

To the Graduate Council:

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DOES TEACHERS' WORK IN PROFESSIONAL LEARNING COMMUNITIES
EXPLAIN VARIATIONS IN THEIR STUDENTS' ACHIEVEMENT SCORES?
EXPLORING THE RELATIONSHIPS BETWEEN PROFESSIONAL LEARNING
COMMUNITY, TEACHER AND STUDENT CHARACTERISTICS

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ABSTRACT

Teachers' professional learning has been, and always will be, a critical thread of research. Over the last decade, however, the research on teacher professional learning has changed in two substantial ways. First, the way teachers learn on the job has changed. In the past, teachers attended one-time workshops, where they received information in a "sit and get" fashion. Today, teacher-learning communities are becoming more of the norm for learning on the job. In addition, today, it is also critical that teachers' learning bolster student achievement. That is to say, evaluators should be able to make direct connections between what teachers learn on the job to the impacts that learning has on their students.

This study examined the relationship between teachers' perceptions of professional learning communities, student achievement, and other teacher and student characteristics. The researcher administered the Professional Community Index to 141 teachers during the 2008-2009 school year at 9 southern California schools. In addition to the Index, the teacher collected demographic data on teacher experience, education, certification, and content knowledge. The researcher merged these data with a large, longitudinal data set, which included background characteristics on these teachers' students. The data gathered included student ethnicity, socioeconomic status, English language status, prior achievement, parent education level, and absences.

Results from several multiple regressions indicated that student background characteristics explained variations in student achievement. In the first regression, prior achievement scores accounted for approximately 37% of the variations in students' 2008 test scores. The second analysis indicated that once the block of student characteristic

variables were controlled, the professional learning community variable explained only a nominal percentage of the overall explanation of scores.

While the data for this sample suggested that teachers' work in professional learning communities had little impact on their students' scores, these results do not in anyway suggest that teacher learning is unsubstantial. The work teachers do within these communities may have influences on these students in ways that were not measured in this study or in ways that only long term research may capture.

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CHAPTER I

INTRODUCTION

The Shifting View of Professional Learning

In recent years, no two ideas seem to have dominated the discourse in education more than highly qualified and accountability. According to the No Child Left Behind Act (NCLB), teachers are highly qualified if they have attained a bachelor's degree or better in the subject taught, obtained full state teacher certification, and demonstrated knowledge in the subjects taught. Recently, however, states have been given an additional tool so that teachers meet the highly qualified status; these guidelines are referred to as the High, Objective, Uniform State Standard of Evaluation (HOUSSE), where teachers provide proof they are highly qualified using artifacts from previous teaching experience, professional development, and knowledge in the subject acquired over time (U.S. Department of Education, ¶ 2, 2003). Of course, this alternative route to achieving the highly qualified status raises additional issues concerning the quality in previous teaching experiences and professional development.

The second term alluded to earlier is accountability. Under NCLB standards, every state prepares an accountability plan, whereby it outlines the knowledge students should have and the ways in which students will be tested on that knowledge. These tests are then used to determine “adequate yearly progress” (AYP), which requires states to set clearly established goals for teaching all students state content standards. A school's AYP reflects its yearly progress toward these goals. The process requires five steps. First, states develop content standards, which reflect what students should be able to do.

Second, states establish a starting point, calculated by assessment experts, using the suggestions identified by the NCLB Act, which states that the starting point is either the largest of the lowest performing group in the state or the 20th percentile school within the state. One of these two options provides the school and the state with a starting point for measurement purposes. The third step is establishing targets for increasing the number of proficient students with the goal of 100% proficiency by 2014. The states then measure student and school progress. In most states, children in grades 3-8 are assessed yearly in math and English; children in grades 10-12 are assessed once. In step five, action plans are implemented for schools failing to meet AYP, which range from business as usual in year one to a complete restructuring after seven years of inadequate yearly progress (The Education Trust, 2004). Essentially, the rationale behind these two ideas is relatively benign: all students have fully competent teachers, and all students achieve high standards of learning. However, the issues with which education and education policy makers continue to grapple, in regard to these “pillars” of the NCLB Act, are far from simple. One response to these provisions has been efforts to find ways to provide teachers with opportunities for high quality professional learning while simultaneously improving achievement for all students.

Finding time for high quality teacher professional learning is an issue that both teachers and school leaders confront every academic year. Efforts by school districts to provide teachers with professional learning experiences have been scrutinized by some, especially efforts that reward individual teachers with fiscal incentives (Campbell, Campbell, & Chia, 1998; Ramirez, 2001). In addition to the types of opportunities, the

quality of professional learning opportunities is insufficient to prepare the classroom teacher for today's students (Sparks, 2002). Many of the reform efforts taking place in teacher professional learning have called for a reconceptualization of the way learning occurs on the job—a shift from the traditional “sit and get” one-day workshop to a job-embedded form of professional learning, which occurs in an ongoing manner during the teacher's workday and links the learning to student achievement.

The Learning First Alliance determined that teacher professional learning that occurred in teacher research groups during the workday increased student achievement in reading (2000). WestEd (2000) echoed these results as they examined model professional development programs across the nation. Their findings suggested that effective schools embedded high quality teacher learning environments within the school culture with time devoted to learning activities. The work of these groups was largely based on calls by school leaders to turn schools into learning communities (National Association of Secondary School Principals, 1996), and the work of the Education Commission of the States (2000) that encouraged schools to build collegial, reflective, and collaborative learning environments.

Embedded in this notion of teacher professional learning is the idea that all students have competent teachers, and more recently this concept of teacher competence has extended beyond the individual teacher and into the realm of “professional community expertise” (Anderson, Rolheiser, & Gordon, 1998, p. 59), where the statement “teachers who work together, learn together” has become a modern-day battle

cry. Community expertise has essentially become the impetus for reform efforts in schools around the nation.

Schools as Professional Learning Communities

In 1983, the National Commission on Excellence in Education published a landmark report entitled, —A Nation at Risk: The Imperatives for Educational Reform.” Essentially, the commission assessed the quality of teaching and learning in the nation’s elementary, secondary, and postsecondary institutions. The report suggested a massive failure of these institutions to meet the needs of students entering a global marketplace. In their words, —the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation and a people” (p. 1). Because of these findings, systemic reform efforts began in schools across the country in an attempt to address the issues raised by the commission.

In these reform efforts, organizational learning became a central topic. Organizational learning is based on the philosophy that an organization can create and transfer knowledge, which maintains its sustainability in a changing and dynamic environment (Schön & Argyris, 1983; Senge, 1992). Based largely on organizational learning theories, educational institutions began examining their work settings and contexts, and major findings from this line of research suggested that teacher collaboration has the potential to improve student achievement (Little, 1982; Darling-Hammond, 1984; Rosenholz, 1989; Bryk & Driscoll, 1988). Rosenoltz’s findings, in particular, indicated that teachers, who felt supported in their practice and professional learning, were more effective teachers than those who were not (1989). Other researchers

found positive relationships between teacher networks and increased professional knowledge and skills (Talbert & McLaughlin, 1993; McLaughlin, 1994). Additionally, McLaughlin's research suggested the possibility of sharing professional knowledge and transferring the knowledge among teachers, which bolstered the notion of teaching as a learning organization and the professionalization of the teaching environment.

These findings gave schools additional reasons to restructure the way teachers learned on the job, and their reform efforts centered on providing teachers with increased autonomy and furthering opportunities for collaborative work (Darling-Hammond, 1996; Brandt, 1996). These restructured environments, where teachers worked in networks with increased autonomy, became learning communities in professional settings. As teachers' work and empirical research substantiated these professional learning communities (PLCs), focus extended beyond teacher knowledge and skill to student achievement. Indeed, numerous researchers began calling for and submitting proposals that directed teachers' work within these networks toward improving student achievement (Louis & Kruse, 1996; Neumann & Wehlage, 1995; Dufour, 1996). These proposals initiated a proliferation of teacher networks in schools around the nation, where the intent was the creation and transference of high quality teacher professional learning on the job coupled with an intense focus on improving achievement for all students.

Background of Professional Learning Communities at the Research Site

The Grossmont Union High School District first began reorganizing into professional learning communities during the 2004-2005 school year. PLCs first operated in select math departments, where teachers spent the first year establishing procedures for

how PLCs would work the subsequent year. Schools around the district adopted PLCs during the 2005-2006 school year. That year, each school amended its traditional school calendar to account for one minimum day a week, where students attended school for half of the day and teachers worked the remaining time in PLCs. However, the way in which individual school sites amended their traditional calendar varied. Some schools adopted a morning PLC time, while others adopted an afternoon meeting time. Additionally, some schools had minimum days on Wednesdays, while others met on other days of the week. While the meeting days and times varied, the basic structure of PLCs remained the same for teachers around the district. That is to say, teachers met during a specified time during the school day to address issues in curriculum, instruction, and assessment. Additionally, the district held workshops several times a year that trained teachers how to work effectively in PLCs. These workshops covered ideas related to a collective focus on student achievement, in which teachers created common assessments; to reflective dialogue, where teachers learned how to communicate better with each other; to human and social conditions in which teachers designed common calendars, agendas, and communication structures. In addition to differences in implementation, schools also differed in their trainings for PLCs. In some cases, all PLC members attended all the workshops, and in other situations, only the lead facilitator or appropriate others attended all the workshops. Therefore, it cannot be assumed that all participants in this study attended all the workshops, and due to the nature of this research study (anonymous survey research), the researcher had no way of determining if participants had participated in district workshops.

Except for a steady stream of research conducted in the 1980s and 1990s, schools have very little information to use when attempting to build a community of learners. As is evident by this particular research site, teachers worked diligently to implement both the structural and human conditions necessary for the success of PLCs. The nature of this work, however, is highly individual to each individual school site. That is, the conditions that are necessary to ensure the success of a PLC is much different in an urban school compared to a suburban school. Furthermore, the work that sustains the ongoing conversations about student achievement is also much different. The conversations about achievement in urban schools differ considerably from those of a suburban or rural school. Due to these differences, schools focus on individual aspects of PLCs differently. One school, for instance, focused more heavily on creating a shared vision for learning by creating a mission for their school and developing a school-wide discipline policy, whereas, a school that had fewer discipline problems, focused on the work of student achievement by creating common assessments. While each school site faced the mandate of implementing a school-wide learning culture, these schools addressed this mandate in their own individual manners using the framework and trainings provided by district-level staff.

Statement of the Problem

A basic, yet unanswered, question about PLCs is the extent to which they influence student achievement. Currently, two types of studies dominate the literature in this area: (1) studies involving national surveys (Lee & Smith, 1993, 1995, 1996; Louis & Kruse, 1995) and (2) studies that suggest tenuous links between the formation of a

professional learning community and student achievement (Berry, Johnson, & Montgomery, 2005; Hollins et al. 1999; Strahan & Ware, 2001; Langer, 2000). While this research suggests that PLCs may have an impact on student achievement, several conditions exist to warrant further research.

First, in many of the national surveys, professional learning community is one variable embedded in larger school reform efforts. Research needs to be conducted in school environments where these larger school reforms do not overshadow the work done within PLCs and in a manner that attempts to determine the relationship between professional community and student achievement.

Second, research suggests that other teacher characteristics may influence student achievement such as the teacher's years of service, educational level, type of certification, and content knowledge. These measures have been used in statistical procedures to explain variations in student achievement. Research also needs to be conducted that adds professional learning community as an additional variable explaining student achievement.

Third, many studies tenuously link teacher professional learning to student achievement using standardized test scores. These test scores are rarely controlled for factors that significantly limit the researcher's ability to compare effects across schools. Research needs to be conducted that attempts to determine the relationship of professional learning communities to student achievement by controlling for factors such as prior student learning, student socioeconomic status, student ethnicity, language status, and parent education level.

Therefore, a study examining the relationship between professional learning communities and student achievement within (a) an environment where PLCs are the most important reform effort taking place, and (b) which examines this relationship in cooperation with other factors that have been determined to influence student achievement, while (c) controlling for the extraneous factors that influence student achievement may help bridge the gap in the literature on determining the influence teacher professional learning has on student achievement.

Purpose Statement

The purpose of this study is threefold. First, the researcher is attempting to determine whether a relationship exists between and among teacher and student characteristic variables and student achievement. Second, the researcher is endeavoring to identify the extent to which student achievement as a criterion variable is explained by a combination of teacher characteristic variables, including professional learning community, teacher years of service, degree level, certification type, and content knowledge; and student background characteristics, such as ethnicity, language status, socioeconomic status, parent education level, and absences. Prior research has indicated relationships between these variables and student achievement (Sanders, 1998; Louis & Marks, 1995; Lee & Smith, 1993, 1996; Rowan, Correnti, & Miller, 2002; Rivkin, Hanushek, and Kain, 2002; Stanovich, 1986; Sirin, 2005). To the extent that each of these variables (the teacher characteristic and student background variables) has an impact on student achievement, the researcher is interested in determining the unique influence each of these variables contributes to the explanation of student achievement

scores. Third, the researcher is concerned with determining the influence of professional learning communities when student characteristic variables act as covariates. Therefore, this study seeks primarily quantitative documentation of teachers' perceptions of their work within a professional learning community in addition to changes in student achievement over time as teachers engage in this work.

Research Questions

1. What relationships exist among the variables teacher experience, degree held, competency, certification type, professional community, language status, socioeconomic status, parent education level, ethnicity, absences, 2007, and 2008 test scores?
2. To what extent do teacher characteristic variables (teacher experience, degree held, competency, certification type, and professional community) and student characteristic variables (language status, socioeconomic status, parent education level, ethnicity, and absences) explain student achievement?
3. Does professional learning community explain variations in student achievement scores when student characteristic variables (language status, socioeconomic status, parent education level, and ethnicity) act as covariates?

Overview of Study Design

This study was designed to determine the strength of the relationships among the 12 variables: professional learning community, teacher experience, educational status, content knowledge, certification type, English language status, socioeconomic status, ethnicity, parent education level, absences, prior achievement, and present achievement

using correlation analyses. Additionally, the researcher designed the study to examine how well the independent variables (professional learning community, teacher experience, educational status, content knowledge, and certification type, English language status, socioeconomic status, ethnicity, parent education level, absences, and prior achievement) explained student achievement on standardized tests using multiple regression. And finally, this research project was designed to determine to what extent student achievement is explained by professional learning community after controlling for student characteristics, including prior student achievement, student ethnicity, parent education level, English language status, free/reduced-priced meals status, and absences using a sequential multiple regression.

Significance of the Study

All reform efforts, especially those that utilize networks of teachers in a professional community, work within the same general framework, where research examines interventions in light of student achievement outcomes. However, the evidence as to whether these reforms affect student achievement has yet to be found. Research that explains student achievement outcomes in relation to the work that occurs within these communities may lead to better models of PLCs. Therefore, the data from this study will a) contribute to the empirical research on PLCs, and b) supply those administrators in charge of teacher professional learning with the necessary data and recommendations to make informed decisions about professional networks and student achievement.

Limitations of the Study

Several factors limit this study. First, the research is limited to responses obtained from participants answering the Professional Community Index. Limitations that apply generally to this survey apply in this situation. For example, the study is limited to the consistency with which respondents respond to questions. A second limitation may be the honesty of the participants. A third limitation may be that the results of this study are only generalizable to this population of teachers. Additionally, the procedures the researcher used to conduct the study may limit the results. That is, the survey was limited to the results gathered between August and November of 2008. Finally, the statistical procedures used in this study, namely multiple regression analysis, limit the generalizability of the findings.

Delimitations

This study is delimited to a sample of 141 teachers in a suburban high school district in California during the 2008-2009 school year. Additionally, only teachers who teach courses that have mandated state exams participated. Finally, data in the study were limited to surveys and student achievement scores during 2008.

Definitions of Terms

The following terms need additional clarification:

1. *School-wide professional learning community* is a school culture where teachers participate in the decision-making process, share values about how students should be educated, and work collaboratively and openly with a focus on student achievement.

2. *Team-based professional learning communities* are the smaller units within a school-wide professional learning community, which include course-level teams, grade-level teams, cross-discipline teams, cross-grade level-teams, and others. These units are typical in larger organizations, especially secondary schools.
3. *Restructured school* is a school that has changed from the technical-bureaucratic model, where a principal oversees department chairs, to a more communal model that emphasizes shared decision-making, communications structures, mixed ability classes, and student and parental involvement in the school. Definitions of “Restructured Schools” may vary according to the literature, but the researcher adopted this definition for the purposes of this study.
4. *Job-embedded professional development* is a form of professional development in which learning occurs as educators engage in their daily work activities. The development may be formal and/or informal and may include but is not limited to reflective dialogue, collaboration, peer coaching, mentoring, study groups and action research (Sparks, 1997).
5. *Cooperation* refers to the efforts of teachers to work together to achieve an objective. However, these teachers do not need shared norms or values in order to achieve this goal.
6. *Collegiality* refers to the work teachers do together whether co planning or peer coaching.

7. *Collaboration*, however, extends beyond the working relationship and requires colleagues to produce some tangible evidence of their work together, which can come in the form of action research or other forms.

Organization of the Study

This study is organized into five chapters. Chapter I contains an introduction to the study, statement of the problem, purpose statement, research questions, overview of the research design, and the significance of the study. Chapter I also includes important definitions, limitations and delimitations of the study. Chapter II includes a review of literature organized into four components: professional learning communities, theoretical perspective, accountability, and other teacher and student characteristics affecting student achievement. The study's methodology is outlined in Chapter III. This section includes an introduction, research design, information about the research site, participants, procedures and data collection, and data analysis. Chapter IV reports the findings of the study and is organized according to the research questions. Chapter V of the study presents the conclusions, discussion, and makes recommendations for future research.

CHAPTER II

LITERATURE REVIEW

The following literature review is divided into several sections. First, the researcher examined the different theoretical perspectives on professional learning communities. Second, the researcher identified and adopted one perspective as a theoretical framework for this study. Third, the researcher investigated the empirical research linking professional learning communities to student achievement along with additional research linking other teacher and student characteristics to student achievement.

Professional Learning Communities

A review of literature on the concept *professional learning community* indicated how ubiquitous the term has become in education. Implied or explicit references to professional learning community seem to be synonymous with any organized group, including grade-level teams, discipline committees, and others. However, researchers have proffered several definitions. Shirley Hord (1997) defined a professional community of learners as:

...a body in which teachers in a school and its administrators continuously seek and share learning and act on their learning. The goal of the action is to enhance their effectiveness as professionals for the students' benefit; thus, this arrangement may also be termed communities of continuous inquiry and improvement (p.1).

Others like Astuto, Clark, Read, McGree and Fernandez (1993) view professional learning communities as opportunities for critical inquiry and action related to improvements in student achievement. Louis and Kruse (1997) contend that five attributes: shared values, reflective dialogue, collaboration, focus on student achievement, and deprivatized practice characterize professional learning communities. Finally, DuFour (2004) offers a definition of professional learning communities as organizations with shared common goals, who collaborate and utilize data to make decisions.

Of these definitions, three researchers provide conceptual models to guide the work of practitioners working in professional learning communities. Attributes of the three models are listed in Table 1.

While the literature on professional learning communities offers no standardized definition of the term, several commonalities emerge from the theoretical models, especially the role of collaboration and focus on student achievement. However, what is

Table 1

Attributes of Three Learning Communities

Seashore-Louis & Kruse (1997)	Hord (1997)	Dufour (2004)
Shared norms and values	Supportive shared leadership	Common goals
Reflective dialogue	Collective creativity	Collaboration
Deprivatized practice	Shared values and vision	Focus on results
Collective focus on student achievement	Supportive conditions	
Collaboration		

most evident from this review is the fact that a professional learning community is more than teacher collegiality. Seashore-Louis, Anderson, and Riedel (2003) acknowledged this notion in their statement:

By using the term professional learning community we signify our interest not only in discrete acts of teacher sharing, but in the establishment of a school-wide culture that makes collaboration expected, inclusive, genuine, ongoing, and focused on critically examining practice to improve student outcomes....what teachers do together outside the classroom can be as important as what they do inside in affecting school restructuring, teachers' professional development, and student learning. (p. 3)

These researchers' acknowledgement of a professional learning community as a school-wide culture is an important distinction. Often, PLCs are large communities comprised of smaller communities, including team-based professional learning communities, cross-disciplinary learning communities, and others. The larger school context encapsulates these smaller units and guides the work within them. This notion is most evident in the way school mission statements, discipline policies, and in the ways at-risk students are remediated steer the collaborative culture of the entire school. In addition to understanding the concept of professional learning community from a holistic perspective, we must also derive some understanding of the concept from its individual parts.

The concept of learning communities has three essential parts: professionalism, learning, and community. The use of *professionalism* is part to the ongoing struggle in

education to professionalize the profession. As Darling-Hammond and McLaughlin (1995) indicate, “The vision of practice that underlies the nation’s reform agenda requires most teachers to rethink their own practice, to construct new classroom roles and expectations about student outcomes, and to teach in ways they have never taught before” (p. 1). In essence, the authors call for a complete reconceptualization of the teaching profession, and teacher community is central to that process of moving away from traditional practices, which are heavily reliant on technical acumen and prepackaged teaching materials, to a more authentic manner of teaching and learning.

The second word, *learning*, is borrowed from the business world and the work conducted on organizational learning. In business, organizations must be able to generate knowledge and transfer that knowledge with relative ease, if they are to remain competitive (Nonaka, 1994). According to Weick and Westley, activities undertaken by groups within an organization constitute organizational learning. These activities are the manner in which organizations remain innovative (1996, 1991). Likewise, education professionals must be able to construct a knowledge base and make that knowledge explicit to persons entering the community, if the community is to remain innovative and have a sustained impact on student learning.

The final aspect of this concept is community. Within this community model, both the reconceptualization of the profession and the organizational learning occurs. The community focus encourages authentic relationships between members, shared values, and meaningful interactions around student achievement (Weistheiser, 1999; Seashore-Louis & Kruse, 1997). This notion of community, once again, shifts the focus away from

the purely technical learning that occurs within the teaching profession to a more socially constructed learning situated in the everyday experiences of teachers.

