012)

The hour we currently have doesn't end up being an hour due to waiting for classroom coverage, explaining what to do while we are gone, and needing to step out to meet the needs of students during our PLC time (PLC Team Survey, 2013).

Meeting every day 6th day for only 45 minutes-it is a tribute to the science team that we are able to accomplish so much-it’s not enough (PLC Team Survey, 2013).

In considering how much time is optimal for PLC teams, 53% of the teachers across the three schools believed teams needed at least 120 minutes of time and 85% believed that at least 90 minutes was needed; however, there were differences of opinions on how the additional time should be used as represented by this middle school teacher’s response to the survey question:

How much additional time should be provided?

Unsure. It is difficult to say. It depends on how many various PLC tasks we have to complete (PLC Team Survey, 2013).

Upon review of the survey data, Central Office staff and principals concluded that schools would benefit from 90-120 minutes of weekly meeting time. Recommendations to provide quality for
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the PLC teams were included in the PLC BOE Study presented to the Board of Education in February, 2013. They were:

Recommendation Option 1: implement a two-year pilot to provide two hours of PLC time for all schools by implementing a two hour weekly early release for PLC time; and,

Recommendation Option 2, implement a two-year pilot to provide two hours of PLC time for all schools by implementing a one hour weekly early release for PLC time and by compensating teachers to stay an additional hour (PLC Board presentation, 2013).

The Board did not support the adoption of either recommendation.

Evidence where principals actions somewhat aligned to the logic model action step.

According to the logic model, principals were to help provide the conditions for PLC success by providing protocols, expectations and support for their PLC teams. These expectations for principals were also articulated in the Superintendent’s Expectations for Administrators (2009). Specifically, it required principals to:

- Use data, formative common assessments (at least 8) in PLC teams and best practices to make decisions about instruction, curriculum and RTI interventions for students; and,
- Monitor, support and provide feedback on the work of collaborative teams.

Prior to 2010, there were no written expectations and guidelines for the PLC teams. Shortly after expanding PLCs into the intermediate and middle schools in 2009, the district identified the need to establish protocols and expectations for the work of the PLC teams. The 2010 Professional Development Plan shows that, in the fall of 2010, PLC teams and administrators received on-site coaching and training by a PLC consultant who visited the district for two days. This visit resulted in the development of the PLC Team Protocols and Continuum (2009) that were to be used by principals to guide the work of the teams in the three schools.

Utilizing a graphic and rubric, the PLC Team Protocols and Continuum (2009) addressed topics such as team norms, SMART goals, common assessments, curriculum, assessment, and
student interventions. The document served to guide teams on how they should address the four PLC questions.

The individual steps of the PLC team protocol were primarily encapsulated by the action steps in each team’s SMART goal. The SMART goal acronym (Conzemius & O’Neill, 2005) was used as a process for goal setting. The acronym called for goals that were Strategic and Specific, Measurable, Attainable, Results Orientated and Time-bound. Teams in all three schools completed the SMART goal templates that outlined the work of the teams to address the four PLC questions and, specifically, the teams’ use of common assessments, data analysis, curriculum and instructional planning, and interventions for students.

PLC teams found this SMART Goal structure helpful in guiding their work. In the 2013 PLC Study Survey, teachers in Intermediate School B and the Middle School reported strong agreement that their PLC teams were working to achieve team-adopted SMART goals with an average score of 2.15 on a 3.0 agreement scale (where 0 = strongly disagree and 3 = strongly agree) while teachers in Intermediate School B only reported a score of 1.69. Survey responses indicated two possible reasons for this. First, many of the teachers in the Intermediate School A shared that their focus and discussions around their SMART goals were often impeded by the lack of time and interruptions. For example, a teacher from Intermediate School A stated:

Time for discussion of our SMART goal is constantly interrupted with other agenda items. Limited time has been devoted to the discussion of our written SMART goal. It has been difficult to spend sufficient time on SMART goals with all of the other demands that are put on PLC teams (PLC Study Survey, 2013).

Additionally, the evolution of what constitutes a SMART goal in the district has caused confusion for the PLC teams in all schools. According to the continuum, SMART goals should:

align with the school improvement plan to guide the work of the PLC teams....also, SMART goals should address the District Achievement Goal and skill(s) (PLC Study Survey, 2013).
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The District Achievement Goal (DAG) states that “students will demonstrate powerful thinking by systemically solving problems through analyzing and synthesizing information and articulating/defending a position.” The DAG is the school district’s effort to set a rigorous 21st Century goal for all students. In an attempt to develop coherence around goal setting, PLC teams were expected to align their goals to the DAG. The requirement for SMART goals to align and support the district achievement goal was, and remains, an ongoing challenge for principals and teachers. An analysis of the SMART goals from 2010 to 2013 revealed that teams struggled to write goals that made these connections, as reflected in this comment from an intermediate school teacher:

It is difficult to write SMART goals that address the district achievement goal. We struggled to make it fit in a meaningful way. We need to be able to write broader SMART goals. (PLC Team Survey, 2012).

Additionally, in the fall of 2013, the introduction of the new teacher evaluation plan provided teachers the option to use the SMART goals as one of their annual objectives. While it was encouraging that the majority of teachers and teams took this option, for others, the increased level of accountability of associating PLC team progress with evaluation caused some additional confusion and concern. One teacher commented:

There are absolutely too many goals to work on. PLC goals and teacher objectives are unrealistic expectations and in many ways undermine each other. This year, I felt that there was increased confusion between SMART goals and IAGDS as we all started the process of understanding and utilizing the new TEP (PLC Study Survey, 2013).

While principals used the PLC protocols as a way of providing structure, expectations and accountability to the PLC teams, principals had the reciprocal responsibility to provide support to the teams. They did this by providing resources such as meeting time and providing feedback to teams. Principals provided feedback to teams in a variety of ways including attending team meetings, reading weekly minutes, facilitating PLC team presentations at faculty
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meetings, and providing oral and written feedback to the teams. For instance, the following email feedback was provided to a fourth grade PLC team from the principal from Intermediate School A:

As a follow up to our meeting last week, continue to discuss and flesh out the details of your action plan, including a detailed intervention plan for students frequency and duration of interventions, a date that you want to achieve the goal (80%) by, as the focus of your CFA’s (one type of reader/text or all 3 types). You might also consider, as other teams are, adding the words “….. as measured by 100% of students showing growth and 80% of students scoring a 2…..” This emphasizes that we want all kids to improve their skills in this area, not just those below goal. Thanks for your continued work (PLC Feedback, 2010).

In the early years, teams were worried that the principal’s presence would stifle conversations and that teachers would be overly concerned that they were being evaluated. Take for instance this comment from a middle school teacher:

Be careful not to allow times when the principal is visiting in a supportive role to cross into evaluation. This does happen and if it starts to become a practice it will undermine the trusting relationships needed between the principals and the teachers. We have phenomenal professional teachers. They know what they are doing and they need to be allowed to be respected to do the work. (PLC Team Survey, 2011)

By the conclusion of the study, in all three schools, principals’ attendance was welcomed and their active involvement, guidance and feedback were appreciated by the teams. As reflected on by a teacher from Intermediate School A:

Our principal does a fantastic job supporting us and keeping us involved/informed and allowing us to be part of the decision making/improvement process. It is a unified effort (PLC Team Survey, 2013).

The practice of providing feedback not only supported the teams but also provided some accountability to the teams and it allowed the principal to monitor the work and growth of teams.

Overall, the evidence collected periodically throughout the four years suggested that teachers in grades 3-8 generally liked and appreciated the use of the protocols and rubrics to
guide their work but that it required a lot of time and sense-making to work through their meaning and implementation.

According to the expectation for principals outlined in the Superintendent’s Annual Expectations for Administrators (2009), in addition to providing teams with the time to meet and the protocols for the work, principals were expected to help create the conditions for success by identifying and providing professional development to staff on the PLC team tasks. This meant providing professional development opportunities for teams to better understand curriculum revision, common formative assessments, data-driven decision making, sharing instructional practices, identifying student interventions, and team collaboration skills.

In 2009, the district strategically started to transition to a model of offering professional development that was much less focused on attending out-of-district workshops to one that was much more focused on the staff learning from each other in their PLC teams. The actual process of learning from each other in teams became a professional development activity. Professional development began to be differentiated to the needs of the PLC teams. For example, in 2010, the teachers identified the need to be receiving training in data-driven decision making. The Professional Development Plan (2011) showed this training was provided to all teachers in grades 3-8 by the Director of Curriculum in the fall of 2011.

An analysis of the District Professional Development Plans (2009-2013), the BOE PLC Study (2013) and the team End-of-Year PLC Reports (2009-2013), indicate the type and amount of professional development scheduled or facilitated by the building principals. These documents show that, since 2009, principals have been organizing annual professional development to the staff on PLC tasks and activities. The professional development experiences were delivered by the Dufours, consultants from Solution Tree and the Capital Regional
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Education Council, Central Office administrators, building principals, and building level coaches.

As discussed in the literature review, Garet et al. (2001) found that the most important professional development features for increasing knowledge and skills were a focus on content knowledge, active learning, greater time spans, collective participation, and coherence to other learning experiences. Table 11, below, shows the degree to which I determined the professional development provided by principals to addresses each PLC topic exhibited the five characteristics of effective professional development described by Garet et al (2001). I coded the degree of determination as follows: the preponderance of evidence generally supported alignment to the action/outcome (coded with +); the preponderance of evidence was generally neutral/conflicting on the alignment to the action/outcome (coded with +/-); or, there was a lack of preponderance of evidence aligning to the action/outcome (coded with -). The determination for each of the PLC topics was made based on the district’s Professional Development Evaluations (2009-2013) that provided teacher feedback on the effectiveness of the professional development activities offered by the district to support professional learning communities, and my personal experiences of the professional development.
Table 11

_Evidence of Garet et al (2012) Features for Effective Professional Development in the PLC Professional Development Offered by Principals for PLC teams_

<table>
<thead>
<tr>
<th>PLC Professional Development Topic</th>
<th>Provided</th>
<th>Content</th>
<th>Active Learning</th>
<th>Time Span</th>
<th>Collective Participation</th>
<th>Coherence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Assessments</td>
<td>Yes</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Curriculum Revision</td>
<td>Yes</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+/-</td>
<td>+</td>
</tr>
<tr>
<td>Data Driven Decision Making</td>
<td>Yes</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Sharing Instructional Practices</td>
<td>Yes</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+/-</td>
<td>+/-</td>
</tr>
<tr>
<td>Student Interventions</td>
<td>Yes</td>
<td>+/-</td>
<td>+</td>
<td>+/-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Team Collaboration Skills</td>
<td>Yes</td>
<td>n/a</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

n/a indicates that the PD characteristic does not apply to the PD topic

As reflected in Table 11, professional development has been provided in some venue and has addressed, to some degree, each of the PLC topics; however, between the years 2010-2013 in four of the six topics, the professional development activity was provided for less than the fourteen hours recommended by Garet et al (2012).

