PROFESSIONAL LEARNING COMMUNITIES’ IMPACT ON SCIENCE TEACHER CLASSROOM PRACTICE IN A MIDWESTERN URBAN SCHOOL DISTRICT

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PROFESSIONAL LEARNING COMMUNITIES’ IMPACT ON SCIENCE TEACHER CLASSROOM PRACTICE IN A MIDWESTERN URBAN SCHOOL DISTRICT

by

Dan Carpenter

A DISSERTATION

Presented to the Faculty of
The Graduate College at the University of Nebraska
In Partial Fulfillment of Requirements
For the Degree of Doctor of Philosophy

Major: Educational Studies

Under the Supervision of Professor Jon Pedersen

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The purpose of this reputation-based, multiple-site case study was to explore professional learning communities’ impact on teacher classroom practice. The goal of this research was to describe the administrator and teachers’ perceptions with respect to professional learning communities as it related to teacher practice in their school. Educators and administrators were asked what types of practices teachers took from collaborative professional learning communities and tried in their classrooms.

This reputation-based, multiple-site case study was important to Nebraska educators because many school districts had implemented professional learning communities in a variety of forms in the schools. There had been little, if any, investigation on what impact professional learning communities have had on teacher practice and the extent to which that had impacted students. This study focused on the teachers’ perceptions of the impact professional learning communities had on their pedagogical practice as a result of collaboration and interactions in professional learning communities.

This study involved three schools in one Midwestern school district. The schools and district had operated professional learning communities for 6 years. The researcher found that professional learning communities had impacted teacher practice in that
teachers had changed what they do from a pedagogical standpoint, as a result of interactions and collaboration in professional learning communities. The extent to which teacher pedagogical practice had been impacted is open to judgment. The fact that teachers had positively changed their pedagogy as a result of professional learning community function, including collaboration and interactions in professional learning community groups, is not open to judgment, as that is the primary finding of this study.
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I would like to dedicate this dissertation to my late grandmother who passed away at the start of my journey. It is with her Irish passion and intense hold on life that I developed the need to go and never quit.

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CHAPTER 1

INTRODUCTION

Statement of the Problem

The United States was the first nation to embrace the concept of a free universal education for all its children (DuFour, DuFour, & Eaker, 2008). A free universal education for all is not really free. Education costs and since taxpayers must finance education, there is a need for accountability of the system to those who pay for it. The United States model of education has been primarily top down in management. There are multiple reasons to educate. Education serves to transmit knowledge and create meaningful interactions with the world to prepare people for real life. The education model is one that has always been expected to produce the workforce of the next generation.

Essentially, a model is a pragmatic mechanism of functionality. A model is a way of doing business. For education, the business is teaching and learning, and the product is the next generation workforce. The accountability of teaching and learning from teachers to students falls back on administration and then on to parents, the local community, the state and the federal government.

DuFour et al. (2008) describes the historical aspects of early education. They describe the United States as working from models of proven success. In the 1880s, industrialization created a national trend. Factory production became a mainstay of American culture. The average classroom was expected to produce workers capable of reading and writing to the extent that the average American could work and produce without limitation to their literacy abilities. Industry taught us, as Americans, that we
could produce things in mass quantities using a centralized top-down management system. Managers and workers each had roles and jobs in the system. The system for the factory of production began with management instructing the workers what to do, when to do it, and how much could be done.

From about 1900 to 1910, education primarily took place at the primary level with an elementary-level curriculum. High schools became prominent between 1910-1930, and middle schools became prominent between 1940-1950. In each of the types of schools, towns and cities formed schools needed to educate citizens for both working within and from the business end of the factory.

Callahan (1964) states that in the early 1900s, teachers worked to instruct students from prior experiences in school. Curriculum focused on literacy skills, and most subjects instructed were needed for success in the workforce. Early in the educational model, teachers were leaders and served as the sole producer of knowledge. Students, as recipients of this knowledge, sat mostly in quiet readiness of teacher expectations. Teachers hired by towns and cities were the sole providers of education. Most schools were independent entities organized by the town or city. There were no incorporated schools or school districts working together to create student expectations or curriculum. Towns and cities expected teachers to produce knowledgeable citizens much like a factory produces products. The products of the education factory were literate citizens ready for the workforce.

Callahan (1964) suggests that by the early 1900s, education had adopted the education factory model. The administration of education aligned to the works of Fredrick Taylor and his system of scientific management. Since America had mastered
factory production, it seemed logical that all systems could work in a factory production process. Education was proposed to be one of the large-scale systems that could operate using the process. Schools were treated like factories, where literacy was the product. In the factory, administrators were the foremen, responsible for directing the assembly process. Teachers were the workers in charge of assembling intellect in their students. Literate students, intellectually shaped by the process, were the finished product. Each year the school, as a factory, would turn out students or further develop them for the next year. Curriculum and examinations served as the quality control of the product. Teachers worked in relative isolation, their classrooms serving as a location for their assembly.

Goldin (1999) suggests that education in the early 1900s until about the 1940s worked from the premise that production of materials came from a centralized, hierarchical top-down management system that dictated time, accountability, and process. There was little accountability for the quality of the product.

The role of the federal government in this process was rather limited until about the 1950s. In the 1900s, schools were formed and established locally in response to civic need. Schools across the United States were financially and resource independent. Decisions concerning teachers, education, and curriculum were made locally up until about 1930 when the United States Department of Education was formed (Goldin, 1999).

Schooling and literacy remained with schools, cities, and townships until the formation of education in the 1930s (Goldin, 1999). The primary way education was managed was the top-down factory model. Even with several influences at the national level, the factory model stood as the primary education management system until about
the mid 1950s. Since it relied on top-down management and implementation, the process generated boundaries between administrators as factory foremen and teachers as factory workers. The process also generated boundaries between the teachers as workers and students as their product. The process allowed teachers to close their classroom doors and work in isolation (DuFour et al, 2008).

The progressive education movement was one of the first large-scale efforts to change the way education was delivered. John Dewey (1929) aimed to challenge conventional models of teaching and learning. The movement placed emphasis on the student as a social learner that needs hands-on projects, expeditionary and experiential learning. Progressivism emphasized the need for collaboration and socialization of learning. Dewey’s progressive education movement was geared at preparing teachers to teach students how to learn based on life needs. From 1915 to 1952, the progressive education movement primarily impacted educators to teach students to think based on real-life experiences (Hayes, 2006). Even with Dewey’s efforts, little impact was made nationally to change traditional education.

In the mid-1950s several articles challenged the educational process, the lack of accountability, and the success of other countries in science, technology, mathematics, and engineering. With the successful launch of the Soviet Sputnik in 1957, and the emergence of Japan as a global industrial power, public schools were challenged to provide a more rigorous curriculum in science, technology mathematics, and engineering. To assist in the quality assurance of education, university-based curriculum reform concepts became the preferred method for resolving the crisis.
With the Soviet Union launch of Sputnik, the United States education system was quickly identified as deficient in providing scientific and technologically intelligent citizens capable of beating the Soviets in the battle for space. The cultural shock of Sputnik produced several immediate reactions. One primary outcome was the U.S. Congress enactment of the National Defense Education Act in 1958, marking the first in a series of educational reform movements needed to develop science, mathematics, and engineering education to keep up with other countries (Trohler, 2010).

From about 1958 to about the late 1970s, educational reform efforts focused on reducing teachers working in isolation and increasing teacher collaboration (Little, 1993). Throughout the 1970s, science literacy came to be identified as the primary need for educational reform (Atkin & Black, 2003). The new progressive movement in education reform was on content and social context. Reform efforts focused on teacher professional development and collaboration with the scientific community at large, to help teachers build a greater understanding of the need for social context (Chafy, 1997; DeBoer, 1999; Little, 1993).

In 1983, the National Commission on Excellence in Education captured the headlines of most major print media with the conclusions from the published report, “A Nation at Risk.” National security was in peril because of substandard education in American public schools (Heise, 1994). The commission referenced deficiencies in content and rigors of public education and its impact on society.

The school reform efforts from 1983 to 2000 focused on teacher content and pedagogical process development. Collaboration, collegiality, and professional
development all became the front-runners in school reform efforts of the time (Stoll et. al., 2006).

In 2000 and 2002, the federal government enacted several pieces of legislation. The first piece of legislation, Goals 2000, was the first federal attempt at helping to reform public education (Heise, 1994). The federal and state governments worked together to establish national goals for public education. In 2002, No Child Left Behind (NCLB) legislation was enacted by the federal government and began the largest historical federal intervention in schools (US Department of Education, 2001). As a result of the legislation, several school improvement and reform initiatives became an issue for every state, school district, and school. The concept of NCLB was primarily accountability toward teaching and learning content standards, and thus the reform movement was termed the Standards Movement (DuFour et al., 2008). NCLB forced the accountability of schools, districts, and states to show students made adequate yearly progress towards mastery of content and process. The legislation forced teachers and administrators to have conversations about what was taught and how educators determine if students have mastered what was taught. The renewed collaborative efforts of NCLB provided a platform for education to generate local, state, and national content standards still used today.

To date, NCLB has failed to meet the original expectations of leaving no child behind society’s expectations and needs (Rentschler, 2006). Since NCLB is a top-down accountability reform effort, it has failed to meet the needs of schools and students. NCLB’s basic premise is to leave no child behind, yet given limitations of assessment practices and special populations, a one-size-fits-all educational experience and
assessment review of the experience is, to say the least, not very pragmatic. NCLB is logical and from a reform standpoint has forced conversations among federal, state, and local government on educational practices. The legislation has further provided opportunity for teachers to collaborate on ways to ensure students reach a basic level of proficiency. Research literature is clear that each learner is different and given the diversity of psychology of learners, a one-size-fits-all pedagogical and measurement system is not practical. Fundamentally, the law ignores the realities of the real educational system (Rentschler, 2006).

Most reform efforts from 1983 to 2010 were focused in large part on teacher collegiality, collaboration, and accountability (Darling-Hammond & McLaughlin, 1995). Due in large part to the whole school reform efforts at teacher collegiality and collaboration, schools became professional communities of practice, where teachers worked together to determine what did and what did not work in teaching and learning. Teacher interactions in staff development learned from experts why classroom practices did or did not work. During professional development, teachers worked independently or collaboratively to determine what could be adopted to classroom practice. Teachers learning what did and did not work in a community of professional practice became known as a professional learning community (PLC) (Hord, 1997).

A PLC may be defined as educators committed to working collaboratively in ongoing processes of collective inquiry and action research to achieve better results for the students they serve (DuFour et al., 2008). The goal of teacher work in PLCs is to enhance their effectiveness as professionals so that students benefit (Hord, 1997).
According to DuFour (2004), educators who build a PLC recognize that they must work together to achieve their collective purpose of learning. Teachers learn in communities with other teachers about student learning by evaluating their practice. Therefore, teachers create structures in collaboration to promote learning, both with each other and for students. Few empirical studies have shown the relative impact of PLCs from the perspective of teachers or students. The question becomes: To what extent do PLCs impact teacher practices and/or student outcomes? The question, fundamentally, has several components and the extent to which these components have been investigated will be reviewed in Chapter 2 of this dissertation.

**Purpose Statement**

The purpose of this study was to explore PLCs’ impact on teacher classroom practice. PLCs were visited, and teachers were interviewed and observed in PLCs and in classrooms to determine: (a) what collaborative efforts teachers focus on during PLC meeting times, (b) what types of practices (pedagogical activities and assessment practices) teachers take from collaborative PLCs, (c) what practices (pedagogical activities and assessment practices) teachers implement in their classroom with students as a result of PLC collaborative efforts, and (d) what teacher practices (pedagogical activities and assessment practices) change in their classrooms with their students as a result of PLC collaborative efforts.

Three purposefully selected schools in one large Midwestern city were examined. Twelve purposefully selected master teachers were asked to participate in the study. In addition, administrators—defined as those working with science teachers as direct
supervisors—were also asked to participate. Each school’s PLC functions independently within a department. Science departments make up a PLC within each school. Within each science PLC, subject disciplines have sub-PLC groups of teachers who meet based on content and course. Biology, physics, chemistry, and ninth grade science are common examples of sub-PLC groups within the science department of each school.

The primary objective of this study was to examine existing, well-established PLCs. Qualitative data was collected in a multisite qualitative case study approach defined in Chapter 3 of this dissertation. The goal of this study was not to examine a controlled or treatment setting. Rather, the objective of the investigation was to examine PLC structure and its relative impact on teacher practice. It was important in this investigation to clearly define and describe the PLC setting at each school. It was also important to communicate with teacher participants through qualitative means their perceptions prior to and after PLC meetings to clearly understand their educational practices prior to and after PLC meetings. Richer understandings of teacher practices were observed both pre and post PLC meeting as to determine potential alignment or misalignment between teacher perceptions and teacher practice.

**Research Questions**

The grand tour question for this study was: To what extent are teacher practices impacted by interactions and collaboration in PLCs?

Four research questions guide the study. The four questions are:

1. What definitions of PLCs were used by each school in this study?
2. What types of collaborative activities did teachers participate in, in PLCs as a result of the school definition?

3. What were teachers’ perceptions of PLCs both pre and post PLC meetings?

4. What practices (pedagogical and assessment) did teachers take from PLCs and implement in their classrooms?

Assumptions

The first assumption of this study was that PLCs constitute a small group of teachers working together in a collaborative process to address student needs. It was also an assumption of this study that collaboration among teachers would provide opportunity to share information freely. It was assumed that collaboration was voluntary by participant. Each participant could freely and voluntarily share information that might lead to shared pedagogical practice.

A second assumption of this study was that teachers would collaborate during PLC work, providing truthful responses as it related to their practice. DuFour et al. (2008) state, “Collaboration is a systematic process in which teachers work together, interdependently, to analyze and impact professional practice in order to improve results for their students, their team and their school” (p. 16). Collaboration oftentimes is interactive, whereby teachers utilize their own expertise to share what they do in hopes of helping to improve the practice of other teachers. It was important to observe collaboration in PLCs. For the purposes of this study, teachers were chosen based on those who have a reputation as a master teacher that shares information voluntarily and truthfully and therefore would collaborate in PLC meetings. Much of the selection was
based on the reputation-based case study methodology. Teachers selected were master teachers, known by their peers in the district as those who work to master the craft of teacher. Case study and teacher selection criteria are discussed later in this dissertation.

A third assumption of this study was that teachers working in a PLC would accurately reflect on their practice. PLC practice, by its definition leads to collaboration. Collaboration, as a voluntary activity, leads to shared ideas and outcomes. Sharing of ideas should then lead to teachers accurately reflect on their practice in PLC groups.

**Delimitations**

Delimitations narrow the scope of the study. For this study, a delimitation was the selection of a single school district for the study. One school district was chosen in the Midwest for participation in the study. Another delimitation of this study was the selection of schools. Schools chosen for this study were those that had interacted in PLCs for at least four years. Bolam et al. (2005) stipulates that schools and school districts undergo phases of development of the PLC model. Schools that have not been utilizing the PLC concept for very long are still in the starter phase, whereas some schools that have been utilizing the model for several years are in the development or mature phase of PLC implementation. Starter-phase schools are commonly defined by their collaborative efforts and oftentimes the lack of a commitment to continued improvement and results orientation. A common characteristic of mature-phase development is defined by collaborative efforts of how teachers learn in PLCs with a focus on continued improvement and results orientation. Schools chosen for this study are considered to be in the mature phase of PLC development. Schools participating in
the study were chosen because teacher collaboration efforts have projected impactful outcomes due to school focus on continued improvement and results orientation.

A third delimitation to this study was that schools participating in the study are using the Rick DuFour model of PLCs. In this model, teachers work in collaborative groups and subgroups based by department or like teaching and learning standards. Teachers focus on student performance, and proceed through the scope and sequence of a course using student achievement data. Using student outcomes as information, teachers work to improve their classroom practices to match the needs of students.

A fourth delimitation of this study was that schools and teachers were purposefully selected based on their level of experience both in PLCs and as expert teachers. Expert teachers were teachers identified by other teachers, administrators, and community members as master teachers. Expert teachers were masters of content and process. Expert teachers had been teaching for at least five years and know scope, sequence, and timing of curriculum. Expert teachers’ knowledge of the curriculum and content allowed them to also seek mastery teaching and learning strategies, further enabling them to have the confidence to collaborate in PLC groups and take away from PLCs practices that may improve their practice.

**Limitations**

Limitations are potential weaknesses or problems with the study indentified by the researcher. The limitations often relate to inadequate measures of variables, loss or lack of participants, small sample sizes, errors in measurement, and other factors typically related to data collection and analysis. These limitations are useful to other
potential researchers who may choose to conduct a similar replication study (Creswell, 2005).

The study was limited to one school district in one Midwestern state.

The study was limited to three purposefully selected schools.

The study was limited to 12 teachers in purposefully selected schools.

All schools were in a suburban setting and had differences in their PLCs. The model they chose was based on the adoption of PLCs at the district level. The PLC model from the district level was then adapted to the school building and its students’ needs. There were several differences between building PLC execution. Different buildings have established PLC times for teacher collaboration. Each building had different expectations for which teachers meet in which PLC group. All buildings met by department, but then subgrouped in different ways beyond department segmentation of PLC groups.

Another limitation was that all schools chosen were high schools. The final limitation was that the departments being studied were only science departments.

**Significance of the Study**

Studies conducted between 1981 and 2011 of the PLC focus primarily on teachers interacting in a collaborative environment. Researchers conducted qualitative and quantitative observations of teachers working together in professional communities with a focus on student outcomes.

Little research from 2001-2011 focused on professional communities, communities of instructional practice, and PLCs’ relative impact on teacher practice.
Most research from 2001-2011 focused on professional communities, communities of instructional practice, and PLCs’ relative level of impact on student achievement. Few studies have focused on teacher perception of PLCs and how PLCs have impacted their classroom practices. Very few studies could be found between 1981-2011 with a focus on potential changes in teacher practice as a result of teacher collaboration in professional communities, communities of instructional practice, and PLCs.

Given the lack of research represented in actual changes in teacher practice as a result of PLCs, this study was important for potential empirical results that suggest impact of PLCs on teacher practice.

This multiple-site reputation-based case study was important to all educators because PLCs have been a school improvement model in use in schools for several years, yet little is known about the impact of PLCs on teachers’ work.

This study involved three schools in one school district in the Midwestern United States. Each school had been operating PLCs for a minimum of four years. As a result of school and teacher time in PLC practices, this study was important for the continued improvement of the literature supporting PLC practices, and the need to help improve teachers’ work in teaching and learning in PLCs.

Definition of Key Terms

Professional Learning Community (PLC): Educators committed to working collaboratively in ongoing process of collective inquiry and action research to achieve better results for the students they serve. PLCs operate under the assumption that the key
to improve learning for students is continuous, job-embedded learning for educators (DuFour et al., 2008).

Collaboration: Systematic process in which teachers work together, interdependently, to analyze and impact professional practice in order to improve results for their students, their team, and their school (DuFour et al., 2008). For collaboration to happen, teachers must perceive their skills, knowledge and experience would be respected and their contributions would be valued (Gosselin, Levy & Bonnstetter, 2003). Gosselin et al. (2003) suggests collaboration must satisfy several key characteristics in order to be effective. Collaboration must be voluntary, based on parity of equal value, require shared goals, shared responsibility for decision making, shared accountability for outcomes, shared resources and be emergent.

Essential Learnings: The critical skills, knowledge, and dispositions each student must acquire as a result of each course, grade level, and unit of instruction. Essential learnings may be referred to as standards, objectives, or outcomes.

Formative Assessment: Any activity undertaken by teachers and students that provides information to be used as feedback to adjust instruction, to support additional learning, and to guide the learning cycle (Stiggens, 2000).

Master Teacher: A master teacher is a leader who has mastered management of their classrooms and found ways to accelerate learning for all students. The master teacher is an exceptional communicator who has a strong connection with their students. A master teacher recognizes that the education process is more than sharing content; rather, it is about creating independent learners who have the critical thinking skills to grow as individual learners. Master teachers put their students first and adapt the
curriculum to the learners’ needs. Master teachers hold their students to the highest expectations. They conduct regular progress monitoring, adjust their teaching approach as needed, and empower their students to take ownership of their education. The master teacher mindset is one of systematic problem solving and personal accountability. These teachers are continually seeking out opportunities to better themselves as professional educators. They have the ability to look through a broad lens and communicate honestly about issues in their classroom, as well as with parents and administrators. Master teachers will be identified by peer and administrative selection as those that meet the above stated criteria.
CHAPTER 2

REVIEW OF THE LITERATURE

Early History of Education

The United States was the first nation to embrace the idea of a free universal education for all its children; its schools were specifically designed to sort and select students according to their perceived abilities and likely vocations (DuFour et al., 2008). Thomas Jefferson (1782) proposed that education should be a 3-year study for select children. Children who were of “best genius” in the state would receive up to 10 years of schooling at the public’s expense. Goldin (1999) states that in 1900, only 10% of high school-aged Americans attended school, and it would be almost 175 years after Jefferson presented his plan for “universal” education before the majority of students who entered public schooling in any given year would complete a high school education.

In the 1880s, Horace Mann proposed that every child born had “the absolute right” to an education and that the government of each state should be granted power and duty to tax every resident to provide for that education (Chafy, 1997). Mann’s model was coined the Common School Movement and sustained elementary (grammar school) education for every child through the turn of the century.

Early Reform

In the early 1900s immigration, urbanization, and industrialization movements in the United States increased the need for more education. The primary purpose was to educate the illiterate immigrants and prepare them for the workforce (Callahan, 1964). Also, in the early 1900s the National Education Association (NEA) suggested that society
needed to sort children based on aptitudes, interest, and prospective careers. The New Education Reform movement was based on the premise that students should be sorted into programs designed to meet different abilities and career interests. The NEA suggested that states and educators should search for instruments to assist with the sorting process (DuFour et al., 2004). The New Education Reform model blended with the common education model. The new model became synonymous with the factory model of education. If sorting and selecting students for educational pathways was the fundamental task of education, then the job of a school was to create an assembly process for the production of “thinkers.” DuFour et al. (2008) says, “The decisions flowed down the education hierarchy to teachers who, like factory workers, were viewed as underlings responsible for carrying out the decisions of their bosses. The focus was on the process rather the results” (p. 32).

In the 1920s, John Dewey proposed the first substantial educational reform model, away from the common education and the factory models. Between the early 1900s to about the 1920s, Dewey wrote several publications that had a profound impact on the concept of education and the role of teachers. My Pedagogic Creed (1897), The School and Society (1900), The Child and the Curriculum (1902), and Democracy and Education (1916) were some of the publications that challenged the concepts of education from the common education model (Chafy, 1997). Dewey argued that education and curriculum should be determined in large part by the teacher in an experimental and social context to create educated students for the real-world workforce (Dewey, 1929). Though Dewey’s ideas were published in national journals in the late
1920s, his philosophical reform models and ideals went mostly unrealized, and the factory model persisted until the mid to late 1950s.

From Dewey’s ideas came a reform movement known as the progressive movement. The progressive education movement aimed to challenge conventional models of teaching and learning. The movement placed emphasis on the student as a social learner who needs hands-on projects, expeditionary and experiential learning. Progressivism emphasized the need for collaboration and socialization of learning. The movement failed to have a national influence, but did reach overseas to places like China. Dewey and others worked from the early 1920s to about the 1950s to change teacher preparation in hopes of changing education on a national scale (Chafy, 1997).

Even with the progressive education movement working behind the scenes in teacher preparation at a few institutions, the common education model stood as the most used educational model until the mid to late 1950s. In the late 1950s, science and technology came to the forefront of the media with the launch of the Soviet Sputnik spacecraft in 1957. The progressive model lost national favor to more disciplined-based approaches (Totten & Pedersen, 2011). Conservative political groups attacked the liberal nature of the progressive nature of education.

Several publications cited the failure of the public schools to provide a rigorous curriculum as the primary reason that the United States had fallen behind Russia in the race to space (DeBoer, 1999). Universities and professional organizations began major reform movements to resolve the perceived public educational and career gaps in the United States in the fields of mathematics and science (DuFour et al., 2008).
Given the need for a greater sense of rigor in math and science, integrated curriculum surfaced as a potential solution (Totten & Pedersen, 2011). Team-teaching approaches focused on the needs of the learner and the connection to their real lives. Joyce (2004) describes the reform movement as similar to current day reform, because it included flexible teaching and reduced teacher isolation. This reform movement was met with great resistance and by the end of the 1960s was absent in most schools.

The middle school movement was another reform effort, revived in the 1960s to create smaller schools with a greater sense of community (George, Stevenson, Thomason, & Beane, 1992). The middle school model was proposed in 1893 and took form as a national holistic education model from elementary, middle, and high school in 1913. The model did not gain national prominence until the early 1960s. One of the first holistic education models called for six grades of elementary—three for middle and three for high school. The middle school component of the model called for continued academic development from elementary school, with a focus on the growth and development of young adolescents. The essential idea was to bring greater depth to the curriculum while offering guidance and exploration, independence, and responsibility. Middle schools created teacher advisory programs, transition and articulation activities, interdisciplinary teaching, and block schedules to provide teachers with strategies needed to meet the dynamic needs of young adolescent learners (George et al., 1992).

The middle school model also generated the school within a school, small school model that has been widely used by elementary and high schools today. The idea was to provide teachers with opportunities to interact as teams for student learning (Little, 1993).
Even with the smaller community concept of the small school within a larger school, teacher classrooms and practice largely remained in isolation.

In 1966 a report titled “Equality in Educational Opportunity” concluded that schools had little influence on a child’s achievement. In 1972 another report suggested student achievement was primarily a function of his or her background and genetics and that schools did little to impact achievement. The report also suggested that the school reform movement of the 1950s through the 1970s had no impact on student achievement (Schmidt, Cogan, & McKnight, 2011).

Several social and political issues arose in the 1970s and early 1980s. The primary outcome for elementary, middle, and high schools was a renewed focus on scientific literacy in a social context (DeBoer, 1999). Schools that showed a greater degree of success had greater graduation rates and an increase in student attendance. These schools also had a focus on staff development for teachers, collective participation between teachers and students, and shared vision of ideas (Supovitz, 2002).

In 1981, Judith Warren Little conducted a study of six urban schools. The study was the first of its kind in that she set out to determine the connection between staff development and the relative success of the school. The results of the study describe successful schools as having several characteristics in common:

1. Staff collaboration
2. Collective participation
3. Focus of shared ideas
4. Timing for trying new ideas.
The study concluded by saying that successful schools provide professional opportunities for teachers to work with other teachers, share ideas of practice, experiment with ideas for students, and collegially report their findings on student success. Teachers interact and collaborate on how to experiment with student findings. This process may create greater accountability for the school as a workplace.

**Excellence Movement**

In 1983, the National Commission on Excellence in Education published the report, *A Nation at Risk*. In this report, the commission argued that national security was in peril because of substandard education in American public schools and that it was imperative that the United States focus on school reform (DuFour & Eaker, 1998). The flurry of school improvement initiatives throughout the United States between 1983 and 1993 became known as the Excellence Movement.

The Excellence Movement offered a consistent direction for reform, but it was not a new direction. DuFour & Eaker (1998) explains that under this new initiative schools, teachers, and students were required to do more—not to change what they were doing to something new.

Students needed to earn more credits for graduation in courses that were more rigorous and required more homework. Schools needed to add more days to the school year and lengthen the school day. Schools needed to test students more frequently and expect more of teachers both before offering employment and before extending tenure. (p. 3)

The Excellence Movement resulted in a series of studies determining the effects of reform on school success. Little (2002) wrote that the studies charged high school curriculum in the United States as being superficial and fragmented, sacrificing rigor and
focusing on maintaining school attendance and social order. Teachers were forced to teach sterile curriculum that had little meaning to the real life of students. Teachers focused on content, while schools focused on attendance. Tye and Tye (1984) explain that:

The reform efforts failed because teachers were isolated from one another, that little in the environment or circumstances of teaching encourages deviation from conventional practices, and that teachers did not often come together in their schools to discuss curricular and instructional changes. (p. 319)

In the 1980s the focus of reform was top down, from district to principal, from principal to teacher, and from teacher to student. Schmoker (2004) calls this era the Strategic Planning Era. He explains that districts and schools came up with volumetric plans for comprehensive and systematic mission, vision, and belief statements that resulted in a lot of print, but no action. “The instructional quality and levels of achievement were typically unaffected by any of these processes” (Schmoker, 2004, p. 425).

Susan Rosenholtz (1985) reviewed literature on effective schools. Rosenholtz found that effective schools improved student learning through collegial teacher interactions, teacher decision making about pedagogy, teacher problem solving, and experimentation with pedagogical methods that work for different student needs. Effective schools were far less likely to be isolated work settings for teachers. Conclusions suggested that schools should be considered as “places of intellectual sharing, collaborative planning and collegial work . . . where staff interaction is characterized as task focused, cooperative and frequent” (Rosenholtz, 1985, p. 365).
Both Little’s and Rosenholtz’s studies were the first of their type in that they suggested timely teacher collaboration with a focus on student learning. The principles of these concepts were termed a professional community and would eventually become foundations to the PLC.

**Restructuring Movement**

Several other studies in the late 1980s and early 1990s pointed to the fact that the reform movement had no effect on student achievement and, in fact, the United States had fewer mathematicians and scientists than other countries. In 1989 the U.S. Congress created Goals 2000. The goals were ambitious and sent a clear message that schools could not continue with the top-down model. President Bush described Goals 2000 as a decentralization of authority and decision-making responsibility to the school site, so that educators are empowered to determine the means for accomplishing the goals and are to be held accountable for accomplishing them (Heise, 1994).

DuFour et al. (2008) suggests Goals 2000 led to two main outcomes for the educational system: (a) School improvement based on national goals, and (b) site-based local autonomy to achieve the goals. Goals 2000 began what is called the Restructuring Movement. In 1991, the National Center on Education and the Economy and the Learning Research and Development Center designed a national exam system. Then in 1994, Congress created the National Education Standards Improvement Council to review and endorse state and national standards (Heise, 1994). The standards movement resulted in another flurry of educational studies to connect content and process standards to pedagogy and student achievement.
In 1990 Peter Senge introduced the term “learning organization” in his book, *The Fifth Discipline*. The book describes five disciplines of an organization made of individuals who must learn in order to create products that they truly desire. Central to the five disciplines is the concept of systems thinking. Systems thinking is a body of knowledge and tools that help an organization to see underlying patterns and how things can be changed (Thompson, Gregg, & Niska, 2004). Senge further describes that the learning organizations “. . . are those that can create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together . . .” (Thompson et al., 2004, p. 3). Another of the five disciplines is described as the learning discipline. The learning discipline concept is important to professional organizations because people who make up an organization must be able to learn to deal with the normal dilemmas and pressures of daily work in the system. The learning discipline is central to how individuals deal with change in a learning organization.

Senge’s initial work focused on the business sector and the community created by the professional. Senge (2000) published the field book, *Schools That Learn*. In the field book he focused on education and the role of schools as learning organizations. Senge’s work in the area of defining a learning organization aligned with Little and Rosenholtz in terms of the collegial need of educators to learn how to work together and consider the (pedagogical) system in a collaborative setting to focus on what they as teachers do and why they do it.

In 1993, Sharon Kruse and Karen Seashore Louis conducted a literature review that considered Senge’s work and combined the work of Little, Rosenholtz, and others.
Kruse and Louis blended the literature of professionalism, community, and teaching as an occupation. The result of the review created a model for school-based professional community. The model identified five main constructs for effective professional communities—reflective dialogue, de-privatization of practice, collective focus on student learning, collaboration, shared norms, and values (Kruse & Louis, 1993).

**Early PLCs**

Hord (1997) was the first known researcher and theorist to connect the concepts of professional community and learning community. She focuses on the application of the work of Astuto et al., (1993), who proposed three related communities—the professional community of educators, the learning community of educators and their students, and the stakeholders in the community. The review focuses on what Astuto et al. labeled as the professional community of learners, in which they propose that teachers in a school continuously seek and share learning and act on their learning.

Hord (1997) synthesized several research studies, connecting them back to Astuto et al.’s (1993) work on the professional communities of learners, by defining principles of effective learning communities. The conclusions of the study reorganized the words “professional community” and “learning community” to operationalize a PLC. In her synthesis, she cites the following attributes:

- supportive and shared leadership,
- collective creativity,
- shared values and vision,
- supportive conditions,
• physical conditions,
• people capacities, and
• shared personal practice.

The report describes that academically successful PLCs have a very distinct look and feel from the perspective of teachers, students, and the community. Requirements necessary for organizational arrangements that produce such outcomes include all of the above factors in a nonhierarchy, but rather a synergistic series of conditions that must exist together for success (Hord, 1997).

In 1999, Joel Westheimer conducted a multiple case study of educators intended to connect teacher practice and their professional work. In the study, he reviewed major national reform efforts by the Carnegie Task Force (1986), Education Commission of the States (1986), and the Holmes Group (1986). The study found four themes related to teacher practice and the professional work of education. The report described successful schools as smaller, having magnet programs, site-based managed, collegial, and collaborative work for teachers. He suggested that if professional communities were to have an impact that moves beyond pedagogy and onto the needed results of schooling, teachers and schools must focus on student achievement. He also stipulated that in order for a professional community to be effective, it must operate from a defined mission, vision, and goals.
Standards Movement

With the dawn of a new century, education took yet another turn in the United States with the passage of NCLB legislation in 2002. The law increased testing requirements, mandated annual assessments in reading and mathematics in grades 3 to 8, and once again in high school. The law called for schools to demonstrate “adequate yearly progress” on state tests for each group of students, broken down by race, gender, and socioeconomic status. The law was perceived as another top-down approach, poorly defined, underfunded, and lacking clarity (DuFour et al., 2008). NCLB was an attempt to create a culture of accountability, forcing teachers and students to work harder to master content standards created in the standards reform movement. NCLB has helped to transform education from “a nation at risk” of complacency to a nation that is accountable to its educational weaknesses, but it has not increased the academic achievement of students (Roberts, 2010).

What NCLB has done is prompt the need for the National Education Standards in subjects such as science, math, and technology. States have adopted the standards and used them to develop state and local standards and/or objectives. The standards and objectives have been further used to create goals and expectations for states reporting to the government on annual yearly progress.

One of the biggest challenges of NCLB legislation has been in creating national and state tests to determine student mastery of the standards and/or objectives. State examinations have created a culture of accountability, but also created a culture of fear. The fear in education has led to further isolation in teachers attempting to get through the standards and objectives and prepare their students for state assessments. The movement
to test mastery of the standards has yet to produce results on a national scale (DuFour et al., 2008; Heise, 1994).

**PLCs**

Much of the literature from 2003-2011 on PLCs, professional development, and school improvement has been focused on three primary areas: (a) What is the connection between student achievement and professional development?; (b) What are teacher perceptions of the effects or impact of PLCs on their practice?; and (c) What is the impact of teachers working together in PLCs on student achievement? (Cormier & Oliver, 2009; Feger & Arruda, 2008; Lomos, Hofman, & Bosker, 2011; Reichstetter, 2006; Supovitz & Christman, 2003; Vescio, Ross, & Adams, 2008).

There is no universal definition of a PLC (Stoll et al., 2006). DuFour et al. (2008) defines a PLC as educators committed to working collaboratively in ongoing process of collective inquiry and action research to achieve better results for the students they serve. PLCs operate under the assumption that the key to improve learning for students is continuous, job-embedded learning for educators (DuFour et al., 2008).

Bolam et al. (2005) describe the following as characteristics of a PLC:

1. Shared values and vision
2. Collective responsibility for pupils’ learning
3. Collaboration focused on learning
4. Group as well as individual professional learning
5. Reflective professional enquiry
6. Openness, networks, and partnerships
7. Inclusive membership
8. Mutual trust, respect, and support.

DuFour (2004) writes that in order for a PLC to accomplish its intent, it must flow from the assumption that the core mission of formal education is not simply to ensure that students are taught, but to ensure that they learn. He contends that PLCs have three big ideas:

1. PLCs must ensure that students learn by teachers asking:
   a. What do we want each student to learn?
   b. How will we know when each student has learned it?
   c. How will we respond when a student experiences difficulty in learning?
2. PLCs promote and characterize a culture of collaboration. Collaboration is a systematic process of teachers working together to analyze and improve their classroom practice.
3. PLCs focus on results. Professional learning communities are when teachers judge their effectiveness on the basis of student results.