Theoretical Perspective

In *Professionalism and Community*, Karen Seashore-Louis and Sharon Kruse identify three potential outcomes of a professional learning community: increased teacher efficacy, personal satisfaction, and collective responsibility for student learning (1995). Since responsibility for student learning is at the heart of this study, their conceptual model will provide its framework. Louis and Kruse's research documents five core characteristics of a professional learning community: shared values, reflective dialogue, deprivatization of practice, focus on student learning, and collaboration. Each of these characteristics is summarized below:

Shared Norms and Values

Shared norms and values represent the agreements between educators regarding their understandings about teaching and learning, relationships, and the school's role in the community (Schein, 1985; Giroux, 1988). A lack of shared norms and values concerning fundamental areas of teachers' work may produce tensions among colleagues that lead to divisiveness rather than collaboration and trust. These values manifest themselves in numerous ways, including the ways in which a school operates (e.g., bell schedules), its policies on discipline, and the manner in which it remediates struggling students.

Reflective Dialogue

Reflective dialogue is rooted in the work of Donald Schön and indicates the efforts of teachers to engage in meaningful reflection with one another concerning the nature of their work. The goal is to situate the discourse in their working experiences, so practitioners will be able to improve their teaching practice in addition to student achievement (Clift, Houston, & Pugach, 1990; Liebowitz, 1991; Little, 1990; Osterman, 1990, 1993). According to Louis and Kruse, reflective dialogue should revolve around four central topics suggested by the work of Zeichner and Tabachnick: academic content, use of teaching strategies, student development, and equity and diversity (1990). Using reflective dialogue, teachers not only form a joint understanding of the work in which they are engaged, but they socially construct knowledge of this work as well.

Deprivatization of Practice

Deprivatization represents the most pragmatic of the five attributes. Deprivatizing one's teaching practice requires opening the classroom in which one teaches to other teachers. The resulting information stemming from the observations then becomes the generative themes for reflective dialogue. Furthermore, opening one's practice to others within the community promotes a greater sense of community and teacher efficacy (Louis, 1991).

Collective Focus on Student Learning

A collective focus on student learning reflects a sustained interest by educators to link pedagogy to the process of learning and teachers' actions to increased opportunities for student achievement (Abbott, 1991; Darling-Hammond & Snyder, 1992; Darling-

Hammond & Gooden, 1993; Little, 1990). By focusing on the process of learning rather than simply the outcomes, the community spends the vast amount of its energy increasing students' capacity to learn. This focus leads to ongoing conversations concerning ways to improve student achievement, including creating after school tutorial programs or using community members to help educate at-risk students. The notion that all students are capable learners permeates the community.

Collaboration

Practitioners often use the term collaboration synonymously with cooperation and collegiality. *Cooperation* refers to the efforts of teachers to work together to achieve an objective. However, these teachers do not need shared norms or values in order to achieve this goal. *Collegiality* refers to the work teachers do together whether co-planning or peer coaching. *Collaboration*, however, extends beyond the working relationship and requires colleagues to produce some tangible evidence of their work together, which can come in the form of action research or other forms. Collaborative work informs the reflective dialogue that occurs within the community.

Supportive Conditions

Louis and Kruse acknowledge several supportive conditions for a professional learning community to successfully operate. First are structural conditions. These conditions include time for teachers to meet and talk, physical proximity to one another, interdependent teaching activities such as team-teaching or collaborative teaching, communication structures such as regular agendas, and autonomy to make group decisions. The second group of conditions includes social and human resources. These

conditions consist of teachers' openness to improve, trust and respect among colleagues, access to experts, supportive leadership from school administrators, and a process to induct new members into the community (1997, pp. 28-40).

In summary, a highly functioning professional learning community has several distinct characteristics. First, the community shares a vision for how the school should function. Second, educators collaborate with one another to implement this shared vision and to improve student achievement; also, these collaborations produce tangible products whose intent is to improve instructional practices and student achievement, and all of these activities are embedded in the school day. In addition to collaborative sessions, teachers are continuously observing each other's classroom teaching practices, and these observations serve as both conversation starters and collaborative projects. Finally, these activities operate within an environment where mutual respect and trust occurs, and where an attitude that all students can learn permeates the community.

Professional Learning Communities and Student Achievement

The following literature on accountability in professional learning communities follows three major threads. The first thread focuses on the question: Do student achievement and engagement improve in restructured schools? These studies examined the literature on school restructuring and teacher collaboration and their impact on student achievement and engagement (Lee & Smith, 1993, 1995), the links between teachers' work lives and how much their students learn (Lee & Smith, 1996), and the extent to which the professional community influences the organization of the classroom

and the effects community has on student achievement (Louis & Marks, 1998). The studies utilized national samples from longitudinal data.

Lee and Smith (1993) examined the effects of school restructuring on student achievement and engagement. Their research attempted to determine the effects of restructured school reforms (academics and engagement) on student achievement. In addition, they hypothesized that restructured schools were more socially equitable. The researchers labeled the two types of school as a) a restructured school (i.e., one that utilizes a communal model and emphasizes social relationships within school including a distribution of power) and b) a traditional school (i.e. one that follows a rational-bureaucratic model with formal functions and specialized tasks where teachers and students maintain defined roles and the school is rule-governed).

The measures for their study were obtained from a public-use data file from the National Center for Education Statistics. The data, collected by the Center for Research on Effective Schooling for Disadvantaged Students, identified 16 variables of a restructured school (Epstein, McPartland, and MacIver 1991). The researchers pulled three measures from the index in addition to using a composite score of all 16 variables for the hierarchical linear modeling. They drew a sub sample from a national sample of 25,000 8th grade students in a National Education Longitudinal Study conducted in 1988. The sub sample was drawn from 84 Catholic, 60 independent (or private), and 231 public schools, which generated 8,845 students from 373 schools.

The results from their multivariate analyses indicated that schools with less rigid departmental structures evinced higher student achievement ($ES = .08$, $p < .01$) and less

social class differentiation (1996). That is, schools that were more communal than bureaucratic produced higher student achievement and were more equitable. In addition, students were more engaged in academic work in restructured schools ($ES = .04$, $p < .01$). However, this higher student engagement coexisted with more frequent incidences of at-risk student behavior. Even with the added frequency of at-risk behavior, students who attended schools with a communal philosophy were performing better than student who attended schools that were more bureaucratic.

In a follow up to their 1993 study, Lee and Smith examined the same research problem in a new context--10th grade students. Once again, they attempted to determine whether students who attended restructured schools were positively affected in areas of academics and engagement, and whether restructured schools were more socially equitable. The data in this analysis, the National Educational Longitudinal Study of 1998, were taken from a public-use file located on the National Center for Educational Statistics website.

Unlike the middle schools, the high schools were divided into three categories:

- *Un-restructured schools*, or schools that engaged in none of the practices determined to be practices of restructuring. These schools accounted for a small proportion of the total schools, just 12%, or 97 of the 820 schools.
- *Traditional schools*, or schools that engaged in one or several moderate practices, but did not engage in a meaningful number of practices deemed consistent with restructuring. Traditional practices included common classes for same curricular

track, parent-teacher conferences each semester, PTA, and others. Traditional schools accounted for 42% of the total schools.

- Schools with *restructuring practices* were schools that reported having at least three of the restructuring practices in place. Examples of restructuring practices included emphasizing staff solving school problems, having parent volunteers in the schools, providing mixed-ability classes in mathematics, science, and others. As mentioned in the definition's section of this study, examples of restructuring practices vary depending on the literature and context of the study involved.

Schools with *restructuring practices* accounted for 46% of the schools, or 377 of the 820.

Lee and Smith used a sample of 11,794 sophomores in 820 high schools to elicit their results. Of the 820 high schools, 717 were public schools, followed by 54 Catholic schools, and 49 independent private schools. The results from their multivariate analyses indicated that schools with restructuring practices have strong, positive, and significant effects on their students' cognitive gains, and students who attended schools with restructuring reforms in place learned more and were more engaged. Effect sizes for core subjects varied from .35 for history to .59 for science, including .37 for student engagement. Each effect size was significant at the .001 level. When Lee and Smith examined schools deemed un-restructured, they found students less engaged in school and with lower cognitive gains. Additionally, schools with restructuring reform distributed gain more evenly across the student body. Effect sizes for equity were .54 for student engagement and ranged from .30 for science to .38 for reading. Again, these

effect sizes were significant at the .01 level. Students who attended schools with restructuring practices were performing better than their counterparts attending more traditional schools or schools with no reform measures in place.

A third follow-up study by Lee and Smith occurred in 1996. This study focused primarily on the links between teachers' work lives and how much their students learned. Lee and Smith addressed two main questions: (1) when teachers collectively believe that their efforts are critical to the learning process, does this lead to increased student learning? And (2) when collective responsibility is assumed for all students, is learning more equitable? They hypothesized that schools with high levels of collaboration had high levels of student learning. In addition, they hypothesized that a more equitably distributed form of learning occurred in schools with high levels of collaboration.

Lee and Smith used a sample of 11,794 sophomores in 820 high schools to elicit their results. Of the 820 high schools, 717 were public schools, followed by 54 Catholic schools, and 49 independent private schools. The researchers took their sample from students who had taken part in the National Educational Longitudinal Study of 1988. Students' teachers supplied the data. The file contained 9,904 high school teachers, 31% of whom taught math, 32% taught English, 22% taught science, and 15% taught social science.

The results indicated that in schools where collaboration occurred, students made higher gains in reading (ES .18), history (ES .12), and sciences (ES .13). Schools were more effective when there was collaboration among teachers. Additionally, a more even distribution of educational outcomes occurred in schools that took collective

responsibility for learning. Furthermore, collaboration had an inverse effect on socio-economic status (SES). That is, for students who had a higher socio-economic status, collaboration had a negative impact. For students with lower socio-economic status, collaboration had a positive impact, thus narrowing the achievement gap between the rich and poor. In schools where there was a high degree of collaboration among staff members, a more evenly distributed form of learning occurred; that is, collaboration makes schools more effective and more equitable places to learn.

Louis and Marks (1998) studied the professional relationships among teachers within a school. They examined the impact professional communities had on student performance and classroom organization. Their research attempted to determine the extent to which professional community influences the organization of the classroom, in addition to the effects of community on student achievement.

The researchers analyzed data drawn from a sample of 910 teachers and 5,943 students at 24 nationally selected schools. The researchers collected observation data on 144 math and social science teachers. Additionally, they collected 235 student assessments and 5,100 samples of work. Louis and Marks used Hierarchical Linear Modeling (HLM) with several measures—listed below—in order to generate their results. Math and social studies scores supplied the student achievement score in three areas: analysis, disciplinary concepts, and written communication. In addition, researchers combined scores from the observations and assessment tasks to create a composite score for teacher pedagogy. Classroom observational data and student responses formed the social support measure. Finally, a professional community score was determined using an

index that represented five components of school restructuring: shared purpose, collective focus on student learning, collaboration, deprivatized practice, and reflective dialogue.

The results from their research indicated that schools with strong professional communities have higher student achievement ($ES = .26, p < .001$). Students in school with professional communities outperformed those where professional communities were absent.

In summary, Lee and Smith (1993, 1995) examined student achievement and engagement in restructured and un-restructured schools. In both studies, they found evidence of a positive relationship between student achievement and engagement and school restructuring. Additionally, both Lee and Smith (1996) and Louis and Marks (1996) found evidence that students who attended high schools with strong professional communities and teacher collaboration learned more than students who attended schools without these innovations did.

The second thread of research examined the relationship between teacher-directed professional development and student achievement. Thread two focused on the question: Does student achievement increase when teachers are given decision-making control over their professional development? These studies were conducted on a micro level and reported on the effects national board-certified teachers, who participated in professional learning communities, had on student achievement (Berry, Johnson, & Montgomery, 2005); whether dialogue and collaboration increases teachers' abilities to solve problems and to improve literacy acquisition (Hollins, McIntyre, DeBose, Hollins, & Towner, 2004), linking teacher learning to student achievement (Phillips, 2003); and whether

learning communities allow teachers to get to know their students better and encourage teachers to collaborate in order to improve teaching practice (Christman, 2001; Supovitz, 2002; Supovitz & Christman, 2003).

Berry, Johnson, and Montgomery (2005) reported on the use of national board-certified teachers who participated in PLCs in rural North Carolina. Adams Elementary, a small school of 560 students (60% of whom were eligible for free and reduced lunch) had 25 teachers, 9 of whom were national board-certified in 2004. In 2002, the district initiated a form of job-embedded professional development, where teachers collaborated using test data to make decisions about curriculum and teaching strategies in addition to researching solutions to other problems the school was facing during the school day. Essentially, the district replaced the traditional “sit and get” style of professional development with a model that encouraged teacher cooperation and shared decision-making. Before this decision, 56% of students at Adams Elementary performed at or above grade level on the state’s standardized measures. After 2002, the school had 83% of its students performing at or above grade level. While other variables could have had an impact on student achievement, teachers anecdotally noted that the use of national board certified teachers to create and sustain PLCs had a greater impact on their teaching than any other form of professional development.

Hollins, McIntyre, DeBose, Hollins, & Towner (2004) combined qualitative and quantitative data to investigate the use of a job-embedded model of professional development to improve the academic performance of urban school students.

A large urban school district in California served as the site for the research study. The district serves over 50,000 students and utilizes 2600 teachers in 94 schools. Phyllis Wheatley School served as the site for this particular investigation, where in 2002, it hosted 300 students in grades K-5, 91% of whom are African-American. Location determined the participants for the study—an urban area representative of other urban areas in the school district. In all, 12 teachers in grades K-4 participated: 10 were African-American and two were Caucasian (of which 9 were women and 3 men).

Hollins et al. collected qualitative data using interviews, transcripts of meetings, field notes, and conversations. Quantitative data took the primary form of test scores on the Stanford Achievement Test, 9th edition. Spring 1999 test scores served as baseline data. The intervention consisted of a job-embedded model of teacher professional learning, where teachers used dialogue and collaboration to solve problems and to improve literacy acquisition during the school day.

The qualitative data suggested 5 themes: delineating the challenge the teachers found in their teaching, identifying and implementing a new approach to meet the challenges, evaluating the new approach, role transmutation, and continuous dialogue on successful approaches. Moreover, the quantitative data suggested greater literacy achievement in second and third grade students at Wheatley. In 1998, 45% of second grade students were above the 25th percentile as compared to 64% in 1999 and 73% in 2000—an overall gain of 28%. District-wide gains were 12% during the same time. Second grade students gained 15% in the 50th percentile at Wheatley, while students' district-wide made gains on average of 6%. Additionally, 32% of third grade students

performed above the 25th percentile in 1998, 52% in 1999, and 63% in 2000—a net gain of 31%. District-wide 42% of third grade student performed above the 25th percentile in 1998, 59% in 1999, and 51% in 2000, an overall gain of 9%. Third grade students gained 13% in the 50th percentile over the same period; district-wide gains were only 6%. These data suggested that a job-embedded model of teacher professional development might have contributed to the improved reading scores of second and third grade students at Wheatley elementary.

Phillips (2003) examined data drawn from a large national research and evaluation study to determine if links existed between teacher learning and student achievement. Principal and teacher interviews, classroom observations, teacher focus groups, and reports comprised the qualitative data. In addition, researchers examined numerous student artifacts.

Researchers reported the qualitative data from one school for this 18-school national study. Woodsedge Middle School serves a population of 1425 students, 45 % of whom are white, 32% Hispanic, 15% African-American, and 8% Asian. Additionally, officials had divided Woodsedge into two schools: a magnet school that served 869 students at the time of the study and a “regular” school serving the remaining 569. The reform efforts focused on the 569 students from the “regular” track. Teachers participated in study groups, where they developed curriculum innovations and employed new instructional strategies. In one particular study group, teachers focused on reading instruction for 6th grade students. Students read aloud texts and subsequently illustrated the materials and connected their illustrations to words from the text. Teachers designed

rubrics to evaluate this work, and they maintained their assessments throughout the school year.

One year before these reform efforts, Woodsedge's disaggregated statewide test scores indicated an achievement gap. In 1999, Woodsedge received a rating of ~~–~~“Acceptable,” which indicated that 50% of its students passed each of their subject area tests on the Texas Assessment of Academic Skills (TAAS). The following year, Woodsedge received a ~~–~~“Recognized” rating, indicating that 80% of its students passed the TAAS subject area tests. In 2002, three years after the teacher study groups were implemented, the school was acknowledged as ~~–~~“Exemplary,” meaning that 90% of its students passed content area tests. When asked what contributed to the change, the principal indicated ~~–~~“the work done in departmental study groups” (p. 256). The results from Woodsedge's statewide achievement scores suggested that the reform efforts the teachers undertook influenced student performance.

Christman (2001), Supovitz (2002), and Supovitz and Christman (2003) examined whether or not learning communities allow teachers to get to know their students better, and whether communities encourage teachers to collaborate in order to improve teaching practice. The data for their examination originated from a large-scale, multi-year evaluation of two school districts in Cincinnati and Philadelphia. The results suggested that only reforms focused on improving the ~~–~~“instructional core of a school” have an impact on student achievement (Supovitz & Christman, 2003, p. 1).

Cincinnati Public Schools (CPS) serves over 50,000 students in 79 schools. Students in CPS are primarily African American (70%) and White (25%), and 60% of

these students receive free or reduced lunch. CPS established professional learning teams in 1996 in order to meet academic standards, collaborate, work with parents in the community, and be collectively accountable for student learning. Supovitz (2002) compared schools that established these communities to those that did not. As a part of the statistical analyses, Supovitz constructed 25 ordinary least-squares (OLS) regressions that examined student performance in grades 3 through 8 in each content area for both team-based and non-team-based schools. Of the 25 regressions, three were statistically significant for team-based schools, 7 were significant for non team-based schools, and 15 were non significant. No trend could be determined from the data. That is, no difference existed between team-based and non team-based schools on student achievement. There were, however, relationships between instructional practices and gains in student learning. In the 25 models constructed for this hypothesis, 14 of the 25 between instructional practices and student achievement were positive and statistically significant. Team-based schools that engaged in instructional improvement practices outperformed the other team-based schools.

Philadelphia Public Schools (PPS) served some 215,000 students in 257 schools. PPS is one of the largest school districts in the United States and one of the poorest. Eighty percent of students in the PPS receive free or reduced lunch. In 1995, PPS handed the decision-making process to small teams at the individual school sites. Supovitz determined that schools with smaller decision-making teams that focused on instructional practices made gains in student achievement. Furthermore, the percentage of students at or above the basic level in math on the Stanford Achievement Test increased from 15.7%

in 1995 to 23.2% in 2000. Reading scores rose from 43.3% to 55.8% and science scores elevated 9% from 18.11% to 27.47% during that same period. This evidence suggested that teaching teams that investigated the relationship between instructional practices and student work contributed to gains in student achievement in math, reading, and science.

In summary, Berry, Johnson, and Montgomery (2005), Hollins et al. (2003), Phillips (2002), and Christman (2001), Supovitz (2002), and Supovitz and Christman (2003), teachers had the autonomy and flexibility to design curriculum and collaborate in order to solve problems and meet students' needs. In each case, student achievement increased consistently year over year, suggesting that when teachers have control over their own professional development, students' scores may increase on standardized measures.

The third thread of research examined professional contexts for teachers; that is, the work teachers perform outside the classroom. These studies have many similarities to the studies in part two, but they are separate from the other studies in this review because they examine the impact of teacher collaboration as a process of reform and not specifically as an outcome of it. These studies addressed the question: Can teachers improve the professional contexts in which they work and learn? Strahan (2002,2003) and Strahan and Ware (2001) explored ways in which teachers improved learning communities in three elementary schools. Additionally, Langer (2000) examined professional contexts in middle and high schools to understand how they relate to what transpires in the classroom.

Strahan (2002, 2003) and Strahan and Ware (2001) explored ways in which teachers improved learning communities in three elementary schools over a five-year period. The initial study built case studies for each school utilizing classroom observations, teacher and administrator interviews, field notes, and document reviews. While the study was predominately qualitative in nature, the researchers triangulated their qualitative research with student achievement data.

Strahan and Ware (2001) collected data on the teachers' interactions and activities in their communities. They determined these teachers structured their meetings around students' needs. Then, teachers used information about students' needs to target areas for instructional improvement. As their collaborations progressed, teachers shared ideas with one another and linked their staff development to their daily practice. When Strahan and Ware conducted interviews to determine why teachers believed student achievement had improved, three major themes emerged: —a) concentrated instruction on student performance, (b) creating an inviting school climate, and (c) guiding reform through energetic leadership” (2003, p. 130).

In addition to the qualitative data, the researchers examined the achievement scores of all three elementary schools. Archer Elementary School serves 600 K-5 students, 68% of whom were eligible for free and reduced lunch and 20% of whom spoke English as a second language. In North Carolina, all students in grades 3-8 take an end of the grade (EOG) assessment in reading and math. In 1997, 49.4% of 3rd, 4th, and 5th grade students could perform at grade level in math and reading. By 2002, 74% were at grade level. Hunter Elementary School served a smaller community of 410 students, of

whom 85% receive free or reduced lunch, and it had a large second language and minority population--20% and 91% respectively. In 1997, only 44.6% of third, fourth, and fifth grade students were able to perform at grade level in math and reading. In 2002, the number had risen to 81.5%. North Elementary School served a population of 400 students, 70% of whom were eligible for free and reduced lunch and are minorities. In 1997, only 44.7% of North 3rd, 4th, and 5th grade students could read and calculate math at grade level. However, in 2002, 71.5% could do so. Teacher collaboration seemed to have improved the quality of teaching in these three elementary schools in addition to the quality of learning taking place in the school.

Langer (2000) examined professional contexts in middle and high schools to understand how they relate to what transpires in the classroom. The study addressed numerous reform practices in schools, one of which was the interactions among teachers in learning communities.

This study utilized data from a large multi-year, multi-site research project. The researcher limited her research to four states (Florida, New York, California, and Texas), primarily due to the diverse populations served by school systems in these areas. Achievement scores determined school selection. The schools were consistently outperforming similar schools. In all, researchers selected 25 programs. In those programs, investigators studied 44 teachers and 88 classrooms in 14 schools. School demographics ranged from all White to 92% African American to 87% Hispanic, and 5-86% meeting the eligibility requirements for free and reduced lunch.