Teacher feedback from all three schools indicated that the professional development training provided by the principals and delivered by authors, consultants, administrators, and instructional coaches, was helpful in effectively utilizing team time around the PLC tasks.
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outlined in the protocol. On the End-of-year PLC Reports (2010-2013), staff identified the need to provide professional development training in leadership and team facilitation for PLC team leaders, particularly in conflict resolution. The district has not yet provided such training. Additionally, over the four-year period, teachers consistently expressed the need for more training in the area of curriculum design, particularly as it pertains to the Common Core State Standards\(^5\).

At times, the teams were confused about how much curriculum writing they could actually do in their team meeting. Teams mediated this priority dilemma for themselves often by taking more time to write curriculum than the PLC protocol would indicate appropriate or necessary as part of the PLC team work.

Providing team training on the use of the protocols was the reasonability of each principal. Annually, at the commencement of each school year, principals led their staff through a sense-making activity where teams would revisit the PLC Protocol and Continuum and have an opportunity to talk about each of its stages, name what they thought each stage meant and share their challenges and successes in implementation. It is surprising. After four years of implementation there continues to be significant misunderstandings about the expectations for PLC work as delineated by the PLC Protocol and Continuum. This professional development activity proved to be a very necessary and helpful annual exercise in letting staff air their mental models about the PLC team work and, ultimately, building greater knowledge and capacity among teachers to do the work.

\(^5\) The Common Core State Standards are a set of academic standards in mathematics and English Language Arts adopted by states that are designed to outline what a student should know and be able to do at the end of each grade. The standards were created to ensure that all students graduate from high school with the skills and knowledge necessary to succeed in college, career and life.
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Generally, protocols were well received by the teams and were perceived as being helpful. Teachers in all three schools appreciated their existence; however, Ad Council agendas (2009-2013), End-of-Year PLC Team Reports (2010-2013) and annual PLC Team Surveys (2010-2013) showed, in all three schools, the adherence to every part of the protocol was difficult for the PLC teams. For example, in the first two years, the protocol called for each team to develop at least 8 common assessments.

From 2009-2010, the PLC teams generally completed between 6-8 common assessments. Many teachers expressed concerns that stipulating the number of common assessments served only to frustrate and constrict the work of the teams. In the fall of 2010, under advisement from the building principals, this requirement was modified. The new expectations allowed PLC teams to develop the number of common formative assessments that made the most sense to their team. In the end, teams developed approximately the same amount of common assessments but it removed the teachers’ anxiety and frustration about an expectation of the protocol that had become a barrier to progress.

In summary, as outlined above, the principals’ efforts to create the conditions of success for the PLC teams by creating the teams and providing the time, protocols and professional development exhibited a mixed alignment to the actions/outcomes in the PLC logic model. Specifically the principals’ actions to design the teams and provide time for the teams to meet exhibited a strong alignment to the logic model action steps. For example, teams were designed around content and the principals were able to differentiate and create the necessary time for their teachers to meet. Principals’ actions demonstrated conflicting alignment to developing protocols, expectations and support for the PLC teams and to providing professional development for the teams. For example, the use of protocols both assisted the team and, in
some cases, constrained the teams’ actions. Also, the professional development activities that were provided to support PLCs were, in some cases, very helpful such as the training for data driven analysis; however, in other cases, the professional development was not always offered in a way and for long enough periods of time to make it most useful.

In the final chapter of this manuscript, I will discuss the implications of this analysis of how the principals’ actions to create the conditions for PLC success aligned to the logic model. I will also make recommendations for practice.

Collaboration

The second phase in the program theory of PLC implementation is the professional collaboration that takes place in teams. Steps 3-4 in the logic model address the teachers’ ability to collaborate on the four PLC questions and instructional practices. The review of the literature supported the importance of collaboration as a dynamic social process to support teacher learning in PLC teams. At the heart of the PLC model is the idea of teams of teachers sitting down together and engaging in collaborative conversations about teaching and student learning. The nature of the PLC team collaboration influences, positively or negatively, the work of the teams and the desired outcomes.

As outlined in Table 12, below, there was a mixed alignment between the PLC team collaboration activities of the three schools to the actions/outcomes in the PLC logic model. There was one area where the schools’ actions to support teacher collaboration somewhat aligned to the logic model action steps and one area where the schools’ actions to support teacher collaboration closely aligned to the action step.
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Table 12

*Schools’ Actions to Support Teacher Collaboration as Described by the PLC Logic Model*

<table>
<thead>
<tr>
<th>Logic Model Actions Step</th>
<th>Degree of Alignment to Action Step</th>
<th>Data Sources Used In Analysis</th>
</tr>
</thead>
</table>
| The four PLC questions are addressed | +/- | - SMART Goals (2009-2013)  
- End-of-Year PLC Team Reports (2009-2013)  
- PLC Team Surveys (2009-2013)  
- Weekly Team Meeting Minutes (2009-2013)  
- BOE PLC Study (2013)  
- BOE Minutes (2009-2013)  
- PLC Board Presentations (2009-2013)  
- PLC Study Survey (2013)  
- PLC Feedback (2010)  
- Superintendent’s Expectations for Administrators (2010-2013)  
- Professional Development Plans (2009-2013)  
- Observations of PLC teams (2009-2013)  
- School Improvement Plans (2009-2013)  
- PLC Team Protocols and Continuum (2009) |
| Instructional Practices Shared | + | - Observations of PLC teams (2009-2013)  
- PLC Team Surveys (2009-2013)  
- PLC Study Survey (2013)  
- PLC Team Meeting Minutes (2009-2013)  
- PLC End-of-Year Reports (2009-2013) |

**Evidence where principals’ actions to support teacher collaboration somewhat aligned to the logic model action step.** According to PLC Protocol and Continuum (2009), team collaboration in Castle has focused on Dufour’s (2009) four PLC questions and the sharing of instructional practices. The four questions are:

1. What is it we want our students to learn?
2. How will we know if each student is learning?
3. How will we respond when students do not learn?
4. How will we enrich and extend the learning for students who are already proficient?
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To address these questions, teacher collaboration was focused on making decisions about curriculum, common formative assessments, data analysis, and providing interventions for students. The SMART goals (2009-2013) developed by each team incorporated these tasks. As a result of the collaborative conversations, teachers were expected to learn from each other, share instructions practices and make improvements in what they taught and how they taught it.

To help address the first and second PLC questions, teams regularly focused their collaboration on developing, administering and analyzing common formative assessments. Figure 3 shows the results from the 2013 PLC Study Survey that utilized a 4-point agreement scale (0-Strongly Disagree, 1-Disagree, 2-Agree, 3 Strongly Agree) to represent the degree to which teachers collaborated on SMART goals, common assessments, data analysis, and student interventions. The data shows that teachers had a moderate score of 1.51 when responding to whether or not they collaborated on developing common formative assessments. They had higher scores of 2.1 on using data analysis to focus on student learning and a score of 2.0 on their teams’ ability to analyze formative assessments to identify students who need additional learning opportunities.
The Professional Development Plan (2009-2013) showed that formal training for teachers on the development of common formative assessments was limited in scope and duration. The only formal professional development offered was in the first year (2010) of implementation. It consisted of an overview of the topic presented by the Dufours in a large workshop setting. Contrary, utilizing data analysis to focus on student learning and providing interventions for students was an ongoing focus of professional development for teachers that was presented in smaller settings at the three schools for much longer periods of time. Providing the professional development on data analysis and student interventions over time helped to develop the knowledge and skills of all teachers, including the fifteen new teachers who joined the three schools during the four-year period of the study. Teachers valued this training. As the survey response from one teacher said:

The data collection and data-driven decision making has been most useful because I am able to target students in individualized areas of need (End-of-Year Team Report, 2012).

The ongoing professional development provided to all teachers on the use of data analysis and student interventions helped teachers use data and plan for student interventions more effectively.

To address the third and fourth PLC questions, teams collaborated on designing interventions for students. Team minutes, team observations and survey data indicated that teachers discussed interventions during their team meetings. Describing the PLC team intervention process, one intermediate school teacher said:
As part of our team work, we regularly discuss how students are doing and examine the data to see what interventions we need to do for students (PLC Team Survey, 2012).

It was evident over the four years that the PLC teams implemented a variety of interventions at the classroom level. According to the End-of-Year PLC Team Reports (2010-2013), some examples of this included the use of teacher modelling and mini-lessons utilized by a fifth grade team in Intermediate School A, the use of flexible grouping and diagnostic rubrics in a third grade team in Intermediate School B, scheduling additional time for students to receive support in a middle school science class and the use of exemplars and graphic organizers in the middle school social studies team.

While the PLC protocols called for teachers to develop interventions for all students, in practice, the vast majority of the interventions designed by teams over the four-year period were targeted as struggling students in need of additional support. There were limited examples of extended learning for students. According to School Improvement Plans (2009-2013), BOE Minutes (2009-2013) and annual PLC Board Presentations (2009-2013), the district struggled to successfully address the fourth question of the PLC: “How will we enrich and extend the learning for students who are already proficient?” Providing enrichment opportunities for the highest performing students proved extremely challenging for the teams from all three schools. This sentiment was captured in the feedback from the middle school language arts team:

Based on our data and ongoing progress monitoring, our goal helped us to more quickly identify students in need of support as well as students in need of more challenge. We are pleased with our focused efforts during PLC time to discuss the kids most in need of interventions and our actions as a result of those conversations; however, we were hindered in terms of extending the learning for students who displayed mastery on the pre-assessment (End-of-Year PLC Report, 2013).