Reichstetter (2006) reviews that a PLC is made up of a team who regularly collaborates toward continued improvement in meeting learner needs through a shared curricular-focused vision. Efforts to facilitate a PLC are composed of several components that include:

- Supportive leadership,
- Classroom and school structural conditions,
- Collective challenges facing teachers and students,
• Questioning and reflecting on instructional practices,
• Team decisions on essential learning outcomes,
• Interventions from common formative assessments.

Douglas Reeves suggests that “professional learning communities add value to standards not by merely delivering them to the schoolhouse door, but by also analyzing, synthesizing, and prioritizing them in a way that allows every teacher to wisely allocate time and instructional focus” (DuFour, Eaker, & DuFour, 2005, p.52).

Feger and Arruda (2008, p.7) note that strong PLCs share the following characteristics:

• An openness to improvement.
• Trust and respect.
• A foundation in the knowledge and skills of teaching.
• Supportive leadership.
• Socialization and school structures that extend the school’s mission.

Little (2002) writes that each of the words making up the phrase “professional learning community” bring their own meaning. The word “professional” suggests a specialized and technical knowledge base, and a service-oriented member who meets client needs, having a strong collective identity to a practice. The word “learning,” in context, involves working together towards a common understanding. A “community” is a group of individuals who share a common mission, values, goals, and experiences to accomplish a task.

In sum, the term “professional learning community” suggests that focus is on the profession, within the context of a cohesive group that focuses on collective knowledge and occurs within an ethic of interpersonal caring that permeates the life of teachers, students and school leaders. (Little, 2002, p. 3)
In conclusion, there is a large theoretical base for a PLC. Some common threads include:

• Collaboration and collegiality
• Shared leadership
• Mission, vision, values, and goals
• Focus on improvement
• Shared practice

There are several others but, from a summative consideration, all defining characteristics meet each of these common threads. The formation of PLCs is a site-based cultural shift of school improvement. PLCs are not a one-stop shop for staff development, but they are a shift in the way we conduct business every day as educators. PLCs are a way of improving education for teachers and students.

Prior to the 1980s school reform movement, the majority of empirical studies attempted to connect staff development for teachers to student outcomes (Little, 1981). The reduction in teacher isolation, increased teacher content knowledge, changes in teacher pedagogy and top-down management of the learning environment continued to be the focus of studies until about 1990 (DuFour & Eaker, 1998).

With the publication of Hord’s study introducing the frameworks of the PLC in 1997, the concept of PLCs is now a leading mechanism for school improvement as a program. Senge (1990) called organizations that learn together in collaboration a learning organization. The learning organization really started as a perceived community of practice (Rosenholtz, 1985), the community of practice then became a professional community (Kruse & Louis, 1993), and a professional community became a learning
community (Joyce, 2004). The first holistic development of the concept of a PLC came from an assemblage of each of these concepts into the practical applications of staff development and school reform (Hord, 1997).

**Empirical Studies that Support PLCs**

Empirical studies of PLCs can thematically be broken into three main clusters:

- **Cluster 1**: PLCs studied from a theoretical approach as professional communities of practice with mission, vision, norms, and common characteristics.
- **Cluster 2**: PLCs and the effects on teacher practice, student learning, and achievement.
- **Cluster 3**: PLCs and the school reform movement.

**Cluster 1 studies.** Cluster 1 begins with the first and most cited study completed by Little (1981). In this study, researchers observed the social organization of the school as a workplace and its effects on the fruitfulness of staff development efforts. The qualitative ethnographic study was completed on six urban schools to determine the effectiveness of the school as a whole, by looking at staff development offerings and their implementation into classroom practice. Data includes interviews, observations, and artifacts of staff development programs and school practices from the six schools, 105 teachers, and 14 administrators. Results were built into thematic units of successful schools. The findings were the first comprehensive consideration of the school as a social workplace for teachers. Little found that successful schools have teachers who collaborate regularly about their practices. She also found that all teachers participate in
staff development and that the focus of teacher work was on collaborative interactions of shared pedagogical ideas. She found that successful schools were made up of teachers who not only shared ideas, but also took the ideas back to the classrooms and integrated them into their everyday practices with students.

Talbert (1991) built on this work by studying 16 academically elite high schools in California and Michigan. The intent of the study was to challenge the top-down approach of administration commanding teachers to teach in certain ways. The study set out to determine the “dimensions of professional community” found in participating schools. “Data for the study includes qualitative and quantitative information on teaching practices (content given vs. constructed; importance of curriculum coverage; instruction as routine vs. nonroutine; accountability for student learning), educational goal as priorities, and collegiality” (Talbert, 1991, p. 3). The findings pointed to professional communities that create strong schools where teachers place the schools’ mission and goals as their top priority. The successful schools had high teacher collegiality and collaboration, and professional growth was important for every teacher. In the analysis of themes, three dimensions emerged for successful schools. First, successful schools had a community of professionals. Second, community of professionals shared common goals. Third, common conceptions of teaching were shared collaboratively for student achievement.

In 2003, Judith Warren Little questioned the collaborative interactions among teachers inside teaching communities. The premise was that if teachers plan together in a community of teachers and they teach their planned ideas, does their account of the actual teaching to the community represent what actually happened in the classroom? What is
intriguing about this study is that teachers plan together and, as a result, will execute a common lesson. Some teachers have a comfort zone in their teaching style and intend to try innovative ideas, but then in the classroom, will teachers revert to what they know? What is at question is, what teachers say versus what they do as a function of their real life in the classroom versus the innovative, collaborative lesson of a PLC. Little conducted a qualitative multiple case study of English and math teachers in two high schools. She videotaped interviews with teachers, made direct observations of classrooms and PLC groups, also supplying questionnaires. Her findings are interesting in that one would think that some teachers would “fall back on what they know” when innovative ideas don’t match their paradigm of teaching. The results indicated that, in fact, teachers tend to accurately depict practices in professional community interactions as they happened in the classroom, whether they were successful or failed with students. She stipulates the need to be honest and open in communication of actual practices provides opportunities for new considerations and possibilities for advice from others (Little, 2003). The idea is that if teachers interact, one primary purpose of the interaction is to seek support and develop teaching efficacy in “what we do.”

Several studies in this cluster looked at the concepts of professional community and teaching as a practice and considered the connection between them. If professional communities share collegiality, and common teacher practice impacts students, what are the common practices that come from the collegial interactions? (McLaughlin & Talbert, 2001; Pitman, 2000; Supovitz, 2002).

Pitman (2000) studied the perceptions of leadership practices and the development of PLCs. The qualitative study examined 16 teachers in one school in
Canada. In the study, she surveyed teachers, conducted personal interviews, and collected artifacts to determine how leadership practices impact professional community interactions and how that translates to teacher practice. Findings indicate that “in promoting shared outcomes of new practice and discussing experiences with various instructional approaches, participants identified the leadership practice of modeling as being the highest prominence and influential on the professional learning community (p. 125).

Two studies considered teacher practice as a variable within PLCs, but also looked at how teacher beliefs, social interactions, and contextual circumstances can shape professional learning in the PLC. Pennell and Firestone (1996) examined 25 schools in California and Vermont, conducted interviews, observations, had teachers complete questionnaires, and collected artifacts. Westheimer (1999) collected similar data in several California middle schools. Each study collected perception data from teachers, as well as direct observation of classroom and school practices. Information was collected from interviews with teachers and administrators regarding their stance on practices, in the professional community meetings, and after the professional community meetings (in a more private setting where people do not have to worry about others hearing what they say).

Both qualitative studies had similar results in that social interaction in collaboration influenced teacher change in instructional practices. According to Westheimer (1999), the liberal or conservative nature of the culture affected both the collaborative interactions and the change of teachers’ practices. Pennell (1996) suggested
that expectations of the community (parents, principals, students) influenced their ability to try instructional changes as a result of the professional community.

McLaughlin and Talbert (2001) summarized the body of work completed by the Center for Research and the Context of Teaching at Stanford University from 1990-2000. The CRC was founded through a national grant from the U.S. Department of Education’s Office of Educational Research and Improvement as a response to the reform movement. The research was primarily on why teachers struggle with the challenges of the professional culture. Data was collected in a mixed methods manner. Results described successful schools as professional communities where teacher culture was shaped by shared classroom practice and resources. The findings point to recurring themes of PLCs: “Communities are characterized by mutual engagement, joint enterprise and shared repertoires of practice . . .” (McLaughlin & Talbert, 2001, p. 127).

Several studies conducted between 2004-2005 attempted to find patterns of high-performing schools that have high student learning outcomes and PLCs (Bolam et al., 2005; Cooper, Ponder, Merritt & Matthews, 2005 Thompson et al., 2005). All of these studies conducted mixed methods case studies of multiple schools. The studies considered leadership as a variable, and PLCs as a process that may or may not improve student learning. All three studies collected similar data, utilizing questionnaires and surveys of teachers involved in PLCs, while also looking at student outcome data. Each of the studies considered the characteristics of effective PLCs and the degree of implementation in schools. All of the studies collected teacher perception data on the potential impact of PLCs on their classroom practices (content, pedagogy, and student learning). The findings of each of the studies were similar in that successful schools with
high achieving students displayed each of the characteristics of an effective PLC. The more developed the PLCs, the more positive the association with student achievement (Bolam et al., 2005). Each of the studies showed that teachers confirmed their school as a learning organization that shares value in student learning as a function of the PLC (Thompson et al., 2004). Finally, each of the studies revealed data that pointed to collaborative leadership as being a fundamental success of a PLC. Successful PLCs had a tendency to focus on increased student learning (Cooper et al., 2005).

All Cluster 1 studies focused on the theoretical development of the model of a professional community that develops into a PLC. Research was clear in the fact that successful PLCs have a series of characteristics that all must be fulfilled. From collaboration to leadership, successful PLCs have a tendency to focus on outcomes for teachers and students. The Cluster 1 research is clearly the identification of a PLC model and its characteristics through empirical data. What is lacking in Cluster 1 studies is the connection between PLCs, teacher practice, and student achievement data. This characteristic is applied to the second cluster of studies.

**Cluster 2 studies.** In 1996 and 1997, Karen Seashore Louis and Helen Marks conducted two studies that focused on how professional community affects instructional quality and the relative effects of instructional quality on student achievement. In the first study, the researchers surveyed 910 teachers and observed 144. For the studies, qualitative data was collected on the professional community characteristics identified by Newman and Wehlage (1995). “Findings strongly support the conceptual model of professional community, that the organization of teachers’ work in ways that promote professional community has significant effects on the organization of classrooms for
learning and the academic performance of students” (Louis & Marks, 1996, p. 26).
Missing from the first investigation was the connection of teacher empowerment, that teachers are committed experts, and their work is more effective if they are involved in decision making.

The second investigation was also conducted from a mixed methods approach and collected data in the form of questionnaires from 910 teachers, personal interviews from 25 teachers, and observations of 144 teachers. The investigation focused on teacher empowerment in professional community and the effect on student outcomes. Empowerment was defined as a type of leadership teachers have whereby teachers make decisions about classroom practice through collaboration with other teachers to ensure student success. Teacher empowerment has four domains: school operations, student experience, teacher work life, and control over classroom instruction. Researchers suggested that high levels of teacher empowerment would result in a greater degree of authentic pedagogy, which in turn would result in higher student achievement. The researchers hypothesized that teacher empowerment in assuming the school’s instructional mission by collaborative professional communities would result in strong student performance (Marks & Louis, 1997). The findings were inconclusive. Provided all the variables, the researchers pointed out that it was difficult to connect authentic pedagogy to student results. Louis and Marks’ studies led to another investigation on authentic pedagogy and reformed schools. Since there were too many variables, researchers suggested reducing the number of measurements taken and simplify the research design.
Newman, Marks, and Gamoran (1996) considered authentic pedagogy as a variable to student achievement. Authentic pedagogy is defined as teaching methodology used to nurture critical thinking in students. They contended that restructured schools using professional communities would emphasize the need for authentic pedagogy in that teachers and students would place no value beyond proving competence in traditional settings. As such, professional communities would encourage the use of collaborative authentic pedagogy and therefore the assessment of students in an authentic way. The study design was conducted from a mixed methods approach. They collected data from 24 schools and found that highly innovative and reformed schools did in fact employ a greater degree of authentic pedagogy in a collaborative way within the professional community. Moreover, authentic pedagogy did help in academic performance for all students at all grade levels, regardless of gender, race, or socioeconomic class (Newman & Gamoran, 1996). The connection between teaching practice and authentic student performance was poorly described in the study, but the implications were huge for successful professional communities.

Supovitz (2002) conducted a 4-year study of schools in Cincinnati and the employment of a district reform movement called Students First. The primary investigation of this strategy was the impact of “communities of instructional practice” on teacher instruction and student learning, all of which are components of the Students First model. The study was conducted from a mixed methods approach and collected data from surveys, interviews, observations, artifacts, and student achievement scores. Data was analyzed for school culture scales. The school culture scale was based on the characteristics of a successful PLC (teacher collaboration, collective responsibility,
deprivatization of practice, reflective dialogue, and faculty influence). The school culture scale was then connected to both group and individual instructional practices. Supovitz (2002) also collected student achievement scores from standardized exams and attempted to connect the culture scale to instructional practice and student achievement. Supovitz suggested if teams of teachers changed instructional practices, teachers’ expectations would lead to higher student performance. Results empirically related effective communities of instructional practice to student achievement scores. Results indicated that effective communities scored highly in the school culture scale on each subcomponent and that related positively to student achievement data.

From 2003 to 2006, studies focused greatly on the connections among elementary, middle, and high school teachers’ PLCs, teacher practices, and student achievement. A defining characteristic of a PLC is that teachers work collaboratively developing stronger instructional strategies and, as a result, enhance student achievement (Jackson & Temperley, 2006; Lam, 2005; Phillips, 2003; Strahan, 2003). Strahan (2003) and Phillips (2003) both conducted mixed methods case studies of urban schools. Strahan conducted a 3-year study of elementary schools, and Phillips conducted a multiple-year study of one middle school. Each investigation reported findings that suggested PLCs, where teachers work collaboratively, develop stronger instructional lessons that, in fact, do increase student achievement. The studies were not as complex as Supovitz’s (2002), but the results were essentially the same.

Lam (2005) conducted a mixed methods approach to an investigation of international schools using PLCs. In the study, he collected data from 29 Hong Kong schools, over 1,300 teachers, and explored the relationship between teacher learning and
student learning using collaboration and teacher collective learning as variables. An interesting variable to this study was the idea that if PLCs are actually learning by practice, then to what degree are teachers learning about innovative pedagogical ideas and what is the impact on student learning? Findings indicated that teachers learn new ways of teaching in what he called school organizational structures. First, he found that teachers would use a type of trial and error method of new teaching methods with students and that this resulted in greater student learning. He also found that even with perceived teacher failure of instructional practices, students learned in ways using the perceived teacher failed lessons as a venue for their own level of understanding (learning the system the teacher was using was the added value). What is truly unique about this study is Lam’s connection between teacher autonomy, motivation, learning opportunities, and student outcomes. The consideration of highly flexible school structures serves as a school reform piece, and the utilization of the structure as a concept and its empirical application to the effects of teaching and learning is significantly different than other studies (Lam, 2005).

In summary, each of the studies considered so far has focused on PLCs, the theoretical characteristics of PLCs, the effectiveness of PLCs, teacher transformational practices in and out of the PLC, and connections of PLCs to student achievement.

Newer studies completed in the last 5 years have focused on empirical data from student exam scores and their relative connection to teacher perceptions of PLCs’ impact on their teaching (Kiburz, 2011; Lomos et al., 2011; Oliver et al., 2009; Roberts, 2010; Wendell, 2010). Perception data is not new to the empirical studies conducted from 1981 to 2011. Over the last 30 years, perception data is found throughout the literature
reviewed. The missing gap in the literature so far has been, and most likely will continue to be, the connection of teacher perceived impact of PLCs with that of impact on student achievement data (Oliver et al., 2009). Even though researchers like Roberts (2010) attempted to use standardized exams such as criterion referenced-based test scores of students as a link to teacher practice, the difficulty becomes the longitudinal study as well as the empirical determination of quality instruction (Lomos et al., 2011). The concept of new practices utilized by teachers as a result of PLC collaboration is well founded in the literature (Vescio, V., Ross, D., & Adams, A., 2008). Moreover, the literature indicates that the new and innovative practices adopted by teachers as a result of collaboration in PLCs have a positive impact on student learning (Jackson & Temperley, 2006; Lam, 2005; Phillips, 2003; Strahan, 2003). Interconnecting student gains in achievement scores in schools over short periods of time have shown a positive correlation between student achievement and teacher practices (Hollins, McIntyre, DeBose, Hollins, & Towner, 2004). What is lacking in the quantitative empirical research are longitudinal data connections of student achievement data to that of effective innovative teacher collaborative practices and the impact of PLCs on each.

Cluster 3 studies. The final cluster of studies reviewed addresses the school reform movement through PLCs and educational innovation. In a mixed methods approach, Lee, Smith and Croninger (1995) studied juniors and seniors in high school from 820 secondary schools nationwide, collecting data for over 11,000 students. Findings indicate that students with higher achievement scores from their junior to their senior year came from schools that were reformed to include collaborative teaming, authentic pedagogy, and small class size. Looking strictly at national achievement data,
the researchers stipulate that schools leveraged collective responsibility for student learning and common academic curriculum produced the largest gains in academic achievement. Also significant to their findings were students in later years of their academic development (juniors and seniors) showed higher gains compared to other years—middle school years to sophomores in high school (Lee et al., 1995). The primary conclusion to the study was that innovation and school reform seemed to serve as a positive correlation to student achievement.

Little (2002) studied professional community as a whole school reform. The multiple site case study was conducted over 1 year with English and mathematics teachers in two urban schools. Findings indicated that both schools were engaged in innovative teacher communities supported by the school and each department within the school. As the year progressed, the administration of each school placed the support component for professional communities on each department and removed the administration as a leadership support component. Little (2002) reports that teachers were highly committed, highly engaged in collaborative varied pedagogy, meaningful assessments, and reflective student learning. The one piece missing for the sustainment of the reform was the shared governance from administration, through departments and with teachers. Reform efforts fail when teacher professional communities do not meet all of the characteristics of an effective community (Little, 2002).

Hofman and Dijkstra (2009) and Schechter (2008) both share the concept of school reform, teacher networks, and school improvement. Both investigations conducted mixed methods research on multiple sites. Hofman and Dijkstra (2009) suggested that teacher professional development:
. . . has been too focused on bringing in experts from the outside into the school to improve teacher quality, failing to meet the needs of different teachers, teaching styles, schools or classroom contexts. . . As a result the best fit model described by teachers for professional development to meet their everyday needs in a real-time setting are internal teacher networks in a collaborative setting where teachers can improve their efficacy, professional knowledge, job motivation and classroom instruction. (p. 1033)

Schechter (2008) also suggested that enabling teachers to collectively discuss ways to improve teaching and learning required a shift in how the whole organization learns. The shift from top-down learning to organizational learning promoted the concept of professional community. This in turn triggered more extensive and shared efficacy and internal motivation for teachers and the school as an organization (Schechter, 2008).

Embedded in other studies was the concept of school reform as a component to PLCs. Most studies from 1981 to 2011 discuss, in a multitude of ways, how professional community in itself is a type of reform from the common school model.

**Summary.** In summary, there are three clusters of empirical data, both quantitative and qualitative that support both the holistic model of PLCs, but also the characteristics of an effective PLC. It is important to keep in mind that PLCs are not a school reform movement. They are a retooling of what we do as professional educators. PLCs are a cultural shift (DuFour et al., 2008). PLCs are a way of doing business to achieve desired results. Fullan (2006) says that teachers working together, collaboratively, towards high academic standards through innovative and common practice is what makes a PLC a shift in culture for almost every school.
CHAPTER 3

METHODOLOGY

Purpose Statement

The purpose of this study was to explore PLCs’ impact on teacher classroom practice. PLCs were visited, teachers were interviewed and observed in PLCs and in classrooms to determine: (a) what collaborative efforts teachers focused on during PLC meeting times, (b) what types of practices (pedagogical activities and assessment practices) teachers took from collaborative PLCs, (c) what practices (pedagogical activities and assessment practices) teachers implemented in their classroom with students as a result of PLC collaborative efforts, and (d) what teacher practices (pedagogical activities and assessment practices) changed in their classrooms with their students as a result of PLC collaborative efforts.

Three schools were purposefully selected in one large Midwestern city. Twelve master science teachers were purposefully selected to participate in the study, four teachers from each school. In addition, three science administrators were also selected to participate. The administrators selected to participate were the associate principals assigned to supervise and appraise the science teachers at each school.

Each school was considered a PLC. Each department at each school was also considered a PLC. Each school functioned independently with respect to PLC function than each other school in the district. Each department in each school operated within the school PLC as a functional department PLC. For this study, the science departments made up a PLC within each school, because science was a department at each school. Within each science PLC, each subject discipline was further divided into sub-PLC
groups of teachers. Teachers met in their sub-PLC based on content expertise and
courses they taught. Biology, physics, chemistry, and ninth grade science were common
examples of sub-PLC groups within the science department PLC at each school.

The primary objective of this study was to examine existent, well-established
PLCs. Each school was considered a case due to bound PLC. Qualitative data was
collected at each school. Each teacher at each school was also considered a piece of the
case. Three schools were chosen to participate, and therefore 12 science teachers were
chosen to participate in a multisite qualitative case study approach defined later in this
chapter of the dissertation. The goal of this study was not to examine a controlled setting
or treatment. Rather, the objective of the investigation was to examine PLC structure and
its relative impact on teacher practice. It was important in this investigation to clearly
define and describe the PLC setting at each school. It was also important to communicate
with teacher participants, through qualitative means, their ideas and opinions at the
beginning and end of the study to clearly identify and understand their educational
practices at the beginning and end of the semester and as a potential result of PLC
meetings through the duration of a semester. Observations were conducted at the
beginning and end of the study to determine potential alignment between teacher
statements and teacher practice. Observations aligned to interviews and surveys help
shape an understandings of teacher practices and PLC interaction through data
triangulation.
**Research Questions**

The grand tour question for this study was: To what extent were teacher practices impacted by interactions and collaboration in PLCs?

Four research questions guide the study. The four questions are:

1. What definitions of PLCs were used by schools in this study?
2. What did teachers do in PLCs as a result of the school definition?
3. What were teachers’ perceptions of PLCs?
4. What practices did teachers take from (pedagogical and assessment activities) PLCs and implement in their classrooms?

**Qualitative Design**

The design of the study was to conduct a qualitative multiple case study of PLCs and the potential impact on teacher practice.

There were various reasons for selecting a qualitative approach to this study. The purpose of this study was to gain information on the impact of PLCs on teacher practices in the classroom. Each person involved in the study had an individualistic view of their reality in the classroom and in PLC interactions.

Perception can be measured through quantitative or qualitative means, but through qualitative means, perception can be measured through the words and actions of the participants as they interact in context to their environment. A qualitative study is an exploration where variables cannot be easily identified and theories are not available to explain behavior (Creswell, 1998).
As teachers interacted in PLCs and in the classroom environment, it was important to see how, in context, teachers changed their pedagogical practices. It was also important to collect data on how personalities interacted to learn from each other in a community of learners. Each community and classroom was unique, but we can learn an extensive amount of information by viewing a typical case of teacher-to-teacher communication in a group and identify themes that govern the interaction that may be applied to other classrooms. Creswell (1998) stated that a purposefully selected, qualitative approach may be used to study individuals in their natural settings: “This involves going out to the setting or field of study, gaining access, and gathering material. If participants are removed from their setting, it leads to contrived findings that are out of context” (p. 17).

The final need to use qualitative research was what Creswell called the need to be an active learner. Creswell (1998) said that a “... qualitative approach emphasizes the researcher’s role as an active learner who can tell the story from the participants’ view rather than as an 'expert' who passes judgment on participants” (p. 18).

**Assumptions and Characteristics of Qualitative Research**

Creswell (1998) defined qualitative research as:

... an inquiry process of understanding based on distinct methodological traditions of inquiry that explore a social or human problem. The researcher builds a complex, holistic picture, analyzes words, reports detailed views of informants, and conducts the study in a natural setting. (p. 15)

Creswell described the focus of qualitative research as a process used to explore, understand, develop, and describe experiences based on individuals in context to their
reality. McMillan and Schumacher (1997) described qualitative techniques used to collect data in all cases as a collection of words.

There is an in-depth verbal description of phenomena. While different qualitative techniques can be used to provide verbal descriptions, the goal of each is to capture the richness and complexity of behavior that occurs in natural settings from the participants’ perspective. Once collected, the data are analyzed inductively to generate findings. (p. 46)

Creswell (1998) said that qualitative researchers approach their studies with a certain paradigm or worldview, a basic set of beliefs or assumptions that guide their inquiries. “These assumptions are related to the nature of reality or the ontological issue being studied” (Creswell, 1998, p. 74). In this type of study, the researcher asked: What was the nature of reality? Moreover, a key characteristic of this type of research was the multiple subjective realities seen by participants. To tease out the reality of each participant, “the researcher uses quotes and themes in words of participants and provides evidence of different perspectives” (Creswell, 1998, p. 75).

Data collection in qualitative research was formed from thick, rich descriptions of people, places, and conversations (Bogdan & Biklen, 1992). Data collection in qualitative research may take several forms. Interviews were a primary form of data collection whereby the researcher talked to participants through semistructured interview criteria. Interviews yielded participants’ views of their reality. Interviews as a data collection instrument have been well established in research as a data collection tool (Creswell, 1998).

Observation and documentation of what a researcher sees is valuable as a data collection instrument (Creswell, 1998). Observations provided the most complete natural setting for the qualitative research. They also gave the researcher first-hand information
as it occurred. Documents provided rich details that others had given thought to and exposed the researcher to processes used by participants in the study. These records and physical artifacts became key members that allowed the researcher to triangulate the data and add validity to the study.

Data, when used correctly, assumed a certain “worldview” about the nature of knowledge (ontology) and the relation between the researcher and that being researched (epistemology) as well as a method of inquiry (Smith, 1987). Given the data, the researcher considered the reality of participants as subjective and their truth as contextual and approached the data inductively in which multiple voices emerged. Moreover, the values and biases of the researcher must be stated as to ensure subjectivity based on participants and not researcher views of reality (Creswell, 1998).

Creswell (1998) wrote that exploratory research may be descriptive and focus on the qualitative pieces taken from natural settings. This type of research requires extensive fieldwork. Creswell also suggested that sampling of data be purposeful. He described purposeful sampling as a selection of participants that represent a group in a study. Purposeful sampling strategies must match the type of study being conducted. In the case of a case study, any sampling method may be used. A typical case was used as a methodology to selecting a sample within a population that highlighted what was normal or average for that group.

Case Study Approach

A case study is an exploration of a case over time through detailed, in-depth data collection involving multiple sources of information rich in context. Case studies are
typically bound by times, locations, programs, individuals, and activities. Multiple site case studies typically yield multiple sources of information that may include observations, interviews, audiovisual materials, and documents. The context of the case involves situating the case within its setting, which may be a physical setting. Multiple sites yield multiple cases and are considered collective case studies (Creswell, 1998).

The bound program and systems in this study consisted of teachers working in PLCs and in classrooms to achieve common goals. The bound activity in this study consisted of teachers working in PLCs, collectively sharing practice, and experimenting with shared practice in classrooms. Bound by time, teachers met in professional learning groups to plan pedagogy and determine the impact of their practices.

PLCs and classrooms were bound systems, though not always bound by walls. Oftentimes teachers and students were bound by the expectations, teacher practice, and student results.

**Role of the Researcher**

The role of the researcher was that of observer. Even though some qualitative literature suggested that qualitative researchers were participants, the researcher for this study did not need to participate in PLCs or discussions.

The researcher for this study was a high school science teacher at the time of the study. He understood the complexities of planning and implementing lesson plans as it related to a high school curriculum. Looking at what other science teachers did in a classroom in terms of planning and execution of a curriculum made sense to the researcher and as a teacher, more so than teaching in a different content area, such as a
social studies class. Moreover, in the State of Nebraska, the researcher knew many science teachers and had access to teachers willing to participate in the study. The researcher developed the trust of quality, master science teachers and establishing trust with them was not as difficult as establishing trust in teachers new to the researcher or schools. The researcher had never been in the professional community meetings of the selected master science teacher participants, nor had the researcher been in the classrooms of teacher participants, and so the researcher was able to make observations that were unbiased and objective.

Stake (2010) described bias as a ubiquitous, undesirable lack of objectivity in research. All researchers have bias. To eliminate the effects of bias, researchers take great care to define terms and operations. Research operations must triangulate data from multiple sources to ensure data validity. Validity and reliability of data sources are discussed in greater detail later in this dissertation.

Second, the researcher had taught high school science for over 15 years and knew how to communicate with teachers and administrators. Establishing trust in discussions with high school teachers and administrators was something the researcher had worked hard at throughout his teaching career. As a result of professional experiences in the community, the researcher provided a foundation for discussion with teachers and administrators. The researcher had developed a rapport with participants because of his status in the community and, as a result of that status, provided a respect with participants in the study, thereby making interviews and surveys more credible to participant experiences.
Since the researcher taught in a public school system, he had access to time frames that made observations and documentation of interviews easy for teachers and administrators. It was important for all participants to know that the researcher would not disrupt the learning environment. Participants were informed that their participation in the study would benefit students, teachers, and administrators in the relationships of teaching and learning. Participants were also informed that their participation in the study would help further the knowledge and understand of quality PLC work, thereby helping shape their professional development.

Sampling and Data Collection

The sampling method that was employed for the study was a reputational-case sampling using several cases to study a spectrum of teacher practices in PLCs and in high school science classrooms. Schumacher and McMillan (1993) described reputation-case sampling as obtaining the recommendation of knowledgeable experts for the best examples. They also described purposeful sampling as “selecting information-rich cases for study samples. The researcher decides what kind of information he or she needs, then searches for information-rich key informants, groups, places or events to study” (p. 378).

They suggested that individuals be purposefully selected because of the power and logic of purposeful sampling. They also suggested that a few cases studied in-depth yield many insights about the topic. Therefore, there was nothing random about the samples chosen for this study. Statistically, the data collected represented the sample and could not necessarily extend to a larger population. Though similarities in situations and cases could be extrapolated, the design of the purposeful sample for this study was to
select individuals who might provide rich descriptions and understanding of information that may be extended beyond their case. Descriptions and understanding were sought for teacher experiences in PLCs and how those experiences impacted their pedagogical practices.

Three schools were chosen in one Midwestern district in one city. Four teachers from each school were asked to participate in the study. The district, schools, and teachers were purposefully selected based on reputation and demographics. Selection criteria for schools, administrators, and teachers will be discussed in greater detail later in this dissertation.

Since research was conducted in a public 9-12 school, a gatekeeper was accessed in order to ensure that access to teachers and schools be attained. According to Creswell (1998), a gatekeeper is an individual who is a member of or has insider status with a group. In this public school district and school, two gatekeepers were accessed. The first gatekeeper accessed was the district assessment and research compliance specialist. This person reviewed studies proposed to the district, ensured IRB approval, relevance, and minimal school disruption. The second gatekeeper for the study was the head high school principal of the purposefully selected schools. This person had to accept the study into the building and thereby give access to research teachers in their high school.

To gain access through both of the gatekeepers, the researcher designed an Institutional Approval Form (Appendix H). The Institutional Approval Form included the title of the study, a description of the study, the nature of the study, the procedures, the timeline, the materials needed, data collection methods, and what was expected of the school district and the school being studied.
To gain access to teachers and administrators, the researcher designed and collected Participant Approval Forms (Appendix G). Teachers and administrators had separate participant approval forms, as the extent of their involvement in the study differed. Approval forms were written in letter format describing the researcher, the nature of the study, the purpose statement, the basic procedures, risks and benefits, a confidentiality statement, and an opportunity to withdraw statement.

Teachers were selected based on their reputation as a quality teacher and their longevity in teaching science in the local community. The researcher gained access to participants through recommendations from peers and the building principal. Participants were selected based on their exceptional pedagogical knowledge, their social abilities to interact with teacher peers, and their ability as master teachers to teach students.

**Participants and Data Types**

**Schools as Participant Locations**

Three schools in one school district were purposefully selected to participate in the study. Merriam (2009) suggested that a purposeful sample was selected for specific reasons and was defined in terms of criteria and how each sample was collected.

The three schools chosen to participate in the study had established PLCs. Bolam et al. (2005) said that a school undergoes stages of development in terms of the maturity of the PLC. Mature PLCs are those that report a high percentage of staff involvement in key PLC activities (Bolam et al., 2005). PLC activities include shared decision making, shared personal practice, focus on student improvement, and data-driven decision making connecting student understanding to teacher shared personal practice (Bolam et al., 2005;
DuFour et al., 2008; Hord, 1997). The three schools chosen were purposefully selected for existent, well established, and mature PLCs. For a well-established PLC, a school that was in the mature stage of PLC development should had established PLCs’ function for a minimum of five years.

**Teachers as Participants**

The teacher participants in this study consisted of 12 science teachers in the three purposefully selected schools. When more than one case is studied, it is referred to as a collective case study (Stake, 1995). Creswell (1998) noted that when conducting case study research, it was important to show different perspectives on the problem, but also select ordinary cases, accessible, and from multiple sources:

I am reminded how the study of more than one case dilutes the overall analysis; the more cases an individual studies, the greater the lack of depth in any single case. When a researcher chooses multiple cases, the issue becomes how many? (p. 63)

Typically, however, the researcher chooses no more than four cases. What motivates the researcher to consider a large number of cases is the idea of generalizability, a term that holds meaning for most qualitative researchers (Glesne & Peshkin, 1992).

Teachers were purposefully selected based on selection criteria. Stake (2010) suggested that reputation-based case studies help yield results from experts. Master teachers were considered experts in this study. A master teacher was a leader who had mastered management of their classrooms and found ways to accelerate learning for all students. The master teacher was an exceptional communicator who had a strong connection with students. A master teacher recognized that the education process was more than sharing content; rather, it was about creating independent learners who had the
critical thinking skills to grow as individual learners. Master teachers put their students first and adapted the curriculum to the learners’ needs. Master teachers held their students to the highest expectations. They conducted regular progress monitoring, adjusted their teaching approach as needed, and empowered their students to take ownership of their education. The master teacher mindset was one of systematic problem solving and personal accountability. These teachers were continually seeking out opportunities to better themselves as professional educators. They had the ability to look through a broad lens and communicate honestly about issues in their classroom, as well as with parents and administrators.

Science teachers who worked in science PLCs were selected. Master science teachers were identified based on the criteria and recommendation from their building principal. Since the researcher was a teacher in the community, he had access and working knowledge of teachers who met the criteria.

Administrators as Participants

One administrator at each school was identified to participate in the study. The administrator asked to participate was the one who directly interacted with the science PLC. In the district, an administrator was assigned a subject discipline to supervise. This administrator conducted yearly teacher evaluations, appraisals, and interacted with teachers based on their subject assignment. Administrators did not typically meet with teachers in PLC groups, but had a working knowledge of PLC functionality both at the school and subgrouping standpoint. The assigned science administrator was selected based on these criteria.
The administrator helped triangulate themes on PLC function, the history of PLCs at the school, mission, vision, and school goals coordinating science PLCs. A semistructured interview process, with focus on the grand tour question, was used with probing questions to help inform the researcher regarding roles, function, and historical aspects of PLCs at the school.

**Forms of Data**

There were several forms of data collected and utilized to triangulate data. “A case study involves the widest array of data collection as the researcher attempts to build an in-depth picture of the case” (Creswell, 1998, p. 123). Yin (1989) suggests that there are six forms of data that can be collected in a case study: documents, archival records, interviews, direct observations, participant observation, and physical artifacts.

For the purpose of this study, the researcher gathered data through interviews, open-ended surveys, documents, direct observation, and physical artifacts. Interviews were conducted with teachers and administrators. Surveys were conducted with teachers. Documents were gathered in the forms of PLC notes, teacher handouts from lessons, teacher derived tests, and school artifacts as they related to PLCs. Physical artifacts included computer downloads of teacher work.

Material gathered as data were recognized as sensitive material by parents, teachers, students, and the community. The researcher obtained informed consent and as a result of that informed consent, trust of participants (teachers and administrators alike). Each participant retained complete anonymity in the study, all markings of a person’s
identity or the school as a location were removed from all data and changed into another name.

**Interviews and timing.** Teachers were interviewed at specific times in the duration of the study. Semistructured interviews were conducted with teachers at the beginning and end of the second semester of the school year. These times were selected to ensure that teachers had established and been interacting in PLCs for an amount of time needed to ensure establishment of norms and procedures in PLC meetings. Interviews with teachers and administrators were designed to answer the grand tour and research questions.