Langer constructed nested case studies for each program. Field researchers spent two years in each school, and their interviews, field notes, email messages, artifacts, teacher portfolios and journals, and case reports eventually comprised the case studies. From these case studies, 6 themes emerged:

1. Coordinating efforts to improve achievement.
2. Fostering teacher participation in professional communities.
3. Creating activities that provide teachers with agency.
4. Valuing commitment to professionalism.
5. Engendering caring attitudes.
6. Fostering respect for learning. (pp. 413-444)

Disaggregating these reform efforts is impractical; however, Langer acknowledged, “Teachers in successful schools are part of ongoing professional communities” (2000, p.416). Teachers in all 25 programs and 14 schools were part of learning communities that shared ideas, provided teachers with others with whom they could solve problems, designed curriculum, and met weekly or even daily. Teachers within these communities spent time learning how to learn from each other. They learned how to appreciate each other’s views. For example, one teacher interviewed stated:

It isn't one person's vision. We work together. We know what good teaching looks like. We've melded our philosophies into one workable paradigm [and grown together over time]. There is a high level of trust and respect; each person knows that someone else knows or can do something better than themselves, and considers crucial in

reaching desired goals. (C. Confer interview, 10/2, Year 1, p. 10)

Each of the schools in Langer's study had impressive student achievement results. Some schools like Ruben Dario Middle School had an 86% passing rate on Florida's statewide writing performance. Others like International High School in New York had a 90% acceptance rate to college—a high school serving a population of immigrants who score below the 21st percentile on New York's Language Assessment Battery. While it may be impossible to tease out the variable that may have had the greatest impact in this study, professional community is the one consistent variable in all 25 case studies, and in each case study, these schools outperform similar schools in all areas of academic achievement.

In summary, three general themes emerged from this section of the review.

1. Restructured schools have higher student achievement, greater student engagement, and less disparity between students' learning. While multiple factors comprise the term —school reform,” researchers acknowledge that teacher collaboration is an essential component of reform efforts.
2. Schools that indicate high levels of teacher collaboration have high levels of student achievement. School districts that have moved away from the traditional —sit and get” method of professional development and toward a more teacher directed model show strong results in standardized test scores. However, researchers tenuously linked the data to student achievement.
3. When schools have highly functioning professional learning communities, they have students that frequently outperform students of similar types.

Other Teacher Characteristics Affecting Student Achievement

The professional literature related to factors affecting student achievement indicate four additional teacher characteristics, which may have an impact on student achievement: teacher experience, teacher education level, teacher content area preparation, and teacher licensure. The following review examines the relationships between these four variables and student achievement.

Teacher Experience

Teacher experience is one of the most commonly examined variables in relation to student achievement. William Sanders' (1998) Tennessee Value-Added Assessment System (TVAAS) data have indicated that teachers have the single greatest impact on academic growth. Sanders' data suggested that teachers with between 7 and 17 years of experience have the greatest impact on achievement, with achievement increasing in the first few years, plateauing in the middle, and trailing off in the end of the teacher's career. These data contradict most of the research conducted in the 1980s that suggested student background characteristics explained most of the variations in student achievement. Over the past 15 years, teacher variables including experience appear to capture a much greater portion of the variation in student achievement than initially thought.

In a cross-classified random effects model, which examined student gain curves using three data points of achievement while controlling for student background characteristics, Rowan, Correnti, and Miller (2002) found that teacher characteristics accounted for 60-61% of the variance in student reading achievement and 52-72% of the

variances in student math achievement. The results yielded effect sizes of .72-.85 for math and .77-.78 for reading.

Rowan, Correnti, and Miller developed a longitudinal data set to examine the effects of teacher credentials on student achievement. Standardized exams determined achievement in this case. Statistical controls included student background variables such as gender, socio economic status (SES), minority status, number of siblings, family marital status, and parental expectations in addition to school composition and location. The results indicated that teacher experience was a statistically significant predictor of growth in achievement in both early grades reading $d=.07$ and later grades reading $d=.15$. In mathematics, teacher experience had a positive effect on achievement for the later grades $d=.18$. Most elementary school students in math and science had gains in achievement relative to their teachers' years of experience.

Ferguson (1991) examined a data set consisting of more than 900 Texas school districts, which included data on teacher test scores on the Texas Exam of Current Administrators and Teachers (TECAT). The exam provided data on teacher literacy, experience, degree held, and average school size. Researchers examined these variables in relation to student test scores on the Texas Educational Assessment of Minimum Skills (TEAMS). The study controlled for multiple student, family, and background variables. Multiple regressions determined that teacher experience had a significant impact on student achievement ($p=.013$), as did teachers holding a master's degree ($p<.05$). Students whose teachers had more years of experience had higher test scores, dropped out less, and were more likely to take the SAT.

Goldhaber and Brewer (1997) used the National Educational Longitudinal Study of 1988 (NELS) to explore the relationship between student achievement and schooling inputs. The survey included a data set of 24,000 eighth grade students in addition to another sub sample of those same students two years later (18,000 students). Goldhaber and Brewer used a valued-added model to determine teacher effects in math, science, writing, and history. Researchers controlled prior achievement by utilizing two years of test scores. Results indicated that 6 out of 10 teacher characteristics had significant coefficients. Experience explained 16% of the variance in student test scores. Students with more experienced teachers had higher test scores.

Finally, Rivkin, Hanushek, and Kan (2002) used Texas administration records of three student cohorts: one cohort of third to seventh grade students and two cohorts of fourth to seventh grade students to examine the relationship between achievement and teacher experience. Each cohort consisted of over 200,000 students. The data contained student and family background information, standardized test scores, teacher grades, and teacher personnel data. Their results indicated that the students of new teachers perform much worse than the students of more experienced teachers on state standardized exams. Teachers with 0-5 years of experience had a negative relationship with achievement from -.018 to -.128 depending on the cohort model investigated.

Fetler (1999) investigated the relationships between teacher characteristics and student achievement. He studied 795 high schools in California, which served nearly 1.3 million students. Fetler collected test scores from the California Standardized Testing and Reporting (STAR) site for the 1998-1999 school year. Fetler's results suggested that

teaching experience measured by the number of years in service was positively related to student achievement ($r = .24$). Multiple regression analysis yielded a pattern, which indicated a positive relationship between teaching experience and achievement scores. That is, schools with more experienced teachers had students with higher math achievement.

The studies examining the relationship between student achievement and teacher experience provide some of the most incontrovertible evidence that teachers have an impact on students. While some discrepancy exists as to both when the experience begins to have an impact and when that impact fades, the research is replete with evidence that experience does have an impact on student achievement.

Education Level

The results from studies examining the relationship between education level and student achievement are relatively clear in one area: advanced degrees in the content area. Teachers who hold advanced degrees in their respective content areas seem to have the greatest impact on student achievement. However, the extent to which any advanced degree has an impact on student achievement is more ambiguous.

Ehrenberg and Brewer (1994) analyzed data from the U.S Department of Education High School and Beyond (HSB) survey to estimate the extent to which teacher characteristics influence student dropout rates and whether they affect student achievement. Their results suggested that teachers with master's degrees were associated with higher achievement scores for African American students in mathematics, reading, and vocabulary.

In two previously identified studies (Ferguson, 1991; and Rivkin, Hanushek, and Kain, 2005) where researchers found effects of teacher experience on student achievement, additional characteristics including degree level were examined. Ferguson (1991) used regression analyses to determine that teachers with master's degrees were positively associated with student achievement gains in Texas. Additionally, Rivkin, Hanushek, and Kain's regression analysis supported prior research (research) that suggested an advanced degree has no relationship with student achievement. However, Rivkin, Hanushek, and Kain's data did not include information regarding the type of advanced degree held.

Goldhaber and Brewer's (1997) study examining the relationship between teacher experience and student achievement also examined the relationship between teacher education level and student achievement. The results from the regression analysis of NELS data indicated that teachers who held a Bachelor's degree or Master's degree in mathematics had a positive impact on student achievement, whereas teachers with a master's degree in a different field had no impact on students' mathematics achievement.

To some extent, instrument sensitivity has created the difficulties in finding effects between teacher education level and student achievement. Many of the studies examining the relationship have data on degrees such as BA or BS, MA or MS, in addition to the number of hours above these degrees (as is often measured by school districts for pay scale increases). However, for years, information on the actual degree type was not gathered. Some of the research in this section identifies the advanced degree as Master's of Science in Biology, while other research identify master's degree only.

Information gathered from instruments that are more sensitive may be a more accurate measurement of the relationship between these two variables.

Content Area Preparation

Numerous researchers have examined the relationship between content area preparation and student achievement. By far, the most popular way to measure this relationship has been to examine teachers who hold a major or minor in their field. However, some studies have attempted to examine the relationship between student achievement and content area preparation by investigating the rankings of the schools teachers attended. Despite the wealth of research in this area, the connection between student achievement and content area preparation has been elusive.

In 1994, Monk found that teachers who took coursework in mathematics had positive associations with student achievement in mathematics; however, a major in math had no significant relationship with student achievement. Conversely, Linda Darling-Hammond (1999) found that teachers who had not obtained a minor in the area in which they taught were less effective than teachers who did. In 2000, Darling-Hammond found that teachers who had both a subject matter major and full certification also had a positive relationship with student achievement in reading and math. Additionally, Goldhaber and Brewer (1996) found that a teacher with a major in his or her content area was the best predictor of student achievement. However, Rivkin, Hanushek, and Kain (2005) and Ferguson and Ladd (1996) found no relationship between teacher content knowledge and student achievement. Students of teachers with advanced content area degrees performed no better than students of teachers who had only an undergraduate degree.

The mixed nature of these results indicates how complicated content area preparation has been to understand in relation to teaching effect. Within the past few years, many states have begun to require teachers to pass a content area exam in order to teach. Analysis comparing teacher education training with teachers who pass content area tests may provide more evidence on the issue of teacher competency.

Certification

Currently, teaching requires certification. However, the ways in which a teacher is certified may vary. For example, in areas of high need such as science, teachers may be certified to teach on an emergency credential or alternatively certified, where they are allowed to teach prior to receiving formal teacher training. The following studies examined the relationship between these different routes to certification in relation to student achievement.

First, Fuller and Alexander (2004) used four data sets: one that linked teachers to students, one with teacher demographics, one with student demographics, and one with outcomes from the Texas Assessment of Academic Skills. The regression results determined that certified teachers' students performed better than uncertified teachers' math students on the Texas state mathematics achievement test ($p = .012$).

Additionally, Laczko-Kerr and Berliner (2002) examined the difference between certified and under-certified new teachers in Arizona. They categorized teachers labeled "emergency, provisional, or temporary" as under certified. For programs like Teach for America, the researchers created an additional category of "alternative" certification. Five school districts with 293 teachers participated in the study. The researchers matched

teachers with student achievement records, which further delimited the sample to 232 teachers. Results indicated that students taught by certified teachers outperformed students taught by under-certified teachers. Also, students whose teachers were certified had higher reading scores ($M=36.52$) compared to uncertified teachers ($M=30.67$), $t(27)=2.36$, $p<.01$. A language test for certified teachers was also significant $t(27)=1.81$, $p<.05$. However, math scores produced non-significant scores, but the trends in means were very similar. That is, students with certified teachers had higher means than students with uncertified teachers. Additionally, the investigators determined that teachers certified through Teach for America had similar means on standardized exams as uncertified teachers.

Darling-Hammond, Hoffman, Gaitlin, and Heilig (2005) utilized student achievement data and teacher certification from the Houston Independent School District from 1995 to 2002 to investigate the relationship between these two variables. The data set included important student demographics, school-level and teacher-level data, and data linking students to teachers. The outcome variables for the study included reading and math scores from the Texas Assessment of Academic Skills. The study controlled for prior achievement, student demographics, teacher characteristics, and school demographics, and investigators coded teachers by certificate type (e.g., standard, alternative, emergency, uncertified). The results indicated that uncertified teachers had negative effects on student achievement on the TAAS reading and math exams ($ES=.05$ math and $ES=.05$ reading). In addition, the researchers found a positive relationship between student achievement and certification. Furthermore, Darling-Hammond et al's

(2005) investigation utilized the same set of data used by Raymond, Fletcher, and Luque (2001). These researchers determined that alternatively certified teachers (those certified through Teach for America) had a positive affect on student achievement scores when compared to other new teachers. Darling-Hammond et. al (2005) found corroborating evidence; however, they subsequently found that new teachers, who had received pedagogical training and certification, had students who faired better on TAAS tests than the students of Teach for America teachers.

Fetler (1999) investigated the relationships between teacher certification and student achievement in his study of 795 California high schools previously mentioned. Teacher certification was determined through a Performance Assessment Information Form (PAIF) completed by each teacher annually. His results indicated that schools with higher percentages of under-certified teachers had lower levels of achievement. Additionally, he determined that the students of teachers with emergency certification did not perform as well as the students of fully certified teachers.

Finally, Goldhaber (1997) and Goldhaber and Brewer (2000) found relationships between teacher certification and certain subjects but not others. For example, Goldhaber (1997) found that certification in English and history had no significant relationship to student achievement, while certified math and science teachers had positive relationships to student achievement in those subjects. In a follow up, Goldhaber and Brewer (2000) examined certification type in relation to mathematics and science achievement gains. Their results indicated that students of teachers who held certification in math and science performed better on standardized exams compared to the students of teachers

who held no certification (or certification in another field or certification by private schools). An examination of achievement gains in math and science in relation to temporary or emergency certification yielded similar results. Under-certified teachers had lower performing students on math and science achievement exams.

Despite the ambiguity in some of the research examining teacher characteristics in relation to student achievement, a substantial amount of research has indicated positive relationships between teacher characteristics (especially experience and certification) and increases in student achievement. Based on the review of teacher characteristics, the following items are of particular importance for this study.

1. Students whose teachers had more years of experience had higher test scores. The present study will utilize these data to confirm whether teaching experience does in fact explain greater variations in student achievement.
2. Many of these studies control for prior achievement by utilizing two years or more of student achievement data.
3. Teachers with degrees in their content areas have a greater impact on student achievement than teachers who hold a Master's degree in education.
4. Content area preparation is measured by whether teachers have completed coursework in their fields of study (i.e., whether they have an undergraduate major or minor in their fields), or whether they have met the requirements for content knowledge through some alternative means, such as subject matter exams or HOUSSE. Additionally, few studies link improved student achievement scores to content area preparation.

5. Fully certified teachers appear to have a greater impact on student achievement than alternatively certified teachers. That is to say, those teachers who were certified through state approved teaching programs have a greater impact on student achievement than teachers certified through other programs such as Teach for America or emergency certification routes.

The School Characteristic Index: Student Demographics as Statistical Controls

The Public Schools Accountability Act of 1999 (PSAA) required California to create instruments and procedures by which it could measure student achievement and rank and compare schools based on “similar characteristics” (PSAA Technical Report 00-1). This legislation created California’s Academic Performance Index (API) to determine the annual percentage academic growth target for each school. Schools that meet the growth criteria are eligible for rewards, while interventions greet schools failing to meet the criteria. The second aspect of the legislation required the development of comparison demographics for schools. These characteristics included, but are not limited to, student ethnicity, socioeconomic status, English language status, and parent education level. These demographics are operationally defined in Table 2.

The main purpose for the development of these characteristics was to provide contextual information about each school’s performance. The report notes, “...it must be recognized that California’s public schools serve student populations with different backgrounds and different needs. These students’ homes and communities differ in the amounts and kinds of support they are able to provide for school learning. As a result, different schools face different challenges and opportunities in meeting the needs of the

learners they serve. For this reason, it is also valuable and informative to examine a school's performance relative to that of other schools similarly situated" (4). This philosophy led to methods and procedures for defining similar schools, and one such method was the School Characteristics Index (SCI).

The SCI provides a composite score of a school's background characteristics. Schools are grouped based on ranges within a fixed region of the state. The process of developing the composite begins by determining a value for overall school performance. In this case, the base-year API score was used. This score becomes the dependent variable in a multiple regression analysis, and the demographic variables listed in Table 2 (along with many others not used in the current study) become the independent variables. (The excluded variables were those that had less than a .40 correlation with the dependent variable—student achievement.) Using the regression coefficients as "weights" for the demographic variables, statisticians then create an index. Those schools with indexes close in numerical value became similar schools. Schools are then ranked according to their values on the SCI. Experts then establish cutoff points with ranges or bands, thereby creating comparison groups for schools. For example, schools in the bottom 20% of the SCI would be compared to each other, as would schools in the top 20%. Additionally, a floating comparison band is used to provide greater equity for schools in each band. The floating method allowed comparisons between a school and up to 10% of the schools above and below the school, once the school in question was located at the median of its own group. This comparison group method provided an additional layer of fairness in the process of comparing schools.

Table 2

Operational Definitions of Similar Characteristics Per PSAA

Characteristic	Definition
Ethnicity	Percentage of students in the school in each ethnic category: • African American • American Indian or Alaska Native • Asian • Hispanic or Latino • Pacific Islander • White not Hispanic
Socioeconomic Status	Average of all parent education level responses for the school where the following scale is used: 1" = Not high school graduate" 2" = High school graduate" 3" = Some college" 4" = College graduate" 5" = Graduate school/post graduate training"
English language learners	Percentage of students in the school that participated in the free or reduced price lunch program Percentage of students in the school who are classified as English language learners

The construction and implementation of the SCI required California schools to collect these data from students on an annual basis. Assessment and evaluation personnel collect the demographic data using a number of instruments and compile them for the state. The availability of the data from the SCI makes them a perfect choice for any study using regression analysis because the primary purpose for these data are the multiple regression analyses measurement experts use to determine the SCI.

Additionally, the philosophy of the SCI revolved around a strong research base that linked these demographics to trends in student achievement. Researchers have

connected variations in achievement to ethnicity, where a student's race has a direct impact on his or her achievement (Secada, 1992; Tate, 1997; Reyes, 1988; Yin; Peng & Hall, 1995; NCTM, 1988). Moreover, researchers examining language acquisition have documented the influence language (especially in students whose primary language is not English) has on standardized achievement (Duncan & Seymour, 2000; Geva, Yaghoub-Zadeh, & Schuster, 2000; Olshtain, Shohamy, Kemp, & Chatow, 1990; Scanlon & Vellutino, 1997; Stanovich, 1986). Other researchers have investigated the links between parent education levels and the attainments of these parents' children (Klebanov, Brooks-Gunn, & Duncan, 1994; Haveman & Wolfe, 1985; Smith, Brooks-Gunn, Klebanov, 1997). Finally, researchers have conducted a considerable amount of research linking low social class standing to lower performance in schools (Entwisle & Alexander, 1992; Lubienski, 2002; NAEP, 1988; Haller & Davis, 1980; Hernandez, 1973; Sirin, 2005). The findings in these studies, in addition too many others, form the foundation for many of the student background variables employed in the School Characteristics Index.

Summary

Chapter II summarized the conceptual models developed by scholars on professional learning communities. In order to examine the similarities and differences between the models, the researcher arrayed them in table form. The chapter then presented the theoretical framework of this study, the conceptual model developed by Louis and Marks. The rationale behind this decision lay in the fact that Louis and Marks' framework was well established in the literature and grounded in the theories of other well-accepted scholars, such as Donald Schön, Kenneth Zeichner, and Linda Darling-

Hammond. The researcher outlined this framework in the chapter as well. The researcher presented information and available research data that linked the work conducted in PLCs to student achievement. These studies suggest a strong relationship between effective PLCs and higher levels of student achievement. Finally, the researcher presented the relationships between other variables and increases in student achievement. These additional factors include teacher experience, education level, type of certification, and content area preparation. The principal investigator will examine the relationship between each of these teacher characteristic variables and student achievement in addition to the primary variable of professional learning community. The final part of this review outlined the development of the School Characteristic Index, which was developed in an effort to control for certain background variables that limit researchers' abilities to make comparisons across schools. In addition to the historical perspective, the researcher presented the information on some of the variables used in the SCI and the research that supports their use as statistical controls. Furthermore, highlighted in Chapter III, are the procedures for demonstrating the relationships and addressing the research questions.

The following itemized list is a summary of the key findings from the review of literature:

- I. A highly functioning professional learning community included these characteristics.
 1. The community shared a vision for how the school should function.
 2. Educators collaborated with one another to implement this shared vision and to improve student achievement; these collaborations produced tangible

products whose intent was to improve instructional practices and student achievement.

3. Teachers continuously observed each other's classroom teaching practices, and these observations served as both conversation starters and the impetus for collaborative projects.
4. All of these activities were embedded in the school day and operated within an environment where mutual respect and trust occurred.

II. Researchers have concluded that PLCs have the following impacts:

1. PLC schools have higher student achievement, greater student engagement, and less disparity between students' learning.
2. School districts that encourage teacher directed professional learning had higher standardized test scores than schools with the traditional –sit and get” method of professional development.
3. In schools with highly functioning PLCs, their students' performance on state assessments outperformed students from schools of a similar nature.

III. Researchers have concluded the following about teacher characteristics:

1. Students whose teachers had more years of experience had higher test scores.
2. Teachers with degrees in their content areas had a greater impact on student achievement than teachers who hold a Master's degree in education.
3. Teachers who majored in their field of study had no greater impact on student achievement than teachers who passed subject matter exams.
4. Fully certified teachers had a greater impact on student achievement than alternatively certified teachers.

IV. Researchers have concluded the following about student background characteristics:

1. A student's ethnicity, socioeconomic status, and language status had negative relationships with the student's standardized test scores.
2. Studies controlled for prior achievement by utilizing two years or more of student achievement data.

CHAPTER III

METHODS

Introduction

This chapter describes the research problem and questions, along with the data sample and collection procedures, instrumentation, and data analysis procedures. The purpose of this study is to examine the relationship between student achievement and several teacher and student characteristics, including teacher experience, degree level, content area preparation, certification, and participation in learning communities, student ethnicity, language status, socioeconomic status, parent education level, and prior achievement. To achieve this purpose, the researcher has developed the following research questions.