According to the End-of-Year PLC Team Reports (2010-2013) the primary reason for not addressing the needs of the highest performing students was that it was not a priority for teachers
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given everything else that teachers had to accomplish in a PLC meeting. For example, a teacher from Intermediate School B stated:

We can't lump interventions, assessments, data and SMART goals into a weekly meeting. Enrichment opportunities are something we always discuss expanding on, but it seems students in need of re-teaching/support seem to get our most immediate attention. It is difficult to create regular opportunities for students deserving enrichment (End-of-Year PLC Report, 2013).

It is noteworthy that the professional development provided to teachers on the topic of student interventions was almost exclusively targeted towards the struggling student. According to the district’s Professional Development Plans (2010-2013), there was no formal professional development offered to teachers over the four years that was specifically designed to address the intervention needs of the highest performing students. Opportunities for teachers to learn about this topic were restricted to teachers sharing amongst themselves. Principals were never able to significantly influence the PLC teams’ ability to address this issue. While time was a barrier to teacher collaboration around providing interventions for the highest performing students, I speculate that the principals’ inability to provide professional development and support for teachers in this arena also played a factor.

There was strong evidence of a culture of collaboration in the three schools around the four PLC questions. Observations of PLC teams (2009-2013), discussions with team members, annual PLC Team Surveys (2009-2013), End-of-Year PLC Team Reports (2009-2013), team minutes (2009-2013), and the PLC Board Study (2013) all revealed that teachers collaborated on developing common formative assessments and using data to provide interventions for students and make instructional decisions. Over the course of the four-year period, PLC team collaboration became a powerful way for teachers to learn from each other and it has become the accepted strategy in the schools for improving teaching and learning. Almost all teachers
indicated that their PLC teams had an impact on their professional growth, and they attributed this mostly to the opportunity to collaborate with others. This sentiment was captured by PLC team in Intermediate School A:

Our PLC team meetings provide an opportunity for student learning and teacher learning (End-of-Year PLC Report 2012)

To help promote and guide the collaborative process, teams developed, implemented and followed meeting norms to guide collaborative conversations. Table 13, below, shows the continuum teams used to develop norms using a four point (Pre-Initiation, Initiation, Developing, Sustaining) analytical continuum. Teams were considered Sustaining in their use of norms by meeting a preponderance of the following indicators under the sustaining level of the continuum:

Table 13

<table>
<thead>
<tr>
<th>Element of a PLC</th>
<th>Sustaining</th>
</tr>
</thead>
</table>
| Collaboration will be guided by written team norms and agendas | • Teams refer to norms periodically and revise as needed.  
• When norms are violated, team members address them in a positive, supportive and respectful way.  
• Teams establish common ground on their purpose and priorities.  
• Team members have clearly defined roles and responsibilities.  
• Team members seek ways to test competing assumptions through action research and are willing to rethink their position when research, data, and information contradict their suppositions.  
• Teams approach disagreement with high levels of trust.  
• Team members address differences through open dialogue and consensus.  
• Norms guide the conduct of the meeting and decision making processes.  
• Agenda is consistently focused on four key questions of PLC.  
• Agendas for the next meeting are developed at conclusion of each meeting, with objectives, anticipated results, and time frames related to SMART goal. |

These team norms helped clarify teachers’ behavior and their work as members of a team. Principals ensured the writing and use of norms, and teams developed and modified their norms
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on an annual basis. The norms represented commitments team members made to each other and served and served as expectations around the work. Norms required unconditional commitments to each team member and this took trust and time to develop. As expressed by one middle school teacher:

We are off to a good start with our norms, but we need another year or two to say that they are totally embedded in our culture. Developing culture takes years, making and sustaining change takes time. People need to trust one another and that does not happen overnight (End-of-Year PLC Report, 2011).

According to the annual PLC Team Surveys (2010-2013), over the four-year period, the norms assisted teachers to develop trust in each other by demonstrating their willingness and ability to follow through on agreements and meet expectations. As reflected in the responses to the annual PLC team survey (2010-2013) in Table 14, below, most teachers believed that their team was Developing or Sustaining in its efforts to embed norms in the culture of teams. Approximately 90% of the teachers on an annual basis rated norms as either Developing or Sustaining. After four years, it was a little bit surprising that only 5% of the teachers rated their team’s ability to embed into the culture of their teams as Sustaining. Changing teams of teachers might contribute to this dynamic. It also suggests that trust is not automatically granted by teams but, rather, it has to be earned each year through commitments and actions.

Table 14
Percentage of teachers between 2010 and 2013 who believe that team norms were embedded into the culture of their team

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Initiation</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
</tr>
<tr>
<td>Initiation</td>
<td>0%</td>
<td>4%</td>
<td>7%</td>
<td>9%</td>
</tr>
<tr>
<td>Developing</td>
<td>80%</td>
<td>70%</td>
<td>60%</td>
<td>82%</td>
</tr>
<tr>
<td>Sustaining</td>
<td>20%</td>
<td>30%</td>
<td>33%</td>
<td>5%</td>
</tr>
</tbody>
</table>
While the PLC continuum addressed the value and need for constructive feedback and disagreement, most often, team norms did not address this expectation or they explicitly precluded controversy or conflict as one of its norms. A review of PLC team minutes (2010-2013) and End-of-Year PLC Reports (2010-2013), found the use of the following recurring norms: Be Respectful, Comprise, Decisions will be made by Consensus, Be Polite, and Avoid Conflict. Particularly in the first two years of implementation, team observations showed limited used of constructive critique in teams. Often, teams played in the “world of nice.” Assumptions and decision-making would often go unchallenged. Today, professional critique is much more evident as an embedded norm, even if it is not a written norm. Professional critique appear to be one characteristic in the higher functioning PLC teams. For example, high-functioning teams involved strong differences of opinions and negotiations between teachers whereas the actions of other less functioning teams predominantly involved consensus building. Observations of PLC team meetings over the four years suggest to me that the effectiveness and productivity of team collaboration is partly dependent on how the teams mediate their differences and resolve conflict.

Over time, teachers established trust through the use of norms. Collaboration among teachers has grown as teams learned to work together and trust each other. Trust became the foundation for the collaborative work. Table 15 shows an annual increase in the percentage of teachers over a four-year period who rated the existence of a collaborative culture among teachers as a 2 or a 3 on a 4-point agreement scale (0-Preinitiation, 1-Initiation, 2-Developing, 3-Sustaining). Responses increased by 13% from 79% in 2010 to 92% in 2013.
Table 15

The percentage of teachers who rated the existence of a collaborative culture as a 3 or a 4 on a 4 point agreement scale between 2009 and 2013.

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborative culture among teachers</td>
<td>79</td>
<td>81</td>
<td>88</td>
<td>92</td>
</tr>
<tr>
<td>Collaborative culture between teachers and principals</td>
<td>91</td>
<td>79</td>
<td>87</td>
<td>76</td>
</tr>
</tbody>
</table>

That same pattern of growth over time was not evident in the collaborative ratings between the teachers and principals. Over the same four year period, the percentage of teachers who rated the existence of a collaborative culture between teachers and administrators as a 2 or a 3 on the same agreement scale actually declined 15% percentage points, from a high of 91% in 2010 to 76% in 2013. Despite the decline in the last year, the collaborative culture between teachers and principals was compatible to that among teachers for the years 2011-2012 and a review of the feedback on the 2013 PLC Team Survey revealed no significant reason for the slight decline in the last year. Throughout the four years, there appeared to be a healthy respect for the work of teacher teams and the role principals had to play interacting, supporting and overseeing the work of the teams. All three schools valued their principal’s leadership of the PLC teams. As one intermediate school teacher said,

Our principal has been helpful in guiding the work and providing us with clear expectations for the work of the teams. The principal does a fantastic job keeping us involved/informed and allowing us to be part of the decision making/improvement process. It is a unified effort (PLC Team Survey, 2013).

The Superintendent’s Expectations for Administrators (2010-2013) required principals to support the PLC teams by “monitoring the teams’ progress and providing feedback to the
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teachers.” Some of the principals did this by directly attending meetings on a regular basis while others provided through other structures such as depending on the team protocols or writing email responses to team minutes such as this email correspondence to an fifth grade intermediate school team from their building principal:

Your team is doing a great job on the PLC expectations and team norms. I would suggest there could be more discourse around interventions – try to focus the agenda around the work of these four questions which would lead into discourse about remediation and enrichment opportunities. Nice job everyone – you should be proud of your team’s work; I am (PLC Feedback, 2010).

One of the most relevant, and perhaps insightful, comments to capture the essence of the collective responses from teachers was this one from a teacher in Intermediate School B:

Developing culture takes years, making and sustain changes such as collaboration between teachers and administrators takes time. People need to trust one another, that does not happen overnight (End-of-Year PLC Report 2011-2012).

All three principals were able to implement the PLC model while maintaining a healthy balance of accountability and high expectations while simultaneously cultivating a collaborative culture by providing the teams with support and autonomy to do the work.

Evidence where principals’ actions to support teacher collaboration aligned to the logic model action step. The logic model suggests the collaboration that takes place in PLC teams is focused on teachers sharing and improving their instructional practices. Some of the strongest evidence was around teachers collaborating on sharing instructional strategies. For example, Figure 4 shows that on the PLC Study Survey (2013), 84% of the teachers across the three schools agreed or strongly agreed that they collaborate with their team members on instructional strategies. Team observations (2009-2013) and teacher comments suggested that collaboration about instructional strategies was most productive when it involved PLC teams
looking at student work. As reflected in these comments from an intermediate teacher and middle school teacher respectively:

Close analysis of student work as a team sparked powerful conversations about instruction. Our PLC shares student work each week and discusses what we are doing in the classroom. For example, we may discuss a specific writing assignment we did with the students and how it worked in the classroom. We give each other feedback and share instructional strategies (PLC Study Survey, 2013).

![Bar Graph](image)

**Figure 4.** Bar Graph Showing the Percentage of Teachers from each School that Agreed or Strongly Agreed to Collaborating on Instructional Strategies and Assessing the Impact of Instructional Strategies.

