

TEACHERS' PERSPECTIVES ON THEIR PROFESSIONAL LEARNING  
ENVIRONMENT AND THE RELATIONSHIP TO GROWTH IN STUDENT  
ACHIEVEMENT

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Doctor of Philosophy

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By

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The undersigned, appointed by the Dean of the Graduate School, have examined the dissertation entitled

TEACHERS' PERSPECTIVES ON THEIR PROFESSIONAL LEARNING  
ENVIRONMENT AND THE RELATIONSHIP TO GROWTH IN STUDENT  
ACHIEVEMENT

Presented by Stacey Preis

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And hereby certify that in their opinion it is worthy of acceptance.

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## DEDICATION

Darin, for your genuine enthusiasm and steadfast confidence in my ability to reach this goal, I will always be grateful.

Hayden, your thoughtfulness and compassion are among your finest qualities, and you have given me more inspiration than you know. It will be a privilege for me to watch you grow and learn and to support you as you pursue your dreams.

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## CHAPTER ONE

### Introduction

Identifying the ways in which teachers affect student outcomes is the subject of continuous inquiry. Policy is written to try to recruit, retain, and reward effective teachers. The mandate for highly qualified teachers is a central tenet of No Child Left Behind (NCLB) with “highly qualified” defined by tangible credentials such as subject matter certification. The belief in the power of quality teaching clearly exists. Where the conflict still exists is whether those teachers can be identified through credentials or instructional practices.

Teachers are compensated by years of experience and level of education in most schools around the country. However, studies of education level and years of experience (e.g., Danna, 2004; Hanushek, 2007; Podgursky, 2005; Schacter & Thum, 2004) demonstrate the difficulty in reaching consistent conclusions about teacher quality from those credentials. At the same time, studies of particular instructional strategies or techniques are limited in the extent to which generalizations can be made about teachers’ overall effectiveness given the diversity in the levels and content areas in which teachers teach, as well as the diversity of individual learners (Darling-Hammond & McLaughlin, 1995; Wayne, Yoon, Zhu, Cronen, & Garet, 2008).

Recently, many studies have begun to look beyond individual teacher practices to teachers’ collective efforts toward improving student achievement. Those collective efforts as exhibited through professional development and teacher learning communities will be the focus of this study. In this study, teacher quality will not be defined or evaluated by credentials or use of particular techniques, rather teacher quality will be

defined simply by the extent to which certain practices within a school's faculty are directed toward improving student outcomes.

### Literature Review

In this study, teaching quality is situated within the context of elementary and middle schools. For decades, researchers have studied and debated what distinguishes successful schools and to what degree schools influence student achievement. The report *Equality of Educational Opportunity*, commonly referenced in the literature as the Coleman Report, was among the earliest and most often cited research addressing the degree of impact schools have on student achievement (Coleman et al., 1966). Among the conclusions reached in the report was that schools account for very little of the variation in student achievement, and that most of the variation is attributable to variables outside of the school such as socioeconomic status (SES).

However, since the time of the Coleman Report, many researchers have continued to study the effects of schools on student achievement (e.g., Coladarci, 2006; Edmonds, 1983; Marzano, 2003; Mussoline & Shouse, 2001; Palardy, 2008). This body of research on school effectiveness provides the conceptual framework for this study and describes school effectiveness in terms of input, process, and output (Marzano, 2003). School effectiveness research supports the belief that teachers and schools can show a positive association with student outcomes beyond the influence of student-level variables. Research on school effectiveness supports the assertion that teachers have the most significant impact on student learning of any school reform initiative (Heck, 2007; Lindjord, 2003; Schacter & Thum, 2004; Scheerens, 2000).

Many studies of teacher influence on student outcomes focus on inputs. Degrees held, experience, and certification are common input variables (Darling-Hammond, 2000; Hanushek, 2007; Podgursky & Springer, 2007). However, studies of teacher inputs associated with increased student outcomes have not reached consistent conclusions (Schacter & Thum, 2004). When considering individual teacher behavior, identifying universal best practices can be a challenge given the diversity of learners and learning environments (Garrison, 2004; Marzano, 2003; Mussoline & Shouse, 2001; Palardy, 2008; Seidel & Shavelson, 2007).

School effectiveness research provides a framework for examining the influence of teachers through teacher learning communities and their professional development. Strong teacher learning communities share a focus on student needs and the responsibility for student learning (Darling-Hammond & McLaughlin, 1995; Ingvarson, Meiers, & Beavis, 2005). The momentum of this collective effort holds the potential for improving teacher quality and subsequently student achievement (R. D. Goddard & Goddard, 2001; Weathersby & Harkreader, 2000).

Furthermore, as teacher professional development has moved beyond stand-alone workshops to become an embedded aspect of daily practice, teachers' collaborative efforts have been at the center of school improvement initiatives (Cochran-Smith & Lytle, 1999; Darling-Hammond & McLaughlin, 1995; Little, 1993; Richardson & Placier, 2001). Teachers' ownership of their own learning is connected to their sense of responsibility for student learning (Marks & Louis, 1997). Professional development has relevance and application within the larger school context and is not limited to classroom practices (Little, 1993). When teachers are continually learning and developing as a staff,



the commitment to increased student achievement is reinforced (Desimone, 2009; Knapp, 2003; A. J. Youngs, Yoon, Zhu, Cronen, & Garet, 2008).

### Statement of the Problem

The interest in teacher influence is clear from the amount of published research on this topic to the prominence of teacher quality in federal law. However, as the pursuit to identify individual quality in teachers remains elusive, there emerges an opportunity to examine teacher influence from a different perspective.

The Missouri Department of Elementary and Secondary Education (DESE) collects data on student demographics, teacher credentials, and student achievement, as well as survey data from faculty which characterize those processes present in their schools thought to contribute to the learning environment. However, currently no analysis is conducted with those data to attempt to make connections between school-level practices and student outcomes. In FY2010, Missouri will invest \$5.4 billion in preK-12 education (95th General Assembly, 2009), and Missouri's school foundation formula is driven by student needs with the intent of providing equitable opportunities for students.

Despite this, achievement across Missouri's 523 school districts varies widely. In 2008, 280 districts received the Distinction in Performance award from DESE, a recognition acknowledging K-12 districts that meet thirteen out of fourteen performance standards and K-8 districts that meet six out of seven performance standards (Missouri Department of Elementary and Secondary Education, 2009). At the same time nine districts remain provisionally accredited, two districts are unaccredited, and one district is interim accredited (Missouri Department of Elementary and Secondary Education, 2009). Research is needed that will begin to identify teaching characteristics which are

consistently present in higher achieving schools. The ability to identify those characteristics could lead to the opportunity to replicate best practices in those schools that struggle with student achievement.

### Purpose of the Study

The purpose of this study is to examine variations in the learning environments within Missouri elementary and middle schools to look for patterns that emerge in the professional practices of teachers in schools with the greatest amount of growth in student achievement independent from the influence of demographic and student-level variables.

### Research Questions

- RQ1 - What are the variations in the presence of teacher learning communities and professional development as reported by teachers in Missouri elementary and middle schools?
- RQ 2 - To what extent does the presence of a strong teacher learning community within a school correlate with growth in student achievement in elementary and middle schools?
- RQ 3 - To what extent does high quality professional development within a school correlate with growth in student achievement in elementary and middle schools?
- Expectation of Outcome for RQ 2 - Schools where teachers experience and contribute to a strong teacher learning community will have higher growth in student achievement than schools with a weaker teacher learning community.

- Expectation of Outcome for RQ3 - Schools where teachers experience high quality professional development will have higher growth in student achievement than schools with lesser quality professional development.

#### Definitions of Key Terms

Professional development – Professional development refers to any deliberate activity in which a teacher engages with intent of improving practice and ultimately student achievement. The concept of professional development as used in this study is not limited to offsite training or stand-alone seminars.

Teacher learning community – Teacher learning community refers to the culture of professionalism, collegiality, and collaboration which is present in a school and directed toward student outcomes. The term *professional learning community* has been associated with a particular model identified with specific researchers; therefore, teacher learning community will be term used in this study.

Student outcomes – Student outcomes refers to the product of any or all measures used to assess a student’s academic knowledge and/or progress.

Achievement growth – Achievement growth refers to measured gains in the achievement of a student over a specified period of time.

Student achievement or achievement status – Student achievement or achievement status is the measure of achievement for a student at any one point in time.

#### Limitations of the Study

As in any secondary analysis of existing data, the study is limited to those practices or characteristics which are included in the teacher questionnaire administered by DESE. The sample of schools was selected based on which schools were reviewed in

the current stage of the accreditation review process rather than by other criteria determined by the researcher. However, those cohorts were selected so that each one represents the diversity of districts throughout Missouri, and the sample of schools was evaluated to confirm that they are representative of the full population of Missouri schools.

The growth measurement used was a variable within the data that was provided. It was calculated using individual student test scores which are not publicly available; therefore, no alternative growth measurement using student-level data could be examined.

In addition, the complexity and interconnectedness of independent variables affecting student achievement do not make it possible to report causal effects. The findings of this study will identify any relationships between variables, but causation cannot be definitively determined.

#### Significance of the Study

This study offers a rational basis on which to evaluate the influence of the connection between a school's professional environment for teachers and growth in student achievement. Knowing which initiatives or practices have the strongest correlation with growth in student achievement will provide useful information on how to most effectively direct resources so as to achieve the greatest impact. NCLB has set the expectation that professional development will produce measurable improvement in student achievement (Wayne et al., 2008). Many believe that the investment in professional development is justification for the expectation of results (Wayne et al., 2008). Edmonds (1983) identified teachers' expectations for student achievement as one

of the primary characteristics of effective schools. In a review of literature of school effectiveness research, Townsend (2001) noted “more research into the effectiveness of teachers and their relationships are accepted as being appropriate and are now starting to emerge in the school effectiveness research” (p.121). Professional development and teacher learning communities provide a platform on which to build those expectations and develop that research.

## Chapter Two

### REVIEW OF THE LITERATURE

#### Introduction

This chapter reviews the literature on characteristics of a positive professional learning environment for teachers specifically as related to teachers' collective behaviors. To lead into this discussion, the chapter begins with a brief historical perspective on the societal changes that prompted new beliefs about the function of schools and teachers. Following that is an overview of school effectiveness research (SER), the conceptual framework for this study. Then the chapter moves into a discussion of the importance of the teacher's role within that conceptual framework.

The chapter continues with an examination of the learning environment within a school and how that is associated with student outcomes. There is a current body of literature which examines the teachers' role in education, not within the context of the individual teacher's classroom, but rather how teachers influence and support one another within the context of the school to raise the level of performance of all teachers and outcomes for all students. I discuss the evolution of professional development in supporting overall school improvement and how that is being enhanced through teacher learning communities. This review of the most current research in best practices in teacher learning communities and professional development demonstrates how they function as key components in school improvement initiatives. The chapter provides the context for this study and concludes by connecting the existing literature with an overview of this study on the learning environment in Missouri elementary and middle schools and the relationship to growth in student achievement.