Research Questions

1. What relationships exist among the variables teacher experience, degree held, competency, certification type, professional community, language status, socioeconomic status, parent education level, ethnicity, absences, 2007, and 2008 test scores?
2. To what extent do teacher characteristic variables (teacher experience, degree held, competency, certification type, and professional community) and student characteristic variables (language status, socioeconomic status, parent education level, ethnicity, and absences) explain student achievement?
3. Does professional learning community explain variations in student achievement scores when student characteristic variables (language status, socioeconomic status, parent education level, and ethnicity) act as covariates?

Research Site

The researcher selected the Grossmont Union High School District in San Diego, CA for this study. The 11-high school district includes three urban and 8 suburban high schools, with an average school population of 2199 students. The district served approximately 24,000 students who reported their ethnic and racial makeup in 2007 as American Indian or Alaskan Native (1.6%), Asian (2.2%), Pacific Islander (1.1%), Filipino (2.4%), Hispanic or Latino (28%), African American (8.5%), and White (52.8%). Additionally, the district labeled 12 percent of students as English learners and students with disabilities. The researcher chose this district partly because of its demographics approximating both local and national demographic data with the most significant variation occurring in the Hispanic or Latino population. According to “Knocking on the College Door,” 59% of high school students are White and 18% are Hispanic or Latino. In the western part of the United States, however, 34% of high school students are Hispanic or Latino (2008).

Participants

Participants in this study were a stratified random sample of teachers from the school district. The sample was drawn from a list of teachers provided by the district’s assessment and evaluation administrator, who were teaching in the major content areas: English, math, science, and social science. Of the district’s teachers, 434 taught students who took content area state assessments. Teachers excluded from the sample included those teaching students in the 12th grade (since no 12th grade student is required to take state assessments), and teachers teaching Advanced Placement courses, economics, journalism, reading, calculus, geography, and physiology. Therefore, the sample size

necessary for adequate power based on a 5% margin of error and a 95% confidence level was 206 participants.

From the list of teachers provided by the district, the researcher sorted the list by content area creating four separate lists each, one for math, science, social science and English. The researcher then randomized the names in each list and chose each name in sequential order until the list approximated district ratios. The researcher over-sampled the population and included 74 English, 61 math, 39 science, and 54 social science teachers for 228 participants. The researcher sent the surveys to the targeted teachers.

Procedures

A pilot test of the Professional Community Index occurred with a small sample of teachers (n=5) who were teaching summer school in the major content areas between the dates of July 7 and July 11, 2008. The survey included several additional questions pertaining to the process of completing the survey (see APPENDIX A). Based on feedback from this pilot test, the researcher eliminated one demographic variable: ethnicity, since one teacher indicated a reluctance to provide this information. Additionally, one other semantic change occurred in the wording of three of the items. The original instrument stated, “In a typical planning period...” but several teachers noted that they referred to this time in the district as “collaboration” and not planning. The researcher changed the wording of those three items (16-18) to read “In a typical collaboration session...” in addition to providing a brief note under the items to further clarify the meaning of “collaboration time.” Other than these two changes, the respondents noted no other difficulties completing the survey.

The researcher distributed the Professional Community Index to teachers at 9 participating high schools during the beginning of the 2008-2009 school year. Teachers received the survey as they resumed their work duties before students returned to their respective campuses. Additionally, a second mailing occurred before the teachers' first PLC meetings. The decision to send the surveys early was made primarily as an effort to minimize any confusion respondents might have as to the timeline for the questions, since respondents were being asked to respond to questions pertaining to their PLC participation during the previous school year and not the current one that had just begun. Additionally, the letter attached to the survey clearly outlined the objectives of the survey, which granted teachers confidentiality and provided them with the option to refuse or remove themselves from the study at any point (see APPENDIX B). Table 3 illustrates the distribution schedule the researcher implemented in order to increase response rates (Dillman, 2000).

In addition to the pilot survey questions and the Professional Community Index, the reminder emails (APPENDIX C) and second cover letter (APPENDIX D), which the sample received, are available at the end of this document.

Variables

This study explored the following 12 independent variables. Two of the variables, years of service and degree of professional learning community, were continuous variables. For years of service, the researcher used the following scale: 0-5, 6-10, 11-15, 16-20, and 20+ years. Since the Professional Learning Community variable consisted of several internal scales, the researcher converted all the scores on the scales to z scores with a mean of 0 and a standard deviation of 1. The other three teacher characteristic variables: degree held, certification, and content knowledge were all categorical variables. Degree held

was measured using the following scale: Bachelor's degree, Master's in education, Master's in academic content, Doctorate in education, Doctorate in academic content. Certification was determined by participants' responses, which included standard certification, alternative certification, emergency certification, out-of-field certification, and uncertified. Teachers in California regularly complete a Performance Appraisal Information Form in which teachers identify their certification status. Finally, the researcher measured content knowledge by the way in which teachers complied with the content knowledge component of the No Child Left Behind Act. Participants' responses included: subject-matter exam, coursework, National Board Certification (which is recognized in the State of California as a means of meeting certification requirements), or High Objective Uniform State Standard Evaluation (HOUSSE). Each of these variables was collected from participants using the Professional Community Index.

Table 3

Survey Distribution Schedule

Mailing	Send Out	Dates	Expected Returns
1 st	Survey, cover letter, envelope	Aug. 18-22	19-27%
2 nd	Email reminder to entire sample	Sept. 2	34-56%
3 rd	Survey, 2 nd cover letter, envelope to non-respondents	Sept. 16	57-70%
4 th	Email reminder to non respondents	Sept. 30	72-95%

In addition to these teacher characteristic variables, the research used 7 student characteristic variables. This study controlled for student characteristics in order to provide a more accurate picture of the effects of the independent variables on student achievement. The researcher gathered the data from the Student Characteristic Index. The State of California created a composite index, the School Characteristics Index (SCI), to summarize multiple factors that are associated with student performance on state tests but are largely beyond the control of the schools themselves. Because this study examined data across multiple schools, the researcher added controls to the statistical model to adjust for differences in student performance attributable to factors outside the control of the school. This makes it possible to estimate how one group's performance would compare to another group's if they had similar students and teachers. Table 4 identifies factors from The Schools Characteristics Index used in this study along with their relationships to student achievement.

Instrumentation

The researcher measured four demographic variables and the teachers' perceptions of Professional Learning Communities using a single survey distributed to teachers during the 2008-2009 school year. Karen Seashore-Louis and Helen Marks developed each item on the survey. Seashore-Louis and Marks granted permission for the researcher to use the survey. Several articles written by the original authors and others report the instrument's reliability and validity information. In *Does Professional Community Affect the Classroom? Teachers' Work and Student Experiences in Restructuring Schools*, for the entire instrument, investigators reported Cronbach's Alpha

Table 4

Correlation Matrix of Student Characteristics and Standardized Test Scores

	Statistics	API	Student Ethnicity White	Hispanic	Parental Education Level	English Learners	Students in the free/reduced-priced meals program	Student Absences (<10 or more days)	Prior Achievement
API*	r	1	.67	-.74	.84	-.65	-.78	**	***
	p		<.0001	<.0001	<.0001	<.0001	<.0001		
	N	1070	1070	1070	1070	1070	1070		
Student Ethnicity White	r	.67	1	-.77	.71	-.78	-.76		
	p	<.0001		<.0001	<.0001	<.0001	<.0001		
	N	1070	1070	1070	1070	1070	1070		
Hispanic	r	-.74	-.77	1	-.83	.79	.78		
	p	<.0001	<.0001		<.0001	<.0001	<.0001		
	N	1070	1070	1070	1070	1070	1070		
Parent Education Level	r	.84	.71	-.83	1	-.76	-.84		
	p	<.0001	<.0001	<.0001		<.0001	<.0001		
	N	1070	1070	1070	1070	1070	1070		
English Learners	r	-.65	-.78	.79	-.76	1	.82		
	p	<.0001	<.0001	<.0001	<.0001		<.0001		
	N	1070	1070	1070	1070	1070	1070		
Students in the free/reduced- priced meals program	r	-.78	-.76	.78	-.84	.82	1		
	p	<.0001	<.0001	<.0001	<.0001	<.0001			
	N	1070	1070	1070	1070	1070	1070		

*API refers to Annual Performance Index.

**The School Characteristics Index does not perform correlations (or any statistical procedures) on ~~Prior Achievement.~~

***The School Characteristics Index does not perform correlations (or any statistical procedures) on ~~Student Absences.~~

as (.69); in addition, for each of the 5 attributes, researchers reported them individually

as: .74 (Shared Norms and Values), .68 (Reflective Dialogue), .62 (Deprivatized Practice), .61 (Collective Focus on Student Learning), .68 (Collaboration). Moreover, several articles and chapters written by these authors and others who utilized the survey reported scale reliabilities in addition to showing robust results (Louis, Marks, & Kruse, 1996; Marks & Louis, 1997, 1999; Spillane & Louis, 2005; Vescio, Ross, & Adams, 2008; Chatterji, 2002). Furthermore, Seashore-Louis has data from several recent surveys that used the professional community items--all of which found similar results--which suggests strong validity. In addition to the validity established by the recent surveys, Seashore-Louis, in her book *Professionalism and Community*, conducted field research in several professional learning communities, which resulted in a number of case studies. These case studies also support the validity of the survey.

In *Does Professional Community Affect the Classroom? Teachers' Work and Student Experiences in Restructuring Schools*, Seashore-Louis and Marks outline the attributes that make up the Professional Community Index; however, when examining whether learning communities have an impact on student achievement, they used only a standardized score for the entire index. That is to say, each attribute did not represent a separate independent factor in their analyses but all were averaged to form a composite standardized score for the index. As is evident in the next section, several of the attributes have a minimal number of items that measure the constructs and as such make reliability challenging. Therefore, in following the same procedures as Seashore-Louis and Marks, this study also used a composite score consisting of an average of each item's standardized score as an independent factor rather than scores for each attribute. The decision to use standardized (*z scores*) was made because the survey consisted of several

scales, some have 5 points while others have 7. Therefore, the researcher captured professional community as a composite score that represented the average of the responses to each of the 19 standardized items ($M = 0$, $SD = 1$). The following section outlines each of the five attributes and the items that correspond to those attributes.

Shared Norms and Values

Shared norms and values represent the agreements between educators on their understandings about teaching and learning, relationships, and the school's role in the community (Schein, 1985; Giroux, 1988). Participants recorded their sense of shared norms and values using a 5-point Likert scale from —Strongly Agree” to —Strongly Disagree.” The items measured teachers' beliefs about the school's mission, goals, and discipline policies. Table 5 depicts the items for shared norms and values.

Reflective Dialogue

Reflective dialogue indicates the efforts of teachers to engage in meaningful reflection with one another concerning the nature of their work. The goal is to improve teachers' practice in addition to student achievement (Clift, Houston, & Pugach, 1990; Liebowitz, 1991; Little, 1990; Osterman, 1990, 1993). The survey gathered data on

Table 5

Items for Shared Norms and Values

Most of my colleagues share my beliefs and values about what the central mission of the school should be.
 Goals and priorities for the school are clear.
 In this school the teachers and the administration are in close agreement on school discipline policy.

Table 6

Items for Reflective Dialogue

In one of your typical collaboration sessions when you meet with other teachers about how much time is spent diagnosing individual students?
In one of your typical collaboration sessions when you meet with other teachers about how much time is spent analyzing teaching?

reflective dialogue using a frequency scale, where teachers indicated the amount of time they spent diagnosing students and analyzing each other's teaching. Participants' responses ranged from "None" of the time to "More than half" the time. The time indicated here corresponds to the time teacher's work together collaboratively. Table 6 exemplifies the items for reflective dialogue.

Deprivatization of Practice

Deprivatization represents the teachers' willingness to open their classroom doors to other professionals in the community. These items ranged from "Never" to "More than 10 times" on a frequency scale. This scale reflected the frequencies of classroom observations teachers made of other teachers' classrooms and the amount of feedback from these observations. Table 7 illustrates the items for deprivatized practice.

Collective Focus on Student Learning

A collective focus on student learning reflects a sustained interest by educators to link pedagogy to the process of learning and teachers' actions to increased opportunities for student achievement (Abbott, 1991; Darling-Hammond & Snyder, 1992; Darling-Hammond & Gooden, 1993; Little, 1990). The researcher measured these items using a

5-point Likert scale, where teachers indicated their agreement with the item from “Strongly Agree” to “Strongly Disagree.” These items related to teachers’ perceptions of how students learn, commitment to authentic teaching and learning activities, and school vision. Table 8 depicts the items for collective focus on student achievement.

Collaboration

Collaboration requires colleagues to produce some tangible evidence of their work together, which can come as action research or in other forms. These items related to the amount of time teachers were receiving suggestions from colleagues on curriculum, teaching techniques, lesson planning, and other teacher-related activities. The scale is the same frequency scale as “Privatization of Practice”—a 5-point Likert scale from “Strongly Agree” to “Strongly Disagree.” Table 9 illustrates the items for Collaboration.

Demographic Identifiers

In addition to the data gathered on teachers’ perceptions of PLCs, the researcher collected demographic information including years of service, degree level, content area preparation, and certification. The researcher also used these identifiers as independent variables in this study. Table 10 identifies the demographic variables collected.

Reliability and Validity

The researcher reported Alpha scores for this instrument and compared them to Louis and Marks’ (1996) coefficients. Nunnally (1994) identified alpha scores of .70 and

Table 8

Items for Collaboration

How often during the previous school year did you receive useful suggestions for curriculum materials from colleagues in your department?
How often during the previous school year did you receive useful suggestions for teaching techniques or student activities from colleagues in your department?
There is a great deal of cooperative effort among staff members.
I make a conscious effort to coordinate the content of my courses with other teachers.
In a typical collaboration period when you meet with other teachers, about how much time is spent on coordinating content?
During the previous school year, about how much time per month have you spent meeting with other teachers on lesson planning, curriculum development, guidance and counseling, evaluation of programs, or other collaborative work related to instruction?

Table 7

Items for Collective Focus on Student Achievement

Rate the importance of these items as goals in your teaching.
Basic literacy/numeracy skills
Academic mastery of the subject matter of the course
Higher level skills (reasoning, problem-solving, critical and creative thinking)
Citizenship
Good work habits and self-discipline
Personal growth and fulfillment (self-esteem, personal efficacy, self-knowledge)
Human relations skills (cultural understanding, getting along with others)
Teachers focus on what and how well students are learning rather than how they are teaching.
Teachers exhibit a reasonably focused commitment to authentic curriculum and instruction.
A focused school vision for student learning is shared by most staff in the school.

higher as acceptable. Additionally, the researcher reported on the validity previously

established by the survey as demonstrated in the extant literature.

Dependent Variable

Student Accountability

Multiple years of achievement data were averaged by using mean scores on California Standards Tests (CSTs) in English, math, science, and social science. In total, the researcher used 11 CSTs for each school year (2006-2007 and 2007-2008): CST-ELA (English) for grades 8-11; CST-Algebra I, II, and CST-Geometry (math); CST-Biology, Physics, and Chemistry (science); and CST-US History and World History (social

Table 9

Demographic Variables

Prior to this year, how many years of experience have you had as a full-time teacher in THIS school?
Prior to this year, how many years of experience have you had as a full-time teacher in OTHER schools?
Educational degrees
Bachelor's degree
Master's in education
Master's in an academic subject
Doctorate in education
Doctorate in an academic subject
How did you obtain your teacher certification?
Standard certification (State-approved college or university)
Alternative certification (e.g., Teach for America, Peace Corp, or district internship)
How did you demonstrate academic subject matter competency?
Subject matter exam
Coursework (e.g., undergraduate major, undergraduate equivalent, or graduate degree in core subject)
National Board Certification in core subject
HOUSSE (High Objective Uniform State Standard of Evaluation in the core subject)

science). California educators and test developers developed the CSTs collaboratively. These tests measure students' progress toward achieving California's academic content standards, which describe what students should know and be able to do in each grade level and subject tested. Scores are reported on a 200-600 scale, where a 350 is the mean with a 50 the standard deviation. Scaled scores allow comparisons of groups of students in different contents and controls for the variations that might exist between different versions of the test.

The researcher used these standardized tests because the vast majority of students graduating high school must take these tests during high school. Additionally, these tests are measuring discrete skills defined by academic content standards. If teachers are truly teaching the standards, then CST performances certainly validate student achievement. However, standardized tests are but one way to measure student achievement. Other tests are available, but few have the established reliability and validity of the CSTs or measure the academic content standards established by the state of California.

The California Standards Test Technical report published each year with the results documented evidence for validity, reliability, and fairness. Item writers address content validity through a series of reviews, including reviews by ETS content assessment specialists and the external Assessment Review Panels. These reviews are conducted to ensure that each item is measuring the appropriate California content standard. Relationships between test scores and other measures intended to measure similar constructs provide convergent validity evidence. For CSTs for English-language arts, mathematics, and science, the reviewers collected information to address convergent evidence through examining the relationship between CSTs and their CAT/6 Survey

counterparts. The report indicated strong correlations for each grade level tested in reading ($M=.78$), math ($M=.78$), biology ($M=.70$), and others. Reviewers determined fairness of the test in several ways, including analyzing results based on demographic identifiers, test accommodations, variations, and modifications, in addition to ensuring a secure test administration. Reliability focuses on the extent to which differences in test scores reflect true differences in the knowledge, ability, or skill tested rather than fluctuations due to chance or random factors. The differences among individuals are partly due to real differences in the knowledge, skill, or ability being tested (true score variance) and partly due to random unsystematic errors in the measurement process (error variance). The number used to describe reliability is an estimate of the proportion of the total variance that is true score variance. Several different ways of estimating this proportion exist. The estimates of reliability reported here are internal-consistency measures, which researchers derived from the analysis of the consistency of the performance of individuals on items within a test (internal-consistency reliability). Reliability coefficients for each of the major content areas across all grade levels tested ranged from .89 to .95. Additionally, researchers used other statistical analyses to determine reliability and they reported these in the technical manual.

Data Analysis

The researcher answered the first research question by analyzing the relationships among all 12 variables in the study. Correlations were computed to determine the strength of the relationships among the 12 variables. A standard set for determining the strength of the relationship will follow conventions set forth by Heiman (2001) in which

a coefficient below .40 is insignificant and scores above the .40 benchmark are substantially strong.

The investigator answered the second question using multiple regression. First, a standard multiple regression was conducted, which produced both an overall degree of variance between the independent variables and the criterion variable and the statistical significance for each predictor variable. Teachers' self-report of the frequency of activities in their professional learning communities and items related to school culture and climate were used as one independent variable. This variable was examined along with teachers' reports of years of experience, educational status, content knowledge, and certification type, student ethnicity, English language status, socioeconomic status, parent education level, and absences.

The professional learning community variable consisted of a composite score, of standardized scores with a mean of 0 and a standard deviation of 1, generated from teachers' responses on the Professional Community Index. The researcher coded the years of service variable according to participants' responses to the number of years teaching, where a one indicated 0-5 years; a two indicated 6-10 years; a three 11-15 years; a four 16-20 years; and a five, which indicated 20+ years of service. The investigator analyzed educational status using teacher responses to the degree(s) held. Codes included one for Bachelor's degree or zero as no Bachelor's degree, a one for Master's in education or a zero for no Master's degree in education, and so forth for each of the following categories: Master's in academic content, Doctorate in education, and Doctorate in academic content. Certification was coded as either one, standard certification, or zero, non-standard certification. A non-standard certification included

alternative certification, emergency certification, out-of-field certification, and uncertified. Finally, the researcher coded content knowledge by the way in which teachers complied with the content knowledge component of the No Child Left Behind Act, which included a one for coursework compliance or a zero for alternative compliance. Alternative compliance included subject-matter exam, National Board Certification, or High Objective Uniform State Standard Evaluation (HOUSSE). All teachers, regardless of years of service, are required to complete the subject matter competency form for the No Child Left Behind Act. This form supplied the information of this demographic variable. Additionally, codes for each student characteristic variable were as follows: ethnicity (0 = ~~w~~white,” 1 = ~~n~~onwhite”), English language status (0 = ~~E~~nglish is primary language,” 1 = ~~E~~nglish is secondary language”), socioeconomic status (0 = ~~n~~o free or reduced-price meals,” 1 = ~~f~~ree or reduced-price meals”), parent education level (1 = ~~n~~ot a high school graduate,” 2 = ~~h~~igh school graduate”, 3 = ~~s~~ome college,” 4 = ~~e~~college graduate,” 5 = ~~g~~raduate school”), absences (0 = ~~l~~ess than 10,” 1 = ~~m~~ore than 10”).

The researcher answered question three using a sequential multiple regression. The first sequence to enter the block consisted of the student characteristic variables. The second sequence included only the professional community variable.

Before each variable entered into the regression, the researcher took steps to ensure that the data were prepared for analysis. Additionally, the researcher took steps to rectify the issues of missing data and outliers. Missing data were replaced with the item mean. Moreover, the researcher established an upper and lower bound response using the

mean and standard deviation for each item. Dropped responses included any item exceeding three or more standard deviations.

Data Screening

The following section outlines the steps for screening and cleaning both continuous and categorical variables, presented here in separate sections.

Continuous Variables

First, the researcher examined output tables for code violations and extreme minimum or maximum values. Mean and standard deviations on continuous variables were compared to ranges published in the extant literature. Second, the researcher examined missing values for all continuous variables, and variables missing less than 5% of their values will be handled using SPSS listwise deletion. For variables missing more than 5%, the Missing Value Analysis feature of SPSS supplied the means for imputation. Third, the researcher explored univariate outliers using the Extreme Values component of SPSS; the lowest and highest five items were scrutinized and targeted for elimination if necessary. Furthermore, the researcher utilized stem-and-leaf plots to confirm the extreme values findings. Fourth, skewness and kurtosis figures determined normality, and values were gauged using the benchmark of +1.0 to -1.0 range. Variables violating the normality assumption were transformed using the most conservative approach. Fifth, the researcher examined bivariate scatter plots for each of the variables to assess linearity. Scatter plots with elliptical or oval patterns are indicative of linearity. Finally, the researcher calculated the Mahalanobis distance for each case to assess multivariate outliers. The Mahalanobis distance values were evaluated using a chi square distribution, where the number of independent variables determines the degree of freedom. Any case

exceeding the value on the Table of Critical Values ($p < .001$) was considered a multivariate outlier and targeted for elimination.