Figure 4, above, shows that approximately 84% of teachers reported that they shared instructional practices as part of their PLC team work. Over 90% of the teachers of the teachers in Intermediate School B and the Middle School said that they spent time on this activity. Observations of PLC teams (2009-2013), annual PLC Surveys (2009-2013) and End-of-Year PLC Team Reports (2009-2013) all reported that teams shared and/or developed instructional practices. The following is an example from the Middle School language arts team:

To achieve student growth, our team researched, developed and shared instructional strategies that directly impacted our student’s ability to self-reflect. Using PD 360, peer
sharing at faculty meetings, inline research, and collaboration with colleagues, we developed a toolbox from which we could pull instructional strategies that address the specific qualities that demonstrate a student’s ability to take ownership of their learning. Some of these strategies included:

- Mud puddles to promote inquiry, increase student engagement and increase student investment;
- Daily goal setting to increase productivity, and develop the ability to articulate short and long term learning objectives;
- Student and teacher developed rubrics to foster metacognitive skills, define academic success, and scaffold purposeful reflection;
- Letters to future students to clarify, synthesize and reinforce learning;
- Guided practice with assessment tools to provide targeted feedback and model self-reflection skills;
- Time management reflection to develop management; and,

In general, there was a desire by all teachers across grade levels to collaborate on instructional practices. As illustrated by teacher comments below, where this did not occur, the primary reason given was lack of time and the need to focus on curriculum. During the time frame of the study, the district was preparing for the Common Core State Standards. Teachers often felt urgency around the need to finish curriculum. PLC team minutes and team observations all show that writing curriculum was a collaborative activity that teachers decided to spend more time on as they prioritized their needs and work. The urgency around developing curriculum caused some teams to deviate from the PLC protocols as they prioritized their work, as illustrated by these teachers’ comments from all three schools:

- It is part of our agenda but very difficult to get to this step in the short amount of time that we have during PLC. It is an area that we still need to get better at as a team (5th Grade Team, End of-Year Report, 2013)

- Most of our time is spent looking at data and not getting to the next step of instructional practices. We often need to focus on the curriculum which impacts our ability to move forward in our data analysis and implementation of strategies (7th Grade Team, End of-Year Report, 2013)

- The majority of our PLC this year as spent working on curriculum units and familiarizing ourselves with the new performance assessments reacted to the common core. We found this
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time incredibly valuable in driving our instruction throughout the year. (4th grade PLC Team, End of Year Report, 2013)

Figure 4 shows that only 69% of teachers collaborated on assessing the impact of instructional strategies that they used. In general, across all schools, this was not a widely utilized teacher practice. From a middle school teacher:

This is not a practice I usually see. We do look at student scores and data but we don’t necessarily discuss the specific impact of each strategy (PLC Team Study, 2013).

It was perhaps not surprising that many teachers did not engage in this activity as it was not outlined in the PLC protocol; however, its serves as an example of how PLC teams incorporated practices that they themselves thought important, even if they were not explicit expectations of the protocol.

In summary, as outlined above, the schools’ actions to support teacher collaboration exhibited a mixed alignment to the actions/outcomes in the PLC logic model. Specifically, collaboration focused on the four PLC questions and instructional practices to support teaching and learning. For example, there was strong evidence of team collaboration on work of the first three PLC questions but teams struggled to collaborate on the fourth PLC question that addressed the needs of students with early mastery. There was strong and consistent evidence that teams collaborated on instructional strategies. For example, End-of-Year PLC Team Reports (2010-2013) and weekly PLC Team Minutes (2009-2013) provided concrete examples of the instructional strategies that were discussed by the PLC teams. Also, collaboration was supported through principal support and as team members earned each other’s trust.

In the final chapter of this manuscript, I will review the implications of this analysis of how the schools’ actions to support teacher collaboration aligned to the PLC logic model. I will also make recommendations for practice.
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Results

The third phase in the program theory of PLC implementation represents the impact stage which is the anticipated outcomes and results of the program theory. Steps 5-6 in the logic model describe the anticipated outcomes as changes in teachers’ practice in the classroom (research question number 1) and increases in student achievement (research question number 2). The program theory of PLC implementation postulates that if the right conditions are created by principals and teachers collaborate around the work of PLC teams, then teachers’ practice will change resulting in higher levels student achievement.

Table 16

Schools’ Ability to Change Teacher Instructional Practices and Increase Student Achievement as Described by the PLC Logic Model

<table>
<thead>
<tr>
<th>Logic Model Actions Step</th>
<th>Degree of Alignment to Action Step</th>
<th>Data Sources Used In Analysis</th>
</tr>
</thead>
</table>
| Instructional Practices Implemented | +/- | • Classroom Walkthroughs (2009-2013)  
• End-of-Year PLC Team Reports (2009-2013)  
• SMART Goals (2009-2013)  
• Observation of PLC Teams (2009-2013)  
• PLC Study Survey (2013)  
• PLC Team Survey (2010, 2013)  
• BOE Agendas & Minutes (2009-2013) |
| Improved Student Achievement | - | • GPA Scores (2009-2013)  
• CMT Scores (2008-2013)  
• Student Achievement Report to the BOE (2009-2013)  
• SMART Goals (2009-2013)  
• End-of-Year PLC Team Reports (2010-2013)  
• Common Formative Assessments (2009-2013)  
• PLC Study Survey (2013) |

As outlined in Table 16, above, there was a mixed alignment between the outcomes experienced by the three schools to the outcomes in the PLC logic model. There was one area where the
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Schools somewhat aligned to the outcomes in the logic model action steps and one area where the schools’ outcomes did not align to the outcomes in the logic model action steps.

**Evidence where principals’ actions somewhat aligned to the logic model action step.**

I did not automatically assume the changes in instructional practices that were being discussed and shared in the PLC teams were actually being implemented in the classrooms by the teachers. Three questions on the 2013 PLC Study Survey provided insight on teachers’ perceptions of whether or not, as a consequence of their participation in PLCs, they implemented new instructional practices; they believed they were better teachers; and, they believed their students learned more. The teachers’ responses indicated a collective focus on increased student learning. Figure 5, below, indicates that teachers in all three schools responded with a very high level of agreement they were implementing the instructional strategies they had developed in PLC team meetings. They also strongly believed they were better teachers and student achievement had improved because of their participation in a PLC team.

![Bar Graph Showing the Percentage of Teachers from each School that Agree or Strongly Agree to Using Instructional Strategies, Becoming a Better Teacher Because of PLC, and Their Students Learn More Because of their PLC Team Work.](image)

**Figure 5.** Bar Graph Showing the Percentage of Teachers from each School that Agree or Strongly Agree to Using Instructional Strategies, Becoming a Better Teacher Because of PLC, and Their Students Learn More Because of their PLC Team Work.
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Approximately 84% of the teachers in grades 3-8 reported strong levels of agreement that they identified instructional strategies in their PLC teams to be used in the classroom. Approximately 89% of the teachers’ responses indicated strong levels of agreement that they actually used in the classroom instructional strategies they identified. Evidence from classroom walkthroughs (2009-2013) conducted by district administrators and teachers supported this high statistic. For example, district walkthroughs at the Middle School from 2010-2013 focused on attending PLC team meetings and/or watching videos of PLC team meetings prior to visiting teachers’ classrooms. This process validated how teachers discussed instructional practices in their team meetings and allowed the visiting team of administrators and teachers to see the practices being implemented in the classrooms. However, as discussed in the prior section on teacher collaboration, End-of-Year PLC Team Reports (2009-2013), the PLC Study Survey (2013), SMART Goals (2009-2013), and PLC team observations (2009-2013) revealed a notable frustration expressed by teachers that teams experienced difficulty actually getting to discussions about instructional practices in team meetings. Even after four years of PLC implementation, there was still evidence that the very intervention (developing instruction practices) which was critical for teachers to discuss in PLC teams did not occur with as much fidelity and frequency as the PLC protocol would anticipate, principals would have hoped for and teachers would have liked.

In Figure 5, above, teachers in all three schools reported very strong levels of agreement (80%-95%) that they were better teachers because of their work in their PLC teams. The reasons for this belief are not explicitly clear; however, teachers definitely valued the collegial, supportive aspect of being part of a team as reflected in these teacher comments from teachers in all three schools:
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We value the shared time together (Intermediate School A, PLC Team Survey 2010)

We are isolated as professionals, so we rely on our meeting time to brainstorm ideas and support each other (Intermediate School B, PLC Study Survey, 2013)

We need this time together and appreciate the time we can discuss our curriculum and student progress (Middle School, PLC Study Survey, 2013)

Evidence where principals’ actions did not align to the logic model action step.

Ultimately, the changes in teacher practices that were implemented in the classroom were intended to increase student achievement. The 2013 PLC Study Survey results shown in Figure 5, above, show that 87% of the teachers across all three schools strongly agreed or agreed that their students learned more because of their work with their PLC team. Teachers clearly believed that their work in PLC teams improved their students’ learning. This belief is reflected in the comment of a teacher from Intermediate School B:

I have obtained valuable ideas that helped my students make gains because of my PLC discussions. Whatever the task at hand at each PLC meeting, we are doing valuable work that is improving student learning (PLC Study Survey, 2013).

To assess student achievement, teams used locally developed assessments and external assessments such as state testing. SMART goals (2009-2013) developed by the PLC teams regularly incorporated internal accountability measures to assess student achievement such as common formative assessments that were developed and scored by teachers. End-of-Year PLC Team Reports (2010-2013) revealed that over 90% of the teams all reported increases in student achievement and/or significant student growth towards the achievement benchmarks set by the PLC teams. These benchmarks used student achievement data from a variety of assessments. For example, the following 6th grade Language Art team’s analysis of student achievement is representative of the type and level of student achievement success that PLC teams said they were able to realize.
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Using the CMT holistic scoring rubric, 71% of students were at goal on the fall writing prompt. After direct instruction, extensive feedback, remediation, practice, application, and reassessment, 94% of students achieved goal or higher on the final prompt in the spring. Our lofty goal of 100% of student’s reaching goal was not met, but incredible progress was made. With 94% of students receiving a holistic score of 8 or higher on the spring prompt, significant growth on the part of the students was evident and impressive. Even the five students not reaching goal made great strides and the improvement in the quality of their writing continued throughout the year (End-of-Year PLC Team Report, 2012).