**Surveys.** Open-ended surveys were conducted with teachers at the beginning, during the middle of, and at the end of the study. The study was locked into the timing of the second semester of the school year and so surveys were conducted after PLC meetings following the first interview, prior to the final interview, and in the middle of the interviews. Survey data were collected from teachers and contained open-ended response questions recorded online using SurveyMonkey and a designed survey instrument. Survey data provided teachers more time to process information and provided more thoughtful response without the pressure of an interviewer or peer pressure of a face-to-face conversation. Data were analyzed for categories, codes, and themes as they related to the research question of the study. Data analysis is discussed further in Chapter 4 of this dissertation.

**Observations and field notes.** Observations were conducted on 3 days at each school when PLCs were meeting and teachers were completing work collaboratively. Observations were completed to validate the teacher work as described by teachers in
interviews and surveys. Observations were recorded in a predesigned field notes protocol. Creswell (1998) suggests that a researcher design an observation protocol as a method for recording notes in the field. The protocol included both descriptive and reflective field notes about experiences, hunches, and learning. Bogdan and Biklen (1992) suggested that observations include records of aspects such as the physical setting, particular events and activities, and the researcher’s reactions.

All observations of teachers’ work in PLCs were considered sensitive material and all names were changed to pseudonyms to protect teacher and school confidentiality.

**Documents and physical artifacts.** Documents for the study included PLC notes, teacher lesson plans, assignments, and documents from school PLC history. Teacher lesson plans were aligned to PLC work and perspectives of expectations for pedagogical applications during lessons. All documents collected were investigated for connections to PLC work and compared to teacher practice. Physical artifacts were used to validate pedagogical design ideas for PLC groups to actual teacher work completed in the classroom.

All documents and physical artifacts were considered sensitive material, and all materials had names changed to pseudonyms to protect student and teacher confidentiality.

**Data Collection and Analysis**

Data analysis in this qualitative case study research began with a general review of the data collected. Data collection and analysis were simultaneous activities rather than discrete activities. The researcher transcribed interviews and conducted preliminary
analysis after each visit to the schools and teachers. The early analysis further shaped data collection and informed the researcher what types of probing questions to follow up with in subsequent visits and interviews. Qualitative data collection and analysis are recursive, dynamic, and flexible (Merriam, 1998).

Qualitative analysis is a process of “reduction” and “interpretation” (Marshall & Rossman, 1989, p. 114). Volumes of information were reduced to manageable units to identify patterns and themes that emerged and were interpreted. Miles and Huberman (1994) suggested that determining what to code is a judgment call and that one task is to eliminate the dross. During the process of reduction, Bogdan and Biklen (1992) encourage researchers to make sure that the data they incorporate into the final report has a purpose.

Tesch (1991) calls the analytic process that of “decontextualization” and “recontextualization” (p. 97). Data are taken apart (segmented into smaller units) and put back together again. The final goal is the emergence of a larger, consolidated picture.

The procedures for qualitative research analysis are not scientific or mechanistic (Tesch, 1991). Analysis should be done artfully (Lincoln & Guba, 1985). “Qualitative researchers draw on tacit knowledge, intuition and personal experience” (Merriam, 1998, p. 176) to develop naturalistic generalizations such as “conclusions arrived at through personal engagement in life’s affairs or by vicarious experience so well constructed that the person feels as if it happened to themselves” (Stake, 1995, p. 85).

The researcher collected participant approval forms, conducted interviews, then conducted online surveys. Three observations were scheduled for each classroom and PLC for each teacher. Field notes and observations of the observations were taken.
Data analysis began with transcription of interviews and surveys verbatim as to ensure accuracy of participant experiences. Dedoose, an online qualitative software solution, was used to code the interviews and surveys, and to take notes for ideas that arose from each interview. Coding was a process suggested by Miles and Huberman (1994) where the documents were examined sentence by sentence, chunk by chunk, and identifying one to two word “codes” that closely as possible resemble the terms used by participants. This ensured that the information gained for theme analysis was data driven rather than researcher driven.

Each interview transcript was offered to participants for review as to ensure accuracy of the interviews, conversations, and survey documents. Accuracy of documents is discussed in further detail in the Verification Strategy section of this dissertation. The member checks were conducted to ensure accuracy of the data and to ensure that it was an accurate reflection of participants’ views.

After transcribing the data, participant excerpt comments were broken up into categories from in vivo codes. Breaking up the excerpts and in vivo codes into coded clusters helped to identify reoccurring concepts emerging from the data. Codes were then distilled into manageable themes by category and then between categories.

**Verification Strategy**

Verifying the trustworthiness of the data collection methodology was essential in checking the information gathered about teacher PLC collaboration and work.
Internal validity was a measurement of whether the findings accurately represented the participants’ reality. There were multiple methods used to ensure findings were credible in accordance to participants’ realities.

First, data was triangulated. Triangulation was a validity procedure where the researcher converged multiple and different sources of information to form themes or categories in a study (Creswell & Miller, 2000). Data gathered from interviews, surveys, observation of PLCs, observations of classrooms, and collection of artifacts helped triangulate data in this study.

Second, member checks were considered important in establishing credibility of transcribed interviews. Member checking was a process used when interview data, analysis, and interpretation were taken to participants of the study so that they could check the accuracy of the findings (Creswell & Miller, 2000).

Third, the researcher must clarify bias that may be possessed as a result of being a science teacher and community member in the area of study. The clarification of researcher bias and/or prejudice helped improve the validity of the study. According to Creswell (1998), researchers must self-disclose assumptions, beliefs, and biases. This was a process whereby researchers report on personal beliefs, values, and biases that may shape their inquiry (Creswell & Miller, 2000).

Fourth, the data presentation in Chapter 4 of this dissertation uses thick, rich descriptions from field notes, interviews, and surveys as to ensure “deep, dense, detailed accounts” of the researcher and participant experiences. The purpose of thick descriptions was that it created statements that produced the feeling that they had
experienced the event, thus establishing credibility through the lens of the reader (Creswell & Miller, 2000).

Stake (1995) noted that to ensure external validity, or the generalizability of the study, the researcher must triangulate data by the use of thick, rich descriptions of participants and the research setting. Creswell and Miller (2000) described thick, rich descriptions as detailed accounts that create vivid detail to accounts to ensure that a study is credible with the reality of the participants.

This study had several sources of thick, rich descriptions. The thick, rich descriptions were found in the data collection of interviews and surveys, the statements of each participant, the account of the research settings, and the sampling and data collection procedures used.

Reliability was the measurement of whether the study was dependable and consistent with participants’ realities (Creswell & Miller, 2000). To accomplish consistent reliability, the researcher used triangulation by leaving a clear audit trail. “An audit trail was established by researchers’ documentation of the inquiry process through journal-activities, memo-ing, keeping a research log of all activities . . .” (Creswell & Miller, 2000, p. 5). The researcher kept a written research log to provide a detailed audit trail.

**Ethical Considerations**

The first ethical consideration for this study was to acquire the informed consent of all participants. Informed consent was obtained through signed consent of administrators and teachers taking part in the study. Each participant was informed of the
purpose and the procedures of the study. Participants were then told that there would be no potential risk to them as a subject in the study by assurance that participant answers to interview and survey questions be kept confidential. Participant names were not used in the presentation of data in this study. Names for schools and each participant were changed to pseudonyms to ensure the anonymity of participants in the study.

Second, participants were informed that they had the right to participate voluntarily in the study and withdraw at any time.

Third, each participant, as a part of the reciprocity of the study, was informed that they would be helping to further the understanding of PLC work and teacher practice. Each participant was also told that the interviews would be transcribed verbatim, and their answers would be seriously considered and used as real data in the study. Responses to questions, given by participants, were considered equally and therefore their participation in the study was unique in case, situation, and circumstance. In summary, reciprocity for each participant was described as an opportunity to be listened to seriously. It was important for participants to have some personal satisfaction of helping others understand their work (Creswell, 1998).

The fourth ethical consideration for this study was that of doing research in the community in which the researcher lived and worked. Stake (2010) said that it was quite appropriate for researchers to study their own place when there is value to determining professional practice in the workplace. He said that most qualitative Ph.D. dissertations aim to generalize findings based on a particular issue at a particular place and, as such, it is quite important to be able to do research to know and understand the bounded cases under question. Since the researcher was a science teacher in the community studied, the
researcher must consider all potential bias about schools and participants based on experiences in the community and workplace. Teachers were unique to this study and, regardless of the researcher’s background, the situations and experiences observed during this study were different than the researcher’s own experiences as a teacher. Therefore, the researcher’s bias was removed strictly because of his own experiences and expectations of what he may or may not have seen in the classrooms in the study. To remove researcher bias, the researcher detailed exactly what was said by each participant and described accounts as they actually happened, without researcher interpretation of either.

Stake (2010) noted that all researchers have bias. To minimize effects of bias, researchers must triangulate data. In data triangulation, researchers gather information from multiple sources to better understand each case and the commonalities between all cases in the study. “Data gathering, analysis and validation must be reviewed by critical friends” (p. 166).

**Methodology Summary**

The purpose of this study was to explore PLCs’ impact on teacher classroom practice. A reputation-based multiple site case study was conducted. Three schools were purposefully selected to participate. Four master science teachers and one administrator were selected to participate from each school. Semistructured interviews were conducted for administrators once during the study. Semistructured interviews were conducted twice during the study. Master science teacher participants were interviewed at the beginning and end of the study. The researcher observed PLCs of each master teacher at
each school three times during the study. Online, open-ended surveys were conducted for each master science teacher three times during the study. Surveys were sent out after PLC observations were conducted as follow-up to observations made of the PLC and its potential impact on teacher classroom practice. The researcher also observed teacher classroom practice for verification of adopted PLC pedagogical strategies to teacher classroom practice.
CHAPTER 4

DATA AND FINDINGS

Teacher Vignette

The first bell rang and the teacher walked to the classroom door, propped it open and stood in the hallway. The hallway quickly flooded with students, released from their classes. Students walk from class to class, the teachers standing by their door. “Good morning,” he said as students walked into the room. The students began to clear the hallway and enter the classroom in anticipation of the second bell. The second bell rang, the teacher pulled the door closed, and walked to the front of the room. Written on the board for students was the schedule for the day, a bell-ringer activity, and a lab purpose.

“Today’s date is January 19th, ladies and gentlemen. Please annotate that on your bell-ringer activity sheet.” Students took out notebooks and wrote the date at the top of blank sheets of paper. Students then took out textbooks and searched for solutions, some wrote, some read for potential solutions. The teacher cycled the room, looked at student work, and monitored the clock for time.

“Pair-share, 3 o’clock partner, please.” Students quickly moved from quiet seat-work to partner shared-work. Some students wrote more, some shared, and agreed on what they had. “Pair-write, please.” Students walked to the side counter, obtained a small white board and a marker, and walked the material back to their workstation. The pair of students wrote their solution on the whiteboard.

“What do you think?” the teacher said. Student groups worked systematically to share their responses with the rest of the class. As each pair of students shared, students not sharing wrote in notebooks or listened intently.

“OK, well done ladies and gentlemen. Our focus for lab today...” The teacher pointed to the lab purpose written on the board. He shared the connection between the bell-ringer activity and the lab as students wrote the purpose of their lab investigation. The teacher handed each student a sheet of paper. “Lab sheets for your review. Please write hypotheses and predictions prior to completing the materials and methods, show me your data table before you step into lab. Good luck!” he said. The lab proceeded with students writing, sharing, and experimenting.

As students finished the lab, the teacher turned on the LCD projector and put up a PowerPoint slide with five questions. Students made their way from lab to the front classroom area and back to their seats, where they took out notebooks.

“Your five-question formative is on the overhead.” Students worked quietly, as the teacher again walked around the classroom looking
at potential student solutions. A quick 5 minutes went by. “Pair-share, 4 o’clock, please.” Students got into pairs again, shared their responses while the teacher switches slides to the solutions.

“Be seated quickly, please. What do you think?” he said again. Students share by raising their hand, he called on them one by one and referred to the solution slide. The teacher quickly moved from formative quiz to lecture and class discussion.

“OK, final five, exit visas, please. Let’s hand them in today,” the teacher said, referring to the final 5 minutes left in the class period. Students transitioned to the final activity, quietly writing, then handing in sheets of paper into a tray at the front of the room.

The first bell rang, concluding the period, and the teacher said, “Great job today, ladies and gentlemen. See you tomorrow. Have a great day!” he said, as he walked quickly to the door and propped it open. He stood in the hallway by his classroom door and greeted students walking by in the hallway.

The above vignette was an observation made by the researcher in January of 2012, at the beginning of data collection for this study. The teacher was a master teacher, having taught high school for 32 years. “Today I would had considered an average day,” John said as we discussed the class period. “Students come in to class, ready to go. They know the expectation and they want to do well,” he said. Most students were seniors, some were juniors, and the level of classroom rigor and teacher expectations were palpable. Students had a great motivation to work within the classroom expectations, either alone or with their peers. No time was lost to student socialization or off-task behavior. As an observer, it could be seen directly that students had intent on working within the classroom contexts from the start to the end of class.

As a researcher, I would also consider the observation “an average day.” Observing master teachers in this study showed that each teacher could lead the room without being the center of attention for their students, while at the same time holding students to a rigorous standard for on-task behavior. What was most interesting for this
study was determining how the master science teachers interacted in a collaborative environment and how that environment impacted their teaching.

The purpose of this study was to explore PLCs’ impact on teacher classroom practice.

**Research Questions**

The grand tour question for this study is: To what extent are teacher practices impacted by interactions and collaboration in PLCs?

Four research questions guide the study. The four questions are:

1. What definitions of PLCs are used by each school in this study?

2. What types of collaborative activities do teachers participate in, in PLCs as a result of the school definition?

3. What are teachers’ perceptions of PLCs both pre and post PLC meetings?

4. What practices (pedagogical and assessment) do teachers take from PLCs and implement in their classrooms?

**Introduction to the Study**

The study investigated opinions and experiences surrounding the central issue of PLC impact on teacher classroom practices. Teachers and administrators collaborated on common instructional practice in PLCs. Participants were asked their opinions and experiences as it related to these central concepts. The study was completed in three high schools in one Midwest, urban school district. The participants shared their experiences and opinions related to the implementation of PLCs on their professional teacher classroom practice. They responded to prompts from the researcher in a natural and
unforced setting. The responses were transcribed, interpreted, and are presented in this fourth chapter.

This chapter is intended to report findings that promote an understanding of three high schools as distinct and interrelated cases.

**Collection and Analysis of Data**

The data for this multiple case study included audio recordings, interview transcripts, open-ended survey responses, and researcher field notes. Each administrator participant was interviewed once at the beginning of the study. Each teacher participant was interviewed twice over a semester during the school year, once at the beginning of the semester and once at the end of the semester. Teachers completed three open-ended surveys during the semester. Teacher PLC meetings and classrooms were observed by the researcher. Field notes were taken from the interviews, PLC meeting observations, and classroom observations. After returning from each interview and observation, the researcher wrote notes or summaries of what had occurred during the research observation process.

The researcher transcribed each interview and survey. When all of the transcripts had been completed, the researcher coded the responses of participants. Each coded document had excerpts of comments pulled by code. The coded excerpts were divided into four code categories based on the research questions of this study. The coded excerpts were then further divided into administrator or teacher subcategories. The two subcategory coded excerpt comments differentiated the level of involvement of each participant. The two groups—administrators and teachers—had different roles and
responsibilities in the school, and it made sense to the researcher that the statements of each subgroup would further help differentiate participant statements of PLCs at each school through the roles and responsibilities of participants. The categories used were: definitions of PLCs, types of collaborative activities completed in PLCs, participant perceptions of PLCs, and practices (pedagogical and assessment) taken from PLCs and attempted in the classroom.

The excerpts and raw data were evaluated for commonality in themes. Common words and ideas found in the excerpts and raw data were counted as themes. The themes are discussed further in the chapter, by school and teacher, as unique and interrelated cases.

Summary of the District and School PLCs

The school district chosen for this study was located in a Midwestern city of about 250,000 residents. The city had one public school system and several private school systems (Catholic, Lutheran, etc.). The school district had a total of six secondary schools, 11 middle level schools, and 36 primary schools. The secondary schools enrolled students from Grades 9 through 12, the middle level schools enrolled students in Grades 6 through 8, and the primary schools enrolled students from kindergarten through fifth grade.

The district had a secondary enrollment of over 10,000 students and employed over 7,000 teachers, administrators, and support staff across all secondary buildings.

At the secondary level, the district had conducted PLCs for 6 years. The PLC model for the district was considered a school improvement device aimed at improving
student learning. Each high school employed PLCs under the district-established goals for PLCs. The district stated that PLCs in each school must: (a) ensure that all students were learning, (b) create a culture of collaboration, and (c) focus on results.

The three high schools chosen for the study employed PLCs from a building-level approach. The building-level approach for each school was described as a way to establish school improvement goals and ensure teachers collaborated in small groups at each school on the goal on a weekly basis. The building-level approach was geared at ensuring teachers collaborated on student learning and teacher pedagogy as a function of school improvement.

The district did not describe for schools how to divide teachers into collaborative groups within each building or PLC. The district provided administrative training on PLCs’ administration for each school. Schools used the training as an administrative planning time to determine how to divide teachers into PLCs and to establish school improvement goals for the year. Each school divided teachers and administrators into PLCs by department (science, English, social studies, world language, fine arts, physical education, industrial education, family and consumer science). Each department was composed of several content areas. The science PLC was divided into biology, chemistry, physics, and ninth grade physical science. Each school employed 12 science teachers and one administrator to oversee the department. One of the science teachers at each school was appointed as the department chair. The science department chairperson was in charge of working with teachers on their teaching role for the year. The chairperson did not supervise or lead PLCs at any one of the high schools.
The science PLC in each building was divided into sub-PLC groups based on teacher subject discipline (biology, chemistry, physics). Each school, therefore, had a science PLC divided into sub-PLC groups for biology, chemistry, physics, and ninth grade physical science. Teachers were grouped into a sub-PLC group that corresponded to their teaching assignment and subject discipline. Each sub-PLC contained anywhere from two to six teachers. Each school conducted PLCs on Tuesday afternoons from about 2:15 p.m. to 3:15 p.m. Teachers were expected, by way of district and school expectations, to meet in their PLC groups during the entire time of PLC meetings.

**Summary of the Participants**

Four teachers and one administrator from each high school were selected to participate in the study. The administrator chosen at each school was the administrator appointed by the school to oversee, supervise, and appraise science teachers. The administrator at each school participated in leadership meetings for school improvement and PLC function. The administrator appraised each science teacher and thus was involved in each science PLC. The administrator also made classroom observations of each teacher as part of the appraisal process. The administrator, because of the appraisal process, observed and provided written feedback to each classroom four times during the year as part of the process. The administrators chosen to participate had been at their respective school for over 10 years and thus had PLCs begin as a model 6 years ago and progress to their current school improvement device.
School, administrator, and teacher participants are listed below in Tables 1 and 2. The school, administrator, and teacher participant names have all been changed to aliases to help participants retain anonymity.

Table 1: Administrator Participants

<table>
<thead>
<tr>
<th>School</th>
<th>Participant</th>
<th>Gender</th>
<th>Education</th>
<th>Years Experience</th>
<th>PLC Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roosevelt High</td>
<td>Administrator 1 - Nancy</td>
<td>F</td>
<td>Ph.D.</td>
<td>34</td>
<td>Admin</td>
</tr>
<tr>
<td>Jefferson High</td>
<td>Administrator 2 - David</td>
<td>M</td>
<td>BA, MA</td>
<td>10</td>
<td>Admin</td>
</tr>
<tr>
<td>Washington High</td>
<td>Administrator 3 - William</td>
<td>M</td>
<td>BA, MA</td>
<td>17</td>
<td>Admin</td>
</tr>
</tbody>
</table>

Teacher participants were chosen from each school based on their reputation as master science teachers, the number of years teaching, and the number of college degrees they had earned. The quality of the teacher reputation was based on the head building principal recommendation and recommendations from other teachers in the school district.

Table 2: Teacher Participants

<table>
<thead>
<tr>
<th>School</th>
<th>Participant</th>
<th>Gender</th>
<th>Education</th>
<th>Years Experience</th>
<th>PLC Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roosevelt High</td>
<td>Teacher 1 – James</td>
<td>M</td>
<td>BS, MEd</td>
<td>17</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Roosevelt High</td>
<td>Teacher 2 – Mary</td>
<td>F</td>
<td>BS</td>
<td>25</td>
<td>Biology</td>
</tr>
<tr>
<td>Roosevelt High</td>
<td>Teacher 3 – John</td>
<td>M</td>
<td>BS, MA</td>
<td>32</td>
<td>Physics</td>
</tr>
<tr>
<td>Roosevelt High</td>
<td>Teacher 4 – Robert</td>
<td>M</td>
<td>BS, BS</td>
<td>12</td>
<td>Biology</td>
</tr>
<tr>
<td>Washington High</td>
<td>Teacher 1 – Michael</td>
<td>M</td>
<td>BS, BS</td>
<td>24</td>
<td>Biology</td>
</tr>
<tr>
<td>Washington High</td>
<td>Teacher 2 – Joseph</td>
<td>M</td>
<td>BS</td>
<td>24</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Washington High</td>
<td>Teacher 3 – Thomas</td>
<td>M</td>
<td>BS</td>
<td>25</td>
<td>Physics</td>
</tr>
<tr>
<td>Washington High</td>
<td>Teacher 4 – Chris</td>
<td>M</td>
<td>BA, MEd</td>
<td>7</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Jefferson High</td>
<td>Teacher 1 – Patricia</td>
<td>F</td>
<td>BA, MA</td>
<td>23</td>
<td>9th Grade</td>
</tr>
<tr>
<td>Jefferson High</td>
<td>Teacher 2 – Linda</td>
<td>F</td>
<td>BS, MEd</td>
<td>25</td>
<td>Biology</td>
</tr>
<tr>
<td>Jefferson High</td>
<td>Teacher 3 – Paul</td>
<td>M</td>
<td>BS, MEd</td>
<td>41</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Jefferson High</td>
<td>Teacher 4 – Donald</td>
<td>M</td>
<td>BS, MEd</td>
<td>15</td>
<td>9th Grade</td>
</tr>
</tbody>
</table>
Summary of the Roosevelt High School PLCs

Roosevelt High School had a student enrollment of over 1,800. The building was relatively new compared to other schools in the district. The school was located on the edge of the city and was built in an expanding city community. The school was situated close to a large public nature park and conservatory. The school operated in a four by four block schedule with 90-minute periods. The science department had 12 science teachers appointed to teach the core science curriculum and electives. Participants described the science core curriculum as physical science, geo science, biology, chemistry, and physics. Master science teachers taught at least one core course in their subject area and one elective.

Roosevelt High School was a large school built on a pod-based system. When the researcher walked in the front doors, the first pod of the main office, security, attendance, and student commons sat in the middle of the school and could be seen through the front entrance. The student commons was a large gathering area with tables in the middle of the room, open space on the north and south sides, mounted televisions on the western-most wall, and a cafeteria on the northern-most boundary. The academic pods were located adjacent and to the eastern side of the school. As the researcher walked down the connecting hallway to the academic pods, there were banners proclaiming state championships and student academic awards. Pictures and murals of student academic leaders, national merit scholars, and valedictorians from each senior class lined the “wall of fame.” Upon entering the academic wing, the researcher noted there were three pods on the first floor and three pods on the second floor. The pods were lettered A, B, and C, by floor respectively. A classroom in the A pod on first floor was labeled A100, a
classroom in the C pod on second floor was labeled C200, and so forth. Each pod contained about 12 classrooms, a common area for gathering, a computer lab, and a teacher plan center. The teacher plan center contained teacher cubicles and conference rooms.

The science classrooms were spread out throughout the building at Roosevelt. The natural sciences, such as biology, were mostly located and taught in classrooms in the A100 pod, the physical sciences were mostly located in the A200 and C200 pods, and the ninth grade sciences were mostly located in the B100 pod. Each science classroom at Roosevelt had a large lab area in the back of the room with cabinets that lined the walls. The lab tables were large and provided ample space for student lab work. Each classroom also had a classroom area with desks or tables located at the front of the room. Also at the very front of the room was a teacher workstation and lab desk.

Teachers at Roosevelt were visible in the hallways, talked to each other during passing periods, and greeted students as they walked the halls. The general feel of the building was community-like. The open nature of the pods and the cordial nature of teachers and students made the pods feel open, warm, and inviting.

Roosevelt divided the large group science PLC into smaller groups by teacher subject discipline. The sub-PLC groups included biology, chemistry, physics, and ninth grade physical science. The biology sub-PLC contained four teachers, the chemistry sub-PLC contained three teachers, the physics sub-PLC contained two teachers, and the ninth grade sub-PLC contained three teachers. The school was very strict on how it employed and met in PLCs. Teachers in PLC groups were expected to meet in their sub-PLC groups and follow a PLC process defined by the school. The PLC process was defined as the
way each PLC conducted business when teachers met. Conducting business included meeting times, dates, locations, participant norms, and teacher projected outcomes. The PLC process at Roosevelt followed a five-step method where teachers in collaborative groups were asked to examine student expectations, develop curriculum maps, create common pre and post assessments, administer the assessments, and analyze data for pedagogical adaptations.

Pedagogical adaptations included changing instructional methods to match needs identified in student performance and/or changing the assessment to make a better series of questions based on the data from student performance on the assessments.

PLC norms represented protocols and commitments developed by each sub-PLC group to guide members in working together. Norms helped PLC team members clarify expectations regarding how they worked together. Norms included starting and ending PLCs on time, equal participant collaboration, equal distribution of workload, respect of others’ time to talk during collaboration, and staying fully engaged during meeting time on PLC work.

Roosevelt began the year with a school-level PLC staff development day. Teachers met as a building and were divided by sub-PLC group. A school-designated group conducted the PLC training with teachers on PLC training day in August. The group was made up of one administrator and five teacher leaders from the building. The team was also considered a PLC. Participants from this school provided literature given to them at the staff development day on PLC structure, function, and process. Participants described using the literature along with building and district level forms to ensure PLCs were conducted consistently between PLC groups within departments and
within the building. The literature provided to participants on PLC day included a literature review of PLCS, how PL Cs in theory were supposed to do their work, the PLC process, and a variety of brainstorming activities on their sub-PLC direction for the year.

It is important to note that during the training at the beginning of the year, teachers were asked to review, discuss, and look for potential modifications in their PLC norms. Teachers also met and discussed the PLC structure, function, and process. PLC function expectations were written in a series of documents that described for teachers how PL Cs should operate each week. The documents described potential outcomes for PLC meetings. Teachers were also trained on the use of the school and building level forms for PL Cs. Since the school treated PL Cs as a school improvement model, teachers were asked to actively participate in the model by filling out forms for the district on the PLC goals for the year. Each PLC group and subgroup were also required to update the forms several times during the year and post them to an online library accessible by all district personnel.

Once every 2 weeks, Roosevelt High School also conducted school-wide school improvement plan meetings that were required for every teacher. The meeting included teacher practice discussions as a function of PLC work. Teachers worked during these meetings on grade and grading expectations, and further planned out how to proceed in their sub-PLC groups to incorporate best practices from grades and grading into PLC work and school improvement.
Teachers at Roosevelt High School

James was a 17-year master teacher veteran. He had taught chemistry at the school since the school opened. James held a bachelor’s degree and a master’s degree, both in education. He was highly decorated, having recently received an award by the American Chemical Society as its outstanding educator. James was also co-head coach of the school’s state champion Science Olympiad team, a position he took great pride in. James taught at Washington High School prior to coming to Roosevelt. Prior to teaching at Washington, he taught middle school in a small town.

I have taught chemistry all my career. Each day is different, but generally when students come in they sit, do a short formative check of their understanding of the prior day’s concept, that leads into usually a lecture, then after that we jump into lab and try out what we lectured. (James’ interview, January 24, 2012)

When asked about his PLC, James replied:

We have two, sometimes four people in our PLC. We have been working together for about 10 years and so we know what each other does, how we do it, and what our strengths are. I know PLCs are about collaboration, but science teachers do that anyway. We have to because of the nature of labs and sharing equipment. (James’ interview, January 24, 2012)

When pressed to define what a PLC was, James replied:

When we first started PLCs, the administration dictated to us what we were supposed to do, fill out, and return to them. Now PLCs are more about collaboration, sharing ideas, coming up with common assessments, and things like that. (James’ interview, January 24, 2012)

When asked about how the PLC ensures equal collaboration, James stated that he was unsure that anything had been done to ensure unequal collaboration.

I think it comes down to personality types. As a professional, you have an obligation to speak up when something is said that you don’t agree with. Since we are adults, we come in with our own personal and professional perceptions of how we fit into the PLC or the department. Some people
will speak up more, just because that is the type of person they are and how comfortable they feel in the group. (James’ interview, January 24, 2012)

Observations of James’ classroom and PLC revealed a very collegial, structured environment. James’ presence to both his students and his peers was palpable. He had a quiet disposition, but one could tell he was respected and appreciated. One classroom observation, James started class by closing the door and turning on the LCD projector. He sat down without saying a word to students. Students took out notebooks and began writing, some took out textbooks, while others just worked on the problem on the overhead projection. After about 5 minutes of student problem solving, he paged forward in his PowerPoint and provided solutions. He spoke softly, but had students’ attention. Some students listened, while others wrote quickly what he had put on the overhead. As he provided solutions, he asked for feedback from some students, a check for understanding. Once finished with solutions he turned to his computer, pulled up a computer program, and began playing a song about the mole. It was International Mole Day, and he put the words of the jazzy tune on the overhead as he sung them out loud. The class started chiming in once he put the words on the overhead and sang with him. They sang together, some laughing. James ignored the laughs, turned the volume up, and sang louder; the class responded with equal increased volume. Following the song, he walked over to the white board, asked the class to repeat the words, and began writing formulas, which were also words from the song. Some students started writing, while others repeated the words to the song, watching him closely write what they had just sung. Following the song, James had students work in small groups on how to solve problems from the formulas he provided from the song. He circulated the room, offered
help, walking past some while looking over other students’ work. Students transitioned from small groups to lab where James had materials for them to solve what he called a quick lab. Students used their earlier day’s work to see how the formulas applied to chemical combinations.

Three observations of James’ PLC revealed a working sub-PLC of two members. The members met in James’ classroom each time, looked at common selected response exams they designed and used, discussed data from student performance, and changed some questions. When asked what he takes away from PLC and tries with students in his classroom, James suggested that he doesn’t take anything new beyond the common tests they work on.

I personally haven’t changed anything or taken away common labs or anything. We work on the tests and use those, but I have been teaching for a while now and I don’t feel there is a lot that I can change in terms of how I teach things. After awhile you just know what works. I can’t say the same for other teachers. Everyone does the same lab I do on Boyles Law and everyone does the same lab I do on balancing equations. I think some teachers just look at what others do and take what they do, but for me that is not the case. (James’ interview, January 24, 2012)

When asked about what he thought about PLCs, what was useful, and what was difficult about them, James responded:

Having time to collaborate with your peers on a regular basis is definitely one of the best things about PLCs. Not losing your creative teacher side with all this standardization and commonality that we do is definitely one of the biggest challenges. Teachers are different and how we go about some things is different and so student performance from classroom to classroom is going to be different. That is both good and bad, but I think one of the biggest things I can do is to prepare my students for the things I know are difficult for them, regardless of all the commonality. I know what students struggle with and so part of my job is getting them in the right frame of mind. (James’ interview, May 23, 2012)
Mary was a veteran teacher of 25 years. Prior to teaching at Roosevelt High School, she taught at another city school for several years and prior to that she taught at a small school in a rural setting. She taught biology, human anatomy, and several other medical-type elective courses. She was also the sponsor for the school health occupations club and was a lead teacher and national presenter for a biological, human anatomy mannequins organization. Mary had college degrees in medical assisting and in education. She was certificated to teach all natural sciences and health education.

Three separate observations of Mary’s classroom revealed a classroom filled with anatomical structures, posters and pictures of human structures, and bookshelves filled with anatomy, physiology, and biology reference. Observing Mary with her students, one could tell that her voice carried and when she spoke students listened. Most of Mary’s classroom pedagogy was based on lecture and student inquiry. Each class observed began with a short lecture, followed by a short formative assessment of student understanding. Mary wrote on the board two questions, students wrote, then, on her command, began discussing the questions in table groups of four. Students carried out a short conversation then began writing solutions. The volume in the room grew and Mary watched, circulated, answered a few questions, then cycled back to the front white board. Mary asked for students to come up and write solutions and as they did so, she walked quickly to the back of the classroom to ensure students had the attention of their peers. Students described their solutions, showed the class on adjacent mannequins their ideas, then sat quickly. On Mary’s command, other groups went up to the front of the room and answered the next question, further showing their solutions on the mannequins. When the student groups finished, Mary returned to the front of the room and began lecturing.
Students wrote quietly. Mary’s stern volume and use of humor kept students on the edge of their seats; some laughed as they wrote. At the conclusion of lecture, Mary asked students to take out their labs from previous days and begin working on segments of the lab, picking up from where they left off.

Each of the three periods observed were very similar in terms of how Mary infused her use of humor with her control of chaos in the room. Mary’s presence in the room was never far. Her use of voice and volume quickly brought students back from what they were doing, to what she wanted them to focus on.

When questioned about things she uses from PLCs in her classroom Mary was very quick to reply:

Nothing is sacred when it comes to labs or activities. We beg, borrow, and steal from each other. I take things from teachers at all of the high schools. That is the way I have always done business, borrowing from other teachers. We have some very smart people in this district, and I feel that my job is to provide a balanced experience for students, which means if I sit on my professional pride, my students might miss an opportunity that another teacher in the district are providing better than me. (Mary’s interview, May 16, 2012)

Further probing into her perception of what PLCs were and how they were defined, Mary suggested the following:

I don't know if I can give an exact definition. My interpretation is that it is a collaborative conversation between teachers, to assess students fairly commonly, and ensure that students are meeting common objectives. How a teacher does that may be different, we each reach students differently, and so it’s not a matter of who is a better teacher. It’s the approach that is used to reach all students, so that we can ensure that all students achieve the same by the end of semester. PLCs make sure that students get the same information no matter which teacher taught them. (Mary’s interview, January 24, 2012)
When probed for what she thought was good about PLCs and what types of things she thought might need to improve, she suggested that the PLCs most impactful to her teaching were ones that worked on commonality.

My Biology PLC worked on a common final exam. We all use the exam, and it was created several years ago. We change it, add questions, take some away, change some question, all based on how students performed in previous semesters. The common final really helps me know what things I should emphasize, what things I should teach in greater detail. The core objectives, the alignment of the test and my teaching to what everyone is assessing their students on really brings us together as teachers. (Mary’s interview, May 16, 2012)

Mary was a very positive person. Everything she had to say about PLCs, her peers, the types of things she took away from PLCs, her thoughts on PLCs, were all very positive. Her upbeat personality and willingness to admit that she did not have all the answers, even as a master teacher and veteran of the profession, was refreshing.

Even an unproductive PLC where everyone comes in and talks about things, we can’t seem to stay on task, even those meetings are fun. I get something out of every PLC because it ensures that I don’t work in isolation. (Mary’s interview, May 16, 2012)

John was a master teacher and veteran educator of 32 years. He had taught all his career as a physics teacher and has taught in two schools, both in the district. At Roosevelt, John was the department chairperson. The department chair was the person responsible for scheduling and teaching assignments. He assisted the building head principal with hiring science teachers and interacted with department chairs from other departments and other buildings. John had two college degrees—a bachelor’s degree and a master’s degree. He was the recent recipient of the Alltel Teacher Award, an award given annually to the region’s best teacher. John was the co-head coach for the state champion Science Olympiad team at Roosevelt and took great pride in their success.
John had spent the last 10 years working with a university on modeling and teaching methods. Three separate observations of John’s classroom revealed the same mechanistic pedagogical format. John had a very quiet demeanor, but also had a big presence in the classroom. Each class period, John turned on an overhead projector, put up a problem for the day, gave students about 5 minutes to work on it independently, and then solved the problem on the board for them. He checked for understanding with thumbs up, thumbs to the side, or thumbs down for how confident students felt in their solutions. After the initial problem, John asked students to take out problem sets, assigned groups and numbers of problems in the set to groups of students, and students got to work solving problems. In small groups, a group of students took a small white board, a dry erase marker, and an eraser back to their workstations. They solved the problem together as John walked around the room, checking in with thumbs-down students. At the conclusion of time, John asked for students to be seated, and one at a time called student groups to the front of the room to present their findings on their problems in the set. Students not presenting turned their notebooks to blank pages and began writing. Time proceeded quickly as each student group took turns presenting. John checked for understanding with the class to ensure there were no questions or better ways to solve each problem. At the conclusion of the small group work, John gave students lab time. He provided very little direction in the process he called student driven inquiry.