Categorical Variables

Categorical variables were examined for unusual bifurcations (unusual split), code violations, and missing values. The researcher substituted item means for missing data. Univariate outliers were examined within each level of the categorical variables. Extreme values were assessed using the Extreme Values function in SPSS, and any value deemed extreme was targeted for deletion. Once the researcher had addressed missing values and outliers, then normality for the dependent variable was assessed within both levels of all categorical variables. Kolmogorov-Smirnov and Shapiro-Wilks tests were used to check the normality assumption. The test of linearity assessed whether equal variances existed across both levels of all categorical variables on the dependant variable. For this test, the researcher used Levene's Test of Equality of Variances with a significance level of .05.

Summary

Chapter III provided a description of the population and research site in addition to the research design used. The researcher addressed the data collection and analysis procedures including the steps to maintain the credibility of the findings. The researcher outlined the statistical procedures, primarily multiple regression, to be used to analyze the data and answer the three research questions. In Chapter IV, the researcher presented the analysis of the data.

CHAPTER IV

FINDINGS

Overview

This study examined the relationships among and between 5 teacher characteristic variables: professional learning community, teacher experience, educational status, content knowledge, certification type and 7 student characteristic variables, including two years of standardized test scores, student ethnicity, parent education level, English learner status, socio-economic status, and absences. The goal of this project was to determine the influence each of these variables have on student achievement. The dependent variable was students' 2008 standardized test scores, and the independent variables were perceptions of professional community, experience, educational status, content knowledge, certification type, 2007 test scores, ethnicity, parent education level, English learner status, SES, and absences. The study consisted of a sample of 204 teachers from the Grossmont Union High School District and their respective students. The first part of the study included the administration of the Professional Community Index and demographic identifier at the beginning of the 2008-2009 school year. Once this phase of data collection concluded, the researcher requisitioned a separate student data file from the district data and assessment office. This file consisted of one large, longitudinal data set, which included the 7 student characteristic variables mentioned previously. The researcher used both the survey and the data file to address the following questions:

1. What relationships exist among the variables teacher experience, degree held, competency, certification type, professional community, language status,

- socioeconomic status, parent education level, ethnicity, absences, 2007, and 2008 test scores?
2. To what extent do teacher characteristic variables (teacher experience, degree held, competency, certification type, and professional community) and student characteristic variables (language status, socioeconomic status, parent education level, ethnicity, and absences) explain student achievement?
 3. Does professional learning community explain variations in student achievement scores when student characteristic variables (language status, socioeconomic status, parent education level, and ethnicity) act as covariates?

Participants

One hundred and forty-one teachers in 9 southern California schools at the beginning of the 2008-2009 school year completed the Professional Community Index and demographic identifier sheet. The actual sample selected totaled 141 teachers, which resulted in a 69% response rate. Initial sampling efforts were taken to reflect the percentages of teachers in each content area. A comparison of the sample with data gathered from the California Department of Education confirmed that the sample and the district's staff were similar. Table 11 identifies the frequencies and percentages of the demographic variables collected in this study. Please note, however, that data collection included variables not used in analysis. These variables, including gender and school site, were used for descriptive purposes and sorting only. The researcher measured teacher experience by combining two responses to questions pertaining to (1) the amount of time the teacher had spent teaching at the school where he or she was presently employed, and (2) the amount of time the teacher had spent teaching at other schools.

Teachers' self-reports of their degrees provided data for educational status. Responses varied from bachelor's degree, master's in education, master's in academic content area, doctorate in education, doctorate in academic content area, and other.

The manner in which teachers' responded to the ways they received their credential supplied the data for content knowledge. Teachers responded as ~~C~~oursework," indicating that they held a major in their field of study; ~~E~~xam," indicating that the teacher was credentialed by passing a subject matter exam; ~~N~~ational Board Certification," which indicated that a teacher from out of state was credentialed to teach within that subject area; and ~~H~~OUSSE," indicating that the teacher met the requirements to teach the subject based on exceptions outlined in the No Child Left Behind Act.

Next, responses on how teachers obtained their initial teacher certification determined certification type. ~~S~~tandard certification" reflected teachers who attended a state-approved teacher-training program. ~~A~~lternative certification" indicated alternative routes to certification including Teach for America. Teachers also indicated ~~E~~mergency certification," which typically indicates certification in high need areas, ~~O~~ut-of-field certification" for teachers teaching outside their field of certification, and ~~U~~ncertified."

As evidenced in the table, the majority of respondents were both the least and most experienced teachers in the district. These teachers mostly worked full time and represented a range of grade levels. Additionally, more respondents taught in English and math than other subject areas, which is consistent with most high school formats. A slightly higher percentage of females responded than males. Additionally, all teachers in the sample held a bachelor's degree, and 70% had an advanced degree. These teachers

were by in large certified to teach through a teacher education program and were qualified to teach based on the coursework they had completed at their respective universities, although some (30%) did qualify to teach through state and national exams, such as the PRAXIS.

Survey Item Responses

Several scales within the Professional Community Index developed by Karen Seashore-Louis and Helen Marks measured professional community. Participants used a Likert scale ranging from “Strongly Disagree” to “Strongly Agree” to rate some items. Others items were rated using frequencies ranging from “Never” to “10 or more times.” Teacher demographics and responses along with means and standard deviations to the Professional Community Index are arrayed in Table 12.

On items 1-8, means ranged from 3.31 to 4.23. The low mean represented the degree of agreement between school administrators and teachers on the discipline code, while the larger mean indicated teachers’ efforts to coordinate their course content with one another.

Item 9 specified that teachers in the district spent on average between 30 minutes and 5 hours per month meeting with each other.

In addition to these items, responses to items 10-15 reflected the frequency in which teachers engaged in learning community activities and what they did in these communities. The means for these items ranged from 1.95 to 4.85, where the low mean indicated the number of time teachers received useful suggestions for teaching techniques from colleagues. This mean was relatively low at never to twice a year (accounting for

Table 10

Descriptive Statistics for Demographic Variables

Variable	Frequency	Percentage
<i>Teaching Experience</i>		
0-5 years	38	28.4
6-10 years	29	21.6
11-15 years	19	14.2
16-20 years	12	9.0
20+ years	36	26.9
<i>School Membership</i>		
Full time	128	95.5
Part time	6	4.5
<i>School Affiliation</i>		
English	44	32.8
Social Science	26	19.4
Math	43	32.1
Science	20	14.9
<i>Grade Level</i>		
09	43	32.1
10	33	24.6
11	40	29.9
12	11	8.2

Table 11 Continued

Descriptive Statistics for Demographic Variables

08	<i>Sex</i>		
	Male	54	40.3
	Female	76	56.7
	<i>Degree Status</i>		
	Bachelor's degree	134	100.0
	Master's in education	81	60.4
	Master's in academic content	18	13.4
	Doctorate in education	0	0
	Doctorate in academic content	3	2.2
	Other	5	3.7
	<i>Teacher Certification</i>		
	Standard certification	132	98.5
	Out-of-field certification	2	1.5
	<i>Subject Matter Competency</i>		
	Coursework	91	67.9
	Exam	40	29.9
	National Board Certification	1	.7
	HOUSSE	2	1.5

the standard deviation), while the higher mean represented the amount of times teachers were receiving curriculum materials from their colleagues (between 3 and 10 or more times per year).

The means for items 16-18 ranged from 1.56 to 3.14. The lowest mean reflected the amount of time (~~none~~) teachers devoted to diagnosing individual student differences, where the highest mean suggested that teachers spent most of their collaboration time coordinating content.

Finally, with a high degree of variance (1.75 SD), teachers indicated that teaching higher-level skills such as problem solving was moderately important to them on item 19

In addition to examining the means and standard deviations for each item, the researcher analyzed both instrument reliability and participant nonresponse bias. To determine the accuracy of the instrument, the researcher used Cronbach's Alpha ($\alpha = .80$) to assess overall reliability. This reading was consistent with other reports of the instrument's reliability from the extant literature. Furthermore, the researcher assessed nonresponse bias by comparing the results of three extremely late arriving surveys to the results of all the other surveys. Research suggests that late arriving surveys are more characteristic of nonrespondents than initial respondents (BarNir & Smith, 2002). The researcher conducted an independent samples *t* test comparing the means of the three late arriving surveys to the 141 other surveys. A non-significant *t* test, $t(2.25) = -.044$, $p = .968$, suggested that no significant differences existed between late and initial survey participants. Therefore, extrapolating this result to all nonrespondents in the sample, we can conclude that teachers who did not respond to the survey would have responded similarly to those who did respond.

Table 12 Continued

Teachers' Responses to Survey Questions, Numbers and Percentages Per Response Category

Survey Item	Strongly Disagree	1 hour or less	5 hours or less	Strongly Agree	Mean	SD
1. Most of my colleagues share my beliefs and values about what the central mission of the school should be.	2(1%) Less than 15 minutes	4(3%) 15-29 minutes	27(20%) 30-59 minutes	72(54%) 1 hour or more	3.91	.82
2. There is a great deal of cooperative effort among staff members.	1(1%)	7(5%)	22(16%)	63(47%)	4.01	.87
3. I make a conscious effort to coordinate the content of my courses with other teachers.	2(1%)	6(4%)	19(14%)	39(29%)	4.23	.96
9. During the previous school year, about how much time per month did you spend meeting with other teachers on lesson planning, curriculum development, guidance and counseling, evaluation of programs, or other collaborative work related to instruction?	2(1%)	15(11%)	49(37%)	53(40%)	3.47	.88
4. Teachers focus on what and how well students are learning rather than how they are teaching.	1(1%)	7(5%)	23(17%)	39(29%)	4.90	1.13
5. Goals and priorities for the school are clear.	5(4%)	9(7%)	12(9%)	71(53%)	3.89	1.05
6. Teachers exhibit a reasonably focused commitment to authentic curriculum and instruction.	2(1%)	5(4%)	43(32%)	46(34%)	4.12	.83
7. In this school the teachers and the administration are in close agreement on the school discipline policy.	7(5%)	22(16%)	43(32%)	46(34%)	3.31	1.05
8. A focused school vision for student learning is shared by most staff in the school.	2(1%)	10(7%)	25(19%)	70(52%)	3.81	.89

Table 12 Continued

Teachers' Responses to Survey Questions, Numbers and Percentages Per Response Category

Survey Items							Means	SD
	Never	Once	Twice	3-4 times	5-9 times	10 or more times		
10. How often during the previous school year did you receive useful suggestions for curriculum materials from colleagues in your department?	4 (3%)	3 (2%)	5 (4%)	32 (24%)	43 (32%)	47 (35%)	4.85	1.19
11. Except for monitoring student teachers or substitute teachers, how often during the previous school year did you visit another teacher's classroom to observe and discuss his/her teaching?	72 (54%)	19 (14%)	18 (13%)	11 (8%)	8 (6%)	6 (4%)	2.12	1.50
12. How often during the previous school year did two or more teaching colleagues regularly examine your students' academic performance or review their grades or test scores?	54 (40%)	18 (13%)	23 (17%)	21 (16%)	12 (9%)	6 (4%)	2.53	1.36
13. How often during the previous school year did you receive meaningful feedback on your performance from your supervisors or peers?	41 (31%)	34 (25%)	28 (21%)	23 (17%)	2 (1%)	6 (4%)	3.96	1.51
14. How often during the previous school year did you receive useful suggestions for teaching techniques or student activities from colleagues in your department?	14 (10%)	8 (6%)	21 (16%)	44 (33%)	21 (16%)	26 (19%)	1.95	1.30
15. During the previous school year, how often did another teacher come to your classroom to observe your teaching?	75 (56%)	21 (16%)	17 (13%)	15 (11%)	3 (2%)	3 (2%)	3.14	.87

Table 12 Continued

Teachers' Responses to Survey Questions, Numbers and Percentages Per Response Category

Survey Items	None	Less than half	About half	More than half	Mean	SD			
16. In a typical <i>collaboration</i> * session, about how much time is spent coordinating content?	4 (3%)	30 (22%)	43 (32%)	57 (42%)	3.14	.87			
17. In a typical <i>collaboration</i> session, about how much time is spent diagnosing individual students?	70 (52%)	56 (34%)	5 (4%)	3 (2%)	1.56	.68			
18. In a typical <i>collaboration</i> session, about how much time is spent carefully examining individual teachers' practice?	36 (27%)	86 (64%)	10 (7%)	2 (1%)	1.84	.62			
Survey Items	RANK								
	Least Important 1	2	3	4	5	6	Very Important 7	Mean	SD
19. Higher level skills (reasoning, problem-solving, critical and creative thinking)	6(4%)	8 (6%)	11 (8%)	15 (11%)	26 (19%)	29 (22%)	38 (28%)	5.15	1.75

Student Achievement Data

In addition to the 141 teachers in the study, over 37,560 student records were used by virtue of these students' teachers being a participant in the study. The researcher analyzed the student data file, which consisted of data for standardized tests in English, math, science, and social science, ethnicity, parent education level, English learner status, SES, and absences. Scores are measured on a 200-600 scale with a mean of 350 and a standard deviation of 50. The 2007 and 2008 test data are depicted in Table 13.

The means from Table 13 ranged from a high in 2008 of 344.37 in chemistry to a low of 287.21 in general math. In 2007, biology had the highest mean score (350.34), while general math still had the lowest mean score (310.19). The most glaring evidence from this table, however, are the number of increasing and decreasing mean scores from 2007 to 2008. The greatest increase occurred in physics from 2007 (312.30) to 2008 (334.55); earth science made the greatest decline (30.19) from a high of 331.30 in 2007 to a low of 301.49 in 2008. The overall means and standard deviations of all tests are arrayed in Table 14 along with means and standard deviations for the 5 other student characteristic variables.

The data in Table 14 suggested that this student sample scored slightly higher on the 2007 achievement tests in relation to the 2008 tests. Additionally, the sample for this study was comprised of slightly more white students than students from other ethnic groups. The average parent educational level suggested that parents were between high school graduates and having some college (accounting for standard deviations). English learners comprised less than 30% of the sample; about 20% of the sample qualified for

Table 13

Mean Student Achievement Data on 10 CSTs for the Student Sample

Test	2007		2008	
	Mean	SD	Mean	SD
English Language Arts	349.26	59.33	339.95	60.07
General Math	310.19	46.00	287.21	45.95
Algebra	326.35	55.57	309.49	55.65
Geometry	315.05	64.29	303.48	58.53
Earth Science	331.30	44.18	301.49	37.85
Biology	350.34	46.99	338.58	49.95
Chemistry	335.22	43.18	344.37	53.86
Physics	312.30	49.95	334.55	60.25
World History	328.55	60.90	337.71	64.34
U.S. History	323.11	54.78	333.53	63.98

free and reduced-price meals, and fewer than 10% of the students had more than 10 absences per semester.

Data Cleaning and Screening

The researcher answered the three research questions in this study using the Statistical Package for Social Sciences version 16 for Macs (SPSS 16). The initial step in data analysis required cleaning the large, longitudinal student characteristic data file provided by the district. The researcher screened the data for code violations using SPSS Frequencies and analyzed missing data using the SPSS Missing Values Analysis feature. Despite research indicating the reliability of the mean substitution procedure (Hill, 1997), the researcher elected to use the more conservative listwise deletion feature based on the

Table 14

Mean Background Characteristics of the Student Sample

	Mean	SD	N
CST 2008	327.79	60.20	26718
CST 2007	334.71	58.81	27249
Ethnicity	.57	.50	36194
Parental education level	2.66	1.30	37369
English learner	.28	.45	37470
Free/reduced-priced meals program	.21	.41	37470
Absence	.07	.26	31515

resulting issues of the mean imputation procedure. The first issue centered on the extreme kurtosis produced by the mean imputation procedure in the dependent variable. Kurtosis would have required the researcher to transform the dependent variable, which would have made data interpretation difficult. Second, a comparison of the complete data set and the imputed data set resulted in statistically significant differences between the two data sets. This difference warranted a more conservative approach to handling the missing data.

The final student data set consisted of 18,139 student records. The researcher aggregated the records to the teacher level ($n=141$) with means computed in the variables of 2008 CST scores (2008CST), 2007 CST scores (2007CST), socio-economic status (SES), English learner status (EL), ethnicity, parent education level (PEL), and absences. The researcher merged these variables with a second data file consisting of all the teacher characteristic variables. One important notation concerning the achievement data is that these data are for the same teacher in 2007 and 2008 and not from the same students.

The teacher characteristic file consisted of data captured using the Professional Community Index and demographics identifier. Variables in this data set included teacher experience (coded -1 for 0-5 years, -2 for 6-10 years, -3 for 11-15 years, -4 for 16-20 years, and -5 for 21 plus years); educational degree (divided into categories: bachelor's degree, master's degree in education, master's degree in content area, doctorate in education, doctorate in content area, and other); subject-matter competency (coursework or exam); certification (standard or other); and a professional learning community composite score, which was transformed into a standardized *z-score*. The newly merged

data file consisted of means on each of the student characteristic variables from the longitudinal data set and the teacher characteristic data set gathered from the survey.

Before data analysis, the researcher screened all variables for code and statistical assumption violations using SPSS Frequencies, Explore, Plot, Missing Values Analysis, and Regression procedures. The frequency procedure indicated no code violations. The researcher screened the data from the 141 teachers for missing data using the Missing Values Analysis feature of SPSS. The analysis indicated that less than 5% of the data was missing in each of the variables. In addition to missing data, the researcher screened continuous variables for univariate outliers. The analysis produced some extreme values; however, no values exceeded three or more standard deviations, the threshold needed for deletion. The researcher addressed the normality assumption in the quantitative variables by examining skewness and kurtosis levels. All but two of the variables were within the acceptable range of -1.0 to +1.0. Because of extreme kurtosis, the researcher transformed the SES and EL variables with a base-10 logarithm. After transformation, all variables conformed to the appropriate skewness and kurtosis levels, and all their respective Shapiro-Wilks tests of normality were not significant ($p < .05$). To determine linearity, the researcher examined the shapes of bivariate scatterplots, and all the continuous variables indicated elliptically shaped scatterplots. The investigator screened for multivariate outliers by computing the Mahalanobis distance for each case. Three cases (57, 36, 6) exceeded the critical value of 20.515; these cases were eliminated from the final analysis.

Once cleaning of the continuous variables concluded, the researcher continued the process with the categorical variables. First, the researcher screened the categorical

variables for unusual bifurcations. The attendance variable indicated extreme bifurcation (95/5 split), as did variables for bachelor's degree, doctorate in education, doctorate in content area, other degree, and the certification variable. Several of these variables, such as the bachelor's degree variable, had a 100% split and would have been eliminated by SPSS as a constant during analysis. Other variables had disproportionate splits but none too extreme for deletion. Additionally, univariate outliers were examined using SPSS Explore. Extreme values existed at both levels of the remaining variables, but none beyond the ± 3 standard deviations threshold. With outliers and missing values settled, the researcher tested normality assumptions within each level of the categorical variables. Skewness and kurtosis were within the acceptable range of -1.0 to 1.0. Additionally, no Shapiro-Wilks tests for normality were significant at the .01 level; also, Q-Q plots revealed the data held close to the line of fit indicating a normal distribution. Furthermore, Levene's Test for Equality of Variances was non significant ($p < .05$), which suggested no homoscedasticity in the data. Finally, a nonsignificant Box's M Test ($p = .860$) indicated equal covariances between the dependent variable for the groups composing the independent variable.

Research Question 1: Correlations Among Research Variables

For the first research question, Table 15 illustrates the Pearson product-moment correlations for the variables used in this study. Subscripts represent correlations significant at the .0009 level, which was the necessary level after a Bonferroni correction.

Each of the years of service variables was coded -1 for 0-5 years, -2 for 6-10 years, -3 for 11-15 years, -4 for 16-20 years, and -5 for 21 plus years. As evidenced

by Table 15, no significant relationships were present between teachers' years of service and other variables of interest in this study.

The degree status variables were coded a -1 " if the teacher had the specific degree and a -0 " if the teacher did not possess the degree. As illustrated by Table 15, degree status exhibited no statistically significant relationships with other variables in the study

The competency variable was coded a -1 " for competency completed through coursework and a -2 " for competency fulfilled by exam. As demonstrated by Table 11, no significant relationships were present for this variable.

The professional learning community variable was a composite score of standardized *z-scores* from 19 individual items on the Professional Community Index. The composite *z-scores* ranged from -1.6 to 1.3. The standardized scores reflected a mean of zero and a standard deviation of one. Based on the data in Table 11, no significant relationships were present for this variable in this study.

The ethnicity variable was a continuous variable based on the mean ethnicity scores for each teacher in the study. Initially, each teacher's students were coded -1 " for white and -0 " for nonwhite. The researcher aggregated these codes to the teacher level. The ethnicity variable ranged from .06 to .88, where a 1.00 indicated a class with all white students. As evidenced in Table 11, ethnicity indicated significant positive associations with parent education level ($r = .595, p < .00005$), 2007 CST scores ($r = .498, p < .00005$), and 2008 CST scores ($r = .448, p < .00005$). These data suggested that a positive relationship existed between a student's ethnicity and his or her parent's education level and his or her performance on standardized tests. Additionally, significant negative relationships were present between student ethnicity, socioeconomic status ($r =$

Table 15

Correlations Among Research Variables

	Teaching Experience	MA in education	MA in content area	Competency	Professional Learning Community	Ethnicity	Parent Education Level	SES	English Learner Status	2007 CST	2008 CST	Mean	Standard Deviation
Teaching Experience	--	.110	.152	-.158	-.094	.148	.165	-.089	-.137	.090	.078	2.82	1.56
MA in education		--	-.252	-.124	-.028	.048	-.116	.083	-.054	-.059	-.075	.60	.49
MA in content area			--	.020	.004	-.063	-.011	.027	.118	.050	.090	.14	.35
Competency				--	-.029	-.242	-.219	.231	.257	-.182	-.135	1.32	.47
Professional Learning Community					--	-.045	-.040	-.098	-.031	.067	.061	-.011	.48
Ethnicity						--	.595*	-.686*	-.568*	.498*	.448*	.54	.20
Parent Education Level							--	-.705*	-.438*	.670*	.600*	.258	.48
SES ^a								--	.330*	-.585*	-.503*	-.69	.34
English Learner Status ^a									--	-.424*	-.443*	-.54	.23
2007 CST										--	.890*	327.72	36.58
2008 CST											--	320.39	39.12

* $p < .0009$.^a transformed variable.