If SMART goals set by the teams were not totally met, PLC teams generally reported that most of their students exhibited growth towards the benchmarks that they had established.

Table 17

4th Quarter Grade Point Averages for all Middle School Students

<table>
<thead>
<tr>
<th>Year</th>
<th>Grade Point Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009-2010</td>
<td>3.46</td>
</tr>
<tr>
<td>2010-2011</td>
<td>3.42</td>
</tr>
<tr>
<td>2011-2012</td>
<td>3.51</td>
</tr>
<tr>
<td>2012-2013</td>
<td>3.55</td>
</tr>
</tbody>
</table>

In an attempt to triangulate student achievement data, I looked at internally available academic achievement scores for middle school students. Academic achievement for students at the Middle School is reported using a 4-point grading scale for each subject class (F receives 0 points and A+ receives 4.3 points). Table 17, above, shows the average 4th quarter grade point averages for all middle school students during the four-year period of the study. Similar data is not available for the intermediate school students. An analysis of the data shows that the grade point average for middle school students increased minimally by 0.09 points over the four years, from 3.46 in 2010 to 3.55 in 2013. Essentially, student achievement remained stagnant over the four year. For example, translating the average grade point average score into letter grades used by the school, students received an average letter grade of B+ in 2010 and the same average letter grade of B+ in 2013.
The pattern of high levels of student achievement experienced by the PLC teams as reflected in their SMART goals was not reflected on external benchmarks as measured by the CMT. Reports on student achievement to the BOE (2009-2013) showed a different picture. Figure 6, below, shows CMT student achievement during the two years prior to the study (2008 and 2009) and the four-year period of PLC implementation (2009-2013).

![Graph showing student achievement](image)

*Figure 6. Line Graph Showing the Total Percent of Granby and DRG B Students in Grades 3-8 at or Above Goal on the CMTs in Math, Reading or Writing Between 2008 and 2013.*

According to Figure 6, student achievement in Castle, as measured by the total number of students in grades 3-8 that met goal in math, reading or writing, remained stagnant over the period of PLC implementation. If anything, the achievement gap between Castle’s students and those students in DRG B districts actually closed by a few percentage points during the four-year time period of the study. Figure 7, below, illustrates that the pattern of stagnating student achievement and the narrowing of the achievement gap between Castle’s student achievement and that of DRG B students was also evident in math.
Figure 7. Line Graph Showing the Total Percent of Granby and DRG B Students in Grades 3-8 at or Above Goal on the Math CMT between 2008 and 2013.

Figure 8, below, shows the reading scores over the four years. Apart from some fluctuation in student scores in years two (2011) and three (2012), student achievement in reading had similar stagnating performance; however, most notable, in Figure 9, below, were the writing scores which steadily declined by 3% during the four years of the study and also dropped by 3% below the student achievement of other DRG B districts.
Figure 8. Line Graph Showing the Total Percent of Granby & DRG B Students in Grades 3-8 at or Above Goal on the Reading CMT between 2008 and 2013.

Figure 9. Line graph showing the total percent of Granby & DRG B students in grades 3-8 at or above goal on the writing CMT between 2008 and 2013.
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Table 18, below, shows student achievement at each of the schools between 2008-2013. It shows Castle’s students consistently underperformed in writing across the three schools compared to students’ achievement in math and reading. Also, during the four-year time period of the study, student achievement in writing actually declined at the Middle School and Intermediate School B and remained stagnant at Intermediate School A.

Table 18

Percent of students at or above goal or higher on the CMTs between 2008 and 2013,

<table>
<thead>
<tr>
<th></th>
<th>Intermediate School A</th>
<th>Intermediate School B</th>
<th>Middle School</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Math</td>
<td>Reading</td>
<td>Writing</td>
</tr>
<tr>
<td>2008</td>
<td>85</td>
<td>78</td>
<td>81</td>
</tr>
<tr>
<td>2009</td>
<td>90</td>
<td>87</td>
<td>80</td>
</tr>
<tr>
<td>2010</td>
<td>93</td>
<td>88</td>
<td>82</td>
</tr>
<tr>
<td>2011</td>
<td>91</td>
<td>90</td>
<td>84</td>
</tr>
<tr>
<td>2012</td>
<td>93</td>
<td>92</td>
<td>88</td>
</tr>
<tr>
<td>2013</td>
<td>90</td>
<td>88</td>
<td>82</td>
</tr>
</tbody>
</table>

Furthermore, Table 19, below, shows an analysis of Castle’s percentile rankings in the DRG when measuring the total number of students at or above goal on the CMTs between 2008 and 2013. It reflects a steady decline in Castle’s ability to be in the top 25th percentile of the DRG B districts.

Table 19

Percentage of grades 3-8 CMT math, reading and writing tests at or above goals between 2008 and 2013 that were in the top 25th percentile of DRG B districts.

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>28%</td>
<td>33%</td>
<td>22%</td>
<td></td>
</tr>
</tbody>
</table>
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From the eighteen CMT tests in math, reading and writing, administered annually to students in grades 3-8, the table shows the percentage of Castle’s student test scores that placed in the top 25\textsuperscript{th} percentile of the DRG for students scoring at or above goal. The district’s percentage remained consistent at 50\% for only one year. During the remaining three years of PLC implementation, the district’s rankings steadily decreased by 28 percentage points from 50\% in 2010 to 22\% in 2013.

The continued stagnation of CMT student achievement data, the declining DRG comparison data and the consistent middle school grade point average data conflicts with the PLC teams’ self-reported data that reflected a high degree of implementation of new practices, better teaching and increased student achievement. The writing scores, in particular, stand in stark contrast to the internal SMART goal data and teacher perceptions. The disconnect between the teachers’ perceptions of student achievement and student achievement related to PLC SMART goals versus student performance on the CMT merits further exploration. Presently, no formal process exists in the district to help PLC teams evaluate how their work and their internal student results support and align to student performance on state administered standardized testing.

In summary, as outlined above, the expected outcomes of the program theory exhibited a mixed alignment to the outcomes in the logic model. Over the four years, there was growing evidence that instructional practices discussed in PLC teams were being implemented in the classroom but that it is not yet an embedded practice for all teams. For example, the use of video and school walkthroughs at the Middle School showed powerful examples of PLCs implementing instructional practices at team meetings; however, due to time constraints, there were other PLC teams who were never able to get to the instructional discussions. The expected
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outcome of increased student achievement was, at best, mixed and the internal assessments did not align to results from administered standardized tests. For example, many PLC teams set literacy goals for their SMART goals, yet student achievement in writing steadily declined during the period of PLC implementation.

In the final chapters of this manuscript, I will discuss the implications of this analysis of how the implementation of teachers’ instructional strategies and student achievement results showed mixed alignment to the logic model. I will also make recommendations for practice.

Discussion

This section summarizes the main findings from the study. This study examined the implementation of PLCs as a primary strategy for school improvement by using a program theory logic model (Chen and Rossi, 1992; Rogers et al, 2000; Weiss, 1998) to analyze the district’s theory of change in respect to PLCs with its theory in action.

Table 20

Alignment of PLC Implementation Actions and Outcomes to the Expectations of the Program Theory Logic Model Actions and Outcomes.

<table>
<thead>
<tr>
<th>Creating the Conditions</th>
<th>Collaboration</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logic Model Inputs 1-2</td>
<td>Logic Model Inputs 3-4</td>
<td>Logic Model Inputs 5-6</td>
</tr>
<tr>
<td>Sufficient meeting time provided</td>
<td>Protocols and expectations provided</td>
<td>Professional development provided</td>
</tr>
<tr>
<td>+</td>
<td>+/-</td>
<td>+/-</td>
</tr>
</tbody>
</table>

+ The preponderance of evidence generally supports alignment to this action/outcome
+/- The preponderance of evidence is generally neutral/conflicting on the alignment to this action/outcome
- There is a lack of preponderance of evidence aligning to this action/outcome
Table 20, above, summarizes my evaluation of the alignment of the evidence to each of the main actions steps in the three main phases of PLC implementation (Creating the Conditions, Collaboration and Results) represented by steps 1-6 in program theory logic model. As outlined in Table 20, there was mixed alignment to the three main phases and to the individual action steps. The results phase was the least aligned. Five major findings from the study are as follows:

Finding One: A program logic model was used to successfully align theoretically predicted PLC events with those that actually occurred. The model allowed me to test the district’s theory of PLC implementation as a high strategy reform initiative to improve stagnating student achievement. The logic model also served as a valuable evaluation tool by validating some district actions, identifying areas where the theory possibly broke down and spotlighting some unanticipated learnings.

Finding Two: The theoretical framework used to conceptualize the interdependence of the PLC strategy with principal leadership and professional learning to understand how PLCs can positively impact teaching practices and student achievement was appropriate. Creating the conditions for success required principal leadership and the work of professional learning communities was fundamentally grounded in and dependent on theories of adult learning. The research on adult learning and principal leadership was evident in the data collected.

Finding Three: According to the research, effective leadership is about creating the conditions for success. Principals did this in a variety of ways including providing protocols, resources, feedback to teams, and professional development. Clearly developed expectations and protocols helped facilitate the work of teams, particularly in the early years of PLC implementation; however, they primarily addressed the technical aspects of the teamwork and did not guarantee student learning. As Castle’s PLC teams worked together, the rigid protocols
may have actually restricted the creativity of the teams and limited their ability to expand
discussions. Over time, teams started to prioritize their own work, making decisions about what
to focus on, such as writing curriculum. Professional learning communities are inherently social
and complex processes. Whether or not they work depended on principals knowing what, when,
how, and why such structures worked. It also depended on how teachers made sense of, and
chose to respond to, the protocols, activities and choices.

Finding Four: The process of collaboration facilitated both student and teacher learning.
Over time, teachers perceived that they had increased their capacity to be collaborative because
they were able to focus on the 4 PLC questions and build trust with other team members. Teams
were successful collaborating on their SMART goals and on the first three PLC questions.
Teams experienced serious difficulty collaborating on the fourth question that addressed
enrichment and extended learning for students who were already proficient.