## Historical Perspectives on the Influence of Schools and Teachers

For decades, researchers have debated the relative impact a teacher has on a student's success. The publication *Equality of Educational Opportunity* (Coleman et al., 1966), often referred to as the Coleman Report, found that student-level variables such as socioeconomic status and home life had more influence on student outcomes than any school-level variable including teacher quality. In fact, numerous studies since the publication of that report have reaffirmed the finding that student background characteristics account for the largest amount of variance in student achievement (Marzano, 2003). Nevertheless, many researchers have not accepted this as reason to abandon the study of how and under what circumstances schools can positively affect student outcomes. Within that body of literature is a strong focus on teacher effects as researchers continue to try to isolate the association between teacher quality and student outcomes and to identify those characteristics which contribute most to a teacher's effectiveness.

The National Commission on Teaching and America's Future recommended measurements for quality teaching which were grounded in high standards for both teachers and students. Among the recommendations was a call for high quality professional development for teachers, an expectation of high standards for students and teachers, and a re-envisioning of schools around expectations for success (1996). These standards were developed in response to the Commission's findings which included schools without the structure in place to support student success and a lack of standards and accountability for teachers (National Commission on Teaching and America's Future, 1996).

Teacher quality has been emphasized by the federal government through the NCLB requirement for highly qualified teachers (U. S. Department of Education, 2005). To be deemed highly qualified by NCLB, teachers must have a bachelor's degree, full state certification or licensure, and proof that they know each subject they teach (U. S. Department of Education, 2005). However, teacher qualifications should not be interpreted as synonymous with teacher quality. Teacher quality is reflected in the way that teachers enrich the development of their students. Certainly teachers' influence can extend beyond measurable gains in student outcomes, but it is growth in student achievement that is examined in this study. Additionally, improvement or assessment of teacher quality need not only be considered at the level of the individual teacher. Numerous current studies point to the collective efforts of teachers and the learning environments created by those efforts which foster a culture of professionalism and high expectations for students (Marzano, 2003; P. Youngs, 2001). Because schools are the unit of analysis for this study, the role of teachers in changes to student achievement outcomes is considered within the context of the school.

In addition, current accountability systems create a mandate for schools to make a difference in student achievement (Heck, 2000; Scott & Bagaka's, 2004). Because NCLB has caused such a dramatic change in accountability and in the expectations for schools to affect achievement, most of the literature discussed in this review will be from studies conducted since the introduction of that law.



## Conceptual/Theoretical Framework

### *School Effectiveness Research*

School effectiveness research (SER) provides the conceptual framework for this study. The introduction and evolution of SER has largely been a rebuttal to studies such as the Coleman Report (Marzano, 2003). SER is based on the premise of acknowledging that student-level factors are responsible for the largest proportion of variance in achievement, but that schools can have a positive effect in countering those negative influences (Edmonds, 1983; Marzano, 2003). Another important reason for using SER as the conceptual framework is that the questionnaire which generated the data to be used in this study was intentionally designed around the principles of SER.

SER is often framed in terms used in a traditional business model: inputs, processes, and outputs. Inputs are resource variables and would include such things as per pupil expenditures but also include student level characteristics (e.g., SES) and teacher characteristics (e.g., level of education). Many economic analyses of schools emphasize inputs and outputs, i.e., resources and outcomes. In a review of research on education production, Hanushek (1997) reported that a problem with input-only analysis is attribution of causation. For example, do better credentialed teachers account for higher achieving students or are better credentialed teachers drawn to teaching at better performing schools?

In considering the relationship of schools to student outcomes, it is worth noting that it is not a particular type of school (e.g., traditional public, charter, private) that is the emphasis of the process phase of SER. In a study of private school and public school student achievement, Lubienski, Crane, and Lubienski (2008) noted the following:

...much policy rhetoric and research...on this topic tends toward the 'black box' view, portraying schools as some type of magical treatment. This approach assumes that inputs and outcomes can be measured to determine the best type of 'box' but pays little attention to what happens inside. We believe the next wave of insights into the question of school effectiveness can be gained by moving away from simple focus on school type and instead examining what happens inside schools (p.694).

By focusing on process rather than input variables, SER asserts that schools are addressing those variables which are more within their ability to control than are most resource variables (Caldas, 1993; Heck, 2000; Marzano, 2003; Palardy, 2008). Processes are not necessarily procedural, but rather describe any interventions that occur beyond the input variables and have the potential to influence the final output. Knowing that input variables such as socioeconomic status have a considerable influence on student outcomes, those variables may function as control variables in studies of effective school-level processes.

Although SER has the objective of accounting for the influence of input variables, some critics assert that the research may not adequately consider the external, compounding, student-level variables and that SER can go farther in its attempts to explain correlations between input, process and output variables (Heck, 2000; Luyten, Visscher, & Witziers, 2005). Stronger school effectiveness research will account for socioeconomic differences in students as well as the value added by the school. This type of study not only makes for more equitable comparisons of student data, but also informs practitioners and policymakers on which school-level interventions have the strongest positive relationship with student learning (Heck, 2000; Townsend, 2001).

### *Critique of School Effectiveness Research*

Given that SER developed as a response to findings from studies questioning the impact of schools, some criticisms of SER are that it may have a tendency for political and ideological bias and that school effectiveness researchers may show reluctance to acknowledge inherent biases (Luyten et al., 2005). This criticism is fueled by the fact that many SER studies are funded and disseminated by agencies or organizations rather than published in peer-reviewed academic journals which may raise doubts about objectivity. Luyten et al. (2005) stated “the close ties between researchers and policy-makers gives the perception that SER is not so much of a scientific endeavor as it is an ideological force” (p. 251). School effectiveness research should acknowledge the influence of external factors and what can be achieved by schools independent of those variables (Luyten et al., 2005; Townsend, 2001).

Another weakness of SER is a tendency for researchers to downplay outcomes when effect sizes are found to be small (Luyten et al., 2005). Luyten et al. (2005) said this is not a wise approach because “critics who argue that the teaching-learning process is unpredictable provide an excellent argument for not investing in education” (p. 253). There are many possible reasons for variations in effect size. Teacher effect size is influenced by the quality of variables selected to measure teacher effectiveness as well as the quality of measurement of those variables. In meta analyses, summarizing teacher effectiveness is difficult because of the variation across studies in the measurement and definition of effectiveness (Seidel & Shavelson, 2007). However, when evaluating the quality of individual studies, even the finding of a relatively small teacher effect can be

meaningful because of the number of variables which impact student learning (Seidel & Shavelson, 2007).

In addition, Wayne and Youngs (2003) noted that “publication bias” may skew the expectation for effect size because those studies with the largest effect size are also the ones most likely to have been published, and it is difficult to estimate to what extent studies showing lesser effect sizes were not selected for publication. For future teacher effectiveness research, researchers should work to develop a clear expectation for effect sizes considered to be significant (Rowan, Correnti, & Miller, 2002). Outcomes must be emphasized if educators expect to justify the public’s investment (Luyten et al., 2005).

#### *The Teacher’s Role in School Effectiveness: Inputs vs. Processes*

Luyten et al. (2005) recommended examining relationships between classroom variables and outcomes as indications of the culture of the school. Teaching is a critical variable relating to student outcomes and has demonstrated more impact than school reform initiatives (Lindjard, 2003; Schacter & Thum, 2004; Scheerens, 2000). For example, in mathematics, Heck (2007) found teacher quality was effective in helping to reduce achievement gaps between higher SES and lower SES students by as much as 36% and between non-minority students and underrepresented minority students by 24%. Teacher quality was represented by teacher practices and “school-level professional standards” such as subject area knowledge and state teacher performance standards (p. 421). Many school improvement initiatives have focused on teacher-student interactions as the foundation for school improvement (Edmonds, 1983). Teacher quality is among the characteristics of effective schools, and SER emphasizes the positive impact of

quality teaching on the professional culture of the school and the overall school improvement initiatives (Edmonds, 1983; Heck, 2007).

### *Teacher Inputs*

Many studies of teacher effectiveness use variables in which the data are readily available and which are easy to measure. The two most common of those variables are level of education and years of experience (Goldhaber & Brewer, 1997; Heck, 2007; Podgursky, 2005; Podgursky & Springer, 2007; Seidel & Shavelson, 2007). These variables are particularly common in economic models in what Rowan, Correnti, and Miller (2002) refer to as “production function” research. Between education level and experience, experience has accounted for more variation in student outcomes than education level (Nye, Konstantopoulos, & Hedges, 2004). While a correlation can be found between teachers’ years of experience and student outcomes, that effect has been shown to reach a threshold and level off, typically at around the five year point (Marzano, 2003). Level of education has not been demonstrated to have a consistent relationship with student outcomes which is not surprising given that a teacher’s advanced degree does not have to be, and often is not, in pedagogy (Darling-Hammond, 2000).

In addition, teacher subject matter knowledge, based on the degree held has been used as measure of teacher quality (Podgursky, 2005). Researchers note that state standards of teacher preparation in subject matter and pedagogical knowledge vary to such a degree that multi-state comparisons of teacher effectiveness using these criteria are difficult (Hanushek, 2007; Podgursky, 2005). Most studies examining the relationship between teachers’ content area coursework and student outcomes have been inconclusive

or in contradiction to one another, with the one exception: mathematics teachers' subject area content knowledge (Wayne & Youngs, 2003).

Of those quantifiable variables most often used to evaluate teacher quality, the teacher's score on the certification exam Praxis II had the highest correlation with student outcomes (Darling-Hammond, 2000; Wayne & Youngs, 2003). Despite this, results of various studies attempting to show a relationship between teacher certification and student outcomes have been inconclusive (Heck, 2007; Wayne & Youngs, 2003).

The fact that teacher qualifications (e.g., degree level, years of experience, certification) are not consistently highly correlated with student outcomes provides the incentive for shifting the focus of analysis to teacher practices (Schacter & Thum, 2004). When considering teacher quality in the context of school effectiveness literature, variables such as certification and years of experience function as input variables and will better serve as control variables rather than as proxies for teacher quality.

### *Teacher Processes*

Studying teachers' collective practices in the "processes" stage of SER research may allow for better analysis of which factors are most associated with student outcomes and where more research is needed on effective practice (Heck, 2007). Some studies have intentionally focused on those teaching practices which are observable (Kyriakides, Creemers, & Antoniou, 2009; Schacter & Thum, 2004; Seidel & Shavelson, 2007). In a study conducted by Schacter and Thum (2004), teachers were observed teaching the same subjects or comparable lessons and then scored on a rubric developed by the researchers to create greater inter-rater reliability among the observers. While this is understandable

in terms of statistical validity and reliability, it also presumes that one is expecting to see the same teaching behaviors present in each classroom.

Clearly, there is not a single pedagogical technique or instructional intervention that will work with all students across all circumstances (Garrison, 2004; Marzano, 2003; Palardy, 2008). Some practices such as team teaching and cooperative learning have more success in mid- to high-SES schools. These schools can afford to experiment and take more risks because the social capital of the students will allow for filling in any knowledge gaps in more experimental methods (Mussoline & Shouse, 2001). In addition, high-SES schools tend to retain stronger teachers who have more success with adapting to new structures or practice (Mussoline & Shouse, 2001). Generally speaking, the research community has had a difficult time agreeing on how to measure effective classroom practices (Wahlstrom & Louis, 2008).