-.686, $p < .00005$), and English learner status ($r = -.568$, $p < .00005$). That is to say, students who indicated their ethnicity as other than white in this study have low socioeconomic status and are also likely to be labeled English learners.

The parent education level variable was a continuous variable based on students' reports of their parents' education level, where a score of one indicated no high school and a score of 5 represented an education inclusive of graduate school. As with the ethnicity variable, the researcher aggregated each individual student's report to the teacher-level, where a score of 5 would indicate a class where all students' parents had an education inclusive of graduate school. The parent education variable ranged from .66 to 3.66. As demonstrated in Table 11, parent education level was significantly and positively related to 2007 ($r = .670$, $p < .00005$) and 2008 CST scores ($r = .600$, $p < .00005$). In this study, students whose parents reported higher educations performed better on standardized exams. In addition, significant and negative correlations were present in parent education level, SES ($r = -.705$, $p < .00005$), and EL status ($r = -.438$, $p < .00005$). Students whose parents reported higher educations were less likely to receive free or reduced-price meals or likely to be labeled as English learners.

The SES variable was a continuous variable based on whether students received free or reduced-price meals. Codes in the initial file included a "1" for yes and a "0" for no. The researcher aggregated these individual responses to the teacher level with a range of scores between .03 and .95, where a score of 1.0 represented a class in which all students received free and reduced-price meals. As is illustrated by Table 14, SES and EL status indicated a significant positive relationship ($r = .330$, $p < .00005$). That is to say, students who received a free and reduced-price lunches were also more likely to be

English learners. Additionally, significant negative associations were present between SES, 2007 ($r = -.585, p < .00005$), and 2008 CST scores ($r = -.503, p < .00005$). These correlations suggested that students who received free and reduced-price meals performed lower on standardized tests than students not designated SES.

The EL status variable was a continuous variable based on a student's English learner designation. These classifications included the designations English learner (EL), Intermediate-Fluent English Proficient (I-FEP), and Reclassified-Fluent English Proficient (R-FEP). Codes in the original file included a "1" for any of the aforementioned designations and a "0" for English-Only designation. Scores on this variable ranged from .06 to .88, where a 1.0 indicated a class with all students designated as English learners. As shown in Table 14, EL status, 2007 ($r = -.424, p < .00005$), and 2008 CST scores ($r = -.443, p < .00005$) indicated significant negative relationships. Students with EL designations performed lower on standardized tests than students without the designation.

The remaining two continuous variables represented the range of scaled scores from state standardized tests. The original scores included an individual score for each student. The researcher aggregated these individual scores to the teacher level. The scores ranged from 229.20 to 414.48 in 2007 to 244.96 to 430.43 in 2008. Based on the data from Table 14, a strong, positive relationship was found between 2007 and 2008 CST scores ($r = .890, p < .00005$). This relationship suggested that these teachers' students' performances in 2007 were almost perfectly complimentary to these teachers' students' performances in 2008. That is to say, variations in performance in 2007 were very similar to variations in performance in 2008.

Research Question 2: Multiple Regression Analysis for All Variables

For the second research question, the students' 2008 achievement scores served as a criterion variable in a multiple regression, and teacher experience, educational status, competency, *z scores* from the Professional Community Index, SES, English learner status, ethnicity, parent education level, and 2007 test scores all served as independent variables. The multiple regression analysis is depicted in Table 16.

The researcher conducted a multiple regression with 2008 CST scores as the dependent variable and teacher experience, educational status, competency, *z scores* from the Professional Community Index, SES, English learner status, ethnicity, parent education level, and 2007 test as independent variables. Because of extreme kurtosis and skewness, the researcher transformed the SES and English learner status variables using a base-10 logarithm.

Regression results summarized in Table 16 indicated that multiple *R* for the regression was statistically significant, $F(10, 112) = 45.695, p < .001$. Two of the 11 independent variables contributed significantly to explaining the variations in 2008 CST scores (2007 CST, $p < .001$ and LEL, $p < .05$). Log base-10 of SES in addition to the other 8 variables indicated little to no relationship with 2008 test scores and subsequently did not make a statistically significant contribution to the explanation of these scores.

As indicated by Table 16, the *B* and beta coefficients represent the weights assigned to each variable at the end of the equation-building process. The *b* weight for SES is 2.18. That is to say, when the influence of all other variables is controlled, a rise of 2.18 in SES is associated with a 1-point gain in student achievement. Beta coefficients provide similar information in standardized form. These weights indicate how much more

one variable explains the variations in the dependent variable compared to another. For example, based on the two statistically significant criterion variables (2007 CST and English language status), the 2007 CST variable provides approximately 7 times the contribution that English language status makes to explaining variations in 2008 CST scores.

Additionally, the fifth column reflects the squared semipartial correlation. The squared semipartial correlation indexes the variance accounted for uniquely by each independent variable in the full model. As evidenced by Table 16, the sum of the squared semipartial correlation column is .382. That is, 38% of the variance in 2008 CST scores is accounted for uniquely by the 11 criterion variables. As is common in most multiple

Table 16

Regression Analysis Summary for Student and Teacher Characteristics Explaining Student Achievement

Variable	<i>B</i>	<i>SEB</i>	β	Squared Semipartial Correlation	Structure Coefficients	<i>t</i>
Teaching Experience	-.343	1.19	-.014	.000	.09	-.307
MA in Education	-.663	3.611	-.008	.000	-.08	-.184
MA in Content Area	6.73	5.09	.059	.003	.10	1.320
Competency	3.47	3.76	.041	.001	-.15	.923
PLC (z score)	-.004	3.51	.000	.000	.07	-.001
LSES	2.18	8.30	.019	.000	-.56	.262
LEL	-19.22	9.49	-.111*	.007	-.49	-2.025
Ethnicity	-4.08	13.53	.021	.000	.50	-.301
Parent Education Level	.581	5.62	.007	.000	.67	.103
2007 CST	.93	.064	.864**	.372	.99	14.55

Note: $R^2 = .81$ ($N=123$, $p < .001$).

* $p < .05$; ** $p < .001$

regressions, this percentage greatly differs from R^2 (.81). The difference in R^2 and the squared semipartial correlation indicates that the model has a large degree of redundancy built into the independent variables. That is, these independent variables overlap and therefore have a high degree of intercorrelation.

The sixth column reflects the structure coefficients for each variable in the model. These statistics provide information to compare the influences of the independent variables on the dependent variable. This statistic is similar to the other gauges previously mentioned; however, the structure coefficient for 2007 CST scores indicates that it is strongly, nearly perfectly, correlated with 2008 CST scores (.99). In contrast to our other gauges of strength, a structure coefficient does not take into account the degree to which the variable in question correlates with other variables in the model. Here, we are measuring the strength of association between one independent variable and the dependent variable.

The final column represents the t test for each variable. The t test's hypothesis indicates that each variable's weight is zero. Any score significantly different from zero reflects the ability of the variable to account for a significant portion of the dependent variable even as other variables act as covariates. In Table 16, only the English language status variable and the 2007 CST variable have statistically significant t tests.

Additionally, multicollinearity can be a concern in multiple regressions because it can reduce the size of multiple R , make data interpretation difficult, and create an unstable regression equation. Essentially, multicollinearity occurs when an extremely high correlation occurs between two independent variables in the regression. Although no guaranteed heuristic exists to measure multicollinearity, as a rule of thumb, researchers

have adopted the .90 intercorrelation standard as indicative of multicollinearity. In order to verify the presence of multicollinearity, several diagnostic tools are available in SPSS and SPSS output tables. First, tolerance levels of .01 or less indicate multicollinearity (Tabachnick & Fidell, 2001). In neither the standard regression nor the block-entry regression were levels remotely near .01. SES at .346 was the lowest. The Variance Inflation Factor (VIF) is an additional method of evaluating multicollinearity. The VIF is the reciprocal of the tolerance, and research has indicated that a VIF level in excess of 10 is indicative of multicollinearity (Stevens, 2002). A final method for determining whether multicollinearity is present in the data is by using the Collinearity Diagnostics Table in SPSS. The Condition Index measures how dependent criterion variables are on one another. If the Condition Index exceeds 30 and at least two proportions for criterion variables are greater than 50, then multicollinearity may be affecting the data (Belsey, Kuh, and Welsch, 1980; Tabachnick & Fidell, 2001). Like the other diagnostics, this last issue is also not present in the data. Therefore, multicollinearity did not affect the results.

Because several significant correlations existed between the study's independent variables and the dependent variable, the researcher elected to rerun the data eliminating the 2007 test scores as an independent variable. Table 16a depicts the results without the 2007 test scores.

Regression results summarized in Table 16a indicated that multiple R for the regression was statistically significant, $F(9, 109) = 10.567, p < .001$. After the researcher eliminated 2007 test scores from the analysis, both English language status and the parent education level variable had statistically significant *t*-tests. Like the previous analysis however, the squared semipartial correlation column summed to .17, roughly one-fourth

of the R^2 statistic of .47. Even without the 2007 scores, the model appears to have a large amount of redundancy built into the variables.

Research Question 3: Professional Learning Community and Student Achievement Scores with Parent Education Level, Ethnicity, SES, and English Learner Status

For question three, the researcher combined two of the variables after analyzing the results of the correlation matrix. Instead of 2008 CST scores, professional learning community *z scores*, parent education level, ethnicity, 2007 test scores, SES, and English learner status being block entered into a sequential multiple regression, the researcher averaged the 2007 and 2008 CST scores since the two variables had such a strong correlation ($r = .89$). The strong correlation suggested that achievement scores changed very little over two years, so the researcher averaged the two variables in an effort to more accurately determine the impact PLC have on student achievement controlling for student background characteristics. The results of the analysis are illustrated in Table 17.

The researcher conducted a block-entry multiple regression with the averaged 2007/2008 CST scores as the dependent variable. Parent education level, ethnicity, SES, and English learner status were entered in the first block, and professional learning community *z scores* were entered in the second block. The rationale for this order of entry was to determine the unique impact of professional learning community on student achievement scores after controlling for the student characteristic variables. The prior analysis (question 2) controlled the influence of the other variables on the dependent variable. In a standard multiple regression, each variable is treated as if it were entered into the regression last. By block entering the variables, the influence of only the first sequence of variables is controlled during the second sequence. This procedure

Table 16a

*Regression Analysis Summary for Student and Teacher Characteristics Explaining
Student Achievement Without 2007 Test Scores*

Variable	<i>B</i>	<i>SEB</i>	β	Squared Semipartial Correlation	Structure Coefficients	<i>t</i>
Teaching Experience	-1.51	1.91	-.059	.003	.14	-.793
MA in Education	3.97	6.18	.050	.002	-.03	.644
MA in Content Area	15.12	8.42	.135	.015	.12	1.796
Competency	2.10	6.31	.025	.000	-.22	.333
PLC (z score)	1.58	5.81	.020	.000	.09	.272
LSES	-15.33	13.69	-.130	.006	-.73	-1.120
LEL	-39.20	15.55	-.229*	.031	-.65	-2.522
Ethnicity	-20.24	23.19	.103	.003	.67	-.873
Parent Education Level	48.43	10.19	.536**	.111	.94	4.752

Note: $R^2 = .47$ ($N=119$, $p < .001$).

* $p < .05$; ** $p < .001$

provides a better estimate of the unique contribution teachers' perceptions of professional community have on student achievement scores. In addition to the information requested in question two, the researcher also requested information on zero-order, part, and partial correlations of each independent variable.

As evidenced in Table 17, multiple R for regression was statistically significant, $R = .56$, $R^2 = .321$, adjusted $R^2 = .292$, $F(5, 118) = 11.15$, $p > .001$. These 6 variables explained the averaged 2007/2008 CST scores accounting for approximately 32% of the variation in scores.

Table 18 depicts the regression analysis and changes at each step in the block-entry. The first block included the four variables: EL status, SES status, parent education level, and ethnicity. The second block included the professional learning community variable.

To assess the contributions of variables, the researcher examined the t ratios for the regression slopes for the variables in the block when they first entered the analysis. In the first block, EL status was not significant $t(123) = -1.826$, $p > .05$. While non-significant, the negative sign for slope in EL status indicated that higher scores on EL status (i.e., EL designation) indicated lower scores on 2008 CST tests. The second variable, SES status, was also not significant $t(123) = -1.426$, $p > .05$. Again, the negative slope indicated that students with higher scores on SES status (i.e., those who received free and reduced-price meals) had lower scores on standardized tests. Additionally, the third variable, parent education level, was significant $t(123) = 2.819$, $p < .01$. Here, the positive slope indicated that students of parents who reported higher educations

Table 17

Results of Block-Entry Multiple Regression to Explain 2008 CST Scores from EL Status, SES Status, Parent Education Level, Ethnicity, 2007 CST Scores, and Professional Learning Community

Variable	Averaged 07/08 CST	EL	SES	PEL	Ethnicity	PLC	B	β	sr^2
EL	-.364						-36.18	-.175	.305*
SES	-.458	.331					-24.99	-.179	
PEL	.511	-.438	-.705				31.12	.318	
Ethnicity	.381	-.568	-.685	.595			-5.83	-.024	
PLC	.169	-.035	-.102	.040	-.044		12.53	.131	.016
Mean	322.00	-.53	-.69	2.58	.54	-.021			
SD	46.88	.23	.34	.48	.20	.49			
						Intercept =		208.55	
						R^2 =		.321	
						R^2_{adj} =		.292	
						R =		.566	

Note: EL, SES, parent education level (PEL), and ethnicity were entered in block one; PLC was entered in block two.

* $p < .05$

Table 18

Summary of R^2 Values and R^2 Changes at Each Step of the Block-Entry Regression

	Variables Included	R^2 for Model	F for Model	R^2 Change	F for R^2 Change
1	EL, SES, PEL, Ethnicity	.305	$F(4, 119) = 13.03^*$	.305	$F(4, 119) = 13.03^*$
2	EL, SES, PEL, Ethnicity, PLC	.321	$F(5, 118) = 11.15^*$	.016	$F(1, 118) = 2.83$

* $p < .001$.

performed better on 2008 CST tests. The final variable, ethnicity, was not significant, $t(123) = -.024$, $p > .05$. The negative slope reflects the fact that students who reported their ethnicity as nonwhite scored slightly lower than students who reported their ethnicity as white. Once these variables entered the model, R^2 was equal to .305.

The second block to enter the model included the professional learning community variable. The rationale for entering this variable in the second block was to determine the unique contribution this variable made in explaining 2007/2008 CST scores controlling only for the influence of the student characteristic variables. Professional learning community did increase the R^2 when it was entered in the second block $t(123) = .1.683$, $p > .05$, $R^2 = .321$; however the change in the F statistic was not significant. In fact, as evidenced in Table 18, the unique explanatory influence of professional learning community on the averaged 2007-2008 CST scores was approximately 1.6%.

Summary

The findings in Chapter IV indicated that respondents (69%) provided a wide range of responses to the Professional Community Index and demographic identifier

reflected in the frequencies, means, and standard deviations of Table 11. In addition to the survey and accompanying demographic identifier, the researcher collected data on several student characteristic variables, a file that included over 37,500 student records. The researcher aggregated the data for these individual records to the teacher level and merged them with the data gathered from individual teachers completing the survey. All the data were screened for code and statistical assumption violations, and where violations occurred, steps were taken to remediate the effects of these violations. Once the data were clean, the researcher analyzed the data in an effort to answer the three research questions. The researcher first examined correlations among the variables in this study. Results indicated significant relationships between variables meeting the more stringent .0009 Bonferroni correction. These correlations ranged in size from moderate ($r = .330$) for SES and EL status to extremely strong ($r = .890$) for 2007 and 2008 CST scores.

In addition to correlations, the researcher conducted two multiple regressions. The first regression, a standard multiple regression, indicated a statistically significant multiple R , $F(10, 112) = 45.70, p < .001$. Of the 11 variables of interest in the study, the greatest contributor to the dependent variable was 2007 CST test scores. The second regression, a sequential, block-entry regression, also indicated statistically significant results, $F(5, 118) = 11.15, p < .001$. However, after the four student characteristic variables (EL status, SES, ethnicity, and parent education level) were entered in the first sequence, only a slight, nonsignificant change was detected in the R^2 value when the professional learning community variable was entered in the second sequence. Therefore, results for the first regression indicated that more than 80% of the variations in 2008 CST

test scores were explained by the variables in the study; however, a sequential regression indicated that only 1.6% of the variation could be explained by teachers' perceptions of working in professional learning communities when student characteristic variables acted as covariates.

CHAPTER V

DISCUSSION

Summary

The ultimate goal of this project was to examine the unique influence professional learning communities contributed to standardized achievement. High school teachers located in southern California completed the Professional Community Index and demographic identifier. Once completed, the researcher merged over 37,500 student achievement records with data gathered from the survey. Standard multiple regression analysis and sequential multiple regression analysis were used to answer the three research questions. The following chapter contains a summary of each of these questions, explanations for the findings, implications for the literature, practical implications, limitations, and suggestions for future research.

Research Question 1

The first question: —~~What~~ relationships exist among the variables teacher experience, degree held, competency, certification type, professional community, language status, socioeconomic status, parent education level, ethnicity, absences, 2007, and 2008 test scores?” examined the relationships between and among the teacher characteristic variables: teaching experience, MA in education, MA in content area, competency, PLC scores; the 5 student characteristic variables: SES, EL status, ethnicity, parent education level, 2007 CST scores, and 2008 CST scores. Correlations proved to be statistically significant between all the student characteristic variables and 2008 CST scores. Negative correlations with 2008 CST scores occurred for students who were designated as second language students and students who received free and reduced-price

meals. Positive associations occurred in the ethnicity, parent education level, and 2007 CST scores. 2008 CST scores were not significantly correlated with any of the teacher characteristic variables. For this sample, students' backgrounds were more closely associated with their achievement than teacher characteristics.

Research Question 2

The second question: —“To what extent do teacher characteristic variables (teacher experience, degree held, competency, certification type, and professional community) and student characteristic variables (language status, socioeconomic status, parent education level, ethnicity, and absences) explain student achievement?” examined the extent to which teacher and student characteristic variables explain student achievement. The data suggested that the combination of variables explained a considerable portion of the variance in student achievement scores, some 81%. However, on closer examination only two variables were significant: English language status and 2007 CST scores, with the latter variable explaining 99% of the variation in scores. The inordinately high intercorrelation between 2007 and 2008 CST scores created difficulties interpreting the influence of the other variables. In addition, while the model explained 81% of the variation in achievement scores, the unique contribution of each variable accounted for only 38%. The discrepancy suggested some redundancy in the model.

Research Question 3

The third question: —“Does professional learning community explain variations in student achievement scores when student characteristic variables (language status, socioeconomic status, parent education level, and ethnicity) act as covariates?” examined the unique influence professional learning community contributed as an explanation for

variations in student achievement scores when student characteristic variables acted as covariates. The sequential multiple regression suggested that the model accounted for 30% of the variations in scores after the first block of student characteristic variables. However, once the professional learning community variable entered the second block, it explained only an additional 1.6% of the variations in scores. While the overall model with the PLC variable was statistically significant, the change in the multiple correlation when the researcher added PLC variable was negligible at best.

Explanation of Findings

Research Question 1

Based on the results of the first question, significant correlations existed between all the student characteristic variables and student achievement. Based on the analysis of research question one, the researcher determined that student background characteristics affect students' performance on standardized tests. For example, student achievement was positively related to ethnicity and parent education level. That is, students who reported their ethnicity as white had higher scores on standardized tests than students who reported their ethnicity differently. This finding was consistent with the literature that has shown that minority students perform more poorly on standardized tests compared to white students. In addition, students whose parents indicated higher levels of education performed better on standardized tests. This finding was also consistent with the literature on socioeconomic status and standardized testing. Students with more highly educated parents perform better on standardized tests. Negative correlations occurred between two student characteristic variables and student achievement. Students who reported receiving a free or reduced-price meal performed lower on achievement

tests than students who reported otherwise. Additionally, students designated as English learners had lower scores on California standardized tests than students without the designator. These final two correlations were similarly consistent with the literature on socioeconomic status and achievement.

The teacher characteristic variables were not related to student achievement. The researcher concluded that for this sample of teachers, their experience, degree held, subject matter competency, and perceptions of PLCs had no discernable relationship with their students' achievement. For example, when teaching experience was between 0-5 years or 16-20 years, student achievement neither increased nor decreased. This finding was not consistent with the literature on teaching experience. Several studies have concluded that teaching experience is positively related to student achievement. Additionally, some studies have concluded that teaching experience and student achievement is most highly correlated for teachers who have been teaching between 7 to 17 years. This study found no such relationship. In this study, teaching experience and student achievement was unrelated.

In addition to teaching experience, level of educational status and perceptions of PLCs made neither an increase nor a decrease in standardized test scores. If teachers' perceptions were positive or negative about professional learning communities, their students' test scores neither increased nor decreased. These findings were also not consistent with the literature in the area of teacher effects. Several studies have found relationships between student achievement and advanced degrees in content areas. This study found no relationship between these variables. Additionally, studies have linked increased student achievement, greater student engagement, and less disparity between

students' learning to PLCs. This study found no such relationships between student learning and PLCs. In fact, this study determined that there was a discrepancy between students' background characteristics and their achievement. That is, a student's ethnicity, language status, socioeconomic status, and parent education level explained the way students performed on standardized tests.

Teacher competency was one teacher characteristic variable from this study that was consistent with the literature. Whether or not a teacher held a major in his or her field had no relationship with student achievement, which was consistent with the literature linking teacher competency to student achievement.