Students are introduced at the start of the course on how to solve problems in lab. They know after lecture and pre-lab that they will have to solve the lab problems with no direction from me. They have all the pieces of the puzzle from lecture and small group work to solve the lab problems. They
just have to go back, complete the lab trials, collect data and express what they did in writing for review. (John’s interview, January 31, 2012)

John discussed his PLC experience and suggested that PLCs were a collaborative experience for teachers. He further suggested that PLCs, the way he thought of them, were better suited for young teachers.

Teachers like us, who have been doing this awhile, it’s difficult to suggest that we are going to get something new out of collaborating with other teachers. When you are a new teacher, you are trying to figure out how things work and how to do things in the classroom with students. After about 8 to 10 years, you have a lot of those questions answered. (John’s interview, May 23, 2012)

John said that his PLC for physics only had two people in it. When asked what types of things they worked on, he described an assessment model he and the other physics teacher used that compared their students to students from around the country. The model was developed at a university and has an online assessment component where teachers compile their results. He and the other physics teacher used this system, compared how their students performed in their PLC meetings, and decided what objectives to focus on.

The FCI gives us some common ground. We compare how our students do on it, then decide how much weight to place on a set of objectives in our teaching. (John’s interview, January 31, 2012)

When probed for what types of things he took from PLCs and tried with his students, John’s response was quite simple:

I don’t take anything from PLCs. Most PLCs I do not meet with my counterpart, there is no need to meet because what we do is what we do. Since I teach the regular and advanced physics and he teaches the regular and AP physics, we just spend most of our PLC meetings trying to figure out how to do what we need to get done. (John’s interview, May 23, 2012)
Robert was in his eleventh year of teaching and his seventh year at Roosevelt. He was an environmental scientist prior to entering into his teaching career. Robert began his career teaching in libraries, appointed by his environmental company to provide community outreach. He described the process of moving from environmental science into teaching as a painstaking process:

I couldn’t convince myself at first that I wanted to teach, but I was the only person that wanted to work with the libraries and help people get outside. The more I did it the more I wanted to do it, so I just bit the bullet and got my teaching certification. It was a lot of fun for me to teach and see the look on peoples’ face when you got them to discover nature. (Robert’s interview, January 29, 2012)

Robert had college degrees in environmental science and in education. He was the recent recipient of the State Farm Educator of the Year award and was also the school sponsor for the outdoor encounters club. Robert taught biology and environmental science. Prior to coming to Roosevelt, Robert taught in a small town in Wyoming. Robert described his experience in Wyoming as eye-opening to the profession.

In Wyoming, I was the science department. I taught all the sciences, but it was fun because whatever I wanted to do was fair game. When I came to Roosevelt there were so many good teachers, and so I was excited about the opportunity to work with and learn from everyone. (Robert’s interview, January 29, 2012)

When asked about his PLC, Robert said that his group had four teachers in it. Robert said that he liked to talk and so he usually was the lead teacher in his PLC, but he insisted that it wasn’t Robert’s show to run. He suggested that each member in the PLC served a role.

When we meet, I usually start with what we did last week, then ask everyone what we need to get done this week to get ready for whatever we are teaching. We usually look at our old tests, make sure they are ready to go, or we look at common labs that we can all do so we only have to set
up equipment once. Then we just have to move the stuff around from room to room during the week. Our group does a really good job of sharing ideas, collaborating on everything we do. Each person in our group has a different teaching style and so we can really borrow from each other and ensure consistency between classes, no matter who is teaching. (Robert’s interview, January 29, 2012)

Three separate observations to Robert’s classroom and PLC revealed the culture and environment he discussed. Walking into his room, you could tell Robert had daily processes. The front of the room was his desk cluttered with papers and soda cans. When the tardy bell rang for class to begin, students filtered into the room, sat down, and began socializing. As the volume of the room increased, Robert stood up from his desk, picked up a stack of papers, and started handing them out.

Class, these are your quizzes from yesterday. Please take a look at what you missed, get into your table groups, and make corrections. You have 10 minutes. Go. (Robert’s observation, February 9, 2012)

The class began discussing, some wrote corrections on their sheets, and some just sat and waited. The class was vocal, loud, and fun. Students laughed, discussed ideas from the quiz, and after a short 10 minutes Robert asked for students to share their responses. After a brief sharing period, Robert asked who scored a perfect score, and two female students raised their hand. “Congratulations, ladies, walk of fame, help yourselves” (Robert’s observation, February 9, 2012). The students walked over to a side counter, wrote their names on a sheet of paper taped to a cabinet, grabbed some candy from a container, and took their seats. While the ladies took their walk and retrieved their reward, Robert handed out a lab. As the ladies took their seats, Robert asked students to read the lab silently. After a short time, Robert turned on an LCD projector and began a discussion of the lab.
Today, class, we will be spoiling milk. Tomorrow you will consume your spoiled milk. How is it possible for us to spoil perfectly good milk, but still consume it? Keep in mind that the milk that goes bad in your fridge at home is different than what we are doing here today. So I ask again, how is this possible? (Robert’s observation, February 9, 2012)

Students came up with a variety of explanations until Robert got the detail he wanted from them. Student brainstorming and sharing provided Robert with a passage to his lecture presentation. He went on in a direct delivery lecture for about 20 minutes, discussing the pathways of respiration and the relationship to lab. Following his lecture, Robert guided students to the lab, discussed safety issues, laboratory procedures for the day, and then got them into groups for the lab experimental process. Students went to work in a smooth transition from lecture to lab and as the class came to a close, Robert interrupted with follow-up.

Observations of Robert’s PLC revealed that this lab was something all biology teachers were doing at Roosevelt. In PLC the group decided that each teacher needed to teach anaerobic respiration through the use of the common lab experience. Review of the summative assessment from this unit also showed commonality in assessing student learning from the common lab experience.

PLCs are collaborative experiences. I don’t know if I have a formal definition of what a PLC is supposed to be, but in my experience a PLC is about collaboration between teachers to close the achievement gap, whatever that gap is. When a student comes into my classroom, I want to ensure that he or she has the same, quality experience they might have in someone else’s classroom. (Robert’s interview, January 29, 2012)

Robert described his PLC as a group of people who got along well and all thought the same in terms of student learning and the role of the teacher. He also described his
PLC as an opportunity to construct things that all members could take away and use in the classroom.

I am not saying that every PLC meeting we make something that we all use. Some PLC meetings we meet and discuss things that aren’t even related to common assessment, common labs, or common teaching. Sometimes we get together on Tuesdays and just vent. Teachers are human and sharing the goings on from class to class is important in team building. I think our PLC is great because we all talk, can share things that are bothering us, and even give each other a hard time and say, “Hey, let’s get back to work here.” (Robert’s interview, May 16, 2012)

Robert further described his PLC as an opportunity to construct commonality, but also share the creative side to teaching.

What I do well is not the same as someone else and so I can share what I do and one of my PLC members can say, “That sounds like a good idea, but I don’t think I can pull that off.” Essentially, I can be creative, do what I do in the classroom, and not feel locked into what others are doing. Sure, we make common formative and summative tests and quizzes, we make common labs and stuff like that, but we don’t do everything the same. That would lose the fun in teaching, as far as I’m concerned. (Robert’s interview, May 16, 2012)

**Administrator at Roosevelt High School**

Nancy was a veteran administrator. She began her career 34 years ago as a middle school assistant principal. She moved on from middle school to high school and was an administrator at Washington High School before coming to Roosevelt. She had three college degrees, all in education. Nancy had many responsibilities as an administrator at Roosevelt, which included appraising the science department. One of her responsibilities was to organize, facilitate, and run a group of teacher leaders called the data team. The data team was the steering committee for PLCs at Roosevelt, and Nancy took great pride in the fact that she got the data team organized and off the ground
by recruiting respected master teachers in the building to ensure PLCs were meeting best practices.

I am very proud of the data team. They gave us instant credibility with the teachers. Since the team is made up of respected master teachers, they tell us how to make the PLC building process best for school improvement and most impactful for classroom practice. When we picked the data team members, we wanted to ensure we got master teachers from science, math, social studies, English, world language, and the arts. Since the master teachers are real go-getters, they worked to ensure they stayed ahead on how to make PLCs work. These people are highly respected in their departments and across the school and so when they tell the teacher, “This is what we need to do and here is the literature to back it up,” everyone listens and gives it a try. (Nancy’s interview, January 24, 2012)

As the appraising administrator for the science department, Nancy observed every teacher’s classroom at least three times a year. She was a piloting member of the district appraisal process, which included an online teacher review and reflection, administrative observations, and an open forum for discussing teacher observations and plans.

The appraisal process is very good because when I observe teachers, I just see a snapshot of what they do every day. I don’t see the whole picture, and I can’t see them every day. Our process is more of a reflection and conversation, not just of what I saw, but of what teachers planned on doing, got done, and how they felt about it. (Nancy’s interview, January 24, 2012)

Nancy described the PLC as an extension to the appraisal process:

Appraising is a piece of the school improvement process, as are PLCs and what PLCs do. I hope what teachers take from PLCs and try in their classrooms are a reflection of the work done in PLCs. When I appraise teachers, I am also appraising what they did in PLCs and tried in their classroom. (Nancy’s interview, January 24, 2012)

Nancy described the science PLC as a group of passionate teachers who met in subgroups by subject discipline. She suggested that in each of those groups teachers collaborate on best teaching and assessment practices and derive some commonality that
they can take back to their classrooms and use with their students, thereby changing their instructional methodology.

I get out with the data team and observe PLCs at work. Some are more efficient than others in terms of what they produce and use. PLC work is greatly dictated by personalities and comfort level sharing and collaborating. All of our PLCs have had to come up with common assessments and so I am confident suggesting that our teachers have produced something they use in the classrooms. (Nancy’s interview, January 24, 2012)

When I first got to Roosevelt, there was no PLC process. Teachers met in groups, but had no direction and so part of my job was to help provide direction. That is why we assembled the data team and asked for their help. We wanted a grassroots type of an effort, not a top-down dictatorship. The data team adopted a PLC process that every group follows now. The process starts with common teaching standards, moves on to common assessment, then on to data collection, and then to common instructional methodology. (Nancy’s interview, January 24, 2012)

I think our PLCs are very well defined. I think we provide teachers with a strict definition of what PLCs are, what they are supposed to be doing in PLCs, and we even help them with the theory to practice. If literature suggests teachers should do PLCs in a certain way, then how does that translate into real collaborative teaching and learning? (Nancy’s interview, January 24, 2012)

**Summary of Roosevelt High School as a Distinct Case**

Roosevelt High School science teachers and administrators all viewed PLCs as a collaborative effort between teachers of like subject discipline. All participants described the development and use of common assessments in PLC groups that they use in their classrooms with their students. From a collaboration standpoint, all participants described the need to share ideas and build relationships with their peers.

As the administrator, Nancy viewed PLCs as an opportunity for teachers to construct something together and take it back to their classrooms, thereby changing what
teachers do to match best practices. Robert, Mary, and James agreed that they consistently used common teaching standards to construct and use common assessments. Robert and Mary agreed that commonality between teachers included labs and activities they taught and, as a result, they changed their pedagogical practice to match what they thought was better practices used by their peers. James and John disagreed with this in that they suggested since they had been teaching for so long, that deriving a common lab experience constructed and used by a peer would not change their professional practice.

PLCs at Roosevelt met in subgroups by subject discipline, constructed common assessments, and some common instructional methodology. PLCs were collaborative and focused on a well-defined PLC process adopted and used to ensure all sub-PLC groups operated the same throughout the building. The PLC process sheet described by Nancy, Robert, and Mary included data collection. The data collection process, after review of the document (Lincoln Public Schools, 2011), showed that teachers were supposed to be using data from students to inform their teaching. Essentially, if teachers were using the PLC process as it was written, they would be collecting data on a daily basis from students and using this as information to drive instructional scope and methodology. None of the teachers at Roosevelt used the data collection plan as stipulated on the PLC process sheet. Teachers naturally collected formative data (common quizzes and labs) and used this to determine whether students were mastering course content. None of the teachers at Roosevelt used the data plan, consistent with the PLC process sheet.

Teacher and administrator statements of PLCs were generally positive. Each member expressed the need and desire to collaborate with their peers. Every teacher
agreed that the strength of meeting in a PLC was to bounce ideas off other teachers and share information about teaching and learning.

Nancy, Robert, and Mary stated that PLCs were an opportunity to collaborate, share ideas, and take things away from PLCs that helped shape their daily instructional practice. James and John agreed that PLCs were a great opportunity to collaborate and share ideas, but suggested that their longevity in the profession precluded them from being able to take anything useful away from PLCs that might change their daily instructional practice. Both James and Robert did use some form of common assessment, also used by their peers. Even though they stated that PLCs were not useful to their daily instructional practice, they did have commonality with their peers and, as a result of PLC collaboration, did change their instructional practice through collaboration.

**Summary of the Washington High School PLCs**

Washington High School had a student enrollment of over 2,000. The school was situated in the middle of the city and had served the community as a school for over 55 years. The school grounds and prior school building that it was built on dated back to the early 1900s. The school was rich in academic tradition and was considered by several participants to be the most tradition-rich school in the district. The school operated on an eight, 50-minute period per day schedule. Most classes met 5 days per week.

Washington High School was a large, sprawling school. The school had undergone several renovations and additions. When the researcher walked into the front entrance of the school the main office sat directly to the right. After checking in at the office and walking out into the main hallway, the four-way intersection that led to the
sprawling school sat open and void of students. The four-way intersection served as the main access point to the school and continued on in the four directions as far as the eye could see. The school had both first and second floors. The science department was situated in the middle of the school on a northern-most addition to the first floor. The science wing contained about 12 classrooms and three teacher plan centers. Teacher plan centers were relatively small rooms with teacher desks pushed to the wall for open spaces in the middle of the room. Science classrooms were very similar to Roosevelt in layout. Each room had a classroom area at the front of the room and a lab area located toward the back. The rooms were lined with cabinets and built-in bookshelves along the lab area and sides of the room. The rooms seemed a bit smaller than Roosevelt, but were very organized and had great natural lighting. The natural lighting of the science wing rooms gave a warm, inviting feeling to the science classrooms.

Teachers at Washington worked in their classrooms for most of the day and did not greet students in the hallways. Teachers were, generally speaking, not in the hallways between passing periods. When students entered their rooms, teachers greeted them warmly. Teachers at Washington seemed a bit more isolated than at Roosevelt. Teachers seemed to keep to themselves for most of the day and week. Most teachers even ate lunch in their rooms or at their desks in their teacher plan centers.

The science department at Washington had 12 teachers appointed to teach the core science curriculum and electives. Participants described the science core as physical science, geo science, biology, chemistry, and physics. Master science teachers taught at least one course in their core subject area, but did not necessarily teach an elective.
At Washington High School PLCs were organized and split by the administrative team. Teachers were split into PLCs based on content expertise and teaching discipline. The large group science PLC was divided into three smaller subgroup PLCs in similar fashion to Roosevelt High School. Washington science teachers were organized into biology, chemistry, or ninth grade sub-PLCs. The biology sub-PLC contained four teachers, the chemistry sub-PLC contained four teachers, and the ninth grade sub-PLC contained four teachers. The physics teachers met in the ninth grade PLC in what might have been considered a sub-sub-PLC group.

The master science teachers were divided into different sub-PLC groups based on how many participants there were in each. The ninth grade sub-PLC had several teachers in it who did not teach ninth grade science. Patricia was a master science teacher at Washington who participated in the ninth grade sub-PLC. She was appointed to the ninth grade science PLC subgroup because she was the lone physics teacher in the school and since she was a single teacher in her discipline, there were no other teachers for her to meet with.

The logistical arrangement of grouping teachers like Patricia into a sub-PLC group heterogeneously provided no true PLC for her classroom practice or pedagogical need. As a result of this grouping, the participant described her PLC experience as “frustrating” and a “waste of time”:

I think, for me, I almost have to meet at the district level for PLCs. The majority of what I teach is physics, and I am the only physics teacher here, so getting together with other physics teachers would help me. Meeting in this PLC of ninth grade teachers kind of makes me feel isolated.
(Patricia’s interview, May 16, 2012)
Washington organized PLC meetings for teachers in a structured and consistent monthly process. Three times per month teachers were expected to meet in their departments and sub-PLC groups. Teachers met in departments each Tuesday afternoon the first 3 weeks of the month. In the meeting, teachers sat as a department and discussed building level expectations for school improvement and department issues with things such as scheduling, student activities, supervision, and other similar topics. The department meeting lasted about 10 to 20 minutes, after which time teachers broke out, went to other classrooms, and met as sub-PLC groups for the remainder of the PLC time.

On the fourth Tuesday of the month, teachers were expected to meet in a taskforce PLC group. The taskforce PLC was a whole-school commitment to teachers serving on one of several committees. The taskforce PLC required each teacher to meet on at least one committee of their choosing.

My taskforce PLC is a diversity PLC. We have SMART goals and work through how we want to incorporate diversity issues into our school improvement goals. There are people from several departments and a couple administrators that work on the diversity PLC. I like getting to work on the committee because I am passionate about the subject. (Linda’s interview, May 17, 2012)

The taskforce PLC at Washington included committees for student attendance, school improvement, diversity, staff courtesy, and others. Though the committee taskforce PLC concept is unique to this school and interesting, for this study, the subject discipline PLCs were investigated as they had the closest impact on teacher practice.

Washington High School also began the year with a training day for PLCs’ function similar to Roosevelt. The PLC training day was on the same day as Roosevelt, but was conducted by administrators from Washington. One administrator at Washington
High School was responsible for school improvement and PLC function within the building. The school improvement administrator was also responsible for coordinating and conducting PLC training. Teacher participants described PLC training day as a day when teachers “sit and talk about everything other than PLCs” (Donald’s interview, February 3, 2012). Donald further described training day as a day to review forms they filled out from the year before, update the forms, and post them to an online library (described above in Roosevelt High School practices). No participant in this study could describe or provide literature or documents given to them from PLC training day. Participants could not describe PLC definitions or descriptions of PLC function provided at PLC training day. All participants described PLC training day as a day when administrators provided the expected outcomes for PLC meetings, but did not provide literature to support the expectation.

As described above, Washington required teachers to meet three times per month in their large science PLC for 10 to 20 minutes, then divided teachers into their sub-PLC groups for the remainder of the PLC time. The large group science PLC meeting was described by William as an “opportunity for teachers to cover administrative expectations and products for PLC meetings” (William’s interview, February 6, 2012).

On the other hand, each teacher from Washington described the large group PLC as a department meeting that took care of department business and was usually not focused on PLC business.

Each PLC group and subgroup observed conducted business in different ways. The large PLC group broke up into sub-PLC groups. The sub-PLC groups did not operate the same from group to group. The ninth grade sub-PLC worked each time to fill
out a form provided by the building on data from pre and post testing of students in a geo
science class. Participants in the group did not work collaboratively on the form. Three
teachers in the PLC worked on the form, while one teacher worked independently on her
computer. When asked why she did not collaborate with her PLC members, Patricia
stated:

Because I don’t teach that class, I might as well do something
constructive. (Patricia’s personal communication, February 16, 2012)

In three separate observations, the biology sub-PLC group did not appear to have
a common plan to work or collaborate on school improvement or PLC work. In the
biology sub-PLC group, each member worked independent of one another and some
members talked about school functions, student concerns, and department scheduling
issues. The chemistry sub-PLC group worked on common graphing skills from a rubric
devised by the PLC for all chemistry students at the school.

The observations and recorded field notes of three separate PLC meetings at the
school revealed that Washington High School science sub-PLCs had defined norms and
roles for members, similar to Roosevelt High School. The difference at Washington
High School was that the biology, chemistry, and ninth grade sub-PLC groups had some
group members participating and working through the norms, while other members chose
to ignore the PLC norms and work independently. When questioned, Patricia described
the PLC process as a buy-in from members:

We don’t all agree on what or how to teach things. Some teachers teach
what they want, regardless of the PLC or district standards. (Patricia’s
personal communication, February 15, 2012)
Paul stated:

Look, if you find value in it, you will participate. If there is no value in it, I personally won’t do anything. (Paul’s personal communication, February 15, 2012)

Teachers at Washington High School

Patricia was a master teacher and veteran of 23 years of teaching. She had two college degrees, bachelor’s and master’s degrees, both in education. Her teaching assignment included one chemistry class and six physics classes. She was the school’s lone physics teacher which, according to her, made her feel isolated. When she began her teaching career, she taught ninth grade science at Jefferson High School in the district. She began teaching at Washington about 15 years ago and described the school as a leader and pioneer for education in the community.

Washington is a very good school with a lot of tradition, both academically and athletically. The teachers here are very good. We have very good students and an actively engaged parenting community. (Patricia’s interview, January 29, 2012)

When asked about her PLC, she described a group of teachers who worked in the same room. Since Washington science department had PLC groups for biology, chemistry and ninth grade science, she was forced to meet in a PLC with teachers who did not share common courses of instruction.

In the PLC, we work on data for our geo science class. The two teachers that teach that course collect data from a common assessment they made last year, and we report the data on a form provided by the school. One of the teachers posts the form to the web, and that is about all we get done. (Patricia’s interview, January 29, 2012)

When asked what she did in the PLC as a member, she simply said nothing. The focus of the PLC is on an assessment instrument that can show data for their PLC group.
When probed for her definition of what a PLC was or what the school definition of a PLC was, she said:

I’m not sure about that. We probably were told once, but I don’t remember. I suppose it is about teachers getting together to collaborate on stuff. (Patricia’s interview, January 29, 2012)

When asked what she did as far as collaboration in the PLC she said:

Nothing, really. We shared something once on bell-ringer activities, and I tried that with my students. I liked the activity we came up with and it was different than anything I had ever done, and so I have been using it since. (Patricia’s interview, January 29, 2012)

Three separate observations of Patricia’s classroom yielded similar results.

Patricia started each class period with a bell-ringer activity. Patricia sat at her desk as the tardy bell rang and students filtered into the room. When students entered the room, Patricia stood and took out a couple of long two-by-four boards. She set up a demonstration at the front desk and asked students what they thought was going on in the demonstration. Some students ventured a guess, some just watched the perpetual motion of the boards going back and forth on the table. Patricia went to the board and wrote an equation. She asked students to define the parts for her, at which time students began chiming in on what each part of the equation represented. Some students took out notebooks and scribbled a few notes, while others verbalized pieces of the equation. Patricia returned to the demonstration and once again asked students to verbalize the parts of the equation and how it fit the demonstration. Patricia looked down at the demonstration then back at the class, checking for understanding on the parts of the equation and the demonstration. Patricia began a short lecture, describing equations, parts of equations, and derivatives for students. After the brief lecture, she then asked
students to take out a worksheet she provided the previous day. The equation was the central theme of the bell-ringer demonstration and of the worksheet, and she described derivatives of other equations needed for students to complete the worksheet. Students took out the sheet, and Patricia instructed them to work on parts of the sheet. At her command, Patricia released students to work in pairs on the worksheet. Students worked quickly and shared ideas with their partners as Patricia circulated the room. As the class period came to a close, Patricia nonverbally got their attention with a raised hand. She informed them that the sheet would be due at the start of class the next day and that their test was coming up at the end of the week. The period went exceptionally fast, and Patricia had the focus of her students from the moment the first bell rang to the moment they walked out the door.

I like the connection between the demo and the bell-ringer. They really captivate and activate the kids and connect ideas. (Patricia’s observation, February 15, 2012)

Patricia suggested that PLCs better served young teachers, new to the profession. She also suggested that since she was not a new teacher that maybe she was not supposed to get anything out of PLC.

Maybe us veteran teachers aren’t supposed to get anything out of PLC. I personally don’t feel like I get anything out of them. It’s not like I’m making and taking things away and changing what I do. (Patricia’s interview, May 16, 2012)

Patricia said that she and her PLC teammates constructed the bell-ringer activities through collaboration in PLC. She also stated that she and her sub-PLC group members constructed activities for a unit on radioactivity that she used. Even though she stated
that she did not get anything out of PLC, she also stated that she did construct the two instructional strategies and use them in her classroom.

Linda was a biology and human anatomy teacher at Washington High School. She had taught at a larger school in another district her first year of teaching, moved to the community, and began working for the district as a middle school teacher. After about two years as a middle level science teacher, she moved to Washington and had been teaching at the school for about 20 years. Linda had two college degrees, a bachelor’s and a master’s degree, both in education. Her certification was in natural science and health education. She also coached track and was the school’s diversity liaison to the district. Linda was originally from Jamaica and she proudly wore pins, scarves, or other identifiers to her cultural heritage. Her classroom was quite large, very bright with natural lighting, and filled with plants, fish in aquariums, books on bookshelves, and human anatomy mannequins all over the room.

Three separate observations of her classroom showed a very positive, fun rapport with her students. Before the tardy bell rang, students walked into Linda’s room, took a sheet from the entry desk, and took their seats. As the tardy bell rang, students quietly talked amongst themselves. Linda walked into the room from the hallway, closed the door, and said good morning. The class responded in a collective soft-voiced “good morning” as Linda made her way to the front of the room. Linda pointed to the white board at the front of the room and quickly described the learning objective for the day. She gave students a couple minutes to discuss the objective. After a short time, in a confident voice, Linda addressed the class with one word, “Class,” the class loudly and in unison responded, “Yeah, man” (Linda’s observation, February 15, 2012).
One of my focuses this year was on classroom management. I wanted a single word I could use that would get the students on task. I read somewhere that if I used a signal, like a single word, I would need students to respond to show they were paying attention. I shared this with students and they came up with the “Class-Yeah, man” response in honor of my cultural heritage. (Linda’s observation, February 15, 2012)

Linda continued on with the class by describing a worksheet provided for students when they walked into the room. Each period began with a start-of-the-day activity. Today the start-of-the-day activity required students to pair into groups of two and complete a series of questions on a sheet that aligned to the class’s learning objective of the day. Students moved quickly to lab to work on the activity, some taking textbooks, some not. Linda moved between student groups, asking questions about the activity as students searched for solutions. After about 15 minutes, Linda called them back to their seats and instructed them to take out their notebooks for writing notes. She turned on an overhead projector and began to speak. Students wrote quietly, listening to her words, and she pointed to structures, described functions, and related concepts to text readings. Some students opened their books to diagrams she described and wrote more. Based on her lecture, she instructed the class to get into what she called table groups, and go over the entry activity sheet one more time. Students complied as she cycled through the room, looking at work and providing feedback. After about 10 minutes, she returned to the front of the room and said “Class,” the class loudly and in unison responded, “Yeah, man” (Linda’s observation, February 15, 2012). Linda addressed them on how to hand in their work and pick up their lab. Students quickly filed by the hand-in basket and picked up a lab sheet. They quickly worked their way to lab, got into lab teams, and began working as Linda cycled the room. As the period came to a close, Linda brought the
class back together. She described to students what to expect for writing the lab report and asked that they clean up their lab spaces before the bell rang. As the bell rang, students finished cleaning up, grabbed their materials, and headed for the exit. Linda cycled around the empty lab while one student turned and wished her a good day. She exchanged pleasantries and quickly made her way to the door for the next class coming in.

Linda’s relationship, use of humor, and semantics from her cultural heritage created a rapport with students that was palpable. Students respected Linda, and it could be seen through their interactions that Linda had their attention.

Linda described her PLC as a group of individuals. When probed for how she would define a PLC, Linda described the theory of a PLC:

A PLC is supposed to be about teachers collaborating on ideas, coming up with some common practices, and trying them out with their students. (Linda’s interview, February 1, 2012)

When asked about what her PLC collaborated on, Linda responded:

At the start of the year, we talked about classroom management because that was what I was focusing on. At Washington we are supposed to have data for everything we do in PLC, and one of the things I wanted to work on for my personal goal in my appraisal process was getting my students back on task and getting them to transition quicker from activity to lab or lab to activity. My PLC teammates thought it was a good idea and so they wanted to run with it. The problem was that no one would actually try things. Even at the beginning of the year, people were saying they were trying some of the strategies for on-task behavior that we discussed in PLC, but they didn’t have the data we said to have. After a couple weeks of nothing to report and nothing to fill out on the form, we just faked it. (Linda’s interview, February 1, 2012)
Linda described her PLC as a group of individuals. When asked why she used the word individuals, she described teachers committed to teaching, but not to the team of teachers that make up her PLC.

In my biology PLC, we don’t really work on anything. Our district has standards that teachers are supposed to teach from, but two of the teachers don’t even teach from those; they just do their own thing. People in my PLC are just too lazy. The only thing I can remember doing together all year was this STS issues thing. We looked some stuff up on the internet, came up with a way to teach science technology and society issues, and ran with that. I am not sure what everyone else actually taught in their classroom, but I tried it and liked what we got. That was a whole year and only one thing to show for it. (Linda’s interview, May 17, 2012)

Linda’s statement of how a PLC was supposed to work was built around the school definition. Washington administrators told teachers to meet in their departments, then break out to the sub-PLC, fill out a form that described what they were doing, what data they were using to prove it worked, and post the form for administrator review. Three separate observations of her PLC and review of the form showed some teachers engaged in filling out the form, while other PLC group members worked separately and independently on other things, not PLC related.

I meet with one of my friends in the summer and on the weekends. She teaches biology as well here at Washington and we discuss the objectives, tests we give, and share labs and activities. I guess we are a PLC, but it’s on weekends and after school because we can’t talk about these things during our PLC time. We don’t have time and the others in our PLC disrupt our conversation and so we just meet outside of PLC time. (Linda’s interview, May 17, 2012)

Paul was the longest tenured veteran teacher in the study. Paul was in his forty-third year of teaching. He taught for 14 years at a private school in the community, then came to Washington High School and had been there ever since. Paul taught all chemistry classes. He was one of four teachers who taught chemistry at Washington.
Paul had two college degrees, a bachelor’s degree and a master’s degree, both in education. His classroom was in the middle of the school and off the science wing, in what he called an old science room. The room was dark, with no windows for natural lighting and low ceilings. The room had no posters on the walls or books on shelves. At the front of the room was a teacher lab work station, a white board, and an overhead projector. The lab stations in the back of the room were set up for a lab experiment that Paul was planning for the day.

Students entered the room at 7:00 a.m., first period for Washington High School. The room was quiet and students kept to themselves. Several students came in after the tardy bell sounded at 7:00 a.m., but Paul ignored their tardiness. Paul handed out tests from the previous day, and one at a time put overhead transparencies on the overhead projector, describing what students should have gotten and why. Some students asked questions, some did not. Most students wrote on their tests. After describing the chemistry theory or equation for each question, Paul gave students work time to correct their responses and search for solutions out of their textbook. For every corrected response, Paul gave half credit back to student test scores in the grade book. After about 15 minutes, Paul collected the tests and gave students a container filled with small plastic apparatuses to hand around. Paul made sure each student had a lab paper and a spectroscope from the container. He had students stand and make their way to a lab station in the back of the room where he had equipment set up, ready for their observations. Students gathered around the lab station in the lab area, and Paul showed students tubes of gas with an electric current through each. He asked students to look through the spectroscope and write down what bands they could see for each tube. As
students completed their observations and writing, Paul spoke in a loud, confident voice about gas and wavelength law. Once each tube had been placed in the apparatus for student viewing, he instructed students to work in table groups on the lab sheet. Students worked the remainder of the period on equations and solutions. The bell rang at 7:50 a.m. and students cleaned their workstations with a little more energy than they came into class with. Students picked up their bags and left the room quietly as Paul cleaned the lab area for the next class.

Three separate observations of Paul’s classroom and PLC yielded very similar results. Paul was definitely an experienced teacher with a long list of successful accomplishments. Paul described his PLC as a couple of old teachers meeting with new teachers to help them find ways to teach.

Our PLC has me and our department chair in there, and that is over 80 years of experience right there. There are a couple of other teachers in there that have been teaching for about 5 years or so. They are really smart and hard working. I think we get stuff done for them in there. (Paul’s interview, February 2, 2012)

When probed for a school definition of what a PLC was, Paul responded:

I don’t know if they have ever given us a definition, but I guess it’s about teachers getting together in like areas, collaborating on what to teach and how to go about it. (Paul’s interview, February 2, 2012)

Paul was very intent on the idea that he did not get a lot out of PLCs as a teacher. He described his PLC as a group that met every Tuesday and filled out a form. He further described the PLC as something extra he had to do on Tuesdays that did not connect to his classroom practice.

I don’t want to say that I can’t learn something new, but I have been doing this for awhile now. I don’t see the value in getting together once a week and talking about stuff. Filling out this form and turning it in, how does
that help a kid in my chemistry class? If I had a choice of filling out some form or being in the classroom with students, I would prefer to be in the classroom. (Paul’s interview, May 16, 2012)

When asked about what his PLC collaborated on, what types of activities they worked on together, and what he took back to his students, Paul described one thing. The chemistry sub-PLC group decided that student scores in scientific reporting and graphing were deficient. As a group, they constructed and devised a common teaching and assessment rubric for scientific graphing and reporting.

My PLC came up with this goal of helping students be better at graphing. We came up with this rubric to assess it, and we all tried it. I took it to my students, gave it to them, taught them how to assess themselves, and how I use it when they hand in lab reports for a grade. I guess that has helped me be better at assessing their labs and the graphing skills in their labs. (Paul’s interview, May 16, 2012)

Paul’s thoughts, expressions, and statements of PLCs were generally negative. In each interview and survey completed, Paul expressed that meeting each Tuesday served as time away from students in what he called wasted teacher meeting time. He insisted that since he had been teaching for so long that he was getting nothing from PLC he could use in his daily instructional practice. In reality, Paul worked with his peers to evaluate student performance in scientific reporting. He and his PLC team devised standards for scientific reporting and graphing, further constructed a rubric to assess it, shared that with his students, and has changed his assessment and instructional practices because of it. Paul did say, in our second interview, that he could see the value in meeting with other science teachers, but thought meeting once a week was a bit much for his needs.
Donald was in his fifteenth year of teaching. He was Washington’s primary geo science teacher. Donald was a geologist prior to getting into teaching. He worked for a national geology organization almost 20 years ago. His first college degree was in biology, but Donald was fascinated by geology and life’s connection to it. In the national organization, Donald began helping with community outreach and public education. Once he began teaching the public, Donald was hooked into teaching. He went back and got his master’s degree in education and had been teaching at Washington the entire time since. Geo science at Washington was a freshman class. Donald taught all geo science and, by nature of the course, also taught all freshmen. He also served on a freshman transitional committee for the school.

Students walked into Donald’s classroom before the tardy bell rang. They sat in assigned seats while he handed them a quiz sheet and instructed them to stand by a lab station where he had rock samples ready for their examination. Students cycled the room, going by each station for about 30 seconds per station on Donald’s command. He walked by each station double-checking that each sample was sitting just right for students to see. Once the final station was complete, Donald instructed students to hand in their quizzes and then to find their seats. Students filed by a side lab table, putting their quizzes into a box. After the last student handed in their exam, Donald swiftly walked by, picked up the box, and took it to his desk in the front of the room. He grabbed a worksheet, handed some to each student at the beginning of each row, and asked that they hand it back. Once he was sure that each student had a copy of the activity, he held up a rock and said, “Tell me.” Students wrote, drew pictures, and described what they saw on the sheet he provided just moments previously. As students
wrote, Donald walked around the room, giving them a closer look at the rock. He asked for student responses and several replied. He walked around the room, speaking softly, but with confidence, about what natural events led to the production of the sample. He quickly walked to the front of the room, turned on the overhead projector, and began to lecture. Students wrote quickly as Donald dramatically described physical events that led to the types of rock formation. He referred students back to the worksheet he had handed them, turned on the classroom television, and played a short video for them. Once again, Donald referred students to the worksheet and asked that they complete it based on lecture and the video. As the class period came to a close, Donald gave the students instructions on when to hand in the worksheet. Students packed up their materials into bags and walked out of class as Donald wished them a good day.