One challenge that Seidel and Shavelson (2007) discovered in their meta analysis of teaching effectiveness was that studies used different variables to represent teacher quality making it difficult to compare their results of the effect of teacher quality on student outcomes. The key seems not to be in identifying whether a teacher is engaging in specific practices, but whether he or she is a reflective practitioner who is responsive to student needs and has the ability to adapt instruction to meet the needs of any learner.

An alternative way to study teacher influence on process is to consider the teachers' professional learning environment and the culture of expectations it creates within the school. One avenue by which to investigate that influence is through the interaction between faculty and the ways in which they regard themselves as part of the school's learning community. In addition, the role of professional development in a

school can offer insight into the ways in which a school enhances and strengthens its learning environment.

The literature on the collective influence of teachers on student outcomes and school improvement focuses on two closely related topics: teacher learning communities and professional development. In strong teacher learning communities, teachers take an active role in establishing goals around the needs of students. These attributes extend to quality professional development which is an integral part of ongoing practice. The next section of this chapter reviews the research on teacher learning communities and best practices in professional development and the extent to which these variables are correlated with increases in student outcomes.

#### Review of the Literature on Teacher Learning Communities

Teacher learning communities, sometimes formally labeled as *professional learning communities* (PLCs) (DuFour, 1997), are a central component of school improvement initiatives. Professional community is described by Youngs (2001) as the school's capacity, defined as "including the knowledge, skills, and disposition of individual teachers; the strength of the school's professional community; the extent to which programs are coherent; the nature of the principal's leadership; and the quality of its technical resources" (p. 279). When conceptualizing teacher effectiveness in this way, the focus is on the collective behavior of teachers within a school. "A strong professional community is characterized by shared goals for student learning; meaningful collaboration among faculty members; in-depth inquiry into assumptions, evidence, and alternative solutions to problems; and opportunities for teachers to exert influence over the work" (P. Youngs, 2001, p. 280).



### *Shared Culture*

Schools as organizations have traditionally followed practices that exemplify the metaphor of organization as machine where decisions are made from the top down and each person focuses on his or her designated role (Morgan, 2006; Wood, 2007). School administrators make decisions for the organization and teachers work within those parameters. A benefit of teacher learning communities is that teachers feel respected in their knowledge as professionals, and this respect strengthens their commitment to improvement (Lieberman & McLaughlin, 1992). A teacher learning community creates a norm for high expectations among teachers and can function as a tool of positive peer pressure setting a higher standard for all staff (R. D. Goddard, Hoy, & Woolfolk Hoy, 2000; King, Louis, Marks, & Peterson, 1996).

A metaphor that would reflect a more contemporary view of teaching would be the metaphor of organization as organism, wherein the parts of the organization share interdependence and the survival of the organization relies on its ability to evolve (Morgan, 2006). From a different organizational framework, Griffith (2003) noted that an open systems and rational goal framework contain the elements of a school in which a strong learning community is in place. In the open systems model, the emphasis is on shared responsibility, collegiality, flexibility, adaptability, and openness. However, the measurement of effectiveness of this system according to Griffith is the attitudes of staff about the work environment. Student outcomes are only an implied, possibly indirect outcome.

Solid research on teacher learning communities should stretch beyond teacher satisfaction as the measured outcome. A successful school improvement initiative must

be able to demonstrate its value as it relates to student outcomes. The rational goal model uses student achievement as the measure of school effectiveness. Elements of this model present in strong learning communities include clarity of goals, consensus on goals, high expectations for students, and a focus on student learning (Griffith, 2003).

### *Teacher Empowerment*

In a traditional school setting, teacher leadership may have meant assisting principals with more administrative functions, not focusing on instructional decisions or goals. In teacher learning communities, empowering teachers leads to greater efficacy and their sense of responsibility for student learning (Marks & Louis, 1997; Scribner & Hager, 2000; Vescio, Ross, & Adams, 2008; Wahlstrom & Louis, 2008). Not only do teachers feel more responsible, but a strong sense of efficacy makes teachers more adaptable and responsive to meeting student needs, supporting the metaphor of teacher learning community as organism.

Studies of teacher learning communities have found positive changes to the culture of teaching within a school, moving from a traditionally isolated and individualized practice to one that is open and collaborative (Marks & Louis, 1997; Vescio et al., 2008). Teachers in a strong learning community tend to be more innovative and have a willingness to take more risks. The mutual trust among faculty allows teachers to open themselves up to peer evaluation and critique (King et al., 1996; Louis, Marks, & Kruse, 1996).

### *Student Outcomes Centeredness*

One of the changes in culture surrounding teacher learning communities is an increased degree of student outcomes centeredness. Traditional teacher learning is

heavily focused on the teacher; whereas, teacher learning communities focus on teacher practices as a vehicle for achieving greater student outcomes (King et al., 1996; Scribner & Hager, 2000; Vescio et al., 2008). Several studies of teacher learning communities specifically reference data-driven decision making (Vescio et al., 2008). Teachers' conversations within their teacher learning communities centered around data, and data was used to direct instruction. They focused on the end result (i.e., student learning) not just on the practices of teaching (Vescio et al., 2008).

#### *Potential Weaknesses or Drawbacks*

While a strong sense of teacher community is touted as a strength of teacher learning communities, there is the potential drawback of that strong sense of community making members too complacent in accepting the will of the majority (Giles & Hargreaves, 2006). Related to that concept is the potential that a strong internal focus will develop into a myopic view of teaching and learning. Vescio et al. (2008) noted the following

[T]eachers construct visions of teaching and learning based on a picture that is structured by their very positions as teachers. This can create paradigms of thinking that privilege certain voices and epistemologies based on preconceived notions of right, wrong, good, or bad in schooling. In the end, this horizon of observation can serve to limit the solutions teachers develop to improve their own practices and improve student learning (p.89).

Because the concept of teacher learning communities is still relatively new in most schools, there is some question as to the sustainability of their momentum over time (Lieberman & McLaughlin, 1992). Threats to momentum include changes in principal leadership or key faculty as well as changes in the student demographics or district priorities (Giles & Hargreaves, 2006). Schools will be more successful in sustaining

teacher learning communities if the momentum does not hinge on the presence of one or two key individuals, but rather the teacher learning community is built on a foundation of distributed leadership (Giles & Hargreaves, 2006; Nelson, Slavit, Perkins, & Hathorn, 2008; Scribner & Hager, 2000).

To build a successful learning community, teachers must go beyond seeking new instructional techniques to becoming thoughtful, reflective problem solvers who can be self-directed in the development of their practice (Wood, 2007). The characteristics of successful teacher learning communities provide the foundation for effective professional development as described in the next section.

#### Review of Literature on Professional Development

The emergence of teacher learning communities has coincided with the evolution of professional development. Quality professional development is a variable that is consistently present in school effectiveness research (Marzano, 2003). Several national organizations, such as the National Staff Development Council (NSDC) and the National Board of Professional Teaching Standards (NBPTS) have formal, written standards outlining the characteristics of quality professional development (National Staff Development Council, 2009; Pritchard & Marshall, 2002). NSDC standards center around objectives that improve student learning (National Staff Development Council, 2009). The sections that follow will discuss the evolution of professional development in recent decades and highlight features which are central to best practices in professional development.

### *Beyond the Workshop Paradigm*

Nearly twenty years ago, research began to acknowledge the limitations of exclusively workshop-based professional development. The workshop model is often the first thing people think of when professional development is mentioned, and workshops are often criticized for their ineffectiveness (Guskey & Yoon, 2009; Pritchard & Marshall, 2002). “Compared with the complexity and ambiguity of the most ambitious reforms, professional development is too often substantively weak and politically marginal” (Little, 1993, p. 148). Richardson and Placier (2001) described the old mentality of professional development as a function of empirical-rational change: new ideas are developed externally and presented to teachers who, if acting rationally according to the theory, will implement. Similar to this is the concept Cochran-Smith and Lytle (1999) described as “knowledge-for-practice” where successful teachers are those who learn and implement external knowledge into their classroom practice. For professional development to be valuable, teachers must be engaged rather than passive learners. “Teachers do not assume an active professional role simply by participating in a 'hands-on' activity as part of a scripted workshop” (Little, 1993, p. 138). In addition, when teachers feel less in control of their learning, they may also not take responsibility for students underachieving, focusing blame on external or student-level input variables (Richardson & Placier, 2001).

One of the keys to successful professional development is finding the right balance between outside presenters and in-house expertise (Guskey & Yoon, 2009; P. Youngs, 2001). External professional development such as outside speakers or conferences are acceptable, but should complement and not replace internally-driven

professional development (Pritchard & Marshall, 2002). For example, in their study of a university-school district partnership focused on school improvement, Scribner, Cockrell, Cockrell, and Valentine (1999) found that off-site conferences were a good complement to the on-site, ongoing work. When off site, teachers were able to focus their conversations without distractions. The off-site meetings enhanced the teachers' opportunities for critical self-reflection designed to bring about lasting change and were deeply integrated within the larger initiative.

The findings of a study on the professional development associated with the implementation of a new literacy program illustrate many of the central points in the shift in professional development approaches (Nielsen, Barry, & Staab, 2008). In focus group interviews, teachers reported feeling more reliant on the outside experts in the first year. However, by the end of the year, they saw themselves as capable of bringing about positive change in their schools. Teachers talked about the lack of follow up in previous professional development and noted that when they returned to their classrooms they could choose to apply what they learned or choose not to apply it. Often the issue was never addressed again. The teachers believed that their past professional development was not only fragmented but often redundant (Nielsen et al., 2008). Most teachers said they liked having their more experienced peers model classroom practices and found this more effective than hearing about an instructional approach at an off-site workshop (Nielsen et al., 2008).

The strength of internal professional development is the ability to precisely target the school's needs (Knapp, 2003). To frame teacher learning in terms of "knowledge-in-practice" is to view teachers as constructivist learners and is based on the premise that all

knowledge is not generated externally. The foundations for best practices grow out of the classroom (Cochran-Smith & Lytle, 1999). However, with that comes the risk of being too internally focused and not having enough exposure to new ideas (Knapp, 2003). An internal focus does not mean that conjecture or traditional beliefs about best practices should replace the need for research-based practice (Cochran-Smith & Lytle, 1999).

In a third model, “knowledge-of-practice,” described by Cochran-Smith and Lytle (1999), teacher knowledge is constructed collectively developing a community of learners around problems of practice. Outside resources are still used as part of the learning process, but less focus is placed on outsiders as experts and teachers as students. The structure for learning is a collective effort coming from within the faculty. Knowledge of practice looks beyond what is happening within individual classrooms to broader changes at the school level. “[T]he goal is understanding, articulating, and ultimately altering practice and social relationships in order to bring about fundamental change in classrooms, schools, districts, programs, and professional organizations” (Cochran-Smith & Lytle, 1999, p. 279).