Other related variables included ethnicity, parent education level, SES, and EL status. The researcher found positive relationships between ethnicity and parent education level, which indicated that students who reported their ethnicity as white also had parents who reported higher levels of education. This finding was consistent with the literature, which has indicated that minority students also report their parents are less educated. Negative relationships surfaced between ethnicity, SES and EL status. Therefore, students who reported their ethnicity as white also had no EL designation or received free or reduced-price meals. Parent education level and SES, on the other hand, were very strongly related to each other. Students who reported receiving free or reduced-price meals also had parents who reported low levels of education. These findings were all highly consistent with the literature on student background characteristics.

Finally, the two variables with the most significant relationship were 2007 and 2008 CST scores. Statistically speaking, the relationship between these two variables was nearly perfect, which suggested that the variations in the 2007 scores were nearly

identical to the variations in the 2008 scores. Based on these correlations, the researcher concluded that teachers' students' test scores in 2007 changed very little in 2008.

Additionally, the researcher concluded that when multiple years of test data represent the different students of the same teacher, as is the case in this study, too little variation exists in the scores to use them for control purposes. The scores are so highly related they diminish the affect of other variables in the analysis.

Research Question 2

Question two examined the extent to which teacher and student characteristic variables explained student achievement. According to social science research, variance percentages of 30% or more in the dependent variable indicate good explanations (Light, 1997). The researcher concluded that the combination of variables: teaching experience, MA in education, MA in content area, competency, PLC perceptions, SES, EL status, ethnicity, parent education level, and 2007 CST scores explained an overall variance of 80%. However, 2007 CST scores were responsible for 99% of the overall variance. As a result, 2007 CST scores and English language status were the only two variables that demonstrated enough significance to make a difference in 2008 CST scores.

Additionally, the researcher concluded that the unique influence of each of the variables combined to explain only 38% of the variations in student achievement. Therefore, a relatively large discrepancy existed between R^2 and the sum of the squared semi-partial correlations. Based on this difference, the researcher concluded that there was a high degree of intercorrelation among the independent variables.

Based on the results of the regression analysis, findings from question two was both similar to and different from the findings in the literature. First, prior achievement

has shown to have a significant impact on student achievement. At first glance, the data in this study suggested that prior achievement had a similar affect. However, the data in this study are not multiple years of data from the same student, which would be necessary to make any claims about prior achievement. In effect, the multiple years of achievement data in this study represent the impact a teacher has yearly on a set of students. That is, theoretically, 2007 test scores serve as pretests and 2008 test scores as posttests. The difference between these tests then represent the overall impact the teacher had on achievement scores for that year. In the present study, the researcher concluded that teachers had a minimal impact on achievement scores. As depicted in Table 16, a one-point rise in 2008 scores is associated with a .93-point rise in 2007 scores. Overall, teachers increased achievement by .07 points. This finding is inconsistent with the literature on the impacts teachers have on student achievement in PLCs. Numerous studies (Lee & Smith, 1993, 1995) have found positive impacts on student achievement in schools with highly functioning PLCs. Effect sizes, which were used to determine the magnitude of the differences between student achievement data in PLC schools and non-PLC schools, were .30 in science, .35 in English, and .59 in history. The mean increase in PLC schools is between .30 to .59 standard deviations higher than mean scores from non-PLC schools. For example, in history (assuming normal distributions), the average PLC school mean score fell at the 73rd percentile of the non-PLC mean score distribution—a full 23 percentile points beyond what be expected if the attributes of a PLC had never been implemented. The researcher could not determine the effect sizes between the schools in this study and non-PLC schools. However, the researcher did examine the effect sizes between 2007 and 2008 test scores. The effect size in science was .0004,

English (.0015), math (.006), and history (.0009). From this analysis, the researcher determined that 2007 and 2008 scores virtually overlapped. Since scores were relatively unchanged, this explained, to some extent, why the independent variables in question two did very little to explain the dependent variable, and why 2007 achievement scores explained 99% of the variation in the dependent variable.

Research Question 3

The final question was, “Does professional learning community explain variations in student achievement scores when student characteristic variables act as covariates?” A sequential, block-entry regression was conducted to answer the question. Due to the strong positive relationship between 2007 and 2008 CST scores, the researcher combined these variables and took the average of the pair as the dependent variable for this regression. All four variables in the first block indicated strong relationships with the dependent variables. Additionally, the combination of these variables explained 30% of the variations in the averaged student achievement variable. The addition of the professional learning community variable had a slight impact on the results, but not enough to prove significant. The researcher concluded from these results that other variables did a better job than professional learning communities of explaining variations in student achievement scores.

Findings in the literature suggested strong relationships between student background characteristics and student achievement. However, research had also indicated that highly functioning professional learning communities ameliorated the influences of many of these student background variables (Lee & Smith, 1993). The researcher concluded from this study that the PLCs operating at this particular research

site were not highly functioning PLCs, and because they were not highly functioning, they were not having a “counterbalancing affect” (as suggested by Lee & Smith) on student background characteristics, nor were they having a significant impact on student achievement.

The researcher determined, based on a thorough review of the literature, that the following attributes were consistent with a highly functioning PLC:

1. The community shared a vision for how the school should function.
2. Educators collaborated with one another to implement this shared vision and to improve student achievement; these collaborations produced tangible products whose intent was to improve instructional practices and student achievement.
3. Teachers continuously observed each other’s classroom teaching practices, and these observations served as both conversation starters and the impetus for collaborative projects.
4. School officials embedded these activities in the school day, and they worked within an environment where mutual respect and trust occurred.

In examining the breakdown of responses to the Professional Community Index, the researcher deduced that some aspects of a highly functioning PLC were present, but many were not. Based on teachers’ responses to the survey, teachers utilized most of their PLC time for two main purposes: (1) curriculum development and coordination, and (2) improvement of instructional practice. Over 51% of teachers indicated they made a conscious effort to coordinate content with other teachers; thirty-seven percent spent 10 or more hours coordinating curriculum material. Additionally, 35% reported they had

received suggestions on curriculum materials 10 or more times last year, while 19% had received suggestions on student activities 10 or more times. Finally, 43% indicated they spent more than half the PLC time coordinating content. The teachers who completed the survey spent most of their time co-planning with other teachers.

In addition to coordinating curriculum, however, professional communities have other very important characteristics. The researcher determined that many of these other aspects were not employed by teachers. For example, only 10% of teachers strongly agreed that teachers focus on how well students are learning in PLCs. Only 19% indicated that their schools had a focused vision for learning. These are two of the main aspects of the PLC attribute, collective focus on student achievement, and a large percentage of respondents were not doing these things. Furthermore, the data suggested that teachers were agreeable to only certain aspects of a collective focus on student achievement. Teachers' perceptions of the work they do in PLCs seemed to be primarily focused on specific acts, like creating common goals and assessments, and less on the impact of their use. That is to say, teachers worked diligently to create common materials for their students, but they spent far less time evaluating the effectiveness of these materials on student achievement. The researcher determined that by both creating these collaborative projects and evaluating how they improve student achievement that teachers are engaged in work that is more consistent with a highly functioning learning community. This type of work transforms a PLC from the realm of collegiality to a truly professional learning environment. This study determined that teachers in these communities were working collaboratively producing tangible products, but they were not discussing how effective these products were at improving student achievement. In

fact, the lack of reflective conversations are especially obvious in the data where 52% and 27% respectively indicated they have not had a conversation in which student achievement was diagnosed or teaching practice carefully examined. Evidence in the literature on the impacts learning communities have on student achievement has suggested that all the properties of a professional learning community are essential if schools are acting to promote systemic change in students' academic behaviors and teachers' professional learning.

Furthermore, the researcher found the frequency of activities in the area of teacher observations more concerning. Fifty-four percent indicated they had not observed another teacher teaching in the classroom last year, and 56% indicated that another teacher had not observed them. The majority of these teachers are not leaving their own classrooms to observe other teachers teach. One of the ways in which teachers improve their instructional practices is by observing other teachers teaching, and then reflecting on those observations in the PLC. How can teachers learn from each other if they are not observing each other's teaching? The answer to the question is obvious from teachers' reports of how they spend their PLC time. Ninety-one percent reported they spent less than half the PLC time examining teachers' practices.

Based on this evidence, PLCs in this school system were not functioning in a manner consistent with a highly functioning PLC. Survey evidence found that teachers responded favorably to items pertaining to collaboration, shared norms, and to half the items related to collective focus on student achievement. Teachers were less agreeable to items pertaining to reflective dialogue and deprivatized practice.

Implications for Literature

A limited number of studies conducted on professional learning communities attempt to connect the practice to student achievement. For the implications for literature section, the researcher will compare and contrast the results of this study to studies that attempt to link impacts of PLCs to student achievement. In addition, the researcher provided several implications for the literature on teacher and student characteristics based on findings from this study.

Professional Learning Community Studies

A few researchers have examined the influence of professional community on student achievement, and several breakthrough studies research these variables in restructured schools (Lee & Smith, 1993; 1996). Lee and Smith examined the communal verses bureaucratic nature of departments in high schools and found that departments that were more communal had higher student achievement scores and less social class differentiation. The differences in findings between the Lee and Smith study and the present study may involve these other characteristics of a restructuring school. One implication from this study is that PLCs in traditional schools may not have affects on student achievement.

Furthermore, the results in the Lee and Smith studies indicated that schools that were more communal were also more equitable. Another implication based on the findings in this study is that learning may not be more fairly distributed even though schools adopt a more communal way of teaching and learning. A major finding from this study was that socioeconomic status, parent education level, ethnicity, and English learner status made important contributions (both positive and negative) in student test

scores. In fact, student background differences exaggerated differences in these scores. Therefore, a more communal philosophy alone may not be enough to raise student achievement and provide a more equitably distributed education. Schools may have to adopt reforms that are more sweeping.

Louis and Marks' (1998) study, from which the instrument for this study was designed, examined the affects of community on student achievement in restructuring elementary, middle, and high schools. Their study found significant results between schools with strong professional communities and higher student achievement. The schools in their studies had also adopted structural changes such as block scheduling, teaching teams, interdisciplinary teaching, and advisory periods, in addition to others. In the present study, few if any of these structural changes were in place. The major difference in the findings from the present study and those conducted by Louis and Marks and Lee and Smith may be partly due to the additional innovations occurring in the schools participating in their studies. One implication of these results is that gauging the impact of PLCs in more traditional schools may present more of an unbiased measurement of the impact on student achievement in comparison to the restructured schools where the impact of learning communities may be more difficult to tease out from the additional ongoing innovations. An important question to be answered is: Do the additional innovations in restructured schools affect teachers' perceptions of professional community?

Teacher Characteristic Studies

Over the past 10 years, the results of Sanders' value-added methodology have captured the attention of researchers and teacher evaluators. Sanders' data have indicated

that teachers have the greatest impact on their students. Due to these revelations, other researchers have investigated the links between teacher characteristic variables and student achievement. For example, Ferguson's data on 900 Texas school districts present a compelling argument that teacher experience has a significant impact on student achievement. Ferguson's results suggested that students with more experienced teachers have higher test scores, drop out of school less, and were more likely to take the SAT. Likewise, Goldhaber and Brewer found that teacher experience explained 16% of variations in student achievement. Moreover, Rivkin, Hanushek, and Kain determined that new teachers had a negative relationship with achievement, and Fetler's data suggested that more experienced teachers had higher achievement scores. One implication based on the results of this study is that sample sizes are important considerations when reviewing the literature in this line of research. That is, the aforementioned studies had enormous sample sizes, and statistically speaking, the greater the sample size the greater the likelihood of finding significant results. The present study utilized a relatively small sample compared to these others. The implication being that teacher experience may have statistical significance but perhaps no practical significance, especially if these researchers obtained these results in part due to a statistical phenomenon.

Another implication is that additional factors affect the relationship between experience and achievement. Teachers with more experience may be more likely to get higher achieving students. They may also take on more school-related responsibilities, start families, and others things. These factors are only a few of the ones that may influence whether teaching experience has an impact on student achievement.

Researchers collecting data on teaching experience may need to collect more evidence in order to make a valid claim that experience has an affect on achievement.

Student Background Studies

Research continues to document differences between student background characteristics and achievement. Schools have implemented many initiatives in order to close the achievement gap. Schools today provide higher quality educational programs to students before they start school. Better alignment exists between the different levels of schools (elementary to college). School systems have better business partners in education designing innovative schools and curriculums. Teacher education programs prepare more culturally responsive teachers who understand the importance of rigor and relevance in classroom instruction. School systems certainly have more accountability measures in place—measures that identify students who need additional interventions much earlier. One implication for the literature is that when researchers find situations where schools are more equitable that it may have more to do with all of these external initiatives than it does with the internal structures of a school or school system. That is to say, reducing an achievement gap may be an entire community effort, which would include schools, businesses, and other organizations. The findings in this study certainly point to an achievement gap between students. Differences in state test scores between students receiving a free and reduced lunch compared to students not receiving these services was as much as 50 points. The implication for schools attempting to reduce the achievement gap is that they may not be able to do this work alone. Reducing the achievement gap, as suggested in some of the literature, may not be simply a bi-product of creating learning communities and adopting restructuring practices. What other,

macro-innovations, were occurring in these school systems that reduced the achievement gap? These additional innovations should be clearly articulated in the literature. The data analyzed in several of the studies that indicated a reduced achievement gap were gathered from national databases. The researchers had no context for the data; they provided little evidence that other macro-reform efforts, other than those that were documented in the survey, were not having a sustained influence on these schools. School systems must be able to learn from the successes of other school systems that are making a difference in the lives of their students, but these school systems have to know if they are comparing apples to apples or apples to oranges. Research needs to provide a better contextual picture of schools, the reforms they undertake, and the reforms that envelop them more broadly.

Implications for Practice

Schools are consistently searching for interventions that lead to increased student achievement. While professional learning communities have been linked by several researchers to increased student achievement, the results of this study suggested that teachers' perceptions of PLCs explained little, if any, of the variations in student achievement. Despite these findings, practitioners should not be dissuaded from working to create highly functioning learning communities in their schools.

There are several implications that support this conclusion. First, teachers must embrace all the aspects of a learning community. The findings in this study are obvious. When teachers engage in certain aspects of learning communities and neglect others, their efforts are not evinced in student achievement data. Teachers must work to implement all the attributes of a learning community.

Second, the work within a PLC must be a recursive process. Teachers and administrators should be formatively evaluating the work conducted in PLCs. These evaluations should be measured against a set of criteria, such as the criteria outlined in this study for a highly functioning learning environment. These evaluations should then be used to improve the PLC process. As previously mentioned, the main goal of any PLC is the learning and development of the teachers who take part in it. Therefore, in order for PLCs to be effective, schools cannot have scores of teachers or entire learning communities opting out of their professional learning, or opting out of certain aspects of PLCs. PLCs must be held to the same accountability standards as the students they serve.

Third, teachers and administrators in this school system should be concerned that teaching was highly unchanged from one year to the next. If PLCs are an attempt to improve student achievement, then teachers and administrators must be held accountable when the intervention fails to meet its goal. Teachers may need more training on how to function and manage the work of a PLC. More accountability may need to be built into the innovation. Teachers are currently investing 50 minutes a week in this intervention. How is the school system determining that practitioners are spending this time meaningfully?

Finally, as indicated through comparisons of this study to other studies on PLCs, PLCs may be only one part of a complex puzzle that leads to higher test scores and more equitable learning environments. School systems must be willing to add additional innovations that have proven records of accomplishment in increasing student achievement. This implication requires school systems to be continuously engaged in an inquiry-based, improvement-minded movement. Teachers and administrators must

remain informed of the literature on school improvement, attend conferences, and constantly experiment with ways to increase their students' achievement.

Limitations of Results

Several conditions occurred throughout the course of this study that limited the results. First, while professional learning communities have operated over the past 20 years, very few instruments exist that measure teachers' perceptions of their work within the community. In conducting the literature review for this study, the researcher uncovered two such instruments, the one used in this study created by Louis and Marks and one created by Shirley Hord. Because professional learning communities differ in their shape and scope, perhaps the Hord survey would have been a better match for the teachers in this district. The two surveys have considerable overlap in what they measure, but the Louis and Marks survey seeks teachers' responses in areas of reflective dialogue and deprivatized practice unlike the Hord survey.

Second, other variables may have had a stronger impact on the dependent variable than those chosen in this study. While the researcher took efforts to account for factors that influence student achievement, the researcher was only able to account for a relatively small percentage of the influence PLCs had on student achievement (2%). Furthermore, the regression analysis indicated some redundancy in the model. That is to say, several variables, such as parent education level and SES level, seem to be measuring the same construct. By merging these variables, perhaps the results of the regression analysis would have been different.

Third, the workshops teachers attended on professional learning communities may be a limitation of the results. The researcher was unable to link data regarding the

participants who attended multiple district-level workshops on PLCs to participants in this study. That is to say, these additional workshops were voluntary, so some of the participants in this study may have attended these additional workshops, while others may have not. This limitation is important, especially for future research, because a group design of teachers who attended workshops compared to those who did not attend may lead to different results since participation in workshops could lead, theoretically, to higher functioning PLCs, which, in turn, could lead to higher student achievement.

Fourth, demographic differences in the schools and teachers also may have limited the results. Two schools in the district elected not to participate. These schools were both located in urban areas. By not participating, the study was limited to two urban schools instead of four. In addition, differences existed in the number of participants at each school site. At one site, only 7 teachers participated in the study, while another site had 24 participants. Furthermore, the researcher did not analyze other teacher demographics such as ethnicity and gender in this study. In addition to the school demographics, these other teacher demographics may have informed the results of the study had they been utilized.

Fifth, the political climate and sampling frame may have limited the results in this study. While the researcher took efforts to provide teachers with safe and confidential procedures for completing the survey, other outside factors, may have circumvented these procedures. For example, from March 2008 until September 2008, many teachers across the school district were “pink slipped” or targeted for layoff by the district due to a rule in California in which California school districts must notify employees whether they will be rehired based on projected budget figures. Due to a budget impasse and the economic

crisis unfolding around the nation, administrators gave many teachers notifications of termination. Some estimates were as high as 10% of the district's teaching population. Some teachers left the district for employment in other school districts, while others left the state to seek employment in states less affected by the economic downturn. In addition to the fear of layoffs, the school district raised class sizes by two students to meet budget expectations, which eliminated some teachers' jobs. A few teachers (<5%) returned the survey indicating that they could not answer the questions without full anonymity, which was impossible to provide since the research required a way of linking the survey items to the student achievement data of the teacher, a process that occurred using a teacher identification number. Some teachers were reluctant to provide that information even though the researcher disclosed in the cover letter that the data from the survey and the data obtained from students were for statistical purposes only and no data would be attached to any individual. For some teachers, the political climate (created by a poor economic climate) may have entered into their decision not to complete the survey because they feared reprisal from the school district if the results turned out negative. While this limitation seems plausible, the data obtained from the surveys do not necessarily correspond to this claim since over 28% of the respondents to the survey were teachers with less than 5 years teaching experience, and this percentage accounted for the greatest proportion of respondents. Apparently, these issues did not dissuade newer teachers from taking the survey. Nevertheless, their responses may have been influenced or biased by the current economic hardships facing the school district; therefore, some teachers may have responded to items more favorably than they would have in different circumstances. As in most economic downturns, schools are examining ways in which

they can trim spending. Because this survey coincided with the economic problems, teachers may have interpreted the survey as a way of determining whether the funding of PLCs should continue. District administrators indicated that PLCs have very little cost to the district itself. Schools are required to teach students for a certain amount of minutes per year, and these schools may use the extra minutes in any manner they choose. Some schools use the extra minutes for advising periods, homerooms, reading time, and others. The Grossmont Union High School District utilizes this time for PLCs. The only cost to the school district was in the form of the workshops it sponsored, and administrators discontinued these workshops during the 2008-2009 school year. The discontinuation of these workshops had no substantial impact on this study since the period for the evaluation was the 2007-2008 school year. However, as previously mentioned, the elimination of the PLC workshops in cooperation with budget cuts and this survey may have had some impact on the perceptions teachers have of the PLC program and whether teachers perceived this program as being slated for elimination. These perceptions, no matter how valid, may have influenced teachers to rate items more favorably or less favorably than they would have under different political and economic circumstances.

Another limitation linked to participants occurred in the sampling design. While the researcher took efforts to create a stratified random sample of teachers in the district, returned surveys created a slightly less than stratified sample in the areas of English and science. In addition to this limitation, the actual sample size differed from the sample generated when the researcher first mailed the surveys to participants. Two reasons prompted this change. First, some of the teachers sampled taught content area courses, but they were primarily teachers in non-core content areas such as special education and

as such did not participate in PLCs. That is to say, a special education teacher taught one or two sections of a content area course (like biology), but did not participate in the PLC for that content area course due to other obligations regarding the teacher's work as a special educator. These individuals returned the survey and reduced the initial sampling plan by 6%. Second, a number of content area teachers taught all the sections of the content, and as such, these teachers had no other teachers with whom to meet. These teachers received the survey but could not complete it because they did not participate in a PLC. This limitation further reduced the initial sampling plan by 5%. Because of these two changes, the researcher's initial sample of 228 participants was reduced by 24 teachers and resulted in a sample size (204 participants) less than the number necessary for adequate power (206 participants).

Another factor that may account for the outcome and perhaps to the limitations of PLCs involves the number of participants in a PLC. That is to say, some PLCs, such as Algebra I, have four to five members in the community. Others, however, like chemistry, may have only two members in the community due to fewer course offerings. Since community members share the work in a PLC, a community of 5 people has less work than a community of two. Communities with fewer members may have less favorable ratings of PLCs and vice versa.

Recommendations for Future Research

Although this study added to the growing body of empirical research on professional learning communities, several conditions existed that warrant additional research. First, research conducted in the future should have a method of linking PLC training to student achievement. A study might examine differences between teachers

who attended the trainings compared to teachers who did not attend the training. A group design might determine if better functioning PLCs are a product of the training they received, and if the trainings led to higher functioning PLCs and increased student achievement. A group design could also control for factors that covaried with the dependent variable in this study.