Finding Five: Actions taken by the district to implement new instructional practices
somewhat aligned to the expectations of the logic model while student achievement outcomes
did not align to the expectations of the logic model. Teachers reported discussing and
implementing instructional practices and they believed student learning had improved as
evidenced by student progress towards SMART goals. The evidence suggested that teachers did
share instructional practices and that they were mostly being implemented in the classroom;
however, the student achievement results on the CMT and Middle School grade point averages
showed continued stagnation of student achievement. Student achievement scores continued to
stagnate in math and reading over the four years, and most disappointingly, student achievement
in writing actually declined significantly. Student achievement on external assessments did not
appear to be supported by the work of the PLC teams.
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Castle’s PLC story suggests that in a high-performing school district, the PLC strategy might promote a positive culture and learning environment and lead to changes in teacher practices but not increase student achievement. The results from this study can be used by Castle and other school districts to inform how professional learning communities can be better used as a model for professional learning, to change teachers’ practices and to increase student achievement.

In the next section that follows, I address suggestions for steps that other districts similar to Castle – those high-performing schools districts that are implementing professional learning communities to improve student achievement – might consider making to ensure changes in teachers’ instructional practices and improved student achievement.

Recommendations for Practice

The following recommendations for practice suggest steps that other districts similar to Castle – those high-performing schools districts that are implementing professional learning communities to improve student achievement – might consider making to realize changes in teachers’ instructional practice and improved student achievement. Based upon the data, research, and insights from the program theory logic model, I offer the following six recommendations for practice.

Theoretical Frameworks and Logic Models

Districts can capitalize on opportunities to further grow principals as instructional leaders in PLCs by having them develop and use theoretical frameworks and logic models to better understand and build capacity around the change process of professional learning community teams. This supports the research that says adults learn best when learning experiences require
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them to construe and make sense of situations based on the mental models they use to guide their practice (Brooks, 2007; Ertmer & Newby, 1996).

**PLC Team Collaboration**

In identifying potential reasons why the program theory did not provide the expected results, school administrators should constantly pay attention to the dynamic, sense-making process of collaboration. Research suggests that some PLC teams have been shown to improve culture, and not instructional practices or achievement (Supovitz, 2002); hence, it is imperative that principals create the conditions that enable teachers to change instructional practices and improve student achievement. For example, collaboration around student work was successful in Castle.

**Professional Development in PLC Team Collaboration**

Designing professional learning opportunities around the work of teams is a recommended practice (Carroll, 2009; Dufour, DuFour, & Eaker, 2008) and it has been shown to improve individual and team performance (Gully, Incalcatera, Joshi & Beaubien, 2002). Given that PLC teams became the accepted primary model for professional development within the district for teachers, district leaders should consider expanding the opportunities of how teachers learn from each other as opposed to the traditional professional development model of workshops. Also, the professional development activities to support PLCs should, therefore, be planned in alignment with theories of adult learning and effective professional development practices (Garet et al., 2001; Knapp, 2003; Supovitz, Mayer, & Kahle, 2000).

**Mechanisms to Measure the Effectiveness and Fidelity of PLC Implementation**

The research supports the implementation of PLCs by school districts as a strategy to increase teacher professional knowledge and student learning (Annenberg Institute for School
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Reform, 2004; Darling-Hammond, 1996; DuFour & Eaker, 1998; Schmoker, 2004). However, evidenced by the study, even the most productive PLC team work does not necessarily guarantee the realization of improved student outcomes. Administrators and teachers should seek coherent accountability processes to help ensure the successful implementation of outcomes of PLC teams. One example would be to closely align PLC team SMART goals to content standards and strands of standardized assessments such as the Smarter Balanced Assessments. A second example would be to closely tie the performance and outcome of the PLC teamwork to teacher evaluation through teacher goal setting. A third example to achieve this would be for PLC team members to incorporate classroom walkthroughs and to use videotaping to observe and reflect upon the changes in instructional practices that teams say are occurring in the classrooms.

**Time and Protocols**

Research supports the need for principals to create time for PLC teams to meet (DuFour, Dufour, Eaker & Karhanek, 2010). Based on this study, principals should consider providing their PLC teams with meeting times between 60-90 minutes per week. This time can be realized by one dedicated meeting per week or by a coherent and sophisticated understanding of the PLC work that utilizes and/or combines other team meeting times during the week. It is possible and perhaps even desirable, to allow principals to designate and differentiate the amount of time that PLCs meet in their schools.

Clearly developed expectations and protocols help facilitate the work of teams, particularly in the early years of PLC implementation; however, they primarily address the technical aspects of the teamwork and do not guarantee student learning. As Castle’s PLC teams worked together, the rigid protocols may have actually restricted the creativity of the teams and limited their ability to expand discussions around instruction; hence, administrators should
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consider extending greater decision-making autonomy to teams on how best to construct the PLC teamwork to focus on teaching and learning.

Leadership Matters

The literature calls for effective principal leadership in creating the success of professional learning community teams (Dufour et al., 2008; Louis, Leithwood, Wahlstrom, & Anderson, 2010; Marzano, Waters, & McNulty, 2005). According to the study, although not evident in Castle, principals could advance the work of the PLC teams by building the capacity of PLC team leaders to do the work. As PLCs develop, there is a need for more team and teacher autonomy. Teams become more skillful and increase in confidence when they demonstrate their ability to lead themselves. Team autonomy and effectiveness are increased with a team facilitator (Gully et al, 2002). As teams self-identify PLC team leaders, administrators need to leverage this opportunity by providing PLC team leaders with training in the work of PLCs and in effective team facilitation.
References


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The White House (2011, September). *Remarks by the President on No Child Left Behind Flexibility*. Washington, DC.


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Appendix A – Professional learning community logic model.

The elements that compose the logic model below were designed by central office administration after a review of the literature (Ainsworth, & Viegut, 2006; Conzemius & O’Neil, 2002; DuFour, et al., 2006) and in consultation with a national professional learning community consultant who, in order to understand the work of PLC teams, visited teams throughout the district, reviewed team artifacts, spoke with different team members and provided feedback to district administrators. The six steps described in the boxes on the left-hand side of logic model represent the team processes and protocols that are outlined in the graphic on the right-hand side of the logic model provided to all PLC teams throughout the district to guide their work.
Appendix B – Consent Form (Adult Learning)

Consent Form for Participation in a Research Project

University of Connecticut

Course Instructor: Professor Barry G. Sheckley, PhD.
Student Researcher: 
Study Title: EDLR 337 Professional Learning Interview

1. Invitation to Participate
   Good afternoon/evening. My name is __________________. Before we begin, I would like to thank you for taking the time to talk with me today.
   I am working on a research project for a course offered in the Adult Learning Program at the University of Connecticut.

2. Purpose
   We are interested in knowing more about adults’ professional learning experiences.

3. Description of Procedures
   During the next hour or so, I will ask you some questions about professional learning with an emphasis on your proficiency and how you developed it. I’d also like your consent to tape-record your response so that I may review your words at a later time.

4. Risks and Inconveniences
   We believe this interview does not involve any risk to you. This should take approximately 45 minutes of your time.

5. Benefits
   Although you may find it interesting to participate in this study, there will be no direct benefit to you from your participation.

6. Confidentiality
   All of your responses will be anonymous. Only I will know your name. Your answers will be combined with those from other people we interview to get an overall picture of about how adults develop proficiency.

   You should also know that the UConn Institutional Review Board (IRB) and the Office of Research Compliance may inspect study records as part of its auditing program, but these reviews will only focus on the researchers and not on your responses or involvement. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.

10. Voluntary Participation
    You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time. There are no penalties or consequences of any kind if you decide that you do not want to participate.
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Appendix C – Interview Protocol (Adult Learning)

Course Instructor: Professor Barry G. Sheckley, PhD.

Student Researcher: Alan Addley

Study Title: EDLR 337 Professional Learning Interview

OK? Ready to begin?

Now that the tape-recorder is on, please state your name, the date, and that you consent to have your response tape-recorded.

Part 2: Background Information.

To begin, would you tell me about your prior work experience? _____________________

[NOTE: During the discussion probe to get an estimate of number of years of experience. If necessary, ask “Do you have fewer than 3 years of experience? 3-5? 5-10? 10-15? 15-20? More than 20?”

In this interview, I’m particularly interested in discussing your work and experience [related to resolving this problem of practice]. Would you tell me in general about your prior experiences [related to resolving this problem of practice]. 2

Part 3: Individual Components of Professional Learning

OK. Tell me about your specific proficiency in addressing or [resolving this problem of practice] ….

1. …by “proficiency,” I mean an area in which you both have knowledge about [resolving this problem of practice] and can apply it skillfully to solve problems related to [resolving this problem of practice]. Can you identify an area or topic in which you have proficiency as it relates to resolving [this problem of practice].__________________________________________________________________

NOTE: The person may have trouble identifying – or admitting to having – an area of proficiency related to resolving the problem of practice. If necessary, expand the discussion with examples such as: “Often times it’s an area in which people consult you or ask your advice because they view you as having well developed skills in addressing or resolving this problem of practice.” In any event keep probing to help an understanding of the person’s proficiency as it relates to addressing the problem of practice. At a minimum you need a statement that completes the phrase “This is what I can do well related to resolving [this problem of practice....]”

2 As appropriate, you can omit this phrase “…as it relates to resolving the problem of practice.” Occasionally insert the phrase just to keep your interviewee focused on the problem of practice.
2. In general, what prompted you to develop this proficiency [related to resolving this problem of practice]? ……[pause and wait for response—then keep probing].

If the person does not mention this issue, ask: Any way that an external reward (e.g., Recognition? Notoriety? Money?) was involved in the development of your proficiency [as it relates to resolving this problem of practice]? On a scale where 1=not at all important to 10=very important, how important was this sense of external reward?

1=not important _____________________________ 10=very important

Briefly explain why you gave this rating. ________________________________

If the person does not mention this issue, ask: “Any way that a sense of “internal satisfaction” was involved in the development of your proficiency as it relates [to resolving this problem of practice]? On a scale where 1=not at all important to 10=very important, how important was this sense of internal satisfaction in the development of your proficiency related [to resolving this problem of practice]? 1=not important _____________________________ 10=very important

Briefly explain why you gave this rating. ________________________________

3. On a scale where 1=not at all important to 10=very important, how important was this sense of competence? 1=not important _____________________________ 10=very important

Briefly explain why you gave this rating. ________________________________

4. Let’s talk about a few other factors that may have been involved in the development of your proficiency [related to resolving this problem of practice].