Effective professional development is not about learning specific techniques, but rather about being exposed to a number of ideas and working collaboratively with colleagues to effectively integrate those ideas into practice (Guskey & Yoon, 2009; Nielsen et al., 2008). If the professional development infrastructure within a school is strong, then external professional development can complement internal effort. If the infrastructure is weak, then external professional development will not contribute to enhancing the professional culture of the school and school improvement efforts (P. Youngs, 2001).

### *Teacher Collaboration*

Good professional development can also be a key factor in creating a positive school climate through the establishment of interdependence and trust among faculty and school leaders (Barley & Beesley, 2007; Knapp, 2003). The concept of teamwork is relatively new in the business and professional world, and until recently many initiatives aimed at improving teacher effectiveness have focused on individual teacher behavior (Wheelan & Kesselring, 2005). Teachers thrive with support from their peers and administrators (Strahan, 2003). Professional development must get past the isolating aspects of teaching (Darling-Hammond & McLaughlin, 1995). As part of that change teachers must embrace the idea of having their practice evaluated beyond the once a year evaluation done by the principal and recognize the value of peer feedback. For some teachers this is an uncomfortable change in mindset which makes them feel particularly vulnerable, but it is all the more reason to develop a strong sense of community and trust among the teachers (Darling-Hammond & McLaughlin, 1995; Ford, 2008).

This does not assume that collaborative approaches will be naturally or easily embraced by teachers. Historically, teachers have had very little social capital outside of their classrooms; the hierarchical design of schools does not encourage it. Because classrooms are the one place where teachers feel empowered, they may perceive greater collaboration as opening up their classrooms to scrutiny and threatening the one area over which they have control (McKenzie & Scheurich, 2008). Through dialogue with other teachers, rather than as a top-down directive, norms are restructured toward collaborative community (Richardson & Placier, 2001).



As noted in the section on teacher learning communities, a collective sense of efficacy can influence student outcomes (R. D. Goddard & Goddard, 2001). Weathersby and Harkreader (2000) interviewed teachers and administrators in Georgia schools identified as high- and low-achieving in their study. They found that teachers in higher achieving schools were part of the professional development planning and in turn had more buy in. Effective professional development in the high-achieving schools involved peer support and peer coaching and active practice of strategies (Weathersby & Harkreader, 2000). In schools and districts where professional development is an accepted aspect of teaching and not an extra burden to be added to other duties, schools have a healthier professional climate with increased professional dialogue among teachers (Danna, 2004; Pritchard & Marshall, 2002).

The connection between teacher efficacy and student outcomes may not be direct; rather teacher efficacy influences behaviors which may in turn influence student outcomes (R. D. Goddard & Goddard, 2001; Y. L. Goddard, Goddard, & Tschannen-Moran, 2007). By approaching quality instruction collaboratively, dialogue between teachers and administrators is consistent and focused on school improvement goals (Strahan, 2003; P. Youngs, 2001). In addition, collaborative professional development can have the positive side benefit of increased teacher morale and teacher retention (Knapp, 2003; Martin, 2006). Collaborative professional development does not mean that teachers must always be in agreement and never challenge their own thinking, rather various perspectives and respectful differences of opinion can help to improve overall quality (Little, 1993).

### *Embedding and Sustaining Professional Development*

Professional development is most effective when teacher learning is ongoing and ideas are continually reinforced (Desimone, 2009; Knapp, 2003; McAdamis, 2007; Pritchard & Marshall, 2002; Weathersby & Harkreader, 2000; P. Youngs, 2001). A weakness in many professional development practices such as the single workshop model is an inability to sustain those learned practices over time (Nielsen et al., 2008; Stichter, Lewis, Richter, Johnson, & Bradley, 2006; P. Youngs, 2001). Ingvarson, Meiers, and Beavis (2005) stressed the importance of teachers receiving ongoing feedback as part of the professional development process.

Pritchard and Marshall (2002) found that among the schools in their study with the most positive school culture, professional development objectives were integrated into the daily work of teachers and did not have to be incentivized with graduate hours or career ladder credits. Changes can include things as simple as maximizing the time spent in department and committee meetings around problems of practice and minimizing the mundane administrative tasks (Darling-Hammond & McLaughlin, 1995).

The relationship between professional development and student learning should not be thought of as linear, nor should professional development be viewed as an entity unto itself but rather as a critical component in the effort to increase student outcomes (Knight, Wiseman, & Cooner, 2000; Moller, Walsh, & Rappaport, 2000).

### *Responding to Student Needs*

The general consensus is that professional development should focus on high academic standards that will result in greater student outcomes (Knapp, 2003). Rather than getting tied down to specific practices or approaches, professional development can

shape the professional culture that allows practices to be fluid and to evolve with the needs of the students and the acquisition of new information (Darling-Hammond & McLaughlin, 1995). The most effective professional development is focused on student learning where teachers are actively engaged in reflecting on practice and assessing student needs (Ingvarson et al., 2005). These efforts can serve to improve lower performing schools by placing a stronger, more focused emphasis on student learning and student outcomes (Weathersby & Harkreader, 2000).

Teachers can shift their focus from framing the problem as the child's deficiency to a more positive approach focused on those characteristics upon which a student could build (Ford, 2008). In one study teachers used conversations around data to help them understand why students were underachieving. Teachers "transformed what had been an incidental, even superficial commentary about failing kids into more focused, data-based, and student-centered discussions" (Ford, 2008, p. 282).

Another study used focus groups in five high-poverty urban elementary schools to ask teachers about the professional development that accompanied the introduction of a new literacy program in their schools (Nielsen et al., 2008). The study sought a self-evaluation from teachers on their views of the impact of professional development. Teachers reported that they were not looking for one best practice to apply to all students, but rather that student needs, as determined through data analysis, was driving their instruction (Nielsen et al., 2008). Those schools that integrate professional development into their overall goals such as through their school improvement plan will have more success than schools where professional development is disconnected and fragmented (Nielsen et al., 2008; Pritchard & Marshall, 2002; P. Youngs, 2001).

Professional development can be guided by data which is used to inform practice including responding to documented instead of assumed needs, targeting interventions, and short-term and long-term planning (Danna, 2004). Data can be used beyond individual teachers' practices as a way for schools to determine a teaching staff's professional development needs (Hayes & Robnolt, 2007; Vescio et al., 2008). Furthermore, data analysis does not have to mean only external data (e.g., standardized tests), but can apply to internally-collected data as well (Hayes & Robnolt, 2007; Henning, 2006).

Hayes and Robnolt (2007) conducted a study in one elementary school that had implemented a Reading Excellence Act grant. Teachers took the lead on data analysis of pretest and posttest outcomes and were at the center of data-driven professional development. Student proficiency levels saw an 18% gain between the first and second year of the grant. The faculty collaboration exemplified how professional development goes beyond the teacher's individual practice to how schools can use data toward targeted professional development (Hayes & Robnolt, 2007). Too often it has historically been teachers' practice to assess out of duty without ever using the results in a formative way (Mokhtari, Rosemary, & Edwards, 2007). Mokhtari et al. (2007) stated "the systematic use of data to make instructional decisions requires leadership, training, and the development of a culture of data-driven decision making and accountability" (Mokhtari et al., 2007, p. 355). Teacher professional development data can be examined alongside student outcomes data to gain knowledge on which professional development strategies are having the most impact (Mokhtari et al., 2007).

There exists a need for more research connecting professional development to student learning but that research does not come without challenges (Guskey & Yoon, 2009; Knapp, 2003; Nielsen et al., 2008). For example, in their research on peer coaching, Stichter et al. (2006) were unable to design an experimental study because forcing teachers to use a peer-coach or not to use a peer-coach would be a threat to construct validity. On the other hand, allowing teachers to self-select whether or not they would like to have a peer coach or not would create bias. While not without challenges, the close examination of teacher learning through professional development can better inform school and district organizational change and policy initiatives related to teacher professional development (Gallucci, 2008; Nielsen et al., 2008).

#### Summary of Literature Review

An intuitive belief that good teaching affects student achievement is one thing, but to demonstrate relationships between teaching and student learning presents a number of challenges to researchers. While studies attempting to connect teacher credentials to student outcomes have been largely inconclusive, the research in school effectiveness offers the framework for examining teacher effectiveness beyond the characteristics of individual teachers. As Lubienski et al. (2008) noted, the key is not the attributes of the school itself but rather the processes taking place inside of schools that have the relationship to student learning. Teacher learning communities provide the foundation for effective professional development aimed at improving student learning.

When professional development and teacher learning communities are functioning effectively to improve student outcomes, they can be difficult to distinguish. Even separating them into two distinct categories for this literature review was

challenging. “Across the studies, learning opportunities, common goals, control, administrative support, and a shared, complex view of teaching reoccur as significant organizational conditions related to teacher learning, commitment, collaboration, and empowerment” (Richardson & Placier, 2001, p. 929).

Future research on teacher learning communities can go beyond the teachers’ perceptions of their effectiveness to correlations with documented student outcomes including growth in student achievement over time (Vescio et al., 2008; Wahlstrom & Louis, 2008). One aspect within the current body of literature worth noting is that studies of professional development which have examined the effect on student achievement often focus on the implementation of a specific program (e.g., Hayes & Robnolt, 2007; Nielsen et al., 2008). With this emphasis on specific interventions comes the possibility of making incorrect generalizations about the value of professional development on a broader scale.

In the next chapter, I describe a study using survey data on teacher professional development and characteristics of a positive teacher learning community and what relationship those data show with gains in student achievement in Missouri elementary and middle schools.

## Chapter Three

### METHODS

#### Introduction

This chapter begins with a review of the research questions posed by this study as well as statements of the expected outcomes. Then, I describe the data used, the variables in the study, and how those were analyzed. Finally, I discuss the validity and limitations of this study.

#### Research Questions

The first research question is included to provide descriptive statistics which give an overview of the data. Following that are the two additional research questions and the corresponding expectation of outcome, plus the rationale for each question.

- RQ1 - What are the variations in the presence of teacher learning communities and professional development as reported by teachers in Missouri elementary and middle schools?

The literature on teacher learning communities emphasizes professionalism and collective effort toward school improvement initiatives directed at increasing student achievement. The focus of teacher learning communities is on strengthening the quality of teaching in order to improve student outcomes (Lieberman & McLaughlin, 1992; Scribner & Hager, 2000; Vescio et al., 2008).

- RQ 2 - To what extent does the presence of a strong teacher learning community within a school correlate with growth in student achievement in elementary and middle schools?

- Expectation of outcome for RQ 2- Schools where teachers experience and contribute to a strong teacher learning community will have higher growth in student achievement than schools with a weaker teacher learning community.

A central theme which emerged in Chapter Two was that professional development aimed at improving student outcomes should be embedded in teacher practice.

Additionally, professional development initiatives which are more open and collaborative are more likely to situate their focus around student outcomes (Y. L. Goddard et al., 2007; Guskey & Yoon, 2009; Ingvarson et al., 2005; Weathersby & Harkreader, 2000).

- RQ 3 - To what extent does high quality professional development within a school correlate with growth in student achievement in elementary and middle schools?
- Expectation of Outcome for RQ 3 - Schools where teachers experience high quality professional development will have higher growth in student achievement than schools with lesser quality professional development.