Donald’s PLC group consisted of five teachers, two of whom taught geo science. The other geo science teacher also taught a ninth grade physical science course. When asked what types of things his PLC worked on, Donald replied:

We gather data from a common assessment we made for my geo science class last year. (Donald’s interview, February 1, 2012)

Donald described the PLC process of data collection as fruitless. He also said that he gave pre test formative assessments to his students at the beginning of a unit, assessed where they came in, and took that data back to the PLC group. The other geo science teacher did the same assessment and, together, he and Donald recorded their preassessment data on the school form required by the administration. When students finished a unit of study, Donald and his geo science counterpart gave students the same assessment again and compared pre to post assessment scores. They wrote their pre-post
assessment scores in the school form required by administration and posted the final
document to an online library used by the district for administrative review.

When asked what he used the student scores for in his classroom, Donald simply
said, nothing.

I don’t use the scores. I don’t count them as a grade. They are strictly
formative for students to know their level of knowledge coming into a unit
of material and leaving a unit of material. The scores don’t tell me
anything beyond student change in results. (Donald’s interview, May 16,
2012)

Donald appeared to grow frustrated while talking about scores and classroom practice.

PLCs are supposed to be teachers collaborating on common objectives,
sharing ideas for teaching, maybe sharing labs, activities, common
assessments. We don’t have time to do any of that because we spend our
entire PLC time filling out this form and looking at data that doesn’t serve
us as teachers. (Donald’s interview, February 1, 2012)

When probed as to what collaborative activities they worked on in their PLC
group, Donald replied that they did not work on anything other than the data from pre-
post assessment and the school form required by the administration.

I don’t take anything away from PLC and work on it with my students.
My PLC time is devoted to this data set that doesn’t impact me or my
students. It is a complete waste of time. (Donald’s interview, May 16,
2012)

Donald’s statements and reflections on PLCs centered on the use of the school
form and his growing frustration that PLC meeting time was wasted on an activity that
had no impact on his classroom practice. Donald also expressed that, with several
persons in his PLC, what others did in the PLC was work on things for their classrooms,
what he would like to have time to do as well.

Myself and one other person do this work that has no real meaning to
teaching and learning, while others work on stuff for their classroom.
There are so many things not right with the way we do PLCs. I am not sure how to address it or who to talk to. (Donald’s interview, February 1, 2012)

**Administrator at Washington High School**

William was the science-appraising administrator at Washington High School. He had two college degrees—a bachelor’s degree in elementary special education and a master’s degree in educational leadership. He was in his tenth year as an administrator. Prior to working at Washington, he was an elementary principal in the district. William had many responsibilities. Besides being the appraising administrator for science, he was the school budget administrator, he worked with student teachers, and carried an alpha student load.

Much like the administrator at Roosevelt, William visited each teacher and their classroom in the science department at least three times in the school year. He conducted observations of teachers and shared his thoughts using the administrative appraisal process, similar to Nancy at Roosevelt. As a product of the appraisal system, William had the opportunity to work with each science teacher in their classroom and in their PLC.

We have very good teachers here at Washington. We have six or seven teachers that have been teaching for over 20 years and so having that depth of experience in our staff really helps provide a solid educational foundation. Sharing what I see in their instructional design is fun because they have been doing this a lot longer than I have. (William’s interview, February 6, 2012)

When asked how the school defined PLCs, he responded:

I think it is teachers collaborating to find the best way to impact student learning and really the focus of all of our PLCs goes back to that instruction for student learning, and so PLC is about collaboration or
Taking the time as educators to collaborate about what’s going to best address the needs of our students. (William’s interview, February 6, 2012)

When asked about the PLC process, William suggested that teachers should get together in their meeting, focus on a district standard, find ways to assess the standard, and come up with some instructional commonality. When probed for the last time he visited a science PLC he said:

I don’t get out as much as I should. I went to their first one, but haven’t had a chance to get back there. (William’s interview, February 6, 2012)

William was aware of teacher frustration as described with Patricia, Linda, Paul, and Donald. He suggested that the school form was a way of maintaining accountability for what teachers were doing in their PLC. It was difficult to determine what William knew about what teachers were doing in PLC meetings. He knew what PLCs were supposed to be and how they were supposed to function, but did not seem to have a grasp on what Patricia, Linda, Paul, and Donald discussed in terms of their frustrations with the PLC process and function at Washington.

I like to think that the majority of the people that we have tend to be resistant to PLCs because it’s out of their comfort zone and it’s hard to be exposed to the idea that maybe you weren’t the master teacher you hoped you were, and it’s humbling at times to take feedback from maybe somebody you don’t view is quite the level of teacher you thought you were. (William’s interview, February 6, 2012)

Summary of Washington High School as a Distinct Case

Washington High School teachers and the administrator defined a PLC as a group of teachers who met to collaborate on a common set of objectives or teaching topic. At Washington, teachers struggled with collaboration and had a difficult time coming up with common objectives to teach to, common labs, activities, or assessments. At
Washington, teachers did not see eye to eye on what to teach, little less how to teach it. Their years of experience did not seem to help them learn how a PLC was supposed to operate and as teachers could not find common ground to work in PLC meetings. None of the PLC groups at the school could describe more than one thing they collaborated on and tried in their classrooms with their students. It appeared that the PLC level of impact on teacher daily professional practice was relatively small, while frustration was relatively high.

**Summary of the Jefferson High School PLCs**

Jefferson High School had a student enrollment of over 1,400. The school was located in the northern part of the city. The school was over 70 years old and had a rich tradition as a working-class type of school. The school was a sprawling, multiple addition building, much like Washington. The newest addition to the school was the science wing added on about five years ago. Walking into the front entrance to the school, the first thing greeting an observer at the entrance was a huge mural on the wall, the focus of which was diversity. The main entrance intersection was rather small, revealing stucco-type walls, looking in all four directions of the front entrance. The hallways were lined with student lockers built into the walls. The building had hallways that were relatively short compared to Washington. The short hallways led to abrupt changes in direction, leading to more hallways. The classroom doors were tucked back from the hallway and so when walking down a hallway, all one could see were lockers and walls.
The short hallways led to a multitude of additions to the school, 10 total in the school’s history. The science wing was the newest addition and was located along the southern most boundary of the school. The science wing was a big addition, made up of three levels and one sublevel. Each level of the wing interconnected with the main, older building by way of hallways along the northern and eastern boundaries of the science wing. Each level of the wing had a teacher plan center and four classrooms. Each science teacher was issued one of the classrooms, and few teachers shared a classroom. Jefferson High School worked off an eight period, 50-minute day.

The science department at Jefferson had 12 science teachers appointed to teach the core science curriculum and electives. Participants described the science core as physical science, geo science, biology, chemistry, and physics. Master science teachers taught at least one course in their core subject area and at least one elective.

Jefferson also broke up its PLCs by department. The large group science PLC was divided into three smaller subgroup PLCs, as seen at Roosevelt and Washington High Schools. Jefferson High School had biology, chemistry, and ninth grade science sub-PLC groups. The biology sub-PLC was made up of four teachers, the chemistry contained four teachers, and the ninth grade sub-PLC contained four teachers.

Jefferson High School began the school year with a PLC training day in August, the same day as Roosevelt and Washington High Schools. Teachers met together in the cafeteria, divided by departments but not sub-PLC groups. The school appointed one administrator to organize and conduct PLC and school improvement staff development for all teachers. The appointed administrator contracted an outside-the-building “expert” on PLCs to conduct training day. They discussed norms in PLC groups and further
looked at school improvement goals. PLC groups then detailed departmental SMART
goals for school improvement for the year. The training did not provide documents or
artifacts on PLC process or function, but did provide direction for teachers to help
understand the role of PLCs in school improvement. A review of PowerPoint
presentations for PLC training day revealed detailed descriptions for teachers and PLC
groups on how to go about reviewing norms, setting goals, and considering measurability
of those goals. The PLC groups met with appraising administrators to discuss and review
department goals for PLC and the connection of the goals to teacher practice.

The researcher observed and recorded field notes of three PLC meetings for each
participant at the school. Jefferson required teachers to meet in sub-PLC groups each
week, much like Roosevelt. PLC observations and visits conducted revealed teachers
working in classrooms and common teacher planning centers in a similar fashion to
Roosevelt and Washington High Schools. Teachers worked in teams and established
roles and norms. Each sub-PLC meeting began with a quick reflection of the last
meeting, the work completed, a review of PLC goals, and an action plan for the current
day. It was noted that each member had a role in the sub-PLC group, and the group
leader of the sub-PLC group worked at ensuring equal collaboration and conversation
from each member of the group during meetings. Each PLC meeting produced a
common assessment or rubric that teachers used in their classrooms. Each PLC meeting
was focused on using common assessments and assessment data. Teachers gave common
assessments to their students, collected data from the assessment, then brought the data
back to their PLC meeting for collaborative conversation about courses and what teachers
could do to ensure commonality in practice.
Teachers at Jefferson High School

Michael was a veteran teacher of 24 years. He had two college degrees, both bachelor’s, one in pre-medicine and one in education. Michael was a person highly interested in animals. He loved horses and lived on a small farm with his wife and two daughters. He taught biology, geo science, and human anatomy. Michael was also the school’s archery club sponsor and was a stout outdoorsman. Walking into his classroom, one could see from the plants, aquariums, and drawings posted around the room that he loved the biological sciences.

The classroom was brightly lit with natural lighting from desk to roof windows along the south wall of the room. The door stood open, welcoming students from the hallway at 9:45 a.m. The students filtered into the room to the warm greetings from the tall, dark-haired teacher standing at the door. Written on the white board at the front of the classroom was the agenda for the day and the two learning objectives. Students made their way to their desks, the tardy bell rang, and the teacher closed the door. He wished them good morning, and the students returned the sentiment. Michael asked students to tell him what the objectives for the day were and to remind him what they did the previous day. Several students volunteered responses, and he thanked them with a small smile. He then asked them to take out their homework assignment from the night’s work and exchange with a learning partner. As students shuffled papers, Michael put up solutions on the overhead using a transparency. After about 10 minutes, Michael called for students to voice questions they had on the assignment. After about 10 minutes of class discussion, Michael asked students to take out their labs from previous day’s work. Students quickly shuffled notebooks and opened to their lab work. Michael reviewed
expectations for completion and students transitioned from the classroom area to the lab in groups of two. Students spent the remainder of time working on human skeletons, discussing, writing, and asking questions. Michael cycled through the lab area helping students one group at a time, the focus on student levels of understanding. As the class period came to a close, Michael told students what to expect tomorrow and wished them a great day. Once the bell rang, students filed out of the room and Michael returned to the doorway to greet the next period of students.

Michael’s PLC had four members. Michael described his PLC as a passionate group of people.

I meet with the geo science PLC because that is the group of people that care about the formative and summative assessments we have been working on. The biology PLC does not meet and work on anything and so even though I teach more biology than geo science, I would rather meet with geo science because I feel like I at least get something done in there. (Michael’s interview, January 25, 2012)

Three separate observations of Michael’s PLC yielded similar observations. Each PLC meeting, Michael and one other PLC member worked on a test bank of formative and summative assessment items all geo science teachers could use. Michael served as the primary recorder. He typed and copied test questions from several sources, asking for feedback from the participating group member. They mutually agreed or changed items added to the test bank. Other teachers in the group sat and talked about school issues, student concerns, and conducted small talk about sports. Michael didn’t seem to mind off-task back-and-forth banter and carried on his work with his participating group member, stopping occasionally to listen.
Michael defined what a PLC was from his perspective:

Professional learning communities were designed to increase collaboration between teachers of the same subject to make it so students are better prepared for summative assessments. (Michael’s interview, January 25, 2012)

When probed for what his PLC produces, Michael described a formative, summative test bank being written for geo science for all teachers.

When asked about what types of things Michael worked on in his biology PLCs, he described data analysis of assessments, broken down by socioeconomic group, race, and gender.

We have these tests in biology we give that are criterion referenced-based summative assessments, and we gave those to our students, then broke down results by student groups, and wrote this stuff up for our school reporting system. It’s not like we are doing anything with the numbers, but that is what we were asked to do and so that is what we did. (Michael’s interview, January 25, 2012)

Michael could not describe anything he had tried with his students as a result of PLC work:

In biology we spent a colossal waste of time working on numbers from students taking the CRTs, got frustrated by the lack of connection to the classroom, and gave up. With geo science we decided to try a different route with the construction of these test banks that we can all use. In reality, I don’t take anything away from my PLC and use with my students. What we do in PLC is take data from existing tests the district made us give. (Michael’s interview, May 16, 2012)

Even though Michael expressed frustration about PLC connection to his practice, he did describe PLC collaboration as a helpful part to his week:

The good thing about PLCs is the collaboration with colleagues—if nothing else, a time to vent about things and possibly find a solution to issues we all face. I think it is a good thing that we are coming up with common formative and summative assessments, but what I don't like is the
possibility of teaching to a test because it does not improve lifelong learning. (Michael’s interview, January 25, 2012)

Joseph was the department chairperson at Jefferson High School. He was a veteran master teacher of 24 years. Joseph used to coach swimming and diving at Jefferson, but gave that up to lead the science department. Joseph had two college degrees, one was a bachelor’s degree in natural science education and the second was a master’s degree in exercise physiology. He also served on an administrative team for ninth grade teaming, a new district and building initiative. Joseph was not highly decorated, but was very much respected by his peers. As the department chair, Joseph taught a single chemistry class. He was very conscientious about his reduced teaching schedule.

I feel a little disconnected with teachers because I only teach one prep, so I have to work pretty hard at staying in touch with everyone and ensuring I do everything I can to support them. (Joseph’s interview, January 26, 2012)

Joseph shared classrooms with another chemistry teacher. The room was very clean with great natural lighting and open lab space. The classroom area seated 35 students with individual desks. The lab area had eight large lab tables with open space in the middle for a common workstation. Joseph had a presence in the room, not physically, but more inviting like a family member. When students entered the room, Joseph stood with a coffee mug, smiling, and joking with students. Joseph did not wait by the door, but stood at the front of the room. His rapport with students was playful and warm. When the bell rang he did not go to lock the door, but instead let several students come in late without recognizing their tardiness. He greeted the class, told a joke, and as he did so had every student’s attention in the room. Students joked back at the punch line, laughed
at his wit, and Joseph laughed warmly. He asked students to take out their notebooks and write the kickoff activity he had ready for them on the white board. Students readily obeyed his request and wrote quickly. The volume of student conversation in the room drew quiet as students began working on writing and finding solutions. After a short time, Joseph asked for students to share responses and as they did so, he walked around the room and listened. A short time passed, and Joseph asked for a student pair to share their solution. A pair of students stood and shared, and Joseph agreed with their proposed solution, asking the class for questions or comments. When there was none, Joseph began a short 15-minute lecture engaging students with humor on the chemical nature of life. Student focus on task and their attention to Joseph was fun to watch. Students sat fixed, waiting to hear what he would say next, and some exchanged comments to his jokes. Joseph quickly and skillfully moved from lecture into lab. He transitioned students into a lab experience, mixing small amounts of chemicals in test tubes to connect the kickoff activity and lecture to what he called real-life chemical reactions. As the class period came to a close, Joseph asked for student attention on the common workstation. As he stood surrounded by students, he mixed chemicals and asked what types of chemical reactions were taking place in the tubes. Several students volunteered responses and, as they did, Joseph pointed to lab steps and discussion questions students needed to complete. Students began to clean up; some stayed in the lab answering questions until the bell rang. As students exited the classroom, Joseph patted a few on the back and reassured them of what was due the next day.

Joseph’s statements on PLCs were similar to the function of his classroom. He had a great rapport with his students, similar to that seen with his peers. His use of
humor, but stern leadership presence, was observed in each of the three classroom and PLC observations. Joseph defined a PLC as a:

. . . tool for teachers and administrators to work towards the school and district improvement goal. (Joseph’s interview, January 26, 2012)

Joseph described meeting in PLC groups for the last several years:

When we first started PLCs, we wanted to find a way to match student assessment and data analysis to learning. What we got was a disconnect to learning and after several years of trying to fit a square peg into a round hole, I went and talked to the science administrator. (Joseph’s interview, January 26, 2012)

Joseph described their conversation as important to shifting the way PLCs should be done:

If we don’t make PLCs about our classrooms, learning, and student learning, then we will lose teachers in this process because they don’t see the value in the process. (Joseph’s interview, January 26, 2012)

What they decided to change in that meeting was how the science PLC went about their PLC meetings and how the PLC meetings would connect with student learning:

We decided right then and there to make our PLC as a test group to work on a way to make our school improvement goal something that we could use in the classroom. We decided to collect real-time data and make sure that whatever we did impacted instruction. Since chemistry was a junior- and senior-level course, we decided to work on graphical analysis, similar to what students see on the ACT. We spent the entire first semester working in our PLC on coming up each week with opening activities for everyone to use in chemistry and physics on graphical analysis. (Joseph’s interview, January 26, 2012)

In the fall semester, Joseph and his PLC group members came up with daily, start-of-the-period kickoff activities, using ACT sample passages. Their hope was to help students perform better on the ACT, thereby increasing standardized test scores and provide data towards the school improvement goal. After a semester coming up with and
sharing ACT passages as kickoff activities in all chemistry and physics courses, the group decided to increase their effort on graphical analysis for students. In the winter quarter, Joseph’s PLC came up with two documents each PLC member would use with their students. One document was a graphing rubric used for evaluating student graphing skills, the other document was a rubric for evaluating scientific reporting. Each teacher from the chemistry and physics sub-PLC began using the rubric, sharing it with their students, but since it was in development stage, they had not shared it with the science department.

Joseph described the plan for implementing the rubrics as time and teacher sensitive. As the department chair, he knew that having the rubrics be used by all teachers would bring some controversy and resistance. He said that coming up with the rubrics was not the difficult process; rather, finding a way to ensure they were integrated within every science classroom was the difficult part.

We want to roll this out as teachers next year. Getting buy-in from everyone in the department, when you ask for uniformity like this, that is the issue. Personally, I don’t mind changing what I do to match what might be considered a better pedagogical process, but others might see it as an intrusion to their professional judgment. We have tried so hard to do the right thing for teachers and our students, but if everyone doesn’t buy into it, then it will be another wasted opportunity. (Joseph’s interview, May 16, 2012)

Joseph suggested that his perception of PLCs changed between the fall of 2011 and the spring of 2012.

Things are just different now because we are doing things in PLCs that we are all using in our classrooms. We first came up with our kickoff activities using the ACT passages, then moved on to real-time formative and summative data using the rubrics. We are now trying to figure out how to make the data say what we want it to say for our school
improvement goals. It’s exciting stuff, but getting everyone on board will definitely be the biggest issue. (Joseph’s interview, January 26, 2012)

Thomas was in his twenty-fifth year of teaching, all of which were at Jefferson High School. Thomas had a bachelor’s and master’s degree in education. He taught all physics classes, including advanced and AP physics. He was also a cross country and track coach. Being the only physics teacher at Jefferson was fun for Thomas. He liked the idea of being the go-to person for physics. He also taught a single chemistry class, so he met with the chemistry and physics sub-PLCs. Even though he was the only physics teacher, meeting with the chemistry teachers was something he looked forward to.

I have spent my entire career here at Jefferson. I started student teaching here and have been through four administrations. It’s fun to see different initiatives come through, but PLCs are different. Our PLCs are about collaboration, sharing, coming up with something we can use in our classrooms with our kids, and things like that. Even in the earlier forms of PLCs, we tried to have fun in our meetings and make things useful. (Thomas’ interview, January 26, 2012)

Thomas was in the same PLC as Michael. He and Michael have worked together at Jefferson for over 20 years.

We see things eye to eye, how to teach, how we approach things. We have six or seven people in the science department that have been together on staff for over 15 years, so we know each other fairly well. (Thomas’ interview, January 26, 2012)

Thomas’ classroom is at the far western edge of the school and science wing. He has classroom windows that border the western and southern edges of the school. Thomas wears blue jeans, a polo shirt, and sandals with socks to school on one of his observation days. He rides his bicycle to school each day and since his room opens to the door outside, he brings his bicycle into his class and props it up against the side of the classroom. Thomas worked in the lab area as students entered the room, getting
apparatuses ready for student lab experiences. Students entered the room, stood and talked as the bell rang. No students came in late, as that seemed inappropriate for Thomas’ class culture. Thomas walked to the front of the room, and students began taking their seats. He greeted the class with a few kind words and a smile. He turned on the LCD projector and, without providing students instruction, Thomas began reviewing the daily kickoff activity, an ACT graphical analysis passage, and then told students to work on the passage alone. Students began working silently, and Thomas cycled the room looking at student responses. He gave a verbal 60-second warning, and the class finished up their individual work. He patted one student on the back, and the student walked up to the front of the room and recorded his response on the board. Thomas continued to cycle the room and patted another student on the back; she quickly walked up and recorded her response on the board. He patted yet another student on the back and he walked up, looked at the two responses, turned to the class, and began to explain his interpretation of what his two peers wrote on the board. Thomas agreed with his analysis, providing several positive comments about the written and verbal solutions and asked for questions. With the questions answered, Thomas shifted the class to lab, gave each student a copy of the lab sheet, and asked them to read it. After a couple minutes, he described some safety issues and drew student attention to lab methodological issues. He released students to complete the lab, and students filtered to the lab area to meet with their lab groups. Students spent time in lab working for the remainder of the 50-minute period. With about 5 minutes remaining, Thomas then asked students to clean up and take seats. Students made their way back to the front of the room and took their seats. Thomas quickly wrote a formula on the board and reminded students that their homework
assignment would center on the formula provided. As the bell rang, Thomas made his way back to the lab area and readied it for the next class.

Thomas’ presence with the physics students was very similar to Joseph. Joseph’s use of humor was unmatched by any other teacher, but Thomas was very close. In all three observations of his classroom and PLC, Thomas’ presence was unmatched. Students listened when he spoke, but his rapport with students and his peers was centered around humor and the matter-of-fact nature of how he went about things. Thomas spoke with confidence, regardless of who he spoke with. In both of our interviews, he was very sure of what he said and what he did both in the classroom and with his PLC.

Thomas defined PLCs as:

. . . people of like disciplines getting together, trying to come up with a common theme or plan that will promote student learning. (Thomas’ interview, January 26, 2012)

When asked what common themes or plans his PLC worked on, he said,

We decided that we needed to focus on something as a department. We tried to come up with ideas that were common for all levels, as a kid goes through nine through twelfth grade in science. The one thing we kept coming back to was that everybody does graphing, and so we just started with a focus on graphing. Then we looked at three phases, ninth grade, tenth grade, eleventh, and twelfth grade. By the time they graduate, they should be able to complete certain things and it should build from one level to another. I think that has been the most useful thing by far. (Thomas’ interview, January 26, 2012)

Thomas described a variety of things that he thought his PLC had produced over the last several years that each teacher took away and tried in the classroom. He described graphic organizers, labs, start-of-the-period activities, and rubrics. He said that he had tried and continued to use many of the things his PLC constructed. Thomas described the construction of the kickoff activities the rubrics constructed by his PLC,
similar to how Joseph described them. Thomas was very humble about the use of PLC-constructed materials.

You know, when you have been teaching for awhile, you might think you have it all figured out. Every profession changes, people come in with new ideas and if you listen and try, you can learn something. I am obviously not above all the stuff my PLC produces because we have great, smart people and I find new ways to do things all the time that I didn’t know before meeting up with these guys. (Thomas’ interview, May 16, 2012)

Chris was considered the chemistry expert at Jefferson High School. He had been teaching for about six years, but his first college degree was in biochemistry. He had worked in a research lab at the University Medical Center and had also been a graduate student at the medical school. Chris described his first 2 years in medical school and the research lab as a great life experience. He came from a family of teachers and administrators, and so he said that medical school and research was just not in his future like he thought.

Both of my parents were teachers and my father was a principal. Teaching was in my blood. I tried going to medical school and I did well, but after my sophomore year I just wasn’t having fun. I didn’t look forward to school each day, and the job market was just not something I looked forward to, so I went back to school and got my master’s degree in teaching and learning. (Chris’ interview, January 27, 2012)

Being a biochemist, Chris knew chemistry. He was a very good young teacher, and his department chair called for him to take charge of the chemistry curriculum at Jefferson last year. Chris embraced this challenge and led the school in chemistry education by teaching all chemistry and advanced chemistry classes. Chris was also the leader of his PLC, which was interesting considering both Thomas and Joseph were in his PLC. Joseph and Thomas may had been the veteran teachers, but when Chris discussed
the chemistry objectives, chemistry content, scope, and sequence, they listened. Joseph described Chris as “one of the brightest young chemistry teachers I have ever seen” (Joseph’s interview, May 16, 2012).

Three visits to Chris’ PLC and classroom reflected similar observations described by Joseph. Chris was in charge of the direction of chemistry education at Jefferson. Both Joseph and Thomas taught chemistry, and the PLC worked as a team. They drew from each other, but when it came to the hard questions about chemistry, they deferred to Chris.

Chris also coached ninth grade boys’ basketball and volunteered as a track coach. He said that Jefferson High School was his second home, and the culture of the school reflected his personality. He described himself as a hard-working person, willing to learn from anyone. His sub-PLC was a team-like environment and when asked to define what a PLC was from his perspective, he said:

The school started with a lot of data collection and not a lot of positive feeling towards PLCs. They were trying to get a lot of data, crunch numbers, and it didn't mean a lot to teachers. We've changed and went in the right direction, focusing our PLCs more on what we can do in the classroom. (Chris’ interview, January 27, 2012)

Chris’ classroom was on the second floor of the science wing, facing the south side of the school, looking out over the neighborhood that surrounded the school. He was well dressed and soft spoken, but confident in his verbal expressions. As the first bell rang, Chris walked to his door, propped it open and stood at the entrance, welcoming students as they walked into the room. Some students walked past without looking at him, while others smiled as they walked past. When the second bell rang, signaling the period to begin, he closed the door and walked to the front of the classroom where his
teacher desk was situated. Chris turned on the overhead projector and asked students to take a moment to complete the activity. While students worked, he completed a few administrative tasks, then quickly began walking around the edge of the room. He spoke softly, asking for a volunteer to share their solution. Several students raised their hands, and he chose one female student to share her response. She stayed seated, but described what she came up with. Chris then asked another student to go to the board and write what she just described. After the solution was written on the board, Chris picked another student to describe the first and second solutions. Once he was satisfied student responses were consistent, he moved to the front of the room, took a stack of papers from the front desk, and handed them to a student. Chris asked the student to hand them out as he changed the overhead projector to another transparency. Students each obtained a handout, looked at the first question on chemical stoichiometry and car air bags as Chris described the problem to them. He asked them to get into groups and begin working on the first problem and as they did, he cycled the room, looking at solutions and answering questions. After a short 10 minutes of work time, Chris asked for the class’s attention as he solved the problem on the board, referring to the transparency as reference. Satisfied he explained the solution, Chris instructed students to continue working on the remainder of the sheet in their groups for the next 15 minutes. The class transitioned to work pairs, focused the entire time. Chris called for the class to return to their classroom seats, at which time he handed out a lab sheet for the class to read. Students read the lab sheet, and Chris guided their attention to a lab desk where he had equipment set up for pairs of students. He explained several procedural steps in the lab and asked the class to graph their results using the graphic rubric provided. Students spent the remainder of class
working on the lab. Some finished the lab, but some did not. Chris told students to clean up and ensured them that they would have time to finish the next day. As the bell rang, Chris spoke over the class calmly and asked that they return their materials and clean the lab workstations before leaving the class. Chris quickly walked to each student station in the lab, ensuring they were cleaned, dismissed the class, and wished them a good day.

Chris was very humble about his PLC interactions. He said that his classroom was very similar to his PLC in that even though he was a leader, he viewed both as a community.

My classroom is a community, just like my PLC. I know a little about chemistry, but the students and my peers are smart people. I serve my students just like I serve my PLC, and I want to do what is right for both. Whatever we do in PLC has to connect to what I do in the classroom and from a teaching standpoint, whatever we come up with in PLC has to drive what and how we teach in the classroom. (Chris’ interview, May 17, 2012)

When probed for what types of things he collaborates on in his PLC, Chris referred to the ACT passages as kickoff activities for students and to the rubrics both Joseph and Thomas discussed.

Both the passages and the rubrics took a lot of collaboration. Students got tired of being hit over the head with the ACT passages, but every student I talked to came back from the ACT and thanked me for doing it each day. (Chris’ interview, May 17, 2012)

Chris described the rubrics they created in PLC for evaluating graphing and scientific reporting, as things that impacted his teaching:

Both of the rubrics have really helped me hammer out how to teach and evaluate students in the lab. We all use them, share them with students, and grade the same. It’s nice knowing that all chemistry and physics students are getting the same message about how to go about lab. My PLC teammates have said that they spend much less time teaching how to do lab and more time on what the labs mean. The uniformity helps in so many ways. Next year should be interesting because we will be focusing
on data and how to look at it. That should help us better understand how to teach each piece of the curriculum. (Chris’ interview, May 17, 2012)

**Administrator at Jefferson High School**

David was the administrator at Jefferson High School. He had two college degrees—the first was a bachelor’s degree in math education and the second was a master’s degree in educational leadership. David was a math teacher at another school in the district prior to becoming an administrator at Jefferson. He taught for 10 years and is now in his seventh year as an administrator. Besides being the science department appraising administrator, David also served as the building discipline administrator and the budget coordinator for Jefferson.

My average day at Jefferson starts usually with discipline issues, resolution of referrals, things like that. I have leadership meetings each morning. After leadership, I try to get out and make observations using the appraisal process. In the afternoons I usually meet with the budget team or have other intervention issues I help resolve. Each Tuesday I try to make it out to a PLC, be a fly on the wall, and listen. If asked, I give feedback or help the PLC find a way to make something easier for them. (David’s interview, February 6, 2012)

When asked about how the school defines a PLC, David could not come up with a firm answer. He described how the science PLC last year collected data on student performance of common summative assessments in each subject discipline. When he met with the department chair, Joseph, he asked what they were doing with the data and how the information helped instructional practice. David said that the conversation shed some light on the fact that teachers were not doing anything with the data besides reporting it. He and Joseph resolved, at that moment, to not collect data for data’s sake. Joseph described for him what each PLC was doing and further asked for clarification of
what they could do. David pulled a PLC book off his bookshelf and reviewed how Rick DuFour et al. (2008) described the PLC process and the types of things PLCs should be producing. David then met with the head principal and described his conversation with Joseph. The head principal told David to work with the science department and ensured him that their goal setting was based on instructional practice and pedagogical strategies to increase student achievement.

What resulted from the conversations with Joseph and the head principal was a renewed focus and energy to make what the sub-PLC produced useful and productive for the classroom. In David’s description, the science PLC stopped collecting data and started asking themselves, as sub-PLC groups, what should they work on and how did it connect with pedagogical practice.

Even though David could not come up with a definition for how the school defined a PLC or how the district defined a PLC, the fact that he pulled a book off his bookshelf and discussed how PLCs should focus on collaboration for student learning and collect data to help shape instruction, shows that David truly did know what a PLC was and how it should work.

What was also interesting to note, besides the same appraisal process of classroom observations and visits that David does, he also visited PLCs each week. David suggested that since he appraised the art department and the science department, he visited one PLC group every 4 to 6 weeks to help him stay in touch with where teachers were, what they were doing, and how that might impact teacher practice:

Make no mistake about it, observing these professional learning communities you see a lot of dysfunctionality. The science folks have three PLCs, chemistry, biology, and ninth grade science. The chemistry
teachers have this thing figured out. They are working together to determine how to teach the scientific method in chemistry and physics. They have rubrics for methods and reporting, and everyone uses it. They come back with real data—some qualitative, some anecdotal—but they know where their students are. They use that information to discuss how to teach things and then borrow ideas, labs, whatever to do it. On the other hand, biology hasn’t produced anything. Two teachers in that group have their pet projects they love doing, and they can’t let them go. They will be forced, and I hate saying that word, but they will be forced to do what chemistry and physics are doing. Maybe not exactly what they are doing, but they will find ways to measure common student performance. As leaders, it is our job to figure out how to help them find direction. (David’s interview, February 6, 2012)

David has a firm grasp on where the science PLCs are. He also has a facilitative plan for how to help lead some PLCs to where they need to be to ensure that the PLC process matches what he considers as best practice.

**Summary of Jefferson High School as a Distinct Case**

Jefferson High School teachers and administrator defined PLCs as opportunities for teachers of like subject disciplines to get together and collaborate on content or process skills in science. All participants agreed that a good PLC meeting was when teachers shared information about teaching and learning. As a school, Jefferson did not have a PLC process. Each PLC conducted business independent of other PLCs with no thought about how or what each other PLC was producing.

PLCs’ definition and process at Jefferson are not well defined by the school. Teachers at Jefferson struggled with what to do in PLCs. Two of the three science sub-PLC groups could not agree on what to complete or what to do in PLC, and most teachers were not engaged in the meetings. These PLCs did not produce anything pedagogical that teachers used in their classroom.
One of the three PLCs at Jefferson engaged each member and formed a teamwork environment. Each member in the group shared, and the group produced several things that each teacher used in their classrooms. Teachers in this PLC contributed equally and, as a result, PLC group members seemed to have a more positive perception of the direction and focus on PLC meetings. This PLC produced three long-term pedagogical products, used by each member of the group. Each member collected anecdotal formative student data from the pedagogical product and reported back to the PLC for further direction. From data-driven collaborative conversations, the PLC further shaped their direction and changed what they were doing, based on their comments of pedagogical need for students.

**Themes**

The purpose of this section of the dissertation is to describe categories, codes, and emergent themes derived from the data from each case studied. Categories in qualitative research are predesigned ideas and concepts that guide the study (Creswell & Plano-Clark, 2004). Codes were determined by framing sentences, paragraphs, or phrases from raw data and excerpts. Multiple codes were pulled for each category. Themes were drawn from codes and formed into broad terms or phrases to determine commonality between the cases. Themes emerged from codes, and codes emerged from categories.

The categories in this study were described as the research questions and included the following: definitions of PLCs, collaborative activities teachers participate in PLCs, teacher perceptions of PLCs, and teacher instructional practices (pedagogical and assessment) implemented in classrooms.
The categories served as guiding points to interviews, surveys, and observations conducted in the data collection phase of the study. The categories also served as foundations for marking and coding transcripts from data collected. Examination of the categories from transcripts provided structure for coding. Each category served as structure for coded information and the codes provided data for emergent themes from the data.

**Definitions of Professional Learning Communities**

A PLC may be defined as educators committed to working collaboratively in ongoing processes of collective inquiry and action research to achieve better results for the students they serve (DuFour et al., 2008). The goal of teacher work in PLCs is to enhance their effectiveness as professionals so that students benefit (Hord, 1997).

The first category and research question—“What definition of professional learning communities were used by each school in this study?”—provided several codes. Participants defined and stated PLCs were “collaborative” and “grouping.” Participants also used the words “commonality” and “sharing” as well as “increase student achievement,” “common assessment,” “impact learning,” and “instruction.” Participants used the words “teacher alignment” of “what they do in the classroom.” The themes extracted from defining this PLC category included: (a) collaboration; (b) grouping of teachers; (c) teacher commonality; (d) about the students; (e) achievement, assessment, and sharing; (f) impact learning, instructionally focused; and (g) alignment of teacher work.
Teachers and administrators from each school linked the definition of PLCs to collaboration, grouping of teachers, and commonality between teachers. The definition of a PLC for the participants of this study included a collaborative effort between teachers, grouped together to determine commonality in their instructional practice. The three administrators defined PLCs in the following statements:

PLCs are teachers meeting in groups, collaborating on their practice, and finding ways to help students. (William’s interview [Washington High School], February 6, 2012)

PLCs are teachers collaborating to find the best ways to impact student learning. (David’s interview [Jefferson High School], January 26, 2012)

PLCs are a time for teachers to get together by subject discipline, then by grade level. Teachers develop common assessments to see if kids are getting it and what they are going to do for them if they are not. (Nancy’s interview [Roosevelt High School], January 24, 2012)

Administrators share the concept of teachers collaborating and impacting student learning. All three participants could not say what the district or school’s official definition of a PLC was, but did offer their personal definition.

Teachers made many comments about the definition of a PLC and how the school or district defined a PLC. Teachers responded with several variations of definitions. Of the 12 participants, two could not come up with a definition for a PLC. Teachers at each school suggested the following definitions.