Any way that feeling “competent” as a professional was involved in the development of your proficiency [as it relates to resolving this problem of practice.] _____________________________

On a scale where 1=not at all important to 10=very important, how important was this sense of competence?

1=not important _____________________________ 10=very important

Briefly explain why you gave this rating. ________________________________

How about a desire to be autonomous in your work? Any way that a desire to feel “autonomous” as a professional may have been involved in the development of your proficiency [as it relates to resolving this problem of practice]?” _____________________________

On a scale where 1=not at all important to 10=very important, how important was this sense of autonomy?

3 The 1st and 3rd questions in this sequence may appear redundant. They are not. If you find that your interviewee rates any factor on the high end of the scale, in your analysis you’ll want to explain “why” they gave this rating. The answer to this third question will help you.
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1=not important _____________________________ 10=very important

Briefly explain why you gave this rating. __________________________________________

5. Finally, how about “relatedness?” Any way that a desire to feel “related” – a part of a team, connected with others – may have been involved in the development of your proficiency [as it relates to resolving this problem of practice]? _________________________________

On a scale where 1=not at all important to 10=very important, how important was this sense of relatedness?

1=not important _____________________________ 10=very important

Briefly explain why you gave this rating. __________________________________________

6. Now, let’s talk about how you use your proficiency. Would you give me an example or an instance in which you used your proficiency – when you used information skillfully – to address [this problem of practice]? _________________________________

Continuing with this example, would you discuss briefly how you planned, monitored, and evaluated your actions while addressing this situation [Note: Clarify the 3 steps—planning step where you figured out what you were going to do, monitoring step where you literally “watched yourself” and kept track of whether things were going according to plan, evaluating step where you were taking stock, assessing whether this was the best course of action. Use the ideas in the Ertner and Newby article to explain this process]

…planning_______________________________________________________________

…monitoring_____________________________________________________________

…evaluating______________________________________________________________

7. Researchers tell us that professionals will use a “mental model” – or “storyline” – about a situation when addressing a problem of practice. For many professionals these mental models represent a composite of their prior experiences with this situation. [Note: Help to clarify that when you say “mental models” you’re referring to complex frameworks individuals develop of “how the world works.” Use the ideas in the Seel article to explain the idea of mental models]. Did you have any sense of using an overarching mental model of this problem of practice in this situation? _________________________________

If so, would you describe briefly how you used your mental model to guide your professional work in this example [where you addressed this problem of practice]? _____________________________________________

8. OK if we talk about how you developed this mental model? Think back to a time, say 10 years ago, when you had not yet developed your current mental model of practice relative to [resolving this problem of practice]. What are 5 or 6 ways you would differentiate between then (when you had little or no proficiency/experience) and now (when you have more proficiency/experience) [related to resolving this problem of practice]?
[Note: At the end of this section you should have enough information to discuss the individual component of the Professional Learning Model. Specifically, you should have information about innate psychological needs, self-regulation, and mental models. You should also have information on how these factors work to influence professional learning as it relates to proficiency in resolving a problem of practice. If you do not have this information, revisit the questions. Ask probing questions—tell me more, would you expand on that—to generate the information you need]

Part 4: Key Experiences

9. In your own words, how did you develop your current level of professional proficiency [relative to resolving this problem of practice]. ______________

10. Briefly, what were 4 or 5 key activities, events, or occurrences that enhanced the development of your proficiency [in resolving this problem of practice]? For each activity, would you also describe how it helped you to develop your proficiency [related to resolving this problem of practice]?

<table>
<thead>
<tr>
<th>Activity/ Event</th>
<th>How it helped</th>
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</table>

Of these activities, which one was the most influential? Please explain why. ______________

I’m also interested in your experiences with formal “professional development” programs (e.g., workshops, conferences, academic classes) related to [resolving this problem of practice]. In general, what were your experiences with such formal professional learning programs?

….. How frequently did you participate in such programs? Monthly? Quarterly? Yearly? Once every few years? ______________

…..what were their strengths [in helping you gain proficiency in resolving this problem of practice]? ______________
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… limitations [in helping you gain proficiency in resolving this problem of practice]? ________________________________________________________________
…..On a scale where 1=not at all important to 10=very important, how important were formal professional learning programs [in helping you gain proficiency in resolving this problem of practice]??
    1=not important __________________________________________ 10=very important
Briefly explain why you gave this rating. ________________________________________________

11. Here’s a “heads up.” As the last question in this interview, I’m going to ask you to draw a map of your professional learning process – a map that may include how the answers to these last few questions fit together.

[Note: At the end of this section you should have enough information to discuss the Key Experiences component of the Professional Learning Model. Specifically, you should have information about key experiences (also known as the multifaceted, experience-based process) that provides the foundation for professionals’ learning. If you do not have this information, revisit the questions. Ask probing questions—tell me more, would you expand on that—to generate the information you will need]

Part 5: Environment

12. Let’s talk briefly about the environment in which you work. By “environment” I don’t mean the desk and chairs in your workspace. Instead, I mean the broad milieu – the social and physical setting – in which you work. Can you give me a specific example of how your work environment helped you to develop your proficiency [in addressing this problem of practice]? ________________________________________________________________

Let’s talk more about the general work environment that encased this example. Did your work environment have a climate (or culture) that actively supported and encouraged you to develop your professional skills related [to resolving this problem of practice]? ______
If so, briefly describe examples of the supports you received. ____________________________

If not, briefly describe examples of how the environment discouraged or impeded the development of your proficiency [related to resolving this problem of practice].
________________________________________________________

….what about challenges? What examples do you have of your work environment challenging you to develop, refine, or improve your proficiency [in resolving this problem of practice]? ________________________________________________________________

….On a scale where 1=not at all important to 10=very important, overall, how important was your work environment in helping you to develop your proficiency [related to resolving this problem of practice]?  
    1=not important __________________________________________ 10=very important
Briefly explain why you gave this rating. _________________________________

13. What about feedback you received in your work environment? Did feedback from people within your environment - students, colleagues, supervisors – help you to develop your proficiency [related to resolving this problem of practice]?

Explain more how this feedback helped to develop your proficiency [related to resolving this problem of practice]__________________________________________________________

…..On a scale where 1=not at all important to 10=very important, overall, how important was the feedback you received within your work environment in helping you to develop your proficiency [related to resolving this problem of practice]?

1=not important ___________________________10=very important

Briefly explain why you gave this rating. _________________________________

14. Can you describe any examples within your work environment when you had opportunities to engage in “inquiry,” – in a process where you and others questioned current practices and explored ways to improve?

…..On a scale where 1=not at all important to 10=very important, overall, how important was participation in inquiry activities within your work environment in helping you to develop your proficiency [related to resolving this problem of practice]?

1=not important ___________________________10=very important

Briefly explain why you gave this rating. _________________________________

15. One more question. Can you give me an example of an occasion where you worked collaboratively with your colleagues on resolving a problem of practice?

…..On a scale where 1=not at all important to 10=very important, overall, how important was working together with colleagues within your work environment in helping you to develop your proficiency [related to resolving this problem of practice]?

1=not important ___________________________10=very important

Briefly explain why you gave this rating. _________________________________

16. …anything more about your work environment?

[Note: At the end of this section you should have enough information to discuss the environment component of the Professional Learning Model. Specifically, you should have information about how a work environment enhances professional learning. If you do not have this information, revisit the questions. Ask probing questions to generate the
Part 6: Map
17. Over the last hour or so we’ve talked about many issues related to how you developed your proficiency [related to resolving this problem of practice]. Let’s try to pull all the ideas together. Using this blank piece of paper, would you briefly outline the process that was involved as you developed your proficiency [related to resolving this problem of practice]. How do the items you talked about in this interview fit together?

Part 6: Conclusion
18. Any more ideas you’d like to add about your proficiency [related to resolving this problem of practice] or how you developed it? Any more thoughts on professional development [related to resolving this problem of practice]?

Any closing thoughts on your professional learning experiences in general? __________

Again, I want to explain that this interview is anonymous. If you have any misgivings about your interview during the next day or so, give me a call. If you want to know about the results of the project, I will gladly talk with you again at the end of August when I have finished analyzing the data.

Thank you again for your time. Your responses have been very helpful.
Appendix D– Consent Form (Leadership)

Consent Form for Participation in a Research Study
University of Connecticut

Principal Investigator: Richard W. Lemons

Student Researcher: Alan Addley

Study Title: Leadership and Instructional Practice

Introduction
You are invited to participate in an interview research study to investigate the relationship between leadership and instructional practice. You are being asked to participate because of your role and/or position in a school that is trying to improve student achievement and instructional practice.

Why is this study being done?
I am a graduate student at the University of Connecticut, and I am conducting this interview as part of my course work. I am interested in finding out about your experiences in efforts to improve student achievement and instructional practice. In particular, I am interested in understanding the recent improvement efforts of this school, who leads these efforts, and how these efforts impact the work of teachers and students in classrooms.

What are the study procedures? What will I be asked to do?
If you agree to take part in this study, you will be asked to complete a face-to-face interview. The interview will be semi-structured—you will be asked to answer specific questions, but there will be opportunity for you to add additional information you think may be related to any of the questions. These questions will involve the context of your district/school, the improvement efforts underway, the individuals who have taken particular leadership with these efforts, and the impact these efforts are having upon student achievement and instructional practice. You may choose to not answer any question in the interview protocol.
With your consent, the interview will be audiotape or digitally recorded so that I may review the tape at a later date. I may transcribe sections of the audiotape to facilitate my review of the information you provide.
You may turn off the recorder at any time during the interview if you do not want to have something you say recorded.

What are the risks or inconveniences of the study?
We believe participation in this interview does not involve any risk to you. Your participation will require about approximately 60-90 minutes of your time.

What are the benefits of the study?
Although you may find it interesting to participate in this interview, you will not benefit directly from participation.
Will I receive payment for participation? Are there costs to participate?
You will not receive payment for participation. There are no costs, other than your time, of participating in this study.