One suggestion from the literature reviewed in Chapter Two was to have more studies which correlate teacher perceptions with student outcomes (Vescio et al., 2008).

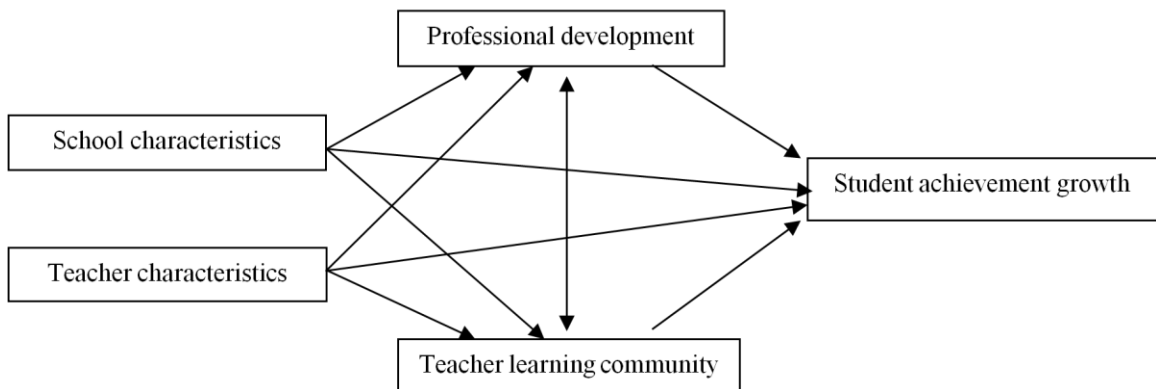
Specifically mentioned are studies which would note changes to student learning outcomes with the presence of a teacher learning community in the school. Also recommended were studies which would analyze teachers' perceptions of the professional culture within a school (Vescio et al., 2008).



## Conceptual Model

In the conceptual model for the study, the input-process-output function of SER can be seen, but the model also shows the complex, nonlinear relationships between the variables (see Figure 1). The existing conditions of school and teacher characteristics, the input variables, are shown on the far left. Those variables, while having a direct impact on growth in student achievement may also be affected by school-level interventions such as teacher learning communities and professional development. The process variables, professional development and teacher learning community, are shown in the middle of the diagram demonstrating their relationship as a potential mediating factor between inputs and outcomes. The line connecting them represents their strong connectedness. Finally, student achievement growth is shown as the output of these inputs and processes.

Figure 1. Conceptual Model



## Missouri School Improvement Program (MSIP) Data

This study is a secondary analysis of data collected through the Missouri School Improvement Program (MSIP) review process conducted by DESE for the academic year 2007-2008 including data from the Missouri Assessment Program (MAP) exam. The MSIP review is the process which determines accreditation of Missouri's public schools. When MSIP originated during the 1990-1991 academic year, Missouri school districts were divided into five cohorts each containing approximately 20% of the school districts and were designed to be representative of the demographic profile of all Missouri schools (K. Jamtgaard, personal communication, January 16, 2009).

Building-level data were provided by the Office of Social and Economic Data Analysis (OSED) on behalf of the DESE. As discussed in the conceptual framework presented in Chapter Two, when considering education as a function of input, process, and output, school and student characteristics, as well as teacher characteristics and credentials, function as inputs.

According to the SER conceptual framework, it is the process stage at which schools have the potential to affect the most change. The MSIP review contains teacher survey data which are used in this study as the measure of process, in this case, the presence of teacher learning communities and professional development.

The output is student learning, which in this study is measured by growth in student achievement. The primary output measure is the median growth percentile for each school based on the growth in MAP scores from 2007 to 2008. MAP status is used as an alternative output measure for comparison. The questionnaire is described in the following section, and the growth model is explained in further detail later in this chapter.

### *Advanced Questionnaire*

As part of the MSIP review, school districts must administer the Advanced Questionnaire (AQ) to teachers, parents, and students in third grade through twelfth grade. The AQ is typically administered in November or December during the academic year of the review (K. Jamtgaard, personal communication, February 13, 2009). In order to meet MSIP requirements, districts must have the following minimum response rates: teacher and student - 60%, parent - 25%. After each five-year cycle, adjustments have been made to improve the quality of data collected through the questionnaire and to reflect the most current literature on best practices. It is for this reason that previous MSIP cycle AQ responses cannot be compared to the responses in the 2007-2008 cycle. (K. Jamtgaard, personal communication, March 13, 2009).

Through data reduction, I use individual AQ items to create index variables for the constructs I chose to measure: teacher learning communities and professional development. DESE has developed index variables from the AQ items as well, but the index variables used for the MSIP did not precisely reflect the specific concepts and practices I was targeting with my research questions. However, many of the individual survey items provide information needed to answer the research questions. In the Research Design section that follows, I list the AQ items which represent characteristics of strong professional development and teacher learning communities. The AQ items are statements rated “strongly disagree,” “disagree,” “neutral,” “agree,” or “strongly agree” with responses coded from one to five respectively.

Given the constraints of time and expense, surveys are often used to capture information about teacher practices (Desimone, 2009). Researchers have noted

confidence in teacher self-reported survey data in part because teachers are not reluctant to speak openly about the value of professional development experiences (Ingvarson et al., 2005). Ingvarson et al. (2005) wrote that for teachers to report experiences with professional development or teacher learning communities does not have the same pressure toward social desirability that other areas of questioning might have.

### *Sample Selection*

The sample used in this study was the third cohort in the fourth cycle of MSIP. Because the districts included in the cohorts have shifted somewhat over the years, the sample was tested by OSEDA researchers for its representativeness of all Missouri schools based on the following demographic variables: locale type, percent minority, percent eligible for free or reduced lunch, and building enrollment (see Table 1). The variable used by OSEDA to analyze locale type is a slightly modified version of the Common Core of Data (CCD) metro- and urban-centric locale code categories (National Center for Education Statistics, n.d.). The Chi-square analysis revealed statistically significant differences between the sample of schools and the population of all Missouri schools in the percent minority and locale type (J. Hagar, personal communication, April 3, 2009).

In order to create a representative sample, schools with 25% or more minority students and which were “Large City or Mid-size City” or “Large Town or Small Town” were randomly selected for removal until the chi-square analysis no longer showed statistically significant results (J. Hagar, personal communication, April 3, 2009).

Table 1

*Comparison of Sample Schools to All Missouri Schools*

Variable	Sample schools	Missouri schools	Chi square
Locale type			$\chi^2 = 10.362,$ $p = .066$
Large/midsize city	17.9%	17.1%	
Urban fringe/large city	27.3%	24.6%	
Urban fringe/midsize city	1.0%	3.2%	
Large town or small town	7.1%	8.8%	
Rural metro	20.5%	17.7%	
Rural non-metro	26.3%	28.6%	
Percent minority			$\chi^2 = 4.818,$ $p = .186$
Less than 1%	12.0%	10.6%	
1% to 9.9%	37.7%	41.7%	
10% to 24.9%	19.8%	21.3%	
25% or more	30.5%	26.4%	
Enrollment			$\chi^2 = 1.32,$ $p = .517$
1-250	31.8%	33.2%	
251-500	43.8%	44.9%	
501+	24.4%	21.9%	
Free or reduced lunch			$\chi^2 = 1.078,$ $p = .583$
Less than 25%	17.9%	16.4%	
25% to 49%	33.1%	35.5%	
50% or more	49.0%	48.1%	

Note: n = 308.

In total nineteen schools were removed from the sample leaving 308 schools remaining in the sample. This sample did not include public charter schools because they do not participate in the MSIP review process and therefore do not complete the AQ. The 308 schools in the final sample represent 94% of the schools with grades four through eight in the third cohort of the fourth MSIP cycle. Because of the small size of the “urban fringe, midsize city” category, I redefined the locale categories using the current Common Core of Data locale codes which allowed me to divide the sample by four subcategories: urban, suburban, town, and rural (National Center for Education Statistics,

n.d.). This collapsed the two “urban fringe” categories into one and collapsed the two “rural” categories into one. Descriptive statistics are reported in Chapter Four.

The schools included in the sample all contain at least one grade in the fourth through eighth grade range, but the grade configurations vary widely (see Table 2). I used the Common Core of Data definitions of “elementary school” and “middle school” to divide the sample by grade level configuration. A third category, “other level,” is used to code any school which did not fit either of the other two definitions. This included the schools with grade level configurations of 6-12, 7-11, or 7-12.

Table 2

*Sample Schools by Lowest and Highest Grade Levels*

Grade levels	Frequency	Percent	Valid Percent	Cumulative Percent
K-4	13	4.2	4.2	4.2
K-5	80	26.0	26.0	30.2
K-6	80	26.0	26.0	56.2
K-8	21	6.8	6.8	63.0
K-12	1	.3	.3	63.3
1-5	1	.3	.3	63.6
2-5	1	.3	.3	64.0
3-5	5	1.6	1.6	65.6
3-6	1	.3	.3	65.9
4-5	1	.3	.3	66.2
4-6	3	1.0	1.0	67.2
5-6	2	.6	.6	67.9
5-8	7	2.3	2.3	70.1
6-6	1	.3	.3	70.5
6-7	2	.6	.6	71.1
6-8	39	12.7	12.7	83.8
6-12	4	1.3	1.3	85.1
7-8	12	3.9	3.9	89.0
7-11	2	.6	.6	89.6
7-12	30	9.7	9.7	99.4
8-9	2	.6	.6	100.0
Total	308	100.0	100.0	

### *Missouri Assessment Program (MAP) Exam*

Proficiency on state standardized exams is a common measure of student achievement in the NCLB era (Scott & Bagaka's, 2004). NCLB has emphasized math and reading in the lower grades and mandated annual testing in both of these subjects through eighth grade. Achievement status is reported as the percentage of students in a school scoring at the Proficient or Advanced level on the MAP exam in 2008 and for both communication arts and mathematics. The MAP is the statewide assessment given beginning in third grade. MAP scores in the same subject in consecutive years are available for Missouri elementary students in grades three through eight.

### *Growth Model*

In addition to status indicators, growth models have become more prevalent in evaluating the achievement of students. Different growth models may be used in various circumstances depending on the purpose for which they are being used (Hull, n.d.). The growth calculation used in this study was developed to replicate a model used by Damien Betebenner for the State of Colorado (Betebenner, 2008). Betebenner wrote that most value-added models do not provide enough information about student achievement growth because the focus is on teacher or school effects. In addition, Betebenner asserts that growth-to-standard models tend to favor students with higher achievement status because they are closer to the target standard to from the outset. Betebenner's model incorporates a normative reference, a percentile rank for each student's measured achievement growth over the designated period of time. Students are given a percentile rank by determining their progress in a given year relative to those students who had the same scale scores in the previous year (Betebenner, 2008). In OSEDA's adaptation of

this model for Missouri students, growth rates were calculated for individual students based on their scale scores on the MAP exam for 2007 and the amount of growth shown by their 2008 MAP scale scores. Then a median growth percentile was calculated for each student and aggregated to the school level. OSEDA reported a median growth percentile for each school in the MSIP cohort based on the median growth scores of all of the Missouri schools testing in MAP in 2007 and 2008.