PLCs are a collaboration process where we go over and talk about stuff. We meet in interdepartment groups, come up with common assessments, and give them to the kids. We come back to PLC and discuss our findings. (James’ interview [Roosevelt High School], January 24, 2012)

Professional learning communities were designed to increase collaboration between teachers of the same subject matter to make it so that students are better prepared in those areas for summative materials. (Michael’s interview [Jefferson High School], January 25, 2012)
PLCs are meant to have collaboration between teachers and share ideas, doing the best things we can in the classroom to help achievement. (Linda’s interview [Washington High School], February 1, 2012)

The common thread for teacher comments was that PLCs were a time for teachers to collaborate. Teachers from Roosevelt and Jefferson commonly stated that PLCs were an opportunity to work on common pedagogy, teaching, learning, assessment, and products for the classroom. Teachers from Washington either did not have a definition for PLCs or thought it was an opportunity for teachers to collaborate, but did not specify what on and/or how that impacted teacher practice.

**Collaborative Activities**

The second category and research question—“What types of collaborative activities did teachers participate in, in PLCs as a result of the school definition?”—revealed several codes. Participants described PLC time as an opportunity to discuss several things. Participants mentioned assessment as an activity discussed most in PLC meetings. Participants also stated their PLC worked on common activities in PLC meetings. Participants described PLC collaborative activities as something they did for the classroom. They suggested that PLC was a time to share ideas and develop common pedagogy. Participants described collaborative activities as the development of instructional strategies and rubrics. Participants also described that their PLC time was spent on the analysis of students and their work, researching pedagogical strategies and developing skills for students.

The themes extracted from collaborative activities of PLC meetings included: (a) discussion, (b) assessment, (c) commonality, (d) for the classroom, (e) bounce ideas, (f)
instructional strategies, (g) sharing, (h) developed, (i) analysis, (j) rubrics, (k) research, (l) developing skills, (m) direction of the group, and (n) forms.

Teacher comments from each school mixed words like “discussion,” “commonality,” and “sharing of ideas” with collaboration. Activities for each of the schools were described as “developing something,” “data analysis,” and “discussion.”

All administrators were confident PLC groups were “producing work” for teacher practice in a “collaborative fashion.” Each administrator stated that teachers were “collaborating,” “sharing ideas,” and “producing common pedagogy.” Administrators also stated that teachers were producing labs and activities that could be used in the classroom, and that those practices impacted teacher daily instructional practice with students.

Teachers are collaborating on and developing common assessments. Most of our PLC groups have used common assessments. They then take the data from the assessments and ask questions about things that would help them in their practice, to do things that work in cross curriculum discussions. (Nancy’s interview [Roosevelt High School], January 24, 2012)

[I] was in a PLC the other day and they talked about wanting to target classroom management. We spent a lot of time talking about making sure that was measurable. With their wealth of knowledge, they should be able to share and learn from each other. I think they do that. (William’s interview [Washington High School], February 6, 2012)

Teachers are talking about data from formative assessments, sometimes summative assessments, and reviewing it to work out plans for what story it tells them about the students, where they are versus where teachers want them to be. The story gives teachers some common ground to share ideas on common practice. (David’s interview [Jefferson High School], January 26, 2012)
Administrators from Roosevelt and Jefferson state that teachers work on the same types of collaborative activities in PLCs. The teachers also suggest that they collaborate on common pedagogy and, as such, tell similar stories between the two schools.

We collaborated on a common assessment for the next unit in our last PLC meeting. We use the information from this assessment to discuss common labs and activities. We will do one common lab and at least one common activity, such as a worksheet or a document of some kind the students work on. The activities are things we work on from our prior experience and the book we use. We then come back with formative information on whether we liked the lab or activity or not and why. (Robert’s interview [Roosevelt High School], May 16, 2012)

I think we have collaborated on various instructional strategies when it comes to summarizing information and we've had those discussions, we've taken the conversation and fact that not only do we do similar scoring from a rubric we created together and use with students, but also with the unit planning and finding common labs and activities. Since we all teach the same subject, we talk about what we do for the basic to the advanced students and differentiate our subject matter to match our outcomes for our students. (Joseph’s interview [Jefferson High School], May 17, 2012)

Comments made by teachers at each school tell a similar story. Roosevelt and Jefferson High Schools share many similarities. Teachers at the two schools produced similar coded excerpt comments in terms of “collaborative activities” and “instructional practice.” Most participants from the schools described an “equal collaborative environment” where teachers share information and how that activity helps shape teacher daily pedagogical practice.

There are a lot of ideas bounced back and forth, and I think that informally the different levels we teach take from that conversation and tweak things to what teachers think should work for their students. (Robert’s interview [Roosevelt High School], May 16, 2012)

In our PLC and in the building, there is a lot of teacher acceptance and buy in. Everyone talks freely and shares ideas. If we don’t like what someone has come up with, we just jump in and say, wait. I have taught with these
guys for so long I can say what is on my mind and share what I do freely. (Thomas’ interview [Jefferson High School], May 16, 2012)

Washington High School teachers produced commonality in instructional practice as well. Teachers described several assessment pieces they made together in sub-PLC group work, but did not describe commonality in shared labs and activities (instructional practice pedagogy). In each of the sub-PLC groups at Washington, participants discussed that teachers were a bit more “territorial” of their practice and “less focused” on what PLC members do for each other in terms of “sharing ideas” and creating “commonality in instructional practice.” The purpose of the sub-PLC group:

. . . is not to collaborate on common labs or activities, but rather to fill out a form needed by the school and for the district. (Donald’s interview [Washington High School], May 16, 2012)

We talk about our PLC goals, but in terms of transferring that to my class, it just doesn't seem like we can get anything done. Our PLC says it is working on something, but we can’t collaborate on or in a way to measure what we want. We can’t agree on one thing to work on and so we just sit and talk, but don't get anything accomplished. (Linda’s interview [Washington High School], May 17, 2012)

Overall the PLC was an inefficient use time. We could had spent time developing things, collaborating on common ways to teach the students. Overall the breakout group was a general waste of time and as far as the department meetings, they got spread out what could’ve been done in 15 minutes out 20 to 30 minutes; generally speaking, the full hour for PLCs was not utilized. (Patricia’s interview [Washington High School], May 16, 2012)

Washington High School teachers developed commonality from collaborative sub-PLC activities. The chemistry PLC collaborated to produce “a rubric” that every teacher used to assess students. The ninth grade PLC produced a “common assessment model” that every geo science teacher used both pre and post instruction. Teachers expressed concern that the collaborative environment at the school was not constructive
to teacher interaction, collaboration, and the relative impact of these to instructional practice.

PLCs are something I do on Tuesdays for an hour. What we do and come up with doesn’t impact what I teach or how I teach it. (Paul’s interview [Washington High School], May 16, 2012)

I think PLCs are for younger teachers. We get together, and I just give advice when people ask. I have been teaching for awhile and so I don’t see how what we are doing can change what I teach. (Patricia’s interview [Washington High School], May 17, 2012)

Teachers at this school, for the most part, don’t see eye to eye on what it means to share ideas, collaborate, and change what they do. (Linda’s interview [Washington High School], May 16, 2012)

All three high schools share the same story in terms of what it means to be a master teacher and be part of the PLC collaborative process and what the collaborative process means to their professional practice.

I have taught for so many years, I’ve implemented things from a lot of different places and things. I think the overall need for collaboration on a regular basis is not as dramatic as someone who is a bit newer to the profession. (John’s interview [Roosevelt High School], May 23, 2012)

I think, for me, I have taught for so many years that I would have to meet with other teachers with equal my experience and talk with them to get anything out of it. (Patricia’s interview [Washington High School], May 16, 2012)

All three high schools agreed that science teacher collaboration is not new. Of the 12 participants, seven teachers stated that before the implementation of the PLC model they collaborated with other teachers on common labs, activities, and assessments.

The collaboration process wasn’t new, it was just more time because before PLCs we always met at lunchtime to go over stuff, talk about what we were doing, and share ideas. (James’ interview [Roosevelt High School], May 23, 2012)
Collaboration is something science teachers do anyway. We have to share equipment, time, lab space, or even rooms. You can’t do that in isolation and so this PLC stuff is just extra time to meet from what we already do. (Patricia’s interview [Washington High School], May 16, 2012)

Almost all teachers said that PLCs provided opportunities to “share,” “discuss,” and “derive” common assessments, labs, or activities for teacher daily pedagogical classroom practice. Teachers said that each sub-PLC group collaborated to develop common assessments. Roosevelt sub-PLCs had common assessments that participants said they used at the time of the study, but hadn’t used until PLCs constructed them. Jefferson and Washington teachers each discussed the development and use of common assessments, rubric, and grading schemes as a result of PLC activities. Not all teachers use the assessments, but PLCs did collaborate to construct them at the schools.

Teacher Perceptions of PLC Meetings

The third category and research question—“What are teachers’ perceptions of PLCs both pre and post PLC meetings?”—yielded several codes. Teachers discussed going into PLC meetings with a high need for group discussion. Participants stated that the discussion served as an opportunity to collaborate with their peers about their classroom functions, instruction, assessment, or teacher pedagogy. One reoccurring theme seen in this category was that of teacher frustration. Teachers at each school stated that sub-PLC meetings grew frustrating when there was little “direction” or “meaningfulness” in what they were doing in sub-PLC meetings. Teachers described meaningful activities in PLC meetings as anything that might impact their daily pedagogical practice. Teachers at each school mentioned being “frustrated about PLC meetings” due to their “lack of direction,” “productivity,” and “potential impact” on their
daily instructional practice. Teachers who expressed frustration also described sub-PLC meetings where they developed common instructional practices and used them in the classroom. The use of the common instructional practices did mean that teachers were changing practice. Participants that used common instructional practices changed their instructional practice from what they have done and, as such, changed their pedagogy.

Several teachers mentioned that they went into and came out of their PLC meeting with a change in their instructional practice, resulting from the PLC meeting and collaboration with other PLC group members. Teachers stated that what they were doing in PLCs impacted their teaching. Several comments were made describing PLCs as a process of “acceptance from peers” for what each other does and how that acceptance further impacts what they take away from PLCs and try in their classrooms.

The themes extracted from teacher perceptions of PLC meetings included: (a) discussion, (b) collaboration, (c) frustration, (d) haven’t changed their practice, (e) pedagogy, (f) no direction for our group, (g) change in what I do, (h) acceptance of peers, (i) impacts what I do, (j) productive, (k) forced change, (l) learning, (m) direction for our group, (n) meaningful products, (o) lack of organization, (p) collegiality, and (q) sharing of ideas.

Teachers from each school stated that they needed the PLC meeting to produce something useful in order for it to be useful. Both Roosevelt and Jefferson High Schools did not provide teachers with direction for what to produce for each PLC meeting, but few teachers expressed frustration. Washington High School administrators provided teachers with weekly direction for what to produce in PLC meetings. Washington administrators required teachers to fill out a form each week in PLC meetings. Teachers
expressed frustration at having to fill out the form due to the lack of connection to instructional practice. Several teachers expressed frustration from the “lack of direction” of their PLC but the insistence on the use of the form. Teachers described the form as a “top-down management” strategy for accountability from administrators to teachers.

All teachers mentioned that PLC meetings involved “discussion” and “collaboration” between teachers in the meeting as it related to “pedagogical practices” and “assessment.” Each participant described common assessment pieces arrived at through discussion and collaboration in PLCs and how that common assessment shaped what they did in the classroom either from an instructional practice standpoint or a planning and practice standpoint. Each teacher described using the assessment pieces and how the assessment pieces changed what they taught or how they taught topics in their courses.

All administrators stated that PLC meetings were constructive and productive as far as what teachers were producing for their classrooms. Administrators were confident teachers had a positive perception of PLC meetings and that each of the PLC meetings were productive in terms of what teachers were producing for their daily professional pedagogy used in their classrooms. Each administrator stated that teachers were producing common pedagogy. Each administrator stated that teachers’ pedagogy were impacted by the PLC meetings and therefore teachers were impacting students through changes in professional instructional practice.

Our meetings in science are very good. We visit PLC meetings several times each year, listen, and offer help if they need it. Each meeting we have visited, teachers have positive things to say about what they are doing and how it impacts their practice. (Nancy’s interview [Roosevelt High School], January 24, 2012)
I think we have an all-star group of science teachers here. They are very good at what they do, and when we put them together in groups they can only get better. PLC meetings here are about data and using that to come up with ways to help students get better. I think PLC meetings are very productive. (William’s interview [Washington High School], February 6, 2012)

I think everybody gets along very well. I really think that they understand common assessment and want to develop them. I think they want to make them better every time they get together because they want to be better teachers after each meeting. At times I think they are very stressed and that they are learning how to do PLCs on the fly, but I think they want to please the administration and their students. (David’s interview [Jefferson High School], January 26, 2012)

There are several common threads from statements made by teachers about PLC meetings. Teachers at all schools discussed PLC meetings as an opportunity to meet with their colleagues, discuss pedagogy, find ways to make pedagogy better, and have collegial interaction. Teachers expressed a high degree of respect for their colleagues and stated that they wanted to learn from each other.

We meet and talk about things in a collegial way. I can bring up ideas that I do not agree with, we can disagree, and we accept it. Disagreement is natural and helps ensure that maybe I am on the right path. (Robert’s interview [Roosevelt High School], May 16, 2012)

The collegiality is definitely one of the best things. I think sharing ideas has been really helpful. (Joseph’s interview [Jefferson High School], May 16, 2012)

There has always been an underlying perception that talking about things together is a good way to do things. (Patricia’s interview [Washington High School], May 16, 2012)

Several teachers expressed that PLC meeting times were not constructive in terms of what the PLC produced, what they took away from meetings, and tried in their classrooms. Teachers from each school also suggested that, since they had been teaching for such a long time in their careers, they had found ways to build their professional
pedagogical knowledge and collaborate with peers, even before PLCs became a model for their district. Several participants stated that PLC meetings were good in terms of the collegiality and time with their peers, but most meetings lacked productivity of new pedagogy that they could use in the classroom because of their experience level.

I like my colleagues. We get along very well, but in terms of what I have taken from the meetings and used in my classroom? I haven't changed much of what I do. Maybe I have had more impact on what others have done. (James’ interview [Roosevelt High School], May 23, 2012)

I am not stuck in my ways, but personally I have looked at different ways to do things by myself for years now. I actively find ways to do things and use them in my classroom. Interacting and talking about test results hasn’t changed me as a teacher. (Paul’s interview [Washington High School], May 16, 2012)

My professional learning community comes together and shares, that doesn't necessarily mean that I have to come out of it with a product but I am coming out of it with better insight on how to better serve students. (Michael’s interview [Jefferson High School], May 16, 2012)

Teachers at each school tell the same story in terms of what was produced in each PLC meeting. Teachers at each school stated that, in sub-PLC meetings, they discussed with their colleagues what they were teaching, how they were teaching, and they planned out and administered some form of common assessments. As a result of administering common assessments, teachers stated that they collected information about student achievement. What teachers at each school do with the student achievement information differs between schools and sub-PLC groups. As an example, at Roosevelt, James and John used the information to inform them about what students were learning, but did not take corrective action in their practice. Mary and Robert used the information to inform them about what their students were learning, but did take some corrective action. James
and John had been teaching longer than Mary and Robert. Mary and Robert taught life science; James and John taught the physical sciences.

Teachers at Washington High School shared the same common story in terms of how PLC meetings impacted their pedagogical practice. All teacher participants from this school stated the PLC meetings were not productive in terms of what the PLC made and how that impacted what they did in their classrooms. Teachers at this school stated that PLC meetings were an interruption to their teaching schedule and something extra they were forced to do on top of their teaching assignment. Each teacher stated that PLC meeting time was a contrived administrative time to fill out a form to show what pedagogical practice they did and how it worked with students. Each teacher also stated that the PLC meetings yielded no change to their instructional practice. Two of the four teachers stated that they came out of meetings with common assessments used in their classrooms, but also said that the meetings yielded no further discussion about the impact of those assessments on their pedagogical practice.

I just don't personally feel like the PLCs are worth the time it takes out of class. (Patricia’s interview [Jefferson High School], May 16, 2012)

Every Tuesday I have to go and participate in a meeting for an hour then there is maybe some stuff I have to do outside of that but in terms of impacting my teaching, it doesn't. (Paul’s interview [Jefferson High School], May 16, 2012)

I go to this meeting and everybody just talks about things, complains about students, talks about everything but PLCs. When I want to talk with peers about how to change my practice, I hunt them down before or after school. (Linda’s interview [Jefferson High School], May 16, 2012)

Teachers at Washington described the large group department PLC meeting as a time to receive instruction for what they needed to produce for their sub-PLC groups.
Their large group department meeting met each Tuesday for about 10 to 20 minutes; the remainder of the time they met in their sub-PLC groups. Teachers described the sub-PLC meeting as a time to meet and fill out the school form and that the time they spent doing that kept them from having collaboration work time on pedagogical practices.

I think the biggest thing that we want PLC to do is to share what we do with our students and take things back to our room and try it. It doesn’t seem that we have ever gotten a chance to do this because the school always wants us to do something else. (Donald’s interview [Jefferson High School], May 16, 2012)

The biggest headache is trying to come up with data to show that what we are doing makes a difference. I feel that trying to show what works takes away from time that we could be using to talk about things that really do work. What we need to do is talk about what works and what doesn’t work. (Patricia’s interview [Jefferson High School], May 16, 2012)

Jefferson High School teachers shared several comments about PLC meetings.

Teachers at Jefferson stated that meetings were an opportunity to discuss with colleagues what they were doing in the classroom with students and further share ways to make their instructional practices better, based on what other teachers were doing.

Some days are good and some are bad in terms of productivity, but I think we have a good goal and we are helping the kids out. We have great rapport and are friends. I don’t care how long I have been teaching, if one of my colleagues shares something I want to listen and be part of it. (Joseph’s interview [Washington High School], May 16, 2012)

The most productive PLCs are the ones when we get together and have a clear and focused goal in mind, and everybody is working toward that goal together. I think we do that now. What I do in the classroom may be just as important as what Joseph is doing in his classroom. PLCs are an opportunity to share those things. (Michael’s interview [Washington High School], May 16, 2012)

Teachers made positive comments about PLC meetings, but also had concerns with meeting outcomes. Jefferson expected teachers to produce common data much like
Jefferson teachers were supposed to collect, write, and share data for student achievement as part of PLC meeting time. Teachers at Jefferson worried that the data-driven concepts forced them to “teach to a test” and controlled what they did in the classroom. Most teachers at Jefferson suggested common pedagogy sharing was good, but they were also concerned that too much commonality took away from their instructional creativity.

All the data-driven stuff and commonality in teaching takes away from what I think I need to do for the students. If I have to give the same test as everyone else, then I have to spend time on preparing students, which takes time away from doing science. Teaching to a test does not build lifelong learning. (Michael’s interview [Washington High School], May 16, 2012)

All of the high schools shared common statements about teacher collegiality as the most adventitious component to PLC meeting times. Teachers in each school seemed to have respect and appreciation for colleagues on both a professional and personal level. Teachers described PLC meetings as an opportunity to meet with colleagues, share information, and oftentimes take pedagogy back to their classrooms, thereby changing their own pedagogy. Teachers described their PLC meeting as productive and unproductive. Productive PLC meetings were described as goal oriented, on-task, and product-dependent meetings. Teachers described unproductive meetings as nongoal oriented, off task, and no product being produced. Products described were pedagogical pieces such as assessments, labs, or activities.

PLC meetings in all three high schools had productive days where teachers used common data and information to discuss assessments or instructional practice. Roosevelt and Jefferson teachers discussed that they shared data and instructional practice ideas on
a consistent basis. Teachers in these schools also described adapting or changing their instructional practice as a result of their interactions and collaboration in PLC meetings.

Teachers at Washington shared common data but did not share instructional practice ideas. Most teachers described PLC meetings as collaborative sharing of data, but not sharing of ideas about instructional pedagogy. Teachers were emphatic that they had not changed their instructional practice. Several teachers described PLC meetings as a time when they were forced to meet with other teachers, share data they were forced to collect, and fill out a form for someone else. These two participants also described this process as something extra in their contractual time that took time away from students and effective instructional practice.

All teachers in the study expressed the need for a PLC meeting to match their expectations in terms of goals, sharing of ideas, and collegiality.

All high schools shared statements about teacher frustration as it related to PLC meetings. Most of the teachers described PLC meetings as frustrating when they went into the meeting with a goal in mind, but came out of the meeting with the goal not being addressed or completed. Teachers described the PLC meeting as a frustrating time for them when they could not accomplish their goal or a task they had in mind, especially when the goal or task had the potential for impacting what they did in the classroom.

What was interesting to note was that the initial interviews for each teacher at each school revealed very positive comments about PLC meetings. Each participant shared that PLC meetings were constructive times to meet with peers, share information, share ideas, and find ways to impact instructional practice. The second set of interviews, conducted at the end of the school year, revealed very negative comments about PLC
meetings. Most teachers described PLC meetings as an obstruction to their pedagogical practice and an obstacle to their weekly function with students.

**Practices That Teachers Take From PLCs**

The fourth category and research question—“What practices (pedagogical and assessment) do teachers take from PLCs and implement in their classrooms?”—yielded several codes. Assessment appears many more times through each dialogue with participants than any other theme. It is obvious that teachers at all schools thought that “assessment” (quizzes, practice tests, tests, exams, unit exams, semester exams, formative and summative, rubrics) were pedagogical pieces that they constructed in sub-PLC groups and took back to their classrooms to try with their students. Teachers from all schools described several forms of assessment that the sub-PLC group had designed, developed, and implemented in their PLC through collaboration. Each participant described assessment pieces as something they had taken back to their classroom, that had forced them to change their pedagogical practice. Essentially, the assessment pieces had taken teachers “out of their comfort zone and forced them to do something they have never done before” (William’s interview, February 6, 2012). By doing this, teachers described activities, labs, instructional strategies, rubrics, skills, or other pedagogical implementations that had been adapted to their current practice.

The themes extracted from what practices teachers take from PLCs and implement into their classroom include: (a) assessment, (b) activities, (c) strategies, (d) instruction, (e) lesson plans, (f) learning goals, (g) commonality, (h) labs, (i) rubrics, and (j) skills.
What is most interesting to note is that each school asked teachers to develop common assessments as a result of their work in PLCs. Most teachers described district professional development on the development of common PLC constructed assessments and the use of them in their classrooms. Several teachers reported developing common assessments, but some described not actually using them. Teachers at Roosevelt and Jefferson each reported that they had consistently, and throughout the PLC meetings for the year, developed common instructional strategies, labs, activities, alignment of lesson plans, learning goals, and expectations for students. Teachers from Washington reported that they had developed some of these, but not consistently. Teachers from Roosevelt and Jefferson reported using commonly constructed instructional practices, whereas teachers from Washington reported not commonly using constructed instructional practices.

The administrators described what teachers took away from PLC meetings and tried in their classrooms. All administrators were confident PLC groups produced common assessments in a collaborative effort in PLC meetings and were using the assessments in the classroom. Administrators also expressed confidence that teachers were collaborating in PLC meetings on common instructional strategies, and that teachers were using the strategies in their classrooms. Each administrator described PLC practice as impactful to teacher pedagogical practice.

They are developing common assessments and using them. They ask questions about the assessments and try to connect with their instruction. They are working together on these things, and I think it impacts what they do each week. (Nancy’s interview [Roosevelt High School], January 24, 2012)
I go in and I see teachers identify areas and really work hard at creating some common assessments, pre and post, and they really find benefit in that they made deeper connections as colleagues. (William’s interview [Washington High School], February 6, 2012)

They are either looking at data from formative or summative assessments and reviewing it. They are working on plans for what they want to do with their common assessments and what that means to what they do in the classroom. (David’s interview [Jefferson High School], January 26, 2012)

William at Washington High School also discussed the development of common student behavioral expectations as being a focal piece for one sub-PLC group. He said that he visited a PLC group and:

They talked about wanting to target classroom management stuff, and we spent a lot of time talking about making sure that was measurable. (William’s interview [Washington High School], February 6, 2012)

Several teachers from the PLC discussed the development of the behavior plan, but also suggested that teachers did not actually collect data or implement the behavioral plan in their classrooms. The administrator suggested that since teachers constructed a plan that it must had been implemented, but the lack of follow-up did not lead to a change in instructional practice.

The common theme for administrators was the development of assessments in PLCs and, that since assessments were developed, there must have been a change in teacher practice that impacted their classroom.

Administrators at each school stated that teachers had to produce reporting documents from PLC meetings for administrative purposes. The reporting document from each school was the same and required teachers to describe what their PLC goal was for increasing student achievement. The document required teachers to describe
common pedagogical practices being used by the PLC group and data collected from the practices that increased student achievement. Administrators described the document as a necessary piece to the PLC process and function, to ensure accountability of teachers to the school and to the district. Teachers filled this form out (some during PLCs each week, some only a couple times a year) and posted the document for review to an online library, accessed by administrators.

Roosevelt teachers described pedagogical practices they took away from sub-PLC meetings as useful documents or practices they collaborated on with their peers.

I suppose the things that we produce the most were formative quizzes, practice tests, and our summative tests. We do have some standardized labs. I give the quizzes and tests and bring the data back to the PLC to discuss. (Robert’s interview [Roosevelt High School], January 29, 2012)

We worked on our common summative assessment for the cell. We looked at a past common assessment, talked about what was good about it and what wasn’t. We used data from old tests to look at what questions to throw out, which ones to rewrite, and which ones to keep. It was a good conversation. (Mary’s interview [Roosevelt High School], May 16, 2012)

We use a common assessment system that comes from the University. We pre and post test our students and bring the data back and talk about it. (John’s interview [Roosevelt High School], January 31, 2012)

Teachers at Roosevelt discussed that their PLC developed common activities and labs that each teacher used. The labs and activities were things that one teacher developed, shared in PLC, and all teachers used as a result of collaboration in PLC meetings. Teachers said that they changed their practice based on what they talked about in PLCs, when one or several teachers shared labs that they thought all PLC group members should do. Teachers described specific examples of labs, activities, lectures, or
other pedagogical they used, changed, or adapted that changed their instructional practice as a result of PLC collaboration.

Teachers at Washington High School described designing common assessments that they constructed in PLC meetings through small group collaboration. Teachers described using the common assessment as a data collection mechanism for student achievement. Most teachers described collecting data and reporting that data. Teachers did not change their pedagogical practices as a result of the collaborative activities in PLC meetings.

For the PLC we looked at class average, actually average across all my students, and then we recorded pre and post just to see whether there was an increase and percent increase. It is just data and that didn’t impact what I did in the classroom. (Donald’s interview [Jefferson High School], May 16, 2012)

We designed and used a rubric. We have given the rubric to the students on how to construct a graph and how to evaluate their graphs. The rubric helps students know what’s expected of them, but I don’t change what I do in the classroom. (Paul’s interview [Jefferson High School], May 16, 2012)

I don’t do as much multiple-choice as other teachers and since that is what we made in PLC, I don’t use them. I have a big mix of critical thinking questions and application questions and so I make my own tests. (Linda’s interview [Jefferson High School], May 16, 2012)

Teachers at Washington discussed that they worked on common activities such as “work on bell-ringer activities,” or they “looked at ways to incorporate new learning activities,” or they even discussed that “sometimes we looked at different topics like issues in biology.” Teachers at Washington described that they did not think PLC meetings were productive in terms of what they collaborated on, made collectively as a PLC, and then tried in their classrooms. Each teacher expressed that they thought PLCs
were intended to share common pedagogy and implement new strategies in the classrooms. Each teacher also expressed that they did not have the opportunity to share or consider implementation of new strategies due to a constraint on how PLCs were led.

Teachers at Washington seemed to have expressed more negative comments of PLC productivity than the other schools, but they also expressed sharing strategies and implementing instructional strategies into their classrooms. Each teacher at Washington described at least one instructional strategy that they worked on in PLC meetings, through collaboration, that they now use in their classroom that they had not used previously.

What was interesting was that several teachers suggested they did not change their pedagogical practice as a result of PLC collaboration. Patricia said that she:

... tried an activity that we looked at online, and I liked what I got from it with my students. (Patricia’s interview [Jefferson High School], May 16, 2012)

She also said:

I will probably do that activity again because it was pretty easy to fit in with what I do. (Patricia’s interview [Jefferson High School], May 16, 2012)

Paul, the longest tenured teacher in the study, suggested he had been teaching for so long that it was hard to find new instructional strategies and implement them into his current pedagogical practice. He said:

I don’t want to say that nobody can tell me what new things to teach, but I have been doing this for over 40 years. I think I know what works. (Paul’s interview, May 16, 2012)

He also said shortly after that comment:
Yeah, I use the rubric to help my students with graphing. It is something we came up with together in PLCs, and it helps kids know what is expected of them. (Paul’s interview [Jefferson High School], May 16, 2012)

The rubric he was referring to was a PLC product from the chemistry sub-PLC group. Teachers in that PLC collaborated over several meetings to construct common expectations for student graphical analysis. The rubric was developed by the PLC group through collaboration and incorporated into each chemistry classroom by teachers. Paul changed his pedagogical practice by using a rubric that he did not have before.

Donald expressed concern with what he thought he was not getting out of PLC collaborative meetings. He said:

We developed pre and post assessments last year and are still using it this year for data collection to figure out where students are, but I don’t use that to change what I do in the classroom. It’s more for students to know and understand their progress in the course. (Donald’s interview [Jefferson High School], May 16, 2012)

The use of this assessment from the year prior was not his primary concern. His concern was that:

I am not taking anything away from PLCs. I am not changing my practice at all because we don’t have time to talk about what we do. We only have time to talk about the data and fill out the form for the administration. (Donald’s interview [Jefferson High School], May 16, 2012)

He was not alone in his concern. Each participant from Washington suggested that the school form they were required to fill out took time away from what they thought was important—“collaboration and sharing what I do with my colleagues” (Donald’s interview, May 16, 2012).

Teachers at Jefferson High School described their PLC meetings as a positive experience and that the work they completed in PLC meetings were impactful to their
pedagogical practice. The school developed several things teachers used in their classrooms. Teachers described the development and use of an assessment rubric.

We realized that graphing and graphical representation items, diagrams, charts, things like that, were a huge part of science, so we felt like we needed to develop something everyone could use in their classrooms to standardize teaching and evaluating that. (Joseph’s interview [Washington High School], May 16, 2012)

Each participant described constructing the rubric through a series of collaborative conversations in PLC meetings. Each teacher had “changed what we do in terms of graphing and reporting” (Thomas’s interview [Washington High School], May 16, 2012). Each participant described how the rubric changed their pedagogical practice and how that further changed what they did in the classroom in terms of how they approach every lab and activity. Each teacher at Jefferson changed what they began class with each day and how they talked to their students about scientific reporting. They also suggested that the rubric had further helped them to come up with other commonalities.

We oftentimes come up with common activities or common assessments and work together and make sure that we’re addressing the essential learnings and that those assessments reflect what we are doing in the classroom. (Chris’ interview [Washington High School], May 16, 2012)

It was interesting to note that three teachers met in a sub-PLC group that was focused on chemistry or physics. They further suggested that since their collegiality was good in the group, they took whole labs or worksheets and used the exact document in their classrooms. The group seemed to have respect and appreciation for each other and what they did in the classroom. They “are not shy about stealing ideas from each other” (Chris’ interview [Washington High School], May 16, 2012). What they were actually taking away from PLC were common labs, activities, and the discussion on how to
evaluate students in scientific evaluation and reporting. They used a rubric as a formative assessment that “drives the remainder of their PLC conversation” (Thomas’ interview [Washington High School], May 16, 2012).

Michael at Jefferson met sometimes with the biology sub-PLC and sometimes with the ninth grade sub-PLC. He said they were developing a common test bank for one course that teachers would draw from. He further suggested that he had not taken anything from the PLC or tried anything new from a pedagogical standpoint with his students from PLC meetings. He said that most of the time the PLC met and discussed a variety of things when not working on the test bank.

We come in most days and talk about different students, what they are doing, what they are not doing, give ideas to each other. Eventually we get to our official PLC work, smart goals, what’s working, what’s not. We work on the test bank. We usually come in, look at what we did the last meeting and then at the end of the meeting, we usually set up what we need for the next meeting. (Michael’s interview [Washington High School], May 16, 2012)

When probed for what types of things they work on from SMART goals, he referred to the test bank and further described it as a piece of pedagogy that was in development for use next school year. Three separate PLC observations of this group revealed that the PLC group collaborated and worked on the test bank.

All in all, teachers at Jefferson suggested that they did a lot of brainstorming and generated ideas about where students were versus where they need to go. Thomas suggested PLC meetings had:

. . . changed what I do. I think it changes how we teach. I don’t think you can say a lot in what I teach, but it may take us in different directions. (Thomas’ interview [Washington High School], May 16, 2012)
This statement was reiterated several times by all participants, but what was most interesting was that, through collaboration, teachers exchanged ideas and by the very nature of collaboration had adapted pedagogical ideas from each other they used in their planning process for implementation in the classroom.

Michael summed it up well. He said:

Even though I don’t take a physical product from the PLC, by talking to my colleagues I am taking what they think and using it in my own planning process. I may not take something away from the PLC that is physical, but what I do take away is something that shapes what or how I teaching something. (Michael’s interview [Washington High School], May 16, 2012)

**Summary of Data Collected**

In conclusion, three schools were purposefully selected to participate in this study. Four master science teachers were selected to participate from each school. One administrator was selected to participate from each school. Administrators were interviewed at the beginning of the study. Teachers were interviewed at the beginning and end of the study. Teachers’ PLCs and classrooms were observed. Teachers completed surveys after each observation.

No administrator could formally define or cite the school or school district’s definition of a PLC. Administrators from each school suggested teachers worked effectively in PLCs by collaborating on common pedagogical practices. Administrators also suggested that teachers constructed common pedagogy (assessments, activities, and lab experience) and implemented those activities in their classrooms, thereby deriving commonality with PLC peers. Administrators suggested that teachers had positive perceptions of their PLCs and its impact on their classroom practices.
None of the master science teachers could formally define or cite the school or school district’s definition of a PLC. Most teachers knew that their PLC was supposed to be teachers collaborating on common pedagogy, but none of the teachers could describe how a PLC was supposed to serve as a learning source for their practice.

Participants agreed that the primary activity teachers participate in PLCs was supposed to be collaboration and deriving common pedagogy. Less than half of the teachers were active participants as collaborating members of their PLC. Teachers generally had a positive perception of their PLCs at the beginning of the study. At the end of the study, over two-thirds of the teachers had a negative perception of their PLC. Positive and negative perceptions were associated with productivity, the opportunity to discuss ideas with PLC peers, and deriving something teachers could use in their classroom practice. The lack of productivity and sharing of common practice (assessments, activities, and/or labs) served as the primary source of frustration and negative perception of PLCs.

All teachers derived something from their PLC that they used in their classroom. The interviews, surveys, and observations verified that all participants took something from PLC work and incorporated into the classroom. Most participants used an assessment constructed in PLC work in their classroom practice. Observations of PLCs at each school and teacher classrooms verified the use of some form of commonality from PLC work.
CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

The findings suggest that PLCs impacted the schools in this school district. Findings also suggest teacher pedagogy had been impacted by PLC practice. Impact from PLC practice on teacher pedagogy varied greatly by teacher. It is a major finding of this study that teacher practice in PLCs and in their classrooms was impacted by PLC interactions and collaborations.

The findings also suggest each school had established PLCs in various ways. Each school, as a unique case, had developed PLC practice. Two schools had adopted models of best practice, whereas one school did not. Best practices are well cited in the literature summarized in Chapters 1 and 2 of this dissertation. The various degrees of the application of best practices in PLCs resulted in differences in how teachers described PLC practice and its relative impact on their pedagogy. It is the purpose of this concluding chapter to point out the best practices and not-so-best practices seen at each school and the potential implications of both on the schools and teachers.

There is no perfect PLC, but there are best practices cited in the literature. With this information and data from the study, we can conclude teacher and school practices in PLCs impacted PLC and classroom pedagogy in both good and not-so-good ways. It is important to recall that there are limitations to this study described earlier in Chapter 1 of this dissertation. Even given the limitations, data from this study suggest teacher pedagogical practices match best practices, but there is much room for improvement at each school.
The hope of the researcher is that the study can be a tool for the district and for future study of PLCs. Schools and teachers in this reputation-based case study created unique cases that might have similarities in other schools and with other teachers in other communities. As such, this study can be a tool for the application of PLC practice and how theoretical models like PLCs are applied in school districts. Theoretical models for school improvement, like a PLC, involve schools and outcomes from teacher work that may be applied to other schools and teachers given similar situations and circumstances. In summary, this final chapter will conclude and recommend, from the data collected and the theoretical application of PLCs, what we can learn from the cases at each school and potential areas for improvement.