How will my personal information be protected?
The following procedures will be used to protect the confidentiality of your data. I will keep confidential your identity in all reporting of information from the interview. I will use pseudonyms to describe your organization and your name. Your identity will be known only to me. I will keep the audiotape of the interview in a secured location and at the end of the course I will erase the recording and destroy any transcriptions.
You should also know that the UConn Institutional Review Board (IRB) and the Office of Research Compliance may inspect study records as part of its auditing program, but these reviews will only focus on the researchers and not on your responses or involvement. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.

Can I stop being in the study and what are my rights?
You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time. There are no penalties or consequences of any kind if you decide that you do not want to participate.
You do not have to answer any question that you do not want to answer.

Who do I contact if I have questions about the study?
Take as long as you like before you make a decision. We will be happy to answer any question you have about this study. If you have further questions about this project or if you have a research related problem, you may contact the principal investigator, Richard W. Lemons (860-486-4284) or the student researcher (insert name and phone number). If you have any questions concerning your rights as a research subject, you may contact the University of Connecticut Institutional Review Board (IRB) at 860-486-8802.

Documentation of Consent:
I have read this form and decided that I will participate in the project described above. Its general purposes, the particulars of involvement and possible hazards and inconveniences have been explained to my satisfaction. I understand that I can withdraw at any time. My signature also indicates that I have received a copy of this consent form.

Participant Signature:
Print Name:
Date:

Signature of Person Obtaining Consent:
Print Name:
Date:
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Appendix E – Interview Protocol (Leadership)

EDLR 6092 Inquiry Project: Leadership and Instructional Practice

Interview Protocol

AFTER Interviewees have signed the informed consent form:

OK? Ready to begin?

Now that the tape-recorder is on, please state your name, the date, and that you consent to have your response tape-recorded.

A. Context
1. Please tell me about this district/school
   a. Potential Probes: Have you worked at other districts/schools? How does this school compare to your past experience in other settings?
2. How would you describe the students who attend your district/school?
   a. Probes: Race, ethnicity, language, family background, prior academic records. What will most students do when they leave your school?
3. How would you describe the adults who work in your district/school?

B. School Focus/Instructional Improvement Efforts
1. What are the vision/goals your school/district has been working on in the past year or two?
2. What are you currently doing around these goals/vision?
3. What particular responsibilities have you assumed in relationship to the vision/goals?

C. Job Responsibilities & Leadership Tasks
1. What does your position as [ ] entail? What are your daily responsibilities?
2. What are the goals/vision that you are focusing on in your own work this year?
3. How did you come to focus on these?
   Probes: circumstances events people

If district leader, ask:

———

4 Substantial portions of this protocol are adapted from two sources: The Distributed Leadership Project at Northwestern University and the Consortium for Policy Research in Education (CPRE) project on Accountability and the High School. The Distributed Leadership project has already designed and made public several interview protocols that have been piloted and employed for the study of instructional leadership in elementary schools using the Spillane, Halverson, and Diamond framework (Distributed Leadership Project (2000). Principal/School leader interview protocol. <http://www.letus.org/dls/instruments/leadersInterviewSpring.pdf> (cited 8 April, 2002). The most applicable questions from The Distributed Leadership project’s protocols have been adopted without change or adopted with slight modification so that they would fit the high school context. In addition, I have adopted certain interview questions from the CPRE-Harvard Graduate School of Education project on High School and Accountability that have been field-tested to generated rich information about leadership task enactment, the distribution of leadership, and the influences of situation/context.
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1. What are the major strategies your district is using to improve teaching and learning:
   a. Tell me a little about each
      • How are human and financial resources allocated to support your vision?
      • Professional development (district leadership and school leadership)
      • Communications within district
      • Collaboration

2. How are you developing people to carry out this vision or reach the goals?
3. How does the district build principals’ capacity to carry out the work?
4. Give examples of how the district provides support to principals.
5. Do you provide models of best practice for principals? How?
6. How do you know whether instruction is changing in schools?
7. Do you provide incentives for change and school improvement? What are they?
8. How is policy informed by practice?
9. How do you see your role as an instructional leader in this district

If building level leader, ask:
1. What are your district’s expectations for your school?
2. How does the district communicate these expectations?
3. How does the district build your capacity to carry out your work as a leader? Does this include being instructionally skilled?
4. How does the district support you as a leader?
5. Does the district provide you with models of best practice?
6. Does the district consider you to be a change agent? How do you know that? How are you supported to be a change agent?
7. How do you see your role as an instructional leader in the district?
8. How does the district support the improvement of instruction in classrooms?
9. Are there incentives for you to change and improve your school?
10. Do you believe that what you do in practice informs policy?

If outside provider, ask:
1. What are the major strategies that districts that you work with use to improve teaching and learning:
   a. Tell me a little about each
      • How are human and financial resources allocated to support your vision?
      • Professional development (district leadership and school leadership)
      • Communications within district
      • Collaboration

2. How are districts that you are working with developing people to carry out this vision or reach the goals?
3. How does the district build principals’ capacity to carry out the work?
4. Give examples of how the district provides support to principals.
5. Do districts provide models of best practice for principals? How?
6. How do you know whether instruction is changing in schools?
7. What incentives do districts provide for change and school improvement?
8. How is policy informed by practice?
9. In the districts with which you work, is the development and support of principals aligned with the other structures in the district?

D. Situational Context
   1. Are there particular structures in this district that are organized to help support your work? If so, what? In what ways?
   2. Are these structures aligned?
   3. Are there any other factors you haven’t yet mentioned that help develop or support the way you go about this work?

E. Perceived Effectiveness
   E1. How effective have you been in these areas? Explain? Why or why not?
   E2. How do you know how effective you have been? What are your measures?
   E3. What is the biggest challenge you are facing in doing this work?

F. Wrap-up
   F1. This is a project on leadership and instructional improvement? If there were one lesson, one message, that we should take back from this study—what would it be?
Appendix F – Alignment of Data Sources and Research Questions

Data for Research Question #1: Interviews, district primary documents, survey results, student achievement scores

Data for Research Question #2: Interviews, district primary documents, survey results
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Appendix G – CMT / CAPT Scores

*Percent of Students at or above Goal on the CMT between 2006 and 2013*

<table>
<thead>
<tr>
<th>Subject</th>
<th>Grade 3</th>
<th>Grade 4</th>
<th>Grade 5</th>
<th>Grade 6</th>
<th>Grade 7</th>
<th>Grade 8</th>
</tr>
</thead>
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<td>2006</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>85%</td>
<td>78%</td>
<td>89%</td>
<td>95%</td>
<td>83%</td>
<td>84%</td>
</tr>
<tr>
<td>Reading</td>
<td>80%</td>
<td>72%</td>
<td>84%</td>
<td>91%</td>
<td>88%</td>
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<tr>
<td>Writing</td>
<td>82%</td>
<td>77%</td>
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Appendix H - Subjectivity Statement

According to Patton (2002), the credibility of qualitative methods hinges on the skills, experiences and judgments of the researcher. Being the primary instrument for data collection and analysis carries with it the responsibility to identify one’s shortcomings and biases that might impact the study. This is done to understand how one’s subjectivity shapes the investigation and its findings (Merriam & Simpson, 2000). Twenty-nine years of teaching and administrative experience both in public and private sectors of education in Ireland and America, my work as an educational consultant, and my doctoral studies have helped shape by beliefs and biases.

First, social justice is one of my strong values. As a prodigy of inner schools in Belfast, Northern Ireland, I have developed an appreciation for and a passion for the work that educators do in facing the educational inequalities experienced by students in inner cities and even in suburban affluent towns such as Castle. Twenty-five years ago, I came to the United States in search of the American Dream. I believe education is the key to helping make that same dream become a reality for all students. It is my hope that this doctorate will allow me to pursue executive leadership positions with greater spheres of influence for social justice. These experiences and beliefs are important as they are a part of who I am and how I see the world. As such, they may have influenced my data collection and analysis.

Secondly, my seven years of experience as an educational consultant for a national professional development organization has resulted in strong beliefs in the necessity for professional development and, in particular, in the area of professional learning communities. During this time, I have provided professional development to schools districts across the country on professional learning communities and have implemented professional learning communities in all schools within my own district as a strategy for district improvement. As
such, my belief in the need for professional development and the use of professional learning communities as an effective strategy for changing teachers’ instructional practices and increasing student achievement have likely influenced my data collection and analysis.

Thirdly, my tenure and experiences and a school principal and superintendent have resulted in a strong belief that school improvement simply cannot happen without effective leadership. As a high school administrator for ten years, I worked closely with the previous superintendent to implement district reform. As the superintendent, I was directly responsible for working with all stakeholders to implement district reform efforts that were informed by the four theoretical lenses to improve stagnating student performance. In doing so, I was strategically and uniquely positioned to examine the factors that supported such reform and the barriers that got in the way. My belief in the need for effective administrative leadership for school improvement has influenced my data collection and analysis.

Fourthly, and most significantly, I am the superintendent of the Castle Public Schools. As the superintendent of Castle Public Schools, active participant and researcher in the study, the potential for research bias is extremely high in this study. I have been an administrator in the Castle Public Schools for the past fifteen years - three years as a high school assistant principal, seven years as the high school principal, and most recently, five years as the superintendent of schools. My actions taken as the superintendent of the district are intertwined within the study. As a leader, I have strong biases towards aligning district systems to the goals of the district, the positive influence central office can have on school improvement, accountability through tight and loose leadership, developing leadership capacity of staff and building district coherence. Even though I worked to diminish the impact of these biases by methods such as triangulation of
IMPLEMENTING PROFESSIONAL LEARNING COMMUNITIES

de the data and peer-debriefing with my classmates, comparisons of findings against the research and interviews, they may have influenced my data collection and analysis.

My data collection only included one interview from within the district and that was with the previous superintendent. Since, none of the interviewees were under my direct supervision there was minimal possibility for coercion.

As a superintendent studying his district, I am real close to the people and situations and processes being studied; however, according to Patton (2002, p.49), “one finds many instances where closeness to sources of data made key insights. In short, closeness does not make bias and loss of perspective inevitable. Rather, understanding comes from true empathy, from trying to discern how others think, act, and feel.”