Only recently with the implementation of the Missouri Student Identification System (MOSIS) has Missouri been able to track individual students' growth over time. In the past different cohorts of students were used to assess a school's progress (e.g., last year's third grade students' scale scores compared to this year's third grade students' scale scores). In the data set, communication arts and mathematics were calculated separately so that each school has two median growth percentiles.

### Research Design

#### *Control Variables*

The first step in analyzing the data was to provide descriptive statistics for the teacher and school variables used as controls. Teacher controls include building means for salary, years of experience, and percentage with a masters degree or higher. These teacher characteristics are often used in "production function" studies of teacher effectiveness as was noted in Chapter Two. In SER, these variables are inputs and function as controls for this study.

School controls include school level, locale type, percentage of minority students, percentage of students eligible for free or reduced lunch, and school enrollment. Dummy variables were created for the four locale categories as well as for the three school levels.



The literature has consistently shown the strong influence of these demographic and student-level characteristics (Graham, 1993; Land & Legters, 2002; Marzano, 2003).

### *Index Variables*

The items selected from the AQ to create the index variables represent the central elements of effective teacher learning communities and professional development. Traits of effective teacher learning communities represented through AQ items include the presence of a professional atmosphere that sets norms of high expectations for both teachers and students. Schools with strong teacher learning communities are open, collaborative environments with a high level of trust and respect among teachers and where teachers are empowered to be leaders in their school. AQ items which are indicative of practice centered on student outcomes are also included.

My objective in measuring professional development was to determine to what extent it changed teachers' practice. The literature presented in Chapter Two indicated that effective professional development is not a series of isolated activities but rather an integrated aspect of practice focusing on student outcomes. Weathersby & Harkreader (2000) noted their findings on a study of professional development in high-achieving and low-achieving schools. "In lower achieving schools, staff development was considered a function with little connection to classroom results; in higher achieving schools, it was more an active collegial effort to improve student performance" (p.9). The objectives for professional development noted in the study referenced effect on school goals, use in the classroom, and impact on student outcomes (Weathersby & Harkreader, 2000).

The AQ items asked teachers about professional development as it relates to their Comprehensive School Improvement Plan (CSIP) and the effect of professional development on their practice and the relationship to improvement of student outcomes. Data collected through other instruments, such as the NELS teacher questionnaire, focus on quantifying behavior (e.g., the amount of time spent in professional development activities, the number of professional development activities attended on particular topics, etc). These data make it difficult to ascertain whether or not professional development is truly embedded and ongoing, and the style of the questions reflects a perception of professional development that fits more with the old paradigm of professional development as stand-alone workshops (National Center for Education Statistics, 1990).

In the Schools and Staffing Survey (SASS) public school teacher questionnaire, an instrument used to collect national data on teacher behaviors and widely used in research, I found questions which were more similar to the types of questions asked on the AQ. In addition to asking the amount of time teachers spent on various activities, the questionnaire asked teachers to rate the usefulness of those activities to their teaching (National Center for Education Statistics, 2007). Several items on the AQ captured similar information from teachers as the SASS, such as in the following example (National Center for Education Statistics, 2007):

SASS - There is a great deal of cooperative effort among the staff members.

AQ - Teachers are routinely engaged in collaborative problem solving around instructional issues.

Based on best practices in teacher learning communities and professional development that emerged from the literature presented in Chapter Two, I selected the following AQ items to include in the data reduction.

- Teachers in our school use effective practices to keep all students actively engaged in learning.
- Teachers are routinely engaged in collaborative problem solving around instructional issues.
- My school administers assessments throughout the school year that are used to guide instruction.
- In our school teachers are encouraged to be instructional leaders.
- I have the skills necessary to meet the needs of all learners in my classroom.
- I believe I can positively impact student performance.
- Our professional development improves student achievement.
- The professional development activities I attend are related to my district's Comprehensive School Improvement Plan.
- I have received professional development on differentiating instruction for learners.
- All staff in our school hold high expectations for student learning.
- My professional development has improved the way I teach.
- There is systematic collaboration across subject areas in our building.
- Norms for conduct that foster collegiality and professionalism among professional staff and administrators are clear and routinely followed.

- Teachers in my school are routinely involved in formulating school-wide decisions and policies.
- My school's principal fosters shared beliefs and a sense of community and cooperation.
- Our principal promotes innovation.
- There are open channels of communication among students, staff, and administrators.

Two AQ items were used in the MSIP index variable for professional development which I chose to exclude. Those items were specific to technology use and special education and did not support my research questions, nor did the literature specifically reference these two areas of emphasis. Because my focus is more broadly on professional development as it relates to school improvement, specific content area questions did not apply.

The AQ items selected for inclusion in the index variables represent the principles of teacher learning communities and professional development reflected in research literature and the themes are consistent with questions on the Schools and Staffing Survey.

#### *Data Reduction and Reliability Testing*

For the eighteen AQ items selected, I performed a principal components analysis to determine the number of factors these items represent. Principal components analysis is a common standard for data reduction (see for example Atkinson, 2007; Clark, Antony, Beck, Swinson, & Steer, 2005; Spada, Barkaoui, Peters, So, & Valeo, 2009). The criterion I used to determine the number of factors to include was Eigenvalues greater

than one. Varimax rotation further isolated the two distinct variables that emerged from the data.

Once the index variables were created, I conducted an item analysis to test these items for their internal reliability, thereby reinforcing the selection of these items as measures for the identified index variables. Descriptive statistics for the index variables and the individual questionnaire items which make up the index variables are presented in Chapter Four along with the correlation matrix.

### Data Analysis

Effective process variables should have a predictive value for student outputs (Scheerens, 2000). With the data from all of the variables, I used different regression models to test combinations of variables for changes in relationships to student outcomes. In the following regression equation,  $X$  is a vector of control variables thought to relate to student growth including teacher controls (years of experience, highest degree earned, and salary) and school controls (locale, percentage of students eligible for free or reduced lunch, percentage of minority students, and school enrollment).  $LC$  is the index variable for teacher learning community, and  $PD$  is the index variable for professional development.

$$Student\ growth_i = \beta_0 + \beta_1 LC_i + \beta X_i + \varepsilon_i$$

$$Student\ growth_i = \beta_0 + \beta_1 PD_i + \beta X_i + \varepsilon_i$$

Alternate groupings of variables were introduced into the regression models.

Model 1 – teacher learning community

Model 2 – vector of school variables and teacher learning community

Model 3 – vector of teacher variables and teacher learning community

Model 4 – teacher variables, school variables, and teacher learning community

The four models were also run using the professional development index variable as an independent variable in place of teacher learning community as shown in the second equation. Each model was run twice: once with communication arts growth as the dependent variable and once with mathematics growth as the dependent variable.

#### Validity

A challenge to studying the effect of processes on student outcomes is determining the best way in which to measure those processes. The most common measurements are by interview, by observation, and by survey (Brand, Felner, Seitsinger, Burns, & Bolton, 2008; Heck, 2000; Johnson & Stevens, 2006; Wheelan & Kesselring, 2005). Limitations exist with any of these instruments. With interviews and observations, it is the inability to collect a large, representative sample (Brand et al., 2008). In the absence of hundreds of direct observations or interviews, the AQ provides insight into those practices and beliefs held by teachers in public schools throughout the state. Within this sample, the mean teacher response rate was 80.17%. The AQ data provided a much more comprehensive perspective of teacher processes in Missouri schools than any survey or other instrument available to me.

## Limitations of Study

Chapter One noted that this study is limited to analysis of the process variables included in the AQ. The AQ contains several items which represent best practices in teacher learning communities and professional development. However, the index variable for professional development created from the AQ items which DESE uses in the accreditation review process did not meet the needs of my precise research questions. Furthermore, the AQ did not have an index variable to represent teacher learning communities so I reviewed each item on the AQ to determine whether or not it reflected the principles of a strong teacher learning community.

In addition, while data on student growth may reveal more about the relationship between school-level processes and student outcomes than status measures, the growth calculation in this study is not the only method for calculating student achievement growth. Other representations of growth could yield varying results. Betebenner (2008) describes the growth rate percentile design as a compromise between most value-added growth models and growth-to-standard models (i.e., NCLB-inspired models which determine if a student is on track to becoming proficient within a particular timeframe).

Finally, the complexity and interconnectedness of independent variables affecting student outcomes did not make it prudent to report causal effects. The findings of this study identified relationships between variables, but causation cannot be definitively determined.

## Chapter Summary

This study is among the first to use achievement growth measurements from student-level data collected through the Missouri Student Information System (MOSIS)

and the only study to date to use student achievement growth in conjunction with data on professional practice collected through the MSIP AQ. The methods chosen for this study present a thorough profile of the variables involved as well as an opportunity to begin to draw connections between teacher learning communities and professional development within a school and growth in student achievement.



## Chapter Four

### ANALYSIS AND RESULTS

#### Introduction

This chapter begins with a presentation of the descriptive data to provide the foundation for the analyses of the research questions. Then I describe the process for creating the index variables for teacher learning communities and professional development using selected AQ items. The rotated factor matrix and the correlation matrix are included. All of this information is included to address the first research question:

- What are the variations in the presence of teacher learning communities and professional development as reported by teachers in Missouri elementary and middle schools?

Using the regression models described in Chapter Three, I proceed to address the second and third research questions:

- To what extent does the presence of a strong teacher learning community within a school correlate with growth in student achievement in elementary and middle schools?
- To what extent does high quality professional development within a school correlate with growth in student achievement in elementary and middle schools?

Finally, I address the Expectations of Outcomes for the second and third research questions and whether the analysis of the data supported those expectations. The conclusion to this chapter serves as a transition to the final chapter, a discussion of the findings.

## Findings of Research Question One

### *School and Teacher Control Variables*

Descriptive data on school and student demographics were presented in Chapter Three (see Table 1). In this chapter, statistics on school enrollment, percentage of students eligible for free or reduced lunch, and percentage of minority students are discussed again without categorical groupings used in the Chi Square analysis.

Descriptive statistics for the locale and school level are discussed as well.

Table 3

#### *Sample School Characteristics*

	Mean	Standard deviation	Minimum	Maximum
Enrollment	369.86	210.63	39.00	1,079.00
Percent FRL	49.67	24.26	4.06	97.11
Percent minority	25.62	33.17	0.00	100.00
Locale				
Urban	0.18	0.38	0	1
Suburban	0.26	0.44	0	1
Town	0.09	0.29	0	1
Rural	0.47	0.50	0	1
School level				
Elementary	0.66	0.48	0	1
Middle	0.22	0.42	0	1
Other	0.12	0.33	0	1

*Note:* n = 308

The sample of schools is very diverse in every respect (see Table 3). First, the range of percentage of minority students, 0 to 100%, is the most extreme. Next, the percentage of students eligible for free or reduced lunch has nearly the same breadth of range, from 4% to 97%. In addition, the enrollment in the schools ranges from 39 students to over 1,000 students. Finally, the areas in which these schools are located range from large, densely-populated urban centers to small, remote rural communities.