**Findings on Definitions of PLCs Used by Each School**

The collective statements from participants in the study were that schools and the school district did not define PLCs well for teachers. All participants described activities and professional development opportunities the school provided that described and defined PLCs. No participant could recall a formal definition of a PLC and the true purpose of the PLC process or its functions as applied by the school and the school district. The district defined PLCs as a school improvement model aimed at improving learning for each individual student. The district further described that PLCs ensured that all students learn, that teachers created a culture of collaboration, and that PLCs focused on results.
There is no universal definition of a PLC (Stoll et al., 2006). DuFour et al. (2008) defined a PLC as educators committed to working collaboratively in ongoing process of collective inquiry and action research to achieve better results for the students they serve. PLCs operate under the assumption that the key to improve learning for students is continuous, job-embedded learning for educators (DuFour et al., 2008).

It is a major finding of this study that teachers did not know the definition of a PLC, nor did they know how it was applied as the district’s school improvement model. Even though the district provided a definition of PLCs, teachers and administrators did not know it. Bolam et al. (2005) suggested that a defining characteristic of an effective PLC was one with shared values and vision. Hord (1997) also suggested that a PLC needed supportive and shared leadership in order for the members of the PLC to know and understand their purpose as professionals.

The lack of detailed and consistent reflection on the district PLC definition and process by each school led to teachers working in PLC groups with little direction and purpose. It is important to note that we could not expect a PLC to function well if the district provided a definition of school improvement, but the definition was not communicated with teachers and administrators clearly and with consistency. The lack of leadership from the district, through the school, and to the teachers led to teacher frustration and little impact on teacher practice in this school district.

Roosevelt High School actively provided literature and continued staff development and, as a result, had the fewest teachers expressing frustration about PLCs. Teachers at this school were excited to meet, discuss, collaborate, and share in their PLCs. Hord (1997) called this shared personal practice, where teachers collectively
create and support learning. Teachers at the school had common pedagogy they worked on in PLC meetings and tried in their classrooms. The PLC served to shape participant pedagogy and teaching through the common assessments and shared pedagogy described by each teacher.

Washington High School had not done an efficient job at defining PLCs and, as a result, teachers were frustrated. Frustration from teachers grew out of a lack of what Reichstetter (2006) called a collective understanding of challenges faced by teachers and a lack of focus on school-structured conditions that support PLCs. From a process standpoint, teachers at the school did not know what they were supposed to be doing other than filling out forms during their PLC time. Teachers did not collaborate on common pedagogy, share a school structured support system for their practice and, as a result, had limited changes in their pedagogical practice because of their frustration. It appeared that PLCs at this school had little, if any, impact on teacher practice.

Jefferson High School teachers and administrators knew and understood what PLCs were supposed to do and how that might impact their teaching, but were still struggling on how to get there given the confines provided on the PLC process. Even though the district listed the DuFour (2004) process on their website, little time was spent on revisiting how PLCs were done.

At Jefferson, teachers met and produced common pedagogy in PLC meetings and that had some impact on what they took away from PLCs and tried in their classroom. Teachers had taken some things produced in PLCs as a result of the definition of PLCs and tried them in their pedagogical practice, therefore changing their practice. No
participant could describe consistent ways their practice was changed, and there were several PLC groups and teachers that did not participate in PLC meetings.

In conclusion, it appeared that defining PLCs for teachers and administrators with consistency, several times a year, had become a great need in this school district. The schools needed to provide shared values, vision, and direction on what PLC groups should have been doing and how they should have gone about their PLC work to maximize impact on their pedagogical practice (Reichstetter, 2006).

The lack of direction provided by the school and district, along with the lack of consistency in defining PLCs and the PLC process, resulted in teacher frustration and further decreased teacher productivity in PLC meetings and teacher pedagogical practice.

**Findings on the Types of Collaborative Activities Teachers Participate In**

The data from comments made by teachers and administrators in the study on what types of collaborative activities teachers participated in during PLCs centered mostly on collaboration and discussion of activities. For the purposes of this dissertation, an activity was defined as a specific action or function as it related to PLCs and teacher practice. Teacher practice was defined as pedagogy, teaching, learning, and implementation of instructional practice. Pedagogy included planning, instruction (lecture, activities, labs), and assessment. Comments made by teachers and administrators in the study described PLC activity as discussion and sharing of ideas, as well as collaboration, bouncing ideas, and commonality. Teachers and administrators used the words “discussion” and “assessment” the most in this category.
DuFour et al. (2008) stated teacher collaboration is a systematic process in which teachers work together, interdependently, to analyze and impact professional practice in order to improve results for their students, their team, and their school.

A major finding from observations at each school verified that teachers interacted in PLCs and discussed ideas more than any other activity. Teachers observed in the study either actively participated in PLCs by discussing pedagogical practice and student achievement or they did not participate in the PLC. Teachers who did not participate in the PLC did not actively discuss ideas. There were participants at each school that chose to not participate and discuss ideas with their PLC group. On the other hand, there were participants who did actively participate in PLC and did discuss pedagogy with other PLC group members. Some schools had more teachers who actively participated in PLC discussions.

Roosevelt teachers discussed and wrote assessment pieces used by teachers and students, whereas Washington teachers did not. Jefferson teachers were beginning the extensive assessment discussion and writing process and had plans to use those documents in classrooms the next school year. All schools had participants who discussed these ideas and, as such, teachers bounced ideas off each other and the frequency of the use of these words in interviews and observations truly tells the story of what teachers perceived PLC activity was supposed to be.

A major finding of this study was that teachers used the word “commonality” in their description for what types of collaborative activities they participated in PLCs. Almost all teachers and administrators stated that one of the activities of PLCs was supposed to be teachers arriving at commonality in their assessments and instructional
plans (standards, scope, sequence). What is important to note is that most participants, especially teachers, did not have much commonality in their instructional practice.

Teachers shared ideas and discussed pedagogy, but most could not describe more than one or two things they had changed in their practice as a result of PLC work. Also important to note is that this school district has used PLCs as a model for school improvement for 6 years. After 6 years of meetings that last an hour, most teachers could not describe more than one or two pedagogical strategies they had adapted through commonality.

A defining characteristic of a PLC was that teachers work collaboratively developing stronger instructional strategies and, as a result, enhance student achievement (Jackson & Temperley, 2006; Lam, 2005; Phillips, 2003; Strahan, 2003). Most teachers in this study agreed that PLC activity should have led to commonality in instructional strategies. They also agreed that developing new pedagogy was an important function of the PLC process. Each school did develop something currently in use that teachers did not have prior to working in PLCs and, as such, the development of these pedagogical concepts does show there is change in teacher practice. The concerning issue is that after 6 years of work in PLCs, it would seem logical to suggest that PLC subgroups should and could have developed much more than just one or two things that all teachers use as a result of PLC work time and teacher collaboration. Teachers in this study agreed that commonality was an important characteristic to PLC function, but did not do it much.

In a PLC, teachers work together to collect information that informs them of the effectiveness of their practice (DuFour, 2004; Hord, 1997). Teachers and administrators at each school agreed that PLC activity should center on teachers collecting data and
analyzing that data to determine student achievement and teacher pedagogical efficiency. The comments made by participants in each school were that the analysis of that data was supposed to tell teachers about students and where students were with respect to course content and process. No participant in the study could describe the analysis of data as a function of their own pedagogy. It is interesting to note that each participant described the assessments they used with their students in several ways. Teachers described assessments as a measure of student achievement, a way to determine grades, a communication to parents about student progress, and/or a way to determine teacher effectiveness.

A major finding of this study was that teachers could not describe their PLC analysis of data and how it impacted their own pedagogy. DuFour (2004) described PLC analysis of data as a mechanism to improved teacher practice. In the study, teachers described their assessments well, in terms of who it served and how, but when questioned and probed for how PLC analysis of assessment data served their instructional practice, each participant described the PLC process as timely and problematic. Teachers commonly referred to the timing of the assessment pieces as something they could not work with on their own pedagogy for several reasons. Teachers said, first and foremost, that PLCs met only once a week and a result of that once-a-week meeting, after assessments had been given, they had moved on in their curriculum and did not have time to back up and correct things for students. Second, teachers said since they were a master teacher they knew what students were supposed to know and how to teach it and, if students didn’t get it, the assessment showed the students’ deficiency, not the teaching deficiency.
In conclusion, the inability to connect the PLC activities, assessment data, analysis, and corrective pedagogy is most definitely a paradigm shift for all participants. In order for PLC process to move into a progressive format, teachers in this district need to ensure that they do not remove themselves from the assessment feedback loop in terms of how their assessments inform them of their instructional practice. This PLC activity will be critical for teachers to move into more meaningful PLC practice. It can also be concluded that discussion and coming to terms with commonality were also major components to teacher perceptions of activities they participated in PLCs. It can be concluded that a little over half of the participants in the study actively discussed pedagogy with peers in PLC meetings, but did not come up with commonality of pedagogy. The lack of commonality in pedagogical practice at each school has exacerbated teacher isolation in the classroom and prevented teachers from strengthening their instructional design through discussion, developing commonality, and analysis of data to inform teachers about their pedagogy.

**Findings on the Teachers’ Perceptions of PLCs**

Pennell, J. R. et al., (1996) and Westheimer (1999) concluded that teacher beliefs, social interactions, and contextual circumstances shape professional learning in the PLC. Findings on the teachers’ pre and post perceptions of PLC meetings were profoundly different at each school and between each teacher, which align to Firestone and Westheimer conclusions. Teachers at the beginning of the study expressed PLCs were opportunities for social interaction with their colleagues to share and discuss pedagogy.
Teachers at the conclusion of the study expressed various degrees of frustration at the lack of opportunities and experiences to share and discuss pedagogy.

It is a major finding of this study that perceptions of meetings at the beginning of the study, as the study progressed, and at the end of the study were different in terms of what teachers and administrators described because of social interactions and contextual circumstances at each school and within each PLC. For example, at Roosevelt teachers and administrator described PLC meetings as collegial, professional, and productive. At the beginning of the study, all four teacher participants described their PLC meetings as an opportunity to get together with colleagues and discuss ideas. All four teachers at Roosevelt described the PLC meeting times as productive opportunities. Teachers at this school further described the meeting as a time to look at student data and review practice. Since teachers at the school had such high regards for each other, they came to meetings with information, ready to share ideas, and discuss what they came up with from the previous meeting. Bolam et al. (2005) described openness, inclusive membership, mutual trust, and respect as key components to an effective PLC.

Teachers at Roosevelt described their PLC meeting as a time when they could meet with others of their common teaching experience and collaborate on assessment data. Two of the four participants further described the meeting time as data “driving their decisions” for instructional practice. Jefferson teacher comments were very similar. Comments on PLC meetings at the beginning of the study and at the end of the study were also similar in that teachers expressed the same desire and appreciation to meet with their colleagues and share information. Washington teachers, on the other hand, expressed increasing frustration at meeting with their peers and further expressed that
they did not develop commonality in pedagogy. Teachers at Washington expressed that meeting with peers was nonproductive and a general waste of time.

A major finding of the study was that of teacher perception of productivity or nonproductivity of PLC time. Teachers at each school described PLCs as productive when they had the opportunity to discuss their pedagogy, share and bounce ideas off their peers, and adapt common pedagogy to best match the needs of their students. Two of the four participants at Roosevelt described PLC meetings as nonproductive in terms of how it impacted their teaching, but collegial in terms of the interactions and collaborations. Their PLC did not share common pedagogy as a result of data. These two teachers described their average PLC as a meeting where they got together, looked at common assessment with PLC members, reflected on the assessment, considered why students missed items, or did well on items. There was no mention in conversations as to how their practice changed as a result of PLC interactions.

The other two participants at Roosevelt described their PLC meeting as productive in terms of how it impacted their teaching. These two described their PLC meeting as a time when they met, discussed common assessment, looked at common missed items, discussed why students did well or missed items, but then steered their PLC conversation into common instruction. These teachers moved from assessment to instruction and, as a result of moving their conversation, looked deeper into their instructional practice. The richness of the conversation from assessment to instructional practice seemed to fuel these teachers into looking deeper at their own instructional shortcomings and further investigate what they could do to be more effective as teachers.
Participants at Washington described PLC meetings as not productive and a “general waste of time.” All four teacher participants described pre and post PLC meeting times as frustrating and unproductive. Participants described PLC meetings as a time when they got together with colleagues once a week and filled out forms. Participants further described PLC meetings as a time when they were forced to meet and produce something that did not connect to their daily pedagogical practice or their classrooms with their students. Participants described PLC meetings as a time when they met as a department or committee and completed things for administration. Participants at the school described PLC meetings at the beginning of the study as an opportunity to meet with their colleagues. Participants at this school had tremendous respect for each other as professionals, but described their meetings as unproductive and wasteful because they did not get to tap into the expertise of their colleagues. They further described their pre-PLC meeting time as stressful in terms of what they were forced to get ready. Their pre-PLC meeting time was when they had to collect data from assessments they gave to students that did not impact their practice and bring that data back to PLC to fill out a form that had no connection to their instructional practice. Teachers were frustrated at the pre-preparation needed and the time it took away from their pedagogical structure in terms of teaching, learning, and student achievement. Teachers were also frustrated in terms of the lack of collegial interaction that took place during PLC meetings. Teachers described the need and desire to discuss and share ideas with their colleagues as it related to their professional practice, but came out of the PLC meetings (post PLC meeting time) with increasing frustration at the lack of connection between the meeting action plans and the impact on their daily instructional and pedagogical practice in their classrooms.
What was interesting to note about teachers at Washington was that teachers at the beginning of the study expressed some frustration, but were hopeful PLC meetings would help shape their pedagogical decision making and execution as it related to their daily pedagogical practice. At the conclusion of the study, participants described pre and post PLC meetings as frustrating and a waste of time. Reichstetter (2006) described this as a lack of focus on team decision making. Feger and Arruda (2008) stated that frustration might result from a lack of openness to improvement, a lack of trust, and a lack of focus on the skills of teaching.

Based on observations of PLC meetings and the types of expectations this school had for PLC meetings, teachers did not have the opportunity to share their pedagogical practice. They did not have commonality in their assessment or instructional practice. As a result of the lack of opportunity to discuss and share ideas, teachers grew frustrated. Moreover, teachers were forced into collecting data and were not provided opportunity to see or connect data back to their classroom practice. The data-driven piece of PLCs and the lack of connection to pedagogical practice increased the level of frustration at this school.

Much like Roosevelt, teachers at this school described productive PLC meetings as times when they looked at what they were doing, instructional practice based on student data, adapted some sort of common pedagogical instrument, took the instrument back to the class and tried it, which further required them to look at their instructional effectiveness. Much like Roosevelt, teachers at Washington described decreasing frustration from PLC meetings where they were reflective of their instructional practice. Teachers at the school described something their PLC meetings produced that impacted
their instructional practice. Even though the general feel of PLC meetings were negative, from a perception standpoint, teachers expressed excitement and appreciation at the few times they did come up with something with their colleagues that forced them to be a reflective practitioner. The richness of their reflection to their instructional practice seemed to fuel their desire to want to meet and reflect on their practice and further change what they did with their students, thereby impacting their practice. Several participants at Jefferson and Roosevelt described PLC meetings when they had the opportunity to reflect on their current practice and, as a result of that reflection, went back to their planning processes outside of PLC meetings with a thought on what the PLC had discussed. The participants further described the desire to get back to the PLC in following weeks to further develop their ideas with hopes of enhancing their pedagogy.

Jefferson High School described their PLC meetings as collegial and at times fun. Teachers at this school were very respectful and appreciative of their peers. They described their PLC meetings as productive, in terms of what they came away from it with and how that further impacted their daily pedagogical practice. Teachers at this school, at the beginning of the study, expressed concern as to what their PLC meetings meant, what they were producing, and how that might or might not impact their daily instructional practice. As the study went on, pre-PLC meeting expectations went up for teachers in terms of what they expected to get completed at PLC meetings. Post PLC meeting comments were more positive in terms of what teachers were getting from PLC meetings for their pedagogical practice. As the semester progressed, teachers expressed more positive comments, pre and post PLC meeting.
All teachers at Jefferson described PLC meetings as productive times when they could get together, work on common assessment items, discuss daily instructional practice, and reflect on their own pedagogy. Three of the four participants described their PLC meeting as a time when they could discuss what they taught, why they taught it, and the ways they taught. The fourth participant also described PLC meetings, pre and post, as times teachers could discuss what they taught and why.

One teacher at this school expressed some concern that commonality and frequency of assessment were forcing teachers to “teach to a test” and, as a result, decreased PLC productivity. He could not describe pedagogical design used by his PLC group that actually did force him or his peers to “teach in a flush and dump system for students” that also “taught to the test.” The perception was that if too great of commonality was reached by teachers, the frequency and verbatim pedagogical practice would force teachers to “teach to the test” which would further restrict what teachers could teach and limit teaching and learning creativity. When probed further for what types of things his PLC did that might perpetuate this system, he could not come up with anything in particular, but his idea is interesting and relevant to the potential impact on his and other teachers’ pedagogical impact perception. If teachers think PLC meetings force them into a system that lacks creativity, and the functionality of the PLC process further restricts their reflective practice, will that further decrease collaborative motivation both pre and post PLC meeting?

Much like Roosevelt and Washington, teachers at Jefferson described the most productive PLC meeting times as opportunities when teachers met with their peers, bounced ideas off each other, and came up with things that they could use in the
classroom. A common theme between all three high schools was the idea of PLC meetings as opportunities for productive, reflective pedagogical practice. Several participants at each school described PLC meetings as times when they could get together with their peers, look at what they practice, and find ways to make what they do in their classrooms better. On the other hand, several participants described PLC meetings as times that were a waste of their time.

In conclusion, teacher perceptions of PLCs at the beginning of the study, in the middle of the study, and at the end of the study changed significantly in each school. The change in perception was due mostly to teacher perceptions of productivity of PLCs. Teachers described productive PLC meetings as a meeting that helped shape teaching practice and pedagogy. Teachers at Jefferson and Roosevelt described decreasing productivity as the study progressed. Decreasing productivity was described as meetings that decreased what teachers took away from the PLC and tried in their pedagogical design. Washington teachers, on the other hand, consistently described frustration at how unproductive PLC meetings were over the duration of the study. Much of Washington participant frustration stemmed from a lack of active participation and focus on teacher pedagogy. It is important to note that all of the schools lacked consistent social interaction between all PLC participants. A couple veteran teachers at Roosevelt and Jefferson High Schools expressed frustration at the lack of productivity of PLC meetings, but these participants were observed as nonactive participants. Washington High School administration placed the most restrictions on the PLC function. Teachers at the school expressed that administration lacked trust in their productivity and that resulted in a lack of trust between PLC participants, a lack of inclusive membership to the PLC, and a lack
of openness to collaborate. All participants who expressed frustration also isolated themselves both in the PLC and in the pedagogical practice. As a result of this isolation, frustrated participants did not consistently interact with their PLC members through discussion and, as such, decreased their relative level of openness, further decreasing their inclusive membership to the PLC group and further decreased their trust among their PLC peers. What was interesting to note was that at each school, the most veteran teachers considered themselves as above the PLC process and isolated themselves from participating in the PLC process, conversations, collaboration, and interactions. It is this isolation that served to inhibit the PLC group from working to commonality, collective reflection on pedagogy, and analysis of data that might have pushed the PLC into best practices, beyond where fully half of the participants sat stagnant as a nonproductive PLC group member. The solution to this issue is quite simple. Veteran teachers should have been leveraged for their longevity of service and further engaged as PLC leaders and not PLC group members. This lack of consistent leadership in PLC practice continues to hold PLC function in this district back from progressing to best practices.

**Findings on What Practices Teachers Take from PLCs and Implement in Their Classrooms**

DuFour (2004) suggested that PLCs focus on results in order to be effective. He further suggested that PLCs learned best about their practice when teachers judged the effectiveness of their practice based on student results. The district in this study cited this statement as a founding practice to PLCs in each school.
A major finding of this study on what teachers described as the primary pedagogical practice they took from their PLC and implemented in their classroom was some form of formative or summative assessment. Each participant at each school described either or both formative and summative assessments developed in PLCs and implemented into classroom instructional practice as the most common practice developed in PLCs and implemented into their classroom with students. The data on collective assessment development at each school was interesting because each school’s PLC culture was very different. Administrators at each school described several whole-district initiatives and attempts at getting sub-PLC groups at each school to develop common formative and/or summative assessments. Observation data from each school verified that teachers developed, or were in the process of developing, common assessments. Interviews and surveys revealed that some teachers used the common assessments, whereas some did not. Based on the data collected, it can be inferred the whole-district initiatives fell short of getting common assessments developed in each school primarily because of a lack of leadership, follow-up, education, and teacher ownership in the process.

Roosevelt High School described common summative and formative assessments constructed by PLC groups, tested in classrooms, revised, and reviewed. Teachers at this school described several labs, activities, and other instructional practices they shared with their peers or got from a colleague in PLC and tried in their classroom. Two of the four participants from this school described activities they got from their PLC as mostly assessment types of things, since they had been teaching for many years, they did not need or have to change their instructional practice in the classroom. These two
participants described their pedagogical practice as static due to how long they had taught, but further described things shared by their PLC group they had tried in their classroom that helped their instructional practice. When probed for what types of things, they each described activities, problem sets, labs, or other pedagogical devices they adapted or changed in their instructional practice. It is important to note that over the 6 years of their participation in PLCs, these two participants could only describe one or two things they had changed or adapted. The other two participants readily described things they did each PLC meeting that they got from their PLC group members that changed their instructional practice.

A major finding of the study was that the assessments constructed in PLC groups did not necessarily shape teacher instructional practice. Each participant described assessment pieces as things they made in PLC, used, and graded in their classroom. They further described the assessments as something that informed them what their students knew and/or could do. Even though each participant described the assessments as something that informed students, parents and teachers, the informed teacher piece was limited in terms of how PLC groups used the assessment data to reflect on their practice. Since teachers described time as a variable in the instructional scope and sequence, it can be inferred from the data that teachers interact and collaborate in PLC with intent on developing common pedagogy, but given the time constraint of the semester and the volume of material (standards, objectives, content, process) teachers must cover with their students, using the assessment as a reflective practice is not practical. PLC meetings met once a week and by the time the assessment was given to students, and the next PLC
meeting arrived, teachers had moved on in their scope and sequence, as such not having
time to reflect on their practice in PLC.

Roosevelt teachers and administrator described designing the assessment,
reviewing, and revising it based on student data. When probed for how the assessment
informed them about their instructional practice, teachers could not describe how the
information could be used in a timely fashion to immediately change their instructional
pedagogy. As described above, Roosevelt teachers explained that their scope and
sequence was locked in timing and, as such, they did not have time to reflect on their
practice.

Washington teachers and administrator also described assessment pieces they
designed in PLC meetings that they used with their students. Each participant described
a formative assessment piece they used, intermixed with their pedagogical process, to
further help inform them of student learning. Washington teachers came up with
formative pre and post tests, and formative grading rubrics they used with students,
designed in their PLC groups, to shape their instructional practice. Teachers stopped
short of describing other types of pedagogical devices designed or discussed in PLC
groups that they took from PLCs and tried in their classroom.

Three participants from the school described several things that they shared,
constructed, or designed in their PLC group that they took from the PLC meeting and
tried in their classroom. One PLC group constructed a rubric that one teacher uses in his
classroom. The rubric helped students know and understand expectations for scientific
reporting as it related to graphing. The other PLC group constructed an activity that they
found online, and each teacher used it to teach a common subject in their physical science
classrooms. The third participant described a science, technology, and society activity her PLC group researched and constructed that she used in her classroom. The fourth participant could not describe any assessment taken from PLC and used in the classroom. This person was also the most disengaged in the PLC process at this school.

What was most concerning about Washington High School was that teacher comments about PLC meetings were generally negative. The sub-PLC meeting time was compacted from their large department meeting time. What time they did have to talk about instructional practice was limited because they first met in a large group, discussed department issues for 20 minutes, then had about 40 minutes to have quality pedagogical conversation in their sub-PLC groups. When they did get to their sub-PLC group, they spent all their time discussing data and filling out a form that had no connection to their pedagogical practice. Teachers expressed frustration at never getting to discuss instructional practice as a function of their daily pedagogy. With the lack of consistently providing time and discussion for common instructional practice, teachers were not taking things away from PLC meetings and trying them out in their classrooms.

Therefore, the impact of PLC meetings was limiting changes to pedagogical practice at this school. Each participant at Washington described at least one or two things they took away from their PLC and tried in their classroom. Given their lack of time provided by PLC administration and function, teachers still found one or two things they could take from PLC and therefore changed their instructional practice. The issue was that over 6 years of working in a PLC, teachers could only describe one or two things they took from PLC meeting and tried in their practice. Over 6 years it would seem logical to suggest that teachers should be able to develop several things each year that might impact their
pedagogy, but at Washington, teachers described not having time and opportunity to develop commonality of practice.

Jefferson High School described several things PLC groups constructed and how that had impacted their pedagogical practice. All participants described coming up with a formative assessment rubric used by the entire department to help with scientific reporting and graphing skills with students. Each participant further described conversations in PLC groups they had discussed and constructed with their peers that further shaped their scope, sequence and, to some degree, labs and activities they used in their classrooms. Three participants described developing a common lab used by each teacher that had changed their instructional practice. The three participants described their PLC as a fun, professional group of people, respected by each other. They described common labs, activities, or assessment pieces as things they could share freely, take from one another, and try in their classrooms. Each of these three participants described their PLC as impactful to their practice due to the things they take from each other and try in their classrooms. One of the four participants at Jefferson described constructing something in PLC, but not using it because it was not finished at the conclusion of the semester.

A key finding and concerning observation at Jefferson and Washington was that, in total, four of the eight teachers at both schools had been meeting in PLCs for 6 years with nothing tangible to show for their work. There were no tangible assessments, even though teachers were working on some form of it in PLC at one school. The impact on teacher practice was minimal due to the lack of consistent production, sharing of ideas, and construction of pedagogical instruments that teachers could use in their daily
practice. The lack of productivity at these schools led to a lack of teacher reflective practice. As described earlier, the lack of reflective practice decreased the richness of PLC productivity that led to pedagogical change for teachers.

Teachers at all schools suggested that PLC practice led to a sharing of ideas, discussion of pedagogy, and teachers coming up with commonality, but the amount of change in 6 years is the greatest concerning factor. What was interesting to note was that seven teacher participants could not describe more than one thing they took from their PLC and tried with their students in their classroom. What does this mean? Most teachers from this district take very few things back to their classrooms and change their instructional practice from PLC practice in this district.

To be fair, of the 12 participating teachers, all agreed that they took something from PLC and tried it with their class, thereby changing their instructional practice, but only five of the 12 participants could describe more than two or three things they took from PLC and tried with their classes. However, as described earlier, one thing all participants described they took from PLC were the conversations with their peers. The idea of collaboration, collegiality, and sharing of ideas does not always equal into a tangible pedagogical product. As described by several participants, collaboration, collegiality, and sharing of ideas does help teachers think about what they are doing and what they could do to help their students be successful. The impact on teacher practice was therefore intangible and not measureable in terms of products from the PLC groups, but rather perception of what teachers did and where they were in their current instructional practice as a group of professionals. Teacher collaboration does not always lead to a paper, lab, activity, or assessment teachers can walk out of a PLC meeting with
and implement into their pedagogical design immediately with their students. Teacher collaboration had led to teachers reflecting on what they did, and that was what most teachers perceived they were taking away from PLCs.

In conclusion, teachers taking assessment or instructional strategies from PLCs and trying it in their classrooms do not constitute an effective PLC. A common thread in the literature for effective PLC was what Bolam et al. (2005) called reflective professional enquiry. DuFour et al. (2008) described reflective practice (enquiry) as a time when teachers use student data to determine the effectiveness of their practice. Reichstetter (2006) further described changes in teacher practice as an intervention from common assessment. There was a wealth of literature that suggested that taking pedagogy from PLC meetings and practice does not constitute an effective learning community. Rather, taking common pedagogy from PLC meetings and implementing it into a classroom constitutes a professional practice community and not a PLC. Until teachers use student achievement data to inform them of the impact of their practice on the learning environment, the relative level of impact will not truly impact student learning.

**Reflection on the Grand Tour Question**

The grand tour question for this study was: To what extent were teacher practices impacted by interactions and collaboration in PLCs?

Teacher practice was impacted by interactions and collaboration in PLCs in each school. The extent to which teacher practice was impacted by PLC interaction and collaboration was limited at each school. Each participant described tangible and
intangible things that came from PLCs that impacted their practice, though teachers could only describe one, two, or three things. The extent of teacher professional learning was limited by the productivity of PLC group members, teacher choice and isolation within the PLC group. Holistically speaking, each school PLC group lacked shared values in terms of what to work on, lacked shared vision on how to go about the PLC process, and lacked a shared supportive leadership on the purpose of professional learning.

All teachers described things they changed, tried, or did as a result of PLC practice and thus how this had led to change in their pedagogical practice over the last 6 years of PLC interactions and collaboration. However, no participant could describe the extent to which PLC interaction and collaboration served in their own professional learning about their pedagogical practice.

In conclusion, teachers in this study collaborated, discussed, shared ideas, bounced ideas off each other, came up with some commonality, looked at scope and sequence, and reflected on their practice. Reflection for these teachers may eventually lead to teachers changing what they do, even if changes in this district are on a small scale—change is change. Teachers changed what they did in the classroom, and that was connected to PLC interaction and collaboration, not always by tangible products, but by the intangible metacognitive processing of pedagogical reflective practice. For each school in this study, it was obvious that teachers thought about what they did and further investigated the effectiveness of their personal pedagogical practice, regardless of what tangible product they gained from the PLC process.
The data suggests that even though some teachers were not consistent active participants in PLC interactions and collaboration, they still gained ideas, tangible and intangible, through reflective practice that changed their pedagogical practice.

**Recommendations**

Bolam et. al. (2005) suggested that PLCs have stages of development, dependent on the characteristics of an effective PLC. Much of the literature suggested that effective PLCs share the following characteristics (DuFour, 2004; DuFour et al., 2005; Feger & Arruda, 2008; Hord, 1997; Little, 2002; Reichstetter, 2006):

- Collaboration and collegiality
- Shared leadership
- Mission, vision, values, and goals
- Focus on improvement
- Shared practice

There were several recommendations made from this study.

1. PLCs in this district and at each school studied were in an early stage of development. Schools in this study should consistently seek opportunity and staff development on PLCs to share values and vision. Teacher frustration has grown in several schools due to the lack of direction and understanding of how to go about PLC practice and the connection to teacher practice. Much of the literature reviewed for this study revealed the need for common shared values and vision. Vision must have direction, and direction must have leadership in terms of how PLCs should operate. In
order for teachers to feel like PLCs are part of what they do in the classroom, the
direction of PLC practice should be tied directly to teacher pedagogy. Teacher PLC
process should match what teachers need to do in the classroom. Shared values are
something everyone who is part of the PLC places worth in. It is obvious that the most
impactful PLCs in the study were those that shared vision and values and thereby placed
worth on similar pedagogical practice.

It is highly recommended that PLCs visit their shared vision and values each year.
It is also recommended that administration help teachers find PLC practices that connect
with instructional practice. PLC development, from early to mature stages, will be
critical to how PLC process connects to teacher pedagogical practice.

2. Motivation for teachers was directly tied to collective collaboration focus on
student learning and teacher practice. Each participant described and verified that their
motivation to want to interact in PLC groups and reflect on their practice was tied
directly to what the PLC group did. If the PLC group focused on teacher practice and
student learning, teachers were motivated to share ideas and take ideas from PLC
meetings and change their pedagogical practice. The schools in this study should be
vigilant in their PLC process in getting teachers to connect what they do in PLC to their
pedagogical practice. Two of the three schools had attempted to connect PLC process
with teacher pedagogical practice, and those two schools have much greater teacher
motivation than the other school in the study.

3. Some master teachers in the study perceived themselves as above the PLC
process and more knowledgeable than their peers. Several master teachers in the study
expressed that their knowledge far surpassed that of their peers and, as a result of this
sense of elitism, teachers lost focus as a group on the PLC process of collaboration. At least half of the master teachers viewed themselves as individuals and not part of a group working on reflective professional practice. With the elitist attitude of some participants, there was no sense of inclusive membership to the professional community of teachers learning about their practice. One school in particular had the most veteran master teachers, and that school had the least effective PLC.

Much of the literature suggested that in order for a PLC to be effective there must be mutual respect and trust. The literature also suggested that effective teachers have an openness to improvement even if they have a broad foundation in the knowledge and skills of teaching (Feger & Arruda, 2008). Several master teachers in this study perceived themselves as above the PLC process and did not have an openness to improvement. These teachers prevent PLCs from being effective and require intervention from administrators and peers but, because of their longevity in the profession, prevent others from questioning their position in the PLC group.

A piece of the issue for master teachers was the lack of direction provided by the school and the school district. The lack of direction, shared leadership, and shared vision has led to an attitude of elitism by some master teachers. The school and school district should provide continued staff development and literature to shift the paradigms of the elitist master teachers so that they can further develop their openness, partnerships, and the collective membership to the professional communities of teachers reflecting on their practice. Master teachers need to further learn about what works and does not work in their pedagogical practice for their students, the same as a nonmaster teacher.
The school administrators and district should further help build community within PLC groups to increase collective membership and cohesion between teachers. It is important to note that just because a master teacher is decorated does not mean that he or she is above collaboration and growing as a professional. Until the schools ensure equality in collaboration through team building and inclusive membership of all teachers, there will continue to be a divide between teacher productivity in PLCs and the lack of PLC practice to classroom practice.

4. The school district and each school has adopted the DuFour (2004) model for PLC practice. The schools asked teachers to reflect on what they want students to learn. All schools in this study had developed essential learnings defined by state and national standards and adopted by each PLC group.

The school has also asked teachers to reflect on how they will know when students learn the essential learnings. Teachers had constructed, or had begun to construct, common formative and summative assessments that will help them study student learning and teacher practice.

The school had also asked teachers to reflect on how they might respond when a student experienced difficulty learning. Each school and the district had fallen short of addressing what to do if and when students did fall short on common assessments. What was interesting to note was that some master teachers in this study had constructed and used common assessments, but the information they got from the assessment was perceived as something that served either their grade book or a form reported on PLC process for administrative purposes. No participant could describe how assessment data and analysis could be used or how they as teachers should respond when students fell
short of mastery on essential learnings, standards, or objectives. Teachers suggested that because of when they gave the common assessment, the impact on their teaching was not something they had time to address. Most participants suggested that their PLC focused on results but could not describe how they judged the effectiveness of the assessments on their classroom practice.

The district and each school needs to develop a plan of action with and for teachers that describe how to use data to reflect on their classroom practice, and therefore how to improve classroom pedagogy. Master teachers are great teachers with long experiences in the profession, but no matter how long a person teaches, assessment data tells a story of how teachers teach and how or what students have learned. Using this information to be better at teaching and learning should be the foundation of the model being implemented by the schools and the school district. The lack of education and direction provided by the district and the schools is the primary source of frustration experienced by teachers. Continued staff development could help build stronger networks, partnerships, and further lead to instructional improvement for each participant.

5. It is important to recommend to Washington High School that the school seriously consider the structure of their PLCs. PLCs are a time for teachers to meet, look at data, reflect on instructional practice, and change what they do so that instructional practices equate to increased student achievement. The school needs to separate committees from PLC time. A committee is not a PLC, as the tie to teacher practice and student achievement is far too distant and indirect to warrant the time away from PLC interaction as it relates to the classroom.
The PLC concept is specifically designed to develop the collective capacity of a staff to work together to achieve the fundamental purpose of the school—high levels of learning for all students. Leaders of the process purposefully set out to create the conductions that enable teachers to learn from one another as part of their routine work practices (DuFour et al., 2005).

The lack of direction and shared leadership provided by the school for teachers on how to conduct PLC process has led to a culture of distrust, little supportive leadership, little connection to classroom practice, and therefore little impact on teacher practice or student achievement. The administration at this school should seek a much deeper understanding of PLC practice. The school should further look at exemplars for effective PLCs in their own district, around their state, and around the country. Implementing quality PLC practice seen in schools similar to theirs will provide a culture of collaboration for teachers of their school to be reflective practitioners. Until the school seeks to make their PLCs reflect the literature and model adopted by the school district, teachers will continue to be frustrated and disconnect from the PLC process, and the impact on teacher practice will be minimal.