Another recommendation for future research would include determining whether the size of the PLC has any bearing on student achievement scores. Another group design with small, medium, and large fixed factors could be used to determine if teachers working in one of these three types of PLCs have higher functioning PLCs and increased student achievement compared to the other sized PLCs. Once again, this design could control for covariates. Research determining the ideal size of a PLC might be informative to practitioners.

One final recommendation includes a design linking teachers' perceptions of PLCs to the actual outcome-based products they create within their respective PLCs. The current study used state tests; however, the common assessments teachers create within their PLCs may be more congruent with the perceptions of the work they do there. A time-series design that included both formative and summative assessments would most likely provide practitioners with the best evidence as to the impacts they are having on their students' achievement. Furthermore, the work teachers do within a highly functioning PLC focuses on higher-order thinking skills. Standardized test, on the other hand, are better determinants of basic forms of knowledge. A design that incorporated both assessments of higher-order thinking and was teacher created might provide useful data to teachers working in these PLCs.

Conclusion

In the age of accountability, school officials are often primarily concerned with the question: *What impact does this intervention have on student achievement.* The present study attempted to link one such intervention to improvements in student achievement.

The first research question examined many of the factors that typically relate to student performance on standardized exams. The researcher sought to determine the influence these variables among each other using this particular set of data. The researcher concluded that student background characteristics had strong positive and negative relationships with each other and student achievement.

The researcher concluded from the second research question that student background variables (SES, EL status, ethnicity, and parent education level) explained a sufficient amount of the variations in student achievement scores (32%). Therefore, these variables could be overlooked when examining the impact the intervention, PLCs, had on student achievement. That is, they would have to function as covariates in the design.

The researcher concluded from the final research question that teachers' perceptions of PLCs had a minimal influence in the overall explanation of student test scores. The researcher was unable to statistically conclude that the work teachers perform within their respective PLCs had an impact on standardized test scores. Despite these disappointing results, researchers cannot overlook the work conducted by teachers in these communities. PLCs provide teachers with more autonomy to do their jobs and create an environment where they are improving the conditions in which they work. Even though the work teachers are doing at this site may not measure up to the criteria

established for a highly functioning PLC, these schools might achieve this status at some point. While their efforts to increase achievement may not be immediately realizable in standardized test scores, teachers may be improving the lives of the students they teach in other, unmeasured ways. Improvements in the lives of these students may ultimately lead to improvements in the larger community, society as a whole, and to the process of education.

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Conclusion

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APPENDIX

APPENDIX A

Additional Questions for Pilot Survey

Hello Teacher:

Thank you for participating in this study. This pilot test will be used to make any corrections/modifications to the attached instrument prior to implementation in the fall. Please take a few minutes to complete the instrument and respond to the following questions. Also, please document the time you start and finish the instrument. I need to provide teachers with an accurate indication of how much time this instrument will take them to complete. Feel free to make any notes directly on the survey.

1. Were the directions clear? Yes ☐ No ☐

If no, please explain.

2. Were any of the items ambiguous? Yes ☐ No ☐

If yes, please indicate which item(s) and explain.

3. Did you experience a problem with an item? Yes ☐ No ☐

If yes, please indicate which item(s) and explain.

4. Did you have any concerns while completing the instrument? Yes ☐ No ☐

If yes, please explain.

APPENDIX B

PROFESSIONAL COMMUNITY INDEX

Instructions

Dear Teacher,

I am inviting you to participate in a research project studying the work teachers do within Professional Learning Communities. Along with this letter is a short questionnaire that asks a variety of questions on your *best estimates* of the frequency of selected activities at your respective school site and for your candid opinions on aspects of school climate. I am asking you to look over the questionnaire and, if you choose to do so, complete it and return it to me. It should take you about 15 minutes to complete.

The results of this project will be used for *doctoral research only*. Through your participation, I hope to understand the ways teachers are continuously learning on the job. I hope that the results of the survey will be useful for the Grossmont High School District, and I hope to share my results by publishing them in a scientific journal, where others may learn as well.

I do not know of any risks to you if you decide to participate in this survey, and I guarantee that your responses will not be identified with you personally. The results will be used for statistical purposes only. Published reports of the research will not refer to the actual names of any states, cities, schools, or specific individuals participating in the study. I promise not to share any information that identifies you with anyone outside my research group, which consists of me and my four-member dissertation committee. Once you have completed the survey, please place the survey in the envelope provided, and drop it in the box labeled “PLC Survey” located in your school’s office. I will pick up these boxes no later than September 5th.

The survey should take you about 15 minutes to complete. I hope you will take the time to complete this questionnaire and return it. Your participation is voluntary and you may decline to participate without penalty. Regardless of whether you choose to participate, you will be entitled to the survey results, which will be made available to each school site in late spring 2009.

If you have any questions or concerns about completing the questionnaire or about being in this study, you may contact me at 7000 Saranac St. #3, La Mesa, CA 91941, by phone (619) 402-3410, or by email at scoulte1@gmail.com. The Institutional Review Board (IRB) at the University of Tennessee Knoxville has approved this study. If you have any concerns about your rights as a participant in this study you may contact the Compliance Section of the Office of Research at (865) 974-3466.

Thank you for your cooperation.

TEACHER IDENTIFICATION NUMBER _____

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PROFESSIONAL COMMUNITY INDEX

DIRECTIONS: Please use the following 5-point scale to indicate the degree to which you agree or disagree with the following statements. If the item refers to something that you agree with, you might respond by marking the first or second bubble. If the item covers something that you disagree with, you might respond by marking the fourth or fifth bubble. If you are undecided about the item, you might respond by marking the middle or third bubble.

(Mark one bubble for each statement)

Questions 1-8	Strongly Agree					Strongly Disagree
1. Most of my colleagues share my beliefs and values about what the central mission of the school should be.	☐	☐	☐	☐	☐	☐
2. There is a great deal of cooperative effort among staff members.	☐	☐	☐	☐	☐	☐
3. I make a conscious effort to coordinate the content of my courses with other teachers.	☐	☐	☐	☐	☐	☐
4. Teachers focus on what and how well students are learning rather than how they are teaching.	☐	☐	☐	☐	☐	☐
5. Goals and priorities for the school are clear.	☐	☐	☐	☐	☐	☐
6. Teachers exhibit a reasonably focused commitment to authentic curriculum and instruction.	☐	☐	☐	☐	☐	☐
7. In this school the teachers and the administration are in close agreement on the school discipline policy.	☐	☐	☐	☐	☐	☐
8. A focused school vision for student learning is shared by most staff in the school.	☐	☐	☐	☐	☐	☐

Question 9	Less than 15 minutes	15-29 minutes	30-59 minutes	1 hour or more, less than 5 hours	5 hours or more, less than 10 hours	10 hours or more

Please start on the following page ➡

Questions 10-15	Never	Once	Twice	3-4 times	5-9 times	10 or more times
10. How often during the previous school year did you receive useful suggestions for curriculum materials from colleagues in your department?	☐	☐	☐	☐	☐	☐
11. Except for monitoring student teachers or substitute teachers, how often during the previous school year did you visit another teacher's classroom to observe and discuss his/her teaching?	☐	☐	☐	☐	☐	☐
12. How often during the previous school year did two or more teaching colleagues regularly examine your students' academic performance or review their grades or test scores?	☐	☐	☐	☐	☐	☐
13. How often during the previous school year did you receive meaningful feedback on your performance from your supervisors or peers?	☐	☐	☐	☐	☐	☐
14. How often during the previous school year did you receive useful suggestions for teaching techniques or student activities from colleagues in your department?	☐	☐	☐	☐	☐	☐
15. During the previous school year, how often did another teacher come to your classroom to observe your teaching?	☐	☐	☐	☐	☐	☐
9. During the previous school year, about how much time per month did you spend meeting with other teachers on lesson planning, curriculum development, guidance and counseling, evaluation of programs, or other collaborative work related to instruction?	☐	☐	☐	☐	☐	☐

Questions 16-20	None	Less than half	About half	More than half
16. In a typical <i>collaboration</i> * session, about how much time is spent coordinating content?	☐	☐	☐	☐
17. In a typical <i>collaboration</i> session, about how much time is spent diagnosing individual students?	☐	☐	☐	☐
18. In a typical <i>collaboration</i> session, about how much time is spent carefully examining individual teachers' practice?	☐	☐	☐	☐
19. If you had to choose from among the seven goals for students listed below, how would you rank them according to their importance in your teaching? Enter a "1" for the most important goal, a "2" for the next most important goal, and so on, through "7" for the least important goal. <i>Do not duplicate the rankings.</i>				

First, read goals, then *CIRCLE* the ranking for each.

	RANK						
	Very Important					Least Important	
a. Basic literacy/numeracy skills (reading, math, writing, speaking)	1	2	3	4	5	6	7
b. Academic mastery of the subject matter of the course	1	2	3	4	5	6	7
c. Higher level skills (reasoning, problem-solving, critical and creative thinking)	1	2	3	4	5	6	7
d. Citizenship (public values)	1	2	3	4	5	6	7
e. Good work habits and self-discipline	1	2	3	4	5	6	7
f. Personal growth and fulfillment (self-esteem, personal efficacy, self-knowledge)	1	2	3	4	5	6	7
g. Human relations skills (cultural understanding, getting along with others)	1	2	3	4	5	6	7

DEMOGRAPHICS

20. Prior to this year, how many years of experience have you had as a full-time teacher in THIS school?
_____ years
21. Prior to this year, how many years of experience have you had as a full-time teacher in OTHER schools?
_____ years
22. Are you a member of this school faculty on
a full-time basis ☐
a part-time basis ☐
24. Mark your PRIMARY subject matter affiliation.
(mark only one)
- a. English ☐
b. History/Social Science ☐
c. Math ☐
d. Science ☐
25. What is the name/title/subject of your TARGET class? (The TARGET class refers to your primary class; that is, the one you teach the most sections of, or the class that is the target of your PLC. Please provide a full description of this class, such as Algebra 2, 10th grade English, reading, AP US History, etc).

26. Please mark the grade level of MOST of the students you teach in all classes.
9 ☐ 10 ☐ 11 ☐ 12 ☐
27. Your gender:
Male ☐
Female ☐
29. Educational degrees (mark ALL degrees you have earned)
- a. Bachelor's degree ☐
b. Master's in education ☐
c. Master's in an academic subject ☐
d. Doctorate in education ☐
e. Doctorate in an academic subject ☐
f. Other degree ☐
29. How did you obtain your teacher certification? (mark only one)
- a. Standard certification (State approved college or university) ☐
b. Alternative certification (e.g., Teach for America, Peace Corp, or district internship) ☐
c. Emergency/temporary certification ☐
d. Out-of-field certification ☐
e. Uncertified ☐
30. How did you demonstrate academic subject matter competency? (mark only one)
- a. Subject matter exam ☐
b. Coursework (e.g., undergraduate major, undergraduate equivalent, or graduate degree in core subject) ☐
c. National Board Certification in core subject ☐
d. HOUSSE (High Objective Uniform State Standard of Evaluation in the core subject) ☐

APPENDIX C

Follow-up Email to Mailed Survey

September 2, 2008

Two weeks ago a survey was placed in your mailbox seeking your views on professional learning communities. The survey is a part of a doctoral dissertation investigating the various ways teacher continue to learn on the job.

Your name was randomly drawn from a sample of teachers from the district. To ensure that this study represents the views of all Grossmont Union High School District teachers, it is important that each teacher selected completes and returns the survey.

If you have already completed the survey, please accept my sincere thanks. If not, please accept this second invitation to let your views be heard. If for some chance you did not receive the survey, or if it has been misplaced, please contact me by phone at (619) 402-3410 or respond to this email with a subject line of ~~missing~~ "survey" so that I can send you another one. Once you have completed the survey, you may return it to your respective school's office, where your principal's secretary has a box labeled ~~PLC~~ "Survey." Boxes will be picked up this Friday. Thank you for your assistance.

Sincerely,

Shannon E. Coulter

APPENDIX D

Cover Letter for Second Survey Mailing

September 19, 2008

Four weeks ago a survey was placed in your mailbox seeking your views on professional learning communities. The survey is a part of a doctoral dissertation investigating the various ways teachers continue to learn on the job.

Many school districts around the nation are attempting to create professional learning communities in their schools every day. The results from this study may provide these school districts with valuable information as they embark on endeavors in which you are involved daily. The usefulness of this study depends on how accurately I am able to describe what the teachers in the Grossmont Union High School District perceive to be the most important aspects of the work they are doing collaboratively.

Your name was randomly drawn from a sample of teachers from the district. One in about every 30 teachers has been asked to complete the survey. For the results of this study to reflect the views of all Grossmont Union High School District teachers, it is essential that each teacher selected completes and returns the survey.

If for some chance you did not receive the survey, or if it has been misplaced, I have enclosed another survey. **Once you have completed this one, you may seal it in the provided envelope and place it in district mail.** Your contribution to the success of this study will be greatly appreciated. Thank you for your assistance.

Sincerely,

Shannon E. Coulter

APPENDIX E

(Aggregated Mean Student Demographics for All Teachers)

Teacher ID	2008 CST	2007 CST	SES	EL	PEL	Ethnicity
ac48	349.98	314.31	0.07	0.18	3.05	0.58
ac70	331.7	341	0.15	0.18	2.7	0.63
ac84	260.87	283.24	0.28	0.49	2.46	0.49
ad79	304	335.57		0.43	2.43	0.71
ad91	323.6	329.28	0.28	0.32	2.16	0.54
ah71	320	299.5			1	0.5
aj02						
al02	342.18	330.15	0.19	0.25	2.75	0.69
al19	314.12	342.3	0.6	0.21	2.7	0.63
al75	294.97	316.11	0.13	0.16	2.75	0.64
b002	410.44	401.55	0.13	0.16	3.24	0.7
b085	323.98	325.85	0.13	0.2	2.98	0.66
b199	261.94	259.12	0.61	0.88	2.3	0.06
b210	392.67	395.22			2.78	0.67
b215	326.82	306.86	0.68	0.1	2.71	0.75
b538	352.81	349.96	0.24	0.33	2.82	0.63
b779	265.62	290	0.5	0.5	2.38	0.5
b972						
c353	267.76	265.99	0.66	0.48	1.76	0.24
da04						
da12	388.57	375.02	0.17	0.21	3.23	0.58

da47	298.64	324.8	0.13	0.09	2.63	0.74
da62	333.77	336.74	0.06	0.84	2.95	0.82
db09	309.42	293.58	0.51	0.54	2.05	0.25
db14	263.49	288.51	0.07	0.2	2.98	0.68
db51						
db58	341.17	351.45	0.07	0.45	2.84	0.8
db60	301.86	332.92	0.07	0.22	2.72	0.7
db71	286.09	325.36	0.52	0.61	1.89	0.23
dc46	328.84	331.35	0.15	0.4	2.12	0.48
dc54	303.83	291.5	0.67	0.33	2.5	0.5
dc88	319.48	310.33	0.08	0.38	2.65	0.58
dd21	296.57	309	0.39	0.13	2.65	0.78
dd56	277.79	323.73	0.51	0.59	2.01	0.22
dd84	324.29	302.62	0.08	0.33	2.58	0.5
de56	354.39	357.43	0.17	0.41	2.78	0.63
de85	383.02	387.7	0.04	0.22	3.36	0.55
de90	323.93	314.98	0.7	0.5	1.76	0.22
df28	329.56	323.66	0.3	0.38	2.63	0.43
df37	284.8	229.2	0.6	0.4	2.6	0.4
df58	290.58	303.36	0.27	0.3	2.48	0.36
df63	337.74	337.79	0.47	0.16	3.05	0.68
df87	335.98	351.58	0.15	0.1	2.3	0.78
dg58	359.48	328.24		0.17	2.83	0.83
dg72	305.51	309.08	0.16	0.18	2.46	0.68
dj53	345.35	369.56	0.06	0.12	2.86	0.73

dj68	256.73	267.2	0.63	0.43	1.9	0.33
dl57	341.01	348.43	0.13	0.2	2.91	0.63
dn96	317.6	313.4	0.2		2.6	0.6
dr87						
dr88	350.77	361.6	0.21	0.19	2.65	0.66
dr91	317.3	309.43	0.54	0.52	1.98	0.24
dr96	330.56	371.94	0.08	0.33	2.91	0.88
ds05	336.07	337.8	0.16	0.12	2.86	0.74
ds18	279.18	294.41	0.11	0.37	2.54	0.69
ds23	329	346.67	0.67	0.33	2.33	0.33
ds56	309.94	313.56	0.25		3.25	
dt46	353.54	355.31	0.11	0.35	2.7	0.77
dt50	298.75	299.75	0.25		2.25	0.5
dt76	335.94	350.02	0.05	0.6	2.95	0.76
dt89	296.92	308.42	0.49	0.57	2.04	0.32
du19	307.36	283.55	0.73		0.64	
du46	329.2	346.3	0.23	0.25	2.45	0.57
du65						
du66	369.67	410.52	0.14	0.12	3.19	0.71
du67	315.31	321.89	0.2	0.24	2.5	0.58
du86						
du88	281.63	306.99	0.18	0.3	2.72	0.58
du98	297.11	286.67	0.26	0.56	2.41	0.22
dv17	345.58	361.27	0.14	0.18	3.1	0.62
dv35	303.39	326.83	0.07	0.4	3.05	0.78

dv40	320.28	312.2	0.34	0.31	2.31	0.46
dv56	244.96	256.68	0.18	0.43	1.86	0.57
dv64	322.87	333.69	0.31	0.4	2.65	0.47
dv66	325.07	331.6	0.3	0.37	2.57	0.47
dv82	314.2	314.78	0.68	0.49	2.05	0.22
dw55	315.49	331.79	0.53	0.41	2.15	0.22
dw83	280.82	285.35	0.43	0.51	1.9	0.27
dw89	306.29	327.21	0.18	0.28	2.8	0.52
dx05	273.76	286.43	0.14	0.71	2.1	0.1
dx14	387.22	398.91	0.08	0.21	3.39	0.71
dx15	298.54	326.84	0.22	0.36	2.94	0.49
dx30	247.5	265	0.63	0.42	1.91	0.27
e279	282.57	277.89	0.6		1.4	
e391	268.33	264.78	0.3	0.24	2.33	0.87
e529						
e864	275	283			2.66	
ea14	294.92	315.59	0.2	0.28	2.63	0.6
eg65	283.67	286.93	0.31	0.46	2.32	0.39
eh76	281.52	283.49	0.25	0.2	2.65	0.56
er40	334.93	334.53	0.27	0.48	2.21	0.35
fl32	330.84	343.51	0.2	0.21	2.51	0.59
ff07	334.51	335.18	0.17	0.15	2.38	0.67
h158	284.78	318.33	0.15	0.15	2.55	0.65
h550	337	344.5		0.5	2.66	0.5
j686	348.29	355.96	0.2	0.23	2.67	0.55

k529	269.04	302.76	0.07	0.5	2.99	0.79
k608						
k619	316.55	359.5	0.13	0.21	3.09	0.66
k840	357.46	349.95	0.33	0.38	2.77	0.26
l577	261.57	298.11	0.32	0.45	2.42	0.4
p163	306.92	308.07	0.15	0.18	2.5	0.71
p176	348.45	351.51	0.36	0.37	2.6	0.3
p188	341.83	377.59	0.09	0.11	2.81	0.79
p222	381.28	385.22	0.04	0.21	3.56	0.71
p276	321.5	353.45	0.05	0.62	3.09	0.78
p559	316.94	322.01	0.19	0.18	2.64	0.67
p837	248.86	273.33	0.48	0.38	2.17	0.17
p925						
q050	300.49	317.95	0.17	0.22	2.67	0.57
q362	344.38	357.99	0.11	0.27	2.83	0.62
q724	313.5	305.8	0.3	0.5	2.7	0.3
q899	387.14	386.42	0.13	0.22	3.05	0.66
r459	387.84	377.96	0.1	0.12	3.2	0.76
r919	339.95	338	0.2	0.4	2.3	0.4
s604	275.98	306.53	0.38	0.43	2.33	0.24
t026	371.37	369.38	0.08	0.87	2.8	0.81
t128	383.95	341.73	0.11	0.18	2.81	0.67
t413	254.35	279.65	0.48	0.45	2.37	0.23
t767	325.87	360.2	0.08	0.48	2.85	0.87
t940	336.57	325.48	0.19	0.19	2.82	0.68

U078	324.08	322.66	0.11	0.28	2.78	0.53
u437	339.03	341.59	0.16	0.41	2.62	0.42
u668	346.81	365.7	0.08	0.18	3.19	0.7
u926	327.2	322.03	0.43	0.34	2.39	0.31
v449	430.43	416.47	0.03	0.17	3.66	0.78
v450	383.58	365.85	0.05	0.15	3.27	0.56
v958	357.22	353.55	0.2	0.23	2.81	0.63
w787	313.52	325.07	0.21	0.21	2.38	0.57
w819	423.52	418.48	0.09	0.06	3.22	0.76
w838						
w839	307.25	294.04	0.42	0.33	2.39	0.21
x077	273.35	298.48	0.45	0.67	2.01	0.22
x354	297.56	315.17	0.53	0.43	2.41	0.28
x485	415.04	393	0.07	0.11	3.19	0.7
x647	306.84	327.62	0.37	0.54	2.17	0.17
x649	260.95	254.47	0.95		1.4	0.23
y152	267.85	277.6	0.59	0.4	1.99	0.25
y482	288.27	300.71	0.19	0.18	2.32	0.65
y630	336.53	326.69	0.53	0.44	2.19	0.26
y634	396.06	394.76	0.11	0.17	3.18	0.75

VITAE

Shannon Coulter was born in Dalton, GA, in 1973. He graduated from the University of Tennessee in 1995 where he earned a Bachelor's of Arts Degree in English. After graduation, Mr. Coulter began teaching high school English in San Diego, California. He continued his studies at San Diego State University and obtained a Master's of Arts in British Literature in 2001. Mr. Coulter continued teaching English until August of 2006 when he entered the Doctor of Education Psychology and Research program at the University of Tennessee. He will graduate in the spring of 2009.