Missouri schools span the full continuum from very wealthy schools to very poor, from racially diverse schools to racially homogenous schools. Given the amount of influence of these characteristics noted in the research literature, it is important to acknowledge the scope of the diversity in Missouri schools.

In addition, descriptive statistics for the teacher control variables which are mean salary, mean years of experience, and percentage with a master's degree or higher reveal the variation in teacher characteristics across the sample of schools (see Table 4). For example, some of the schools have no teachers with master's degrees while others have 100 percent of teachers with master's degrees. Furthermore, the range in salary means is striking. In some schools, the mean salary for all teachers in the schools is only \$25,000; whereas, in other schools the mean salary is more than \$66,000. Because education level is one determining factor in most teacher salary schedules, it would not be surprising for schools with more teachers with advanced degrees to have a higher mean salary than schools with fewer to no teachers with advanced degrees. Years of experience is the other variable used in most salary schedules. Within the sample schools, there is more than fifteen years difference between the lowest mean years of teaching experience and the highest mean years of teaching experience. However, education level and experience alone are not likely to account for the extreme range in schools' mean teacher salaries. Given the variations in locale types across Missouri, differences in cost of living and property tax base would logically account for some of the range that is seen.

Table 4

*Sample Teacher Characteristics*

	Mean	Standard deviation	Minimum	Maximum
Years of experience	12.5	3.08	4.89	21.37
Percent with masters' degree	48.7	20.76	0	100
Salary (x 1,000)	\$43.5	\$8.8	\$25.1	\$66.2

*Note:* n = 308

The literature reviewed in Chapter Two noted that variables outside of the school's control account for a large share of the variation in student outcomes. That knowledge along with the diversity within the sample of schools reinforced the decision to control for these variables.

*Dependent Variables*

In addition to the diversity of teacher and student demographics within the sample, there is also a range a wide range of student outcomes. Because it is acknowledged that student demographic variables have a large influence on status measures of student achievement, it is a challenge to isolate the role of the school. Student achievement growth is the primary outcome variable for this study because implied within my expectation of outcomes is that growth may not be as readily determined by preexisting variables as are status measures of achievement. However, status measures can serve as an alternative dependent variable to see how status measures are affected by the independent variables differently than growth in student achievement. This is further discussed in the following sections comparing achievement growth to achievement status.

Within the sample of schools, there is nearly an 81% difference between the school with the lowest percentage of students scoring proficient or advanced in

mathematics and the school with the highest percentage of students scoring proficient or advanced in mathematics. The range in status scores further illustrates the rationale for using the growth measure of student outcomes to determine the learning within a school (See Table 5).

Table 5

*Sample School Achievement Data*

	Mean	Standard deviation	Minimum	Maximum
Status <sup>a</sup>				
MAP mathematics	43.21	16.98	0.70	81.46
MAP communication arts	42.56	14.61	5.88	83.27
Growth <sup>b</sup>				
MAP mathematics	48.44	12.78	12	88
MAP communication arts	49.31	9.84	19	75

Note: n = 308.

<sup>a</sup>Percentage of students who scored in the categories of proficient or advanced.

<sup>b</sup>School growth percentile.

All Missouri schools which include grades within the grade span of four through eight have a calculated growth percentile for 2008. The percentile ranks for the approximately 20% of that population of schools making up the 2007-2008 MSIP cohort range from the 12<sup>th</sup> percentile to the 88<sup>th</sup> percentile in mathematics growth and the 19<sup>th</sup> percentile to the 75<sup>th</sup> percentile in communication arts growth.

Correlations between the dependent variables reveal a strong positive relationship between communication arts status and mathematics status. However, the correlation between communication arts growth and mathematics growth, while also positive, is only moderately strong (see Table 6). With such a strong correlation between the two status measures, it follows that knowing a student's score on communication arts or

mathematics would provide a strong indication of the other status measure. On the other hand, the amount of growth that a student makes in one content area is not a strong indicator of the amount of growth in the other content area. Because there is not a strong correlation between the growth measures, communication arts growth and mathematics growth are separate dependent variables throughout this study.

Table 6

*Correlations Among Dependent Variables*

	Communication Arts Status	Mathematics Status	Communication Arts Growth	Mathematics Growth
Communication Arts Status	--	.918**	.521**	.455**
Mathematics Status		--	.467**	.538**
Communication Arts Growth			--	.621**
Mathematics Growth				--

Note: n = 307; \*\*  $p < .01$ .

Finally, the relationships between communication arts status and communication arts growth, as well as mathematics status and mathematics growth, are positive but moderate.

*Results of Data Reduction*

*Descriptive Statistics*

As described in Chapter Three, eighteen items were selected from the MSIP AQ which captured elements present in quality teacher learning communities and professional development. The items represent the characteristics of learning communities and professional development discussed in Chapter Two. School mean scores from the AQ were generally around 4.0 for all items (see Table 7). For three of the items (ISP, PDA, and FCC), at least one school had a mean of 5.0. Those items addressed teacher efficacy, teachers' beliefs in the impact of professional development on student

achievement, and principal leadership that encourages a sense of community. Ten other items had a maximum school mean of 4.9. Only four questions (SDP, ERT, PIN, and OCC) had at least one school with a minimum building mean of less than 2.5. Of those four questions, two were related to principal leadership, one addressed teacher decision making authority, and one stressed open channels of communication in the school.

Table 7

*AQ Items Included in Index Variables*

	Abbreviation	Mean	Standard deviation	Minimum	Maximum
Teachers in our school use effective practices to keep all students actively engaged in learning.	EPL	4.2	0.3	3.3	4.9
Teachers are routinely engaged in collaborative problem solving around instructional issues.	CPS	4.0	0.4	2.8	4.7
My school administers assessments throughout the school year that are used to guide instruction.	AGI	4.1	0.3	3.0	4.9
In our school teachers are encouraged to be instructional leaders.	TIL	4.3	0.3	3.3	4.9
I have the skills necessary to meet the needs of all learners in my classroom.	MNL	4.3	0.2	3.6	4.8
I believe I can positively impact student performance.	ISP	4.6	0.2	4.1	5.0
Our professional development improves student achievement.	PDA	4.0	0.4	2.9	5.0
The professional development activities I attend are related to my district's Comprehensive School Improvement Plan.	PDC	4.3	0.3	3.3	4.9
I have received professional development on differentiating instruction for learners.	PDI	4.1	0.4	3.1	4.9
All staff in our school hold high expectations for student learning.	HEL	4.2	0.4	2.9	4.9
My professional development has improved the way I teach.	PDT	4.1	0.3	3.3	4.8
There is systematic collaboration across subject areas in our building.	CAS	3.8	0.4	2.7	4.8



*Table 7 Continued*

Norms for conduct that foster collegiality and professionalism among professional staff and administrators are clear and routinely followed.	CAP	4.0	0.4	2.7	4.9
Teachers in my school are routinely involved in formulating school-wide decisions and policies.	SDP	3.8	0.5	2.2	4.7
My school's principal fosters shared beliefs and a sense of community and cooperation.	FCC	4.2	0.5	2.5	5.0
My school's principal systematically engages faculty and staff in discussions about current research on teaching and learning.	ERT	4.0	0.5	2.3	4.9
Our principal promotes innovation.	PIN	4.1	0.4	2.3	4.9
There are open channels of communication among students, staff, and administrators.	OCC	4.1	0.4	2.4	4.9

Note. Items are rated on a 5-point scale from 1 "strongly disagree" to 5 "strongly agree."

### *Principal Components Analysis*

The principal components analysis conducted on the eighteen AQ items resulted in two distinct factors (see Table 8). My expectations as to the factor with which the items would load were correct with the exception of three items. Two items dealing with teacher efficacy (MNL and ISP) loaded with professional development rather than teacher learning communities, and one item which addressed teacher expectations of student learning (HEL) loaded with professional development rather than teacher learning communities.

Table 8

#### *AQ Item Rotated Component Matrix*

Item Abbreviation	Expectation	Factor 1	Factor 2
EPL	PD	.525	.625
CPS	LC	.724	.545
AGI	LC	.583	.376
TIL	LC	.701	.563
MNL	LC	.293	.625
ISP	LC	.344	.669
PDA	PD	.453	.779
PDC	PD	.305	.796
PDI	PD	.267	.731
HEL	LC	.542	.606
PDT	PD	.273	.810
CAS	PD	.453	.673
CAP	LC	.743	.464
SDP	LC	.798	.341
FCC	LC	.870	.266
ERT	LC	.821	.290
PIN	LC	.820	.340
OCC	LC	.791	.454

*Note.* LC = teacher learning community; PD = professional development. For an explanation of item abbreviations, see Table 7.

However, on the question of teacher expectations for student learning (HEL), the item loaded nearly equally highly on both factors. Because of the shared characteristics

between quality professional development and teacher learning communities, it is not surprising that some items (e.g., EPL, CPS, and TIL) loaded highly on both factors.

*Teacher Learning Community Item Correlation*

Correlations among items in the teacher learning community index variable are all moderate to strong and positive (see Table 9). The strongest correlations (>.8) are between open channels of communication (OCC) in the school and four variables which reflect teacher leadership and a culture of professionalism (TIL, CAP, FCC, and PIN). The other strong correlation relates to teachers as collaborative problem solvers and decisions makers in their school (SDP and CPS).

Table 9

*Correlations Among Items in Learning Community Index Variable*

Item	CPS	AGI	TIL	CAP	SDP	FCC	ERT	PIN	OCC
CPS	--	.671**	.798**	.738**	.840**	.694**	.747**	.719**	.750**
AGI		--	.539**	.487**	.581**	.494**	.630**	.504**	.528**
TIL			--	.783**	.724**	.768**	.676**	.789**	.808**
CAP				--	.713**	.779**	.657**	.717**	.852**
SDP					--	.723**	.715**	.686**	.773**
FCC						--	.761**	.860**	.860**
ERT							--	.782**	.693**
PIN								--	.806**
OCC									--

Note: n = 308; \*\*p < .01. For explanation of item abbreviations, see Table 7. Cronbach's Alpha = .955, n = 9

*Professional Development Item Correlations*

The correlations among items in the professional development index variable are also all moderate to strong and positive (see Table 10). The two items which I did not originally expect to load with professional development (MNL and ISP) have the weakest correlations with the other items. The items with the strongest correlations all relate to the

teachers' perceptions of the quality of their professional development and how it relates to improvement in their teaching, student achievement, and the school's goals.

Table 10

*Correlations Among Items in Professional Development Index Variable*

Item	EPL	MNL	ISP	PDA	PDC	PDI	HEL	PDT	CAS
EPL	--	.504**	.580**	.651**	.561**	.491**	.831**	.570**	.729**
MNL		--	.592**	.524**	.455**	.523**	.475**	.468**	.511**
ISP			--	.576**	.584**	.488**	.555**	.535**	.522**
PDA				--	.812**	.658**	.686**	.815**	.691**
PDC					--	.628**	.548**	.753**	.613**
PDI						--	.486**	.638**	.557**
HEL							--	.579**	.687**
PDT								--	.587**
CAS									--

Note: n = 306; \*\*  $p < .01$ . For explanation of item abbreviations, see Table 7. Cronbach's Alpha = .924; n = 9

The examination of the relationships between items which measure teacher learning community and professional development demonstrate the interdependence and interrelatedness of these principles which define strong teacher learning communities and quality professional development.