**Future Study**

There were several limitations to this study. The study was limited to one school district in the sixth year of implementing PLCs. The study was also limited to three high schools that conduct PLCs from a building level, by department and subdepartment subject groups, and as a school improvement model. Since each school was a unique case, it is important to note that the execution of the PLC process was different at each
school. The study was also limited to four master science teachers at each school. It would be logical to suggest that not all of the cases in a high school are from the eyes of a master teacher. It also might be logical to suggest that more case studies of the “average” teacher could reveal different outcomes as seen in this study. The study also focused on science teachers. Future studies could focus on other disciplines (e.g., English, social studies) and thus yield very different results. The dynamics created by working in disciplines such as science creates the need for very specific types of pedagogy. In the absence of a PLC, teachers of science work together to ensure they share equipment needed for laboratory investigation. Other disciplines might not have this natural dynamic and, as such, might yield different results in terms of established collaborative culture.

The number of years the schools have implemented PLCs, and the way in which PLCs are conducted, have limited the research outcomes of this study. An investigation in another school district might yield different results given both the length of time the school has implemented PLCs and the way in which PLCs are implemented. Furthermore, since this study looked at the story of the master science teacher, a future study in another school district could yield very different results, given a regular classroom teacher with less experience.

Some results from this study point to PLC group member frustration versus PLC group member motivation. It is interesting to note participants who did not express frustration were very motivated to work in their PLC groups, interact, collaborate, and reflect on their instructional practice. Participants who did express frustration were less than motivated to work in their PLC group and did not want to work in their PLC groups.
The lack of PLC work led to a dysfunctional group dynamic that further restricted PLC function and production. Groups that could not work together because of group dynamics—seen at Roosevelt (physics PLC), Washington (all PLCs), and Jefferson (biology PLC)—were not motivated to work on PLC process and/or collaborate together. The lack of interaction and collaboration led to no product and, therefore, little impact on teacher pedagogical change. A future study could investigate group dynamics and how that plays on motivation to interact and collaborate in PLCs. The dynamics of the group definitely impacts what PLC work is completed, and it was beyond this study to look at all of those dynamics as it related to teacher motivation.

Group dynamics in each PLC affected collaboration of group members. Each PLC group member did not necessarily collaborate freely each PLC meeting. Master science teachers worked together in PLC groups sharing information. Some PLC meetings, teachers did not voluntarily give information from their experience and perspective and as a result did not collaborate goals, responsibilities, and accountability. A future study could focus on effective collaboration characteristics on teacher instructional change. Data from this study suggest collaboration affected teacher classroom practice, but the extent of teacher changes in practice as it was connected to effective collaboration was beyond the scope of this study.

In conclusion, this study investigated a multiple case study of three Midwestern high schools’ implementation of PLCs. This study investigated the impact of PLC interaction and collaboration on teacher classroom practice through the eyes of master science teachers. It is obvious that PLCs have impacted master teacher practice. It is also obvious that collaboration and interaction of PLCs has impacted pedagogical
practice of teachers in the study. To what extent teacher pedagogical practice has been
impacted, as stated previously, is open to judgment.
REFERENCES


Callahan, R. E. (1964). Education and the cult of efficiency: A study of the social forces that have shaped the administration of the public schools. Chicago, IL: The University of Chicago Press.


Study Title: Professional Learning Communities Impact on Science Teacher Classroom Practice in a Midwestern Urban School District

Interview Protocol #1a

Participant Name: ___________________________ Date: _______________

School: _____________________________________ Location: _______________

Introduction: I want to thank you for taking the time to talk to me. I will be recording and transcribing what we say today. I will also be asking you to review the transcription with some of the notes I make regarding my interpretations of what you say. It is important that I reflect in my writing what you mean. Therefore, I want you to review it to make sure I am representing your views. The transcription will be a verbatim one, so be prepared to see any “uhhs” or “ahs” that you say. If I use any quotes in the final written paper, those will not be there. It is important that the transcription be verbatim so that I do not paraphrase something you have said with incorrect interpretation.

What I am interested in finding out in this study is how professional learning communities impact your classroom practices. As a professional educator, you have pedagogical practices that you do every day with your students. Teaching, learning and assessment are some of the finer pieces of pedagogy that I am curious about. I would really like to know if, how, when and/or where professional learning communities influences what you do in the classroom.

You have had a chance to review the questions I am going to ask you today and give them some thought. I really want to know your perspective so please feel free to discuss your views. I may ask you some additional questions that you have not reviewed as we go along in order to clarify for me what you mean. Are you ready to start?

Research Questions:
The grand tour question for this study is, to what extent are teacher practices impacted by interactions and collaboration in professional learning communities?

Four research questions guide the study. The four questions are:
1. What definitions of PLCs are used by each school in this study?
2. What types of collaborative activities do teachers participate in, in PLCs as a result of the school definition?
3. What are teachers’ perceptions of PLCs both pre and post PLC meetings?
4. What practices (pedagogical and assessment) do teachers take from PLCs and implement in their classrooms?

Tell me about your teaching assignment here.
   a. What is your teaching and plan schedule?
b. What classes do you teach (subjects, courses, etc.)?
c. Explain your teaching career in terms of where you have taught and the
courses you have taught.

Describe your average day in terms of how you plan out a day and how your day unfolds
in terms of teaching, learning and assessment.
   a. Explain your teaching and learning cycle in day?
   b. What types of teaching and learning activities do you use with students each
day?
   c. In an average week, what is your cycle and what types of things do you do as a
teacher within each unit you study?

Describe how you plan out a day, a term and a year.
   a. Explain how you plan out a course?
   b. Do you construct your own scope and sequence or do you do use something
provided? Explain please.
   c. When do you decide to assess? What determines what you assess and how?
   d. Describe to me how you award grades based on your assessments.

Tell me about your professional learning community. How does your school define a
PLC and/or norms of behavior in PLCs?
   a. What norms does your PLC have?
   b. Describe how PLC’s got started in your building. I am interesting in knowing
how PLC’s have been established as a way of doing business?
   c. To what extent have teachers been introduced to collaboration? Explain any
training you have had in collaboration as part of PLC process.
   d. What types of things does your PLC do to ensure equal collaboration from
members?
      e. Explain a typical PLC meeting, please describe your PLC process.
      f. What do you think is best about your professional learning community? Worst?
      g. What types of things does your PLC produce?
      h. Describe items that you work on with PLC members (assignments, activities,
labs, quizzes, tests, et.).

What types of collaborative activities do you take away from your PLC and try in your
classroom?
   a. Are these things already what you do, new or hybrids?
   b. Do you think PLC activities are useful to student learning? Explain.
   c. Do you think PLC activities change what you do as a teacher with your
students? Provide examples please.
   d. What types of things have you gotten from PLCs that have been most helpful
for student learning? Provide examples please.
   e. Does your PLC develop common pedagogical activities (instructional strategies
and/or assessment pieces)?
   f. Does your PLC develop and use common assessment?
What else can you tell me about your experiences with PLCs and your teaching career?

a. Do you have experience in leadership of PLCs?

b. Do you have experience in higher learning of effective PLCs practice?

c. Describe any education you have that helps you and your PLC function.
Appendix A

Study Title: Professional Learning Communities Impact on Science Teacher Classroom Practice in a Midwestern Urban School District

Interview Protocol #1b

Participant Name: ___________________________ Date: __________________

School: __________________________________ Location: _______________________

Introduction: I want to thank you for taking the time to talk to me again. Please remember that I will be recording and transcribing what we say today. I will also be asking you to review the transcription with some of the notes I make regarding my interpretations of what you say. It is important that I reflect in my writing what you mean. Therefore, I want you to review it to make sure I am representing your views. The transcription will be a verbatim one, so be prepared to see any “uhs” or “ahs” that you say. If I use any quotes in the final written paper, those will not be there. It is important that the transcription be verbatim so that I do not paraphrase something you have said with incorrect interpretation.

Since our last meeting, you have met in your PLC. What I am interested in finding out in this study is how professional learning communities impact your classroom practices. That has not changed. Today I am interested in finding out how your PLC meetings are going and how/what you have taken away from PLCs and working in with your daily curriculum. Last time, we talked about the idea that as a professional educator, you have pedagogical practices that you do every day with your students. Teaching, learning and assessment are some of the finer pieces of pedagogy that I am curious about. I would really like to know if, how, when and/or where professional learning communities influences what you do in the classroom.

You have had a chance to review the questions I am going to ask you today and give them some thought. I really want to know your perspective so please feel free to discuss your views. I may ask you some additional questions that you have not reviewed as we go along in order to clarify for me what you mean. Are you ready to start?

Research Questions:
The grand tour question for this study is, to what extent are teacher practices impacted by interactions and collaboration in professional learning communities?

Four research questions guide the study. The four questions are:

1. What definitions of PLCs are used by each school in this study?
2. What types of collaborative activities do teachers participate in, in PLCs as a result of the school definition?
3. What are teachers’ perceptions of PLCs both pre and post PLC meetings?
4. What practices (pedagogical and assessment) do teachers take from PLCs and implement in their classrooms?

Remind me about your teaching assignment here.
  a. What is your teaching and plan schedule?
  b. What classes do you teach (subjects, courses, etc.)?
  c. Explain your teaching career in terms of where you have taught and the courses you have taught.

Tell me about your professional learning community. Has anything changed since we last met in terms of what your PLC produces and/or how you are using PLC products in the classroom? Explain please.
  a. Explain a typical PLC meeting.
  b. What do you think is best about your professional learning community? Worst?
  c. What types of things does your PLC produce?
  d. Describe items that you work on with PLC members (assignments, activities, labs, quizzes, tests, etc.).
  e. To what extent do you think each member of the PLC team collaborates equally.
  f. Provide an example of a time when each PLC member had equal peer collaboration that resulted in something that you used in your classroom.

What types of collaborative activities have you taken away from your PLC and tried in your classroom?
  a. Are these things already what you do, new or hybrids?
  b. Do you think PLC activities are useful to student learning? Explain.
  c. Do you think PLC activities change what you do as a teacher with your students? Provide examples please.
  d. What types of things have you gotten from PLCs that have been most helpful for student learning? Provide examples please.
  e. Does your PLC develop common pedagogical activities (instructional strategies and/or assessment pieces)?
  f. Does your PLC develop and use common assessment?

What else can you tell me about your experiences with PLCs since we last met?
Appendix A

Study Title: Professional Learning Communities Impact on Science Teacher Classroom Practice in a Midwestern Urban School District

Survey Protocol

Participant Name: __________________________ Date: ______________________

School: ______________________________ Location: __________________

Introduction: I want to thank you for taking the time for me again. Please remember that I will be transcribing what you write today. I will also be asking you to review the transcription with some of the notes I make regarding my interpretations of what you wrote. It is important that I reflect in my writing what you mean. Therefore, I want you to review it to make sure I am representing your views. The transcription will be verbatim of what you wrote. It is important that the transcription be verbatim so I do not paraphrase something you wrote with incorrect interpretation.

Since our last meeting, you have met in your PLC and had the opportunity to get back into your classroom and work with your students. What I am interested in finding out is how professional learning communities impact your classroom practices. That has not changed. Today I am interested in finding out how your PLC meetings affected what you are doing in the classroom. Last time, we talked about the idea that as a professional educator, you have pedagogical practices that you do every day with your students. Teaching, learning and assessment are some of the finer pieces of pedagogy that I am curious about. I would really like to know if, how, when and/or where professional learning communities influences what you do in the classroom.

Please write freely. Type your responses and feel free to edit them as you see fit. Keep in mind the purpose of the study and what I am trying to find out. The questions for my study are listed below for your review. Most important, be honest in what you say you are doing and how you feel about PLC and classroom practice.

Research Questions:
The grand tour question for this study is, to what extent are teacher practices impacted by interactions and collaboration in professional learning communities?

Four research questions guide the study. The four questions are:
1. What definitions of PLCs are used by each school in this study?
2. What types of collaborative activities do teachers participate in, in PLCs as a result of the school definition?
3. What are teachers’ perceptions of PLCs both pre and post PLC meetings?
4. What practices (pedagogical and assessment) do teachers take from PLCs and implement in their classrooms?
Describe your last professional learning community meeting.

Do you think everyone spoke freely about what they know about their students’ performance?

Do you think everyone spoke freely about what they do in their classrooms as a result of student performance?

Do you think everyone spoke freely about what they do from a pedagogy standpoint (e.g., an assessment, a lessons, a lab, a learning strategy, etc.) within a unit of study? Explain please.

Describe what your PLC group collaborated on in your last PLC meeting.

Explain the pedagogical strategies (e.g., an assessment, a lessons, a lab, a learning strategy, etc.) that you collaborated on in the last PLC meeting that you tried in your classroom.

Do you think these strategies were effective for you as a teacher? Explain your response please.

Do you think your PLC group does a good analyzing where students are and therefore what you need to do to ensure the success of your students? Explain your response please.

Explain what types of things your PLC could do to be more efficient at helping every teacher in your PLC group.
What else can you tell me about your experiences with PLCs since we last met?
Appendix A

Study Title: Professional Learning Communities Impact on Science Teacher Classroom Practice in a Midwestern Urban School District

Interview Protocol #2 – Administrator Interview

Participant Name: ___________________________ Date: ________________

School: __________________ Location: _______________________

Introduction: I want to thank you for taking the time to talk to me. I will be recording and transcribing what we say today. I will also be asking you to review the transcription with some of the notes I make regarding my interpretations of what you say. It is important that I reflect in my writing what you mean. Therefore, I want you to review it to make sure I am representing your views. The transcription will be a verbatim one, so be prepared to see any “uhs” or “ahs” that you say. If I use any quotes in the final written paper, those will not be there. It is important that the transcription be verbatim so that I do not paraphrase something you have said with incorrect interpretation.

What I am interested in finding out in this study is how professional learning communities impact teacher classroom practices. As a professional educator and administrator, you have practices that you do every day with teachers and students. I am curious about your work with teachers in teaching, learning and assessment practices with students. I would really like to know if, how, when and/or where professional learning communities influence what is done in the classroom.

You have had a chance to review the questions I am going to ask you today and give them some thought. I really want to know your perspective so please feel free to discuss your views. I may ask you some additional questions that you have not reviewed as we go along in order to clarify for me what you mean. Are you ready to start?

Research Questions:
The grand tour question for this study is, to what extent are teacher practices impacted by interactions and collaboration in professional learning communities?

Four research questions guide the study. The four questions are:
1. What definitions of PLC’s are used by each school in this study?
2. What types of collaborative activities do teachers participate in, in PLCs as a result of the school definition?
3. What are teachers’ perceptions of PLC’s both pre and post PLC meetings?
4. What practices (pedagogical and assessment) do teachers take from PLC’s and implement in their classrooms?

Tell me about your administrative assignment here.
Explain your involvement with teachers.
   a. What involvement do you have with teachers each day?

Describe your average day.
   a. What is your involvement with students?
   b. Explain your involvement (if any) in the learning cycle?

Tell me about your professional learning community. How does your school define a PLC and/or norms of behavior in PLC’s?
   a. When and how did PLC’s get started here?
   b. What norms does your PLC have?
   c. Explain a typical PLC day.
   d. What types of things does your PLC do to ensure equal collaboration from members?
   e. What subject, how many people, what roles does each person serve?
   f. Personally, what do you think is best about your professional learning community? Worst?
   g. To what extent are administrators and teachers introduced to collaboration as a part of PLC’s?

Describe your involvement in professional learning communities.
   a. Explain the history of PLC here at your school.
   b. Describe how your school defines a professional learning community.
   c. Describe what you do with PLC’s (administrative PLC, work with teachers in PLC’s)?
   d. When teachers meet in PLC’s, do you have expectations of them to produce something? If so, please provide an example.
   e. When teachers work in PLC’s, do you work with them to produce things? Do you oversee what they produce? If so, please provide examples.

Describe to what extent you think teacher practices are impacted by interactions and collaboration in professional learning communities?

Describe from your perspective what you think teachers’ perceptions of PLC’s are.
   a. Do you think teachers have a positive or negative perception of PLC’s? Why?
   b. Do you think teachers collaborate in a positive way for student learning in PLCs?
   c. Explain anything you think holds teachers back from collaborative activities in PLC’s.

Describe from your perspective what practices (pedagogical and assessment) you think teachers take from PLC’s and implement in their classrooms?
   a. Do you think teachers make common assignments? Provide examples.
   b. Do you think teachers make common assessments? Provide examples.
c. Do you think teachers collect and use data to make common assignments and/or assessments? Provide examples.

What else can you tell me about PLCs and teacher practice at your school that we have not discussed?
Appendix B

Interview-Survey Verification Form

Study Title: Professional Learning Communities Impact on Science Teacher Classroom Practice in a Midwestern Urban School District

Dear Research Participant,

Please review the enclosed transcript of our recent interview or survey concerning your professional learning community function and classroom practice information. Feel free to note any errors that you find in order to make all information as accurate as possible. Also, please sign on the proper line below to indicate your level of approval for your part in this project. Thank you for your time.

My signature below indicates my approval of the recorded interview at one of the following levels:

__________ I approve of the interview-survey transcript without reviewing it.

__________ I approve of the interview-survey transcript without changes.

__________ I approve of the interview-survey transcript with noted changes.

__________ I do not approve of the interview-survey transcript. Concerns are written below:

___________________________________  _________________________
Signature of participant                   Date

___________________________________  _________________________
Dan Carpenter – Principal Investigator     Date
Participant Information Form

Study Title: Professional Learning Communities Impact on Science Teacher Classroom Practice in a Midwestern Urban School District

1. Participant Personal Information -

First and Last Name: __________________________________________

Age: __________ Gender: _______ Ethnicity: ______________

Home Address: ______________________________________________

Home Phone Number: __________ Cellular Number: ____________

E-mail: ______________________________________________________

College Degree(s): __________________________________________

Teaching Certification(s): _____________________________________

Special Needs or Conditions: _________________________________

How and when is the best way to contact you?: ____________________

2. School Information -

Name of School: ______________________________________________

Subjects that you teach: ________________________________________

PLC Group/Subgroup: _________________________________________

How many people are in your PLC? ______________________________

Other school activities involved in: ______________________________

Awards and recognitions you have received: ______________________

3. Miscellaneous -

Please describe below any information you would like to share either about your school, classroom, students or about your PLC.
Appendix C

Participant Information Form

Study Title: Professional Learning Communities Impact on Science Teacher Classroom Practice in a Midwestern Urban School District

1. Participant Personal Information -

First and Last Name: ____________________________________________________________

Age: _______________  Gender: ______  Ethnicity: ________________

Home Address: ______________________________________________________________

Home Phone Number: ___________  Cellular Number: ______________

E-mail (parent, athlete): ______________________________________________________

College Degree(s): __________________________________________________________

Teaching and Administrative Certification(s): _________________________________

Special Needs or Conditions: _______________________________________________

How and when is the best way to contact you?: ________________________________

2. School Information -

Name of School: _____________________________________________________________

Administrative Responsibilities: _____________________________________________

PLC Group/Subgroup (if applicable): _________________________________________

Other school activities involved in: ___________________________________________

Awards and recognitions you have received: _________________________________

3. Miscellaneous -

Please describe below any information you would like to share either about your school, classroom, students or about your PLC.
Appendix D

Research Log

Study Title: Professional Learning Communities Impact on Science Teacher Classroom Practice in a Midwestern Urban School District

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<th>Time</th>
<th>Activity</th>
<th>Participant</th>
<th>Audio</th>
<th>Field Notes</th>
<th>Paper copies of Document</th>
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<th>* Physical Artifact (teacher computer copies of documents, posters, etc.)</th>
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* A physical artifact is anything not in paper form provided by participants as record of their experience. Physical artifacts and documents will include work completed by teachers, administrators and the school as a result of their work in PLC’s.
Appendix E

Field Notes Form

Study Title: Professional Learning Communities Impact on Science Teacher Classroom Practice in a Midwestern Urban School District

<table>
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<tr>
<th>Date</th>
<th>Drawing and/or Description</th>
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Appendix F

Peer Examiner Attestation

Study Title: Professional Learning Communities Impact on Science Teacher Classroom Practice in a Midwestern Urban School District

The role that I played in the exploration of professional learning communities impact on science teacher classroom practice was that of researcher and peer reviewer of transcripts. The debriefing occurred throughout the time of data collection, transcription and analysis. As a part of the process, I read the proposal, all of the verbatim transcripts of interviews and the thematic unit formation of the researcher’s notes. Summaries of the debriefing session were recorded and used as a resource when writing the results.

The central purposes of the debriefing sessions were to establish credibility and explore aspects of the research that might otherwise have remained implicitly in the researchers mind. Through the process of playing devil’s advocate, I attempted to probe potential biases, explore meanings in the data and clarify basis for interpretation of data by studying the coding procedures and categories. During the sessions we discussed working hypotheses and themes that emerged and discussed the test steps in the methodological design.

_________________________________________  __________________________
Signature of participant                      Date

_________________________________________  __________________________
Dan Carpenter – Principal Investigator        Date
Participant Informed Consent Information

Title:
Professional Learning Communities' Impact on Science Teacher Classroom Practice in a Midwestern Urban School District

Purpose:
The purpose of this study is to explore professional learning communities' impact on teacher classroom practice. This study is being conducted for research purposes. You are being asked to participate in this study. As a teacher your honest and candid perceptions regarding professional learning communities and your perceptions of the relative impact of PLC practices on teacher classroom practice (pedagogical activities and assessment practices) will help us understand how professional learning communities impact other teachers classroom practices. This information will be useful in improving PLC practice and its relationship to teacher classroom practice.

Procedures and the Role of Participants:
We are asking you to complete a personal interview and a short survey indicating your experiences in PLCs. Interviews will take place at your school, either in your classroom or a nearby office. Interviews will be audio/digitally recorded. We are also asking you to allow me to come into your PLC and classroom to observe teacher practice. We will ask for artifacts such as PLC minutes, products (lessons, lesson plans, assessments) and materials that you give students as part of your normal classroom function.

Time:
You will be interviewed twice in a face-to-face discussion. Interviews will take no more than 30 minutes. We will also ask that you complete three surveys during the study. Each survey should take no more than 15 minutes. You will be observed three times in your classroom and three times in your PLC. Observations will require no time or extra materials from you. Each observation will take one full class period or one full PLC meeting period.

Over the duration of the study (four months) you should spend no more than two hours and thirty minutes completing all materials (surveys and interviews).

Risks:
There is no known risks or discomforts associated with this research.

Confidentiality:
The interviews, surveys, observations and documents collected in this study will not identify you by name. The interviews, surveys, observation information and documents will in no way, be able to track back to who answered what to any specific question. All document collected will have all identifying marks removed. Documents collected for this study will be kept in a secure office and will only be seen by the investigator. Records will be kept for no longer than two years after the study is complete. Results will be reported so that no specific individual or school will be identified by name.

Benefits:
Information gather from this study will be used to help better understand professional learning communities practices and the relationship of those practices to teacher classroom practices. This information is critical to the administration of effective professional learning communities. This information will better help your school district understand what types of things teachers do and therefore from an administration standpoint, what can be done to make professional learning communities a more functional piece of the educational process.

Compensation:
You will not receive any monetary compensation for participating in this project.

Opportunity to Ask Questions:
You may ask questions concerning this research at any time during the study and have those questions answered before agreeing to participate. You may contact me by e-mail at dcarpen@lps.org or call me directly using my cellular number (402-617-9849). If you have questions about your rights as a participant in this study that have not been answered by the investigator, you may contact Jon Pedersen at jep@unl.edu or call him using his office number (402-472-4124). You may also contact the University of Nebraska Institutional Review Board by way of e-mail at irb@unl.edu, or by phone (402-472-6965).

Freedom to Withdraw:
You are free to decide not to participate in this study or to withdraw at any time without adversely affecting your relationship with the researchers, LPS, or the University of Nebraska-Lincoln. Your decision will not result in any loss of benefits to which you are otherwise entitled.

Consent:
You are voluntarily making a decision whether or not to participate in this research study. Your signature certifies that you have decided to participate having read and understood the information presented. You will be given a copy of this consent form to keep.

Please check the box below to indicate your willingness to be audio/digitally recorded.

☐

Signature of Participant:

Signature of Research Participant ___________________________ Date ___________________________
Title:
Professional Learning Communities' Impact on Science Teacher Classroom Practice in a Midwestern Urban School District

Purpose:
The purpose of this study is to explore professional learning communities' impact on teacher classroom practice. This study is being conducted for research purposes. You are being asked to participate in this study. As an administrator your honest and candid perceptions regarding professional learning communities and your perceptions of the relative impact of PLC practices on teacher classroom practice (pedagogical activities and assessment practices) will help us understand how professional learning communities impact other teachers classroom practices. This information will be useful in improving PLC practice and its relationship to teacher classroom practice.

Procedures and the Role of Participants:
We are asking you to complete a personal interview indicating your experiences in PLCs as an Administrator. Interviews will take place at your school in your office or a nearby office. Interviews will be audio/digitally recorded.

Time:
You will be interviewed once in a face-to-face discussion. The interview will take no more than 30 minutes.

Risks:
There is no known risks or discomforts associated with this research.

Confidentiality:
The interviews and documents collected in this study will not identify you by name. The interview and documents will in no way, be able to track back to who answered what to any specific question. All document collected will have all identifying marks removed. Documents collected for this study will be kept in a secure office and will only be seen by the investigator. Records will be kept for no longer than two years after the study is complete. Results will be reported so that no specific individual or school will be identified by name.
Benefits:
Information gather from this study will be used to help better understand professional learning communities practices and the relationship of those practices to teacher classroom practices. This information is critical to the administration of effective professional learning communities. This information will better help your school district understand what types of things teachers do and therefore from an administration standpoint, what can be done to make professional learning communities a more functional piece of the educational process.

Compensation:
You will not receive any monetary compensation for participating in this project.

Opportunity to Ask Questions:
You may ask questions concerning this research at any time during the study and have those questions answered before agreeing to participate. You may contact me by e-mail at dcarpen@lps.org or call me directly using my cellular number (402-617-9849). If you have questions about your rights as a participant in this study that have not been answered by the investigator, you may contact Jon Pedersen at jep@unl.edu or call him using his office number (402-472-4124). You may also contact the University of Nebraska Institutional Review Board by way of e-mail at irb@unl.edu, or by phone (402-472-6965).

Freedom to Withdraw:
You are free to decide not to participate in this study or to withdraw at any time without adversely affecting your relationship with the researchers, LPS, or the University of Nebraska-Lincoln. Your decision will not result in any loss of benefits to which you are otherwise entitled.

Consent:
You are voluntarily making a decision whether or not to participate in this research study. Your signature certifies that you have decided to participate having read and understood the information presented. You will be given a copy of this consent form to keep.

Please check the box below to indicate your willingness to be audio/digitally recorded.

☐

Signature of Participant:

____________________________________  ______________________
Signature of Research Participant        Date
To: XXXXXXXX
From: Dan Carpenter
RE: Institutional Approval
Date: November 30th, 2011

My name is Dan Carpenter. I am a doctoral candidate at the University of Nebraska – Lincoln. I would like to work with your high school science professional learning community for my dissertation study.

The title of the study is Professional Learning Communities Impact on Science Teacher Classroom Practice in a Midwestern Urban School District.

Study Description: The purpose of this study is to determine the relative impact of collaborative efforts in professional learning communities on select science teacher classroom practice.

Nature of the study: The nature of the study is to determine the impact of professional learning community collaborative efforts on teacher practice and the implementation of PLCs practices to determine: 1.) what collaborative efforts teachers focus on during PLC meeting times, 2.) what types of practices (pedagogical activities and assessment practices) teachers take from collaborative PLCs, 3.) what practices (pedagogical activities and assessment practices) teachers implemented in their classroom with students as a result of PLC collaborative efforts, 4.) what teacher practices (pedagogical activities and assessment practices) changed in their classrooms with their students as a result of PLC collaborative efforts.

The study is a collection of data about existent, well-established professional learning communities and teacher practice. The study is an observation, reputation case-based exploration. The study does not include a treatment or application approach to change existing practice.

Data Collection Methods: Twelve secondary science teachers, three secondary administrators and three secondary schools will be asked to participate in this study. Teachers will be purposefully selected based on reputation and longevity in the profession. Administrators will be purposefully selected based on their interaction with and connection to science teachers and their professional learning communities. The study will not include students.

Administrators that work with science teachers’ appraisal process and professional learning communities will be interviewed. Teachers will be interviewed, surveyed and observed during the study. Science teachers will be observed in their professional learning communities and in their classroom.

Timing of Data Collection: Administrators interviews will take no more than thirty minutes. Teacher interviews and surveys will take no more than thirty minutes. Observations will require nothing of teachers, administrators or the school. Dates of participation are listed below and are negotiable based on administrator and teacher availability.
December 27th, 2011 - March 19th, 2012 – Study duration for participants

December 27-30 – Call to participate
January 2-6 – Call to participate follow up

January 9-20 - Interview Administrator, Interview Teacher 1

January 16-27 - Observation PLC 1
January 16-27 - Observation Classroom 1
January 30- February 3 - Survey 1

February 6-17 - Observation PLC 2
February 6-17 - Observation Classroom 2
February 20-24 – Survey 2

February 27- March 9 – Observation PLC 3
February 27- March 9 – Observation Classroom 3
February 27- March 9 – Survey 3

May 7-18 – Interview Teacher 2
May 21- Thank you for participating

June –Data Analysis
June and July 2012 – Synthesis Final Report

Materials Needed: Your school will be required to produce nothing for this study. You will need no materials other than what administrators and teachers already use. Therefore no materials will be needed to participate in this study. Teachers will be required to produce nothing more than their daily work and reflective conversation strands about their current practices.

Expectations for the district and school: The school is being asked to provide access to secondary administrators and science teachers to make observations and collect existent data. Your school will be asked to provide access to the science-appraising administrator and select master science teachers. Science teachers will be expected to provide access to their professional learning community and classroom for observational purposes. Teachers will also be expected to give about six hours of their time over the duration of the study. During observations teachers will be expected to conduct business as they would always do and will require them to do nothing more than normal daily functions. Teacher interviews and surveys will take about thirty minutes each for a total of three hours of extra time over the duration of the study.

Thank you for your time.

Dan Carpenter
Doctoral Candidate
211D Henzlik Hall
University of Nebraska-Lincoln
Lincoln, NE 68508
402-617-9849
To: XXXXXXXXXXXX
    XXXXXXXXXXXX
From: Dan Carpenter
       Principal Investigator
Date: November 15th, 2011
RE: Study Proposal

My name is Dan Carpenter. I am a doctoral candidate at the University of Nebraska – Lincoln. I would like to work with three high school science professional learning communities in XXXXXXXXX for my dissertation study.

The purpose of this study is to determine the relative impact of collaborative efforts in professional learning communities on select science teacher classroom practice.

The nature of the study is to determine the impact of professional learning community collaborative efforts on teacher practice and the implementation of PLCs practices to determine: 1.) what collaborative efforts teachers focus on during PLC meeting times, 2.) what types of practices (pedagogical activities and assessment practices) teachers take from collaborative PLCs, 3.) what practices (pedagogical activities and assessment practices) teachers implemented in their classroom with students as a result of PLC collaborative efforts, 4.) what teacher practices (pedagogical activities and assessment practices) changed in their classrooms with their students as a result of PLC collaborative efforts.

The study is a collection of data about existent, well-established professional learning communities and teacher practice. The study is an observation, reputation case-based exploration. The study does not include a treatment or application approach to change existing practice.

Twelve secondary science teachers, three secondary administrators and three secondary schools will be asked to participate in this study. Teachers will be purposefully selected based on reputation and longevity in the profession. Administrators will be purposefully selected based on their interaction with and connection to science professional learning communities. The study will not include students.

Administrators that work with science teachers’ professional learning communities will be interviewed. Teachers will be interviewed, surveyed and observed during the study. Science teachers will be observed in their professional learning communities and in their classroom.
Administrators interviews will take no more than forty-five minutes. Each administrator participating will be interviewed once. Teacher interviews and surveys will take no more than thirty minutes each. Teachers will be interviewed and surveyed three times during the study. Observations will require nothing of teachers, administrators or the school. Dates and study participation are listed below.

December 27th, 2011 - March 19th, 2012 – Study duration for participants
December 27-30 – Call to participate
January 2-6 – Call to participate follow up
January 9-20 - Interview Administrator, Interview Teacher 1
January 16-27 - Observation PLC 1
January 16-27 - Observation Classroom 1
January 30- February 3 - Survey 1
February 6-17 - Observation PLC 2
February 6-17 - Observation Classroom 2
February 20-24 – Survey 2
February 27- March 9 – Observation PLC 3
February 27- March 9 – Observation Classroom 3
February 27- March 9 – Survey 3
March 12-16 – Interview Teacher 2
March 19 - Thank you for participating
March 19-30 –Data Analysis
April - May – Synthesis Final Report

The district and each school participating in the study will require no materials to participate. Teachers will be required to produce nothing more than their daily work. Teacher time will be the only commodity needed to collect data to support the study.

The district is being asked to provide access to secondary schools, administrators and science teachers to make observations and collect existent data. Schools will be asked to provide access to the school administration and selected science teachers. Science teachers will be expected to provide access to their professional learning community and classroom for observational purposes. Teachers will also be expected to give about six hours of their time over the duration of the study. During observations teachers will be expected to conduct business as they would always do and will require them to do nothing more than normal daily functions. Teacher interviews and surveys will take about thirty minutes each for a total of three hours of extra time over the duration of the study.

Dan Carpenter
Doctoral Candidate
211D Henzlik Hall
University of Nebraska-Lincoln
November 29, 2011

Dan Carpenter
UNL Graduate Student
Lincoln Southwest High School

RE: Request to Conduct Research

Dear Mr. Carpenter,

Your request to conduct a study entitled “Professional Learning Communities’ Impact on Science Teacher Classroom Practice in a Midwestern Urban School District” with Science teachers at selected high schools is approved. Please contact the principal at each school to secure their permission to proceed with the implementation of this study. Participant consent is required, please use the forms included in your request.

Sincerely,

Leslie E. Lukin, Ph.D.
Director of Assessment and Evaluation Services

cr:
Rob Slauson, Principal of Lincoln Southwest High School
Pat Hunter-Pirtle, Principal of Lincoln Southeast High School
Kurt Glathar, Principal of Lincoln Northeast High School
Fred Skretta, Principal of Lincoln North Star High School
Kirsten Smith, Science Curriculum Specialist
John Neal, Director of Secondary Education
Kay Byers, Supervisor of Elementary Personnel Service
Title of Research: Professional Learning Communities’ Impact on Science Teacher Classroom Practice in a Midwestern Urban School District

Multiple Reputation-based Case Study

Purpose - The purpose of this study is to explore professional learning communities’ impact on teacher classroom practice.

Question - To what extent are teacher practices impacted by interactions and collaboration in professional learning communities?
Why a reputation-based case study?

- It is an in-depth study of a program, event, process, groups and individuals.
- We have a bounded system
- There is a need to describe the context of the case where setting is key
- We have multiple expert sources of information
- Details provided in the case are from experts in the field with reputations as good teachers.
- Multiple cases needed to ensure generalizability (a measure of external validity of results)

What data sources?

- Interviews – Needed to get perspective of individual experts in the event, undergoing the process.
- Observations – Needed to verify interviews in PLC interactions, collaboration and practices. Observations of PLCs and classroom function needed to verify interview data. Needed for internal validity and data triangulation.
- Open Ended Surveys – Follow up to interview and observation data. Needed for internal validity and data triangulation.
- Documents and physical artifacts – As part of the audit process, needed for both internal and external validity of both interview and survey data.
- Observations and field notes – As part of the verification piece, needed to ensure external validity.
Study Participation Data Timing

Data Types and Sequence
Call to participate
Interview Administrator
Interview Teacher 1
Observation PLC 1
Observation Classroom 1
Survey 1
Observation PLC 2
Survey 2
Observation PLC 3
Survey 3
Interview Teacher 2
Thank you for participating

Study Participant Dates
December 27th, 2011 - March 19th, 2012 – Study duration for participants

December 27-30 – Call to participate
January 2-6 – Call to participate follow up
January 9-20 - Interview Administrator, Interview Teacher 1
January 16-27 - Observation PLC 1
January 30- February 3 - Observation Classroom
January 30- February 3 - Survey 1
February 6-17 - Observation PLC 2
February 20-24 – Survey 2
March 19-23 – Observation PLC 3
March 26-30 – Survey 3
May 7-18 – Interview Teacher 2
May 21- Thank you for participating

June and July –Data Analysis
August and September – Synthesis Final Report