*Correlations among Independent Variables*

Finally, I ran a correlation on all independent variables to assess relationships between variables and to check for any potential problems with multicollinearity (see Table 11). First, correlations between teacher learning communities and professional development and all of the control variables are weak and only about half are significant. This suggests that there is not a problem with multicollinearity between the two index variables and the controls. In addition, I checked the variance inflation factor (VIF) and did not find any items of concern.

Table 11

*Correlations Among School Characteristics, Teacher Characteristics, and Index Variables*

	Enroll	FRL	Min	Urban	Suburb	Town	Rural	Elem	Middle	Oth Lev	MA+	Salary	Yrs Exp	LC	PD
Enroll	--	-.307**	.092	.051	.383**	.103	-.436**	-.109	.288**	-.209**	.438**	.489**	.021	.037	-.112**
FRL		--	.656**	.387**	-.182**	-.016	-.127*	.148**	-.154**	-.019	-.339**	-.024	.224**	-.222**	-.229**
Min			--	.591**	.237**	-.122*	-.591**	.145*	-.056	-.139*	.073	.578**	.426**	-.098	-.336**
Urban				--	0	0	0	.141*	-.108	-.068	.031	.330**	.334**	.010	-.279**
Suburb					--	0	0	.071	.090	-.219**	.498**	.626**	.059	.136*	.007
Town						--	0	.164**	.227**	-.051	-.032	-.135*	.014	-.091	-.030
Rural							--	-.075	-.129*	.274**	-.440**	-.724**	-.316**	-.075	.227**
Elem								--	0	0	.024	.070	.073	.112	.195**
Middle									--	0	.150**	.122*	-.062	-.055	-.097
OthLev										--	-.227**	-.259**	-.027	-.092	-.161**
MA+											--	.646**	.279**	.148**	.125*
Salary												--	.510**	.117*	-.117*
YrsExp													--	-.062	-.089
LC														--	0 <sup>a</sup>
PD															--

Note: n = 308; \*\*  $p < .01$ ; \*  $p < .05$ .

Enroll = total school enrollment; FRL = percentage of students eligible for free or reduced lunch; Min = percentage of minority students; Urban = urban locale; Suburb = suburban locale; Town = town locale; Rural = rural locale; Elem = elementary school; Middle = middle school; Oth Lev = other school level; MA+ = percentage of teachers with a master's degree or higher; Salary = mean teacher salary; Yrs Exp = mean years of teaching experience; PD = professional development; LC = teacher learning community.

<sup>a</sup>Correlation is 0 because index variables were created from the rotated component matrix.

### *School Characteristics and Learning Community and Professional Development*

In urban schools, schools with a higher percentage of minority students, and schools with a higher percentage of students eligible for free or reduced lunch, there is a negative correlation with teachers' ratings of the quality of their professional development. In schools with a high percentage of students eligible for free or reduced lunch, there is also a negative correlation with the strength of the teacher learning community. In regards to other locales, teachers in rural schools were more likely to have positive perceptions of the quality of their professional development as shown by a weak but positive correlation with professional development.

Teachers in different school levels had varying perceptions of the strength of the learning community within their school as there are no significant correlations between teacher learning communities and school level. However, teachers in elementary schools were more likely to indicate their schools had high quality professional development than were teachers at other levels. The correlation between professional development and elementary schools is weak but positive whereas the correlation between other levels of schools is weak and negative.

### *Teacher Characteristics and Learning Community and Professional Development*

When examining teacher characteristics, teachers with more education were slightly more likely to give positive ratings to the quality of the professional development and the strength of the learning community in their school. Teacher learning communities and professional development both have weak but positive correlation with teachers' level of education.

Interestingly, teachers with higher salaries were more likely to have a positive perception of the learning community in their school, but they were less likely to have a positive perception of professional development. Teacher salary has a weak, negative correlation with professional development, but a weak, positive correlation with teacher learning communities.

#### *Correlations Between Control Variables*

As for correlations among the control variables, poverty is more prevalent in minority populations in urban areas than in other locales. There is a moderately strong, positive correlation between the percentage of students eligible for free or reduced lunch and the percentage of minority students. Also, there is a moderately strong, positive correlation between percentage of minority students and urban locale. An equally strong, negative, significant correlation exists between rural locale and percentage of minority students. Somewhat surprising is a weak, negative correlation between rural locale and percentage of students eligible for free or reduced lunch.

Finally, higher teacher salaries and level of education are most common in suburban schools. The moderately strong, positive significant correlations between teacher salary and school enrollment, as well as teacher salary and percentage of minority students, could easily be attributed to locale and the cost of living in urban and suburban areas which would result in higher salaries. This would be consistent with the strong, negative, significant correlation between rural locale and salary, and also considering the negative relationship between rural locale and school enrollment and percentage of minority students.

## Findings for Research Question Two

Research Question Two asked: To what extent does high quality professional development within a school correlate with growth in student achievement in elementary and middle schools?

### *Communication Arts and Teacher Learning Community*

Learning community alone or included in a model with the teacher control variables has a positive relationship with communication arts growth. (See Table 12. The coefficients shown are the  $\beta$  coefficients, and t-values are listed in parentheses. For the locale dummy variable, urban is the reference group. For the school level dummy variable, elementary is the reference group.) Simply interpreted, the models show that teachers who indicate there is a strong learning community in their school are more likely to see greater growth in student achievement in communication arts independent of salary, level of education, or years of experience. However, when school level variables are introduced into the equation (Models 2 and 4), the  $\beta$  coefficient for learning community is greatly reduced and significance is lost indicating an omitted variable bias in Models 1 and 3. As the literature in Chapter Two explained, student and school characteristics carry considerable weight in student outcomes. Model 4 predicted approximately 22% of the growth in communication arts achievement, and teachers' perceptions of the presence of a high quality learning community did not show a strong relationship with growth in communication arts achievement.



Table 12

*Regression of Communication Arts Growth on Learning Community*

	Model 1	Model 2	Model 3	Model 4
LC	.160 (2.285)**	.065 (1.171)	.141 (2.474)*	.049 (.892)
School				
Suburb		-.099 (-1.283)		-.180 (-2.248)*
Town		-.072 (-.942)		.009 (.111)
Rural		-.204 (-1.808)		-.068 (-.567)
Middle		-.041 (-.711)		-.064 (-1.126)
Other Level		-.096 (-1.716)		-.076 (-1.354)
Enroll		-.176 (-2.641)**		-.241 (-3.510)**
FRL		-.230 (-2.565)*		-.106 (-1.103)
Minority		-.308 (-2.744)**		-.452 (-3.553)**
Teacher				
Yrs Exp			-.091 (-1.385)	-.139 (-1.955)*
Salary			-.195 (-2.368)*	.407 (2.905)**
MA+			.246 (3.354)**	.033 (.420)
R <sup>2</sup>	.026	.192	.076	.223
N	303	303	303	303

\*\* $p < .01$ ; \* $p < .05$ . T-values are listed in parentheses. Enroll = total school enrollment; FRL = percentage of students eligible for free or reduced lunch; Minority = percentage of minority students; Suburb = suburban locale; Town = town locale; Rural = rural locale; Elem = elementary school; Middle = middle school; Other Level = other school level; MA+ = percentage of teachers with a master's degree or higher; Salary = mean teacher salary; Yrs Exp = mean years of teaching experience; PD = professional development; LC = teacher learning community. For locale, urban is the reference group. For grade levels, elementary is the reference group.

*Mathematics and Teacher Learning Community*

When mathematics growth is the dependent variable, the coefficients follow the same pattern as with communication arts growth (see Table 13).

Table 13

*Regression of Mathematics Growth on Learning Community*

	Model 1	Model 2	Model 3	Model 4
LC	.129 (2.258)*	.025 (.458)	.110 (1.194)*	.026 (.484)
School				
Suburb		-.018 (-.241)		-.047 (-.605)
Town		.044 (.595)		.080 (1.051)
Rural		-.109 (-.994)		-.013 (-.113)
Middle		-.075 (-1.353)		-.078 (1.420)
Other Level		-.248 (-4.573)**		-.232 (-4.308)**
Enroll		-.136 (-2.116)*		-.155 (-2.342)*
FRL		-.205 (-2.368)*		-.119 (-1.277)
Minority		-.331 (-3.044)**		-.363 (-2.957)**
Teacher				
Yrs Exp			.013 (.203)	.034 (.492)
Salary			-.378 (-4.751)**	.034 (.248)
MA+			.429 (6.048)**	.199 (2.624)**
R <sup>2</sup>	.017	.246	.133	.276
N	302	302	302	302

\*\* $p < .01$ ; \* $p < .05$ . T-values are listed in parentheses. For locale, the reference group is urban. For school level, the reference group is elementary. For an explanation of abbreviations, see Table 12.

The coefficient for learning community in Model 4 (.026) is lower than it was in Model 4 for communication arts growth (.049); however, the R<sup>2</sup> for Model 4 on mathematics growth is slightly higher (.276). As with communication arts growth, learning community does not show a significant relationship with mathematics growth in the model with all controls, and school level variables account for the largest fluctuations in the learning community coefficient and the R<sup>2</sup>.

### *Expectation of Outcome for Research Question Two*

These findings do not support the expectation of outcome for Research Question Two: Schools where teachers experience and contribute to a strong teacher learning community will have higher growth in student achievement than schools with weaker teacher learning communities. From the results it is not clear that such a relationship exists independent from the control variables.

### Findings for Research Question Three

The results of the analysis to answer Research Question Three are similar to the results obtained in Research Question Two. Research Question Three asked: To what extent does high quality professional development within a school correlate with growth in student achievement in elementary and middle schools?

### *Communication Arts and Professional Development*

Considered in a simple regression model, it would appear that professional development is a significant predictor of growth in communication arts achievement; however, again it is also clear that Models 1 and 3 are weakened by omitted variable bias. The introduction of the school control variables reduced the apparent effect of professional development that was seen in Models 1 and 3 (see Table 14). With the introduction of school level controls, professional development is no longer a significant predictor and the strength of the coefficient is greatly reduced.

Table 14

*Regression of Communications Growth on Professional Development*

	Model 1	Model 2	Model 3	Model 4
PD	.200 (3.541)**	.057 (.965)	.149 (2.568)*	.030 (.506)
School				
Suburb		-.110 (-1.416)		-.187 (-2.331)*
Town		-.088 (-1.162)		-.002 (-.031)
Rural		-.236 (-2.104)*		-.091 (-.755)
Middle		-.038 (-.652)		-.064 (-1.115)
Other Level		-.087 (-1.505)		-.072 (-1.259)
Enroll		-.177 (-2.665)**		-.244 (-3.556)**
FRL		-.239 (-2.692)**		-.116 (-1.207)
Minority		-.305 (-2.706)**		-.453 (-3.536)**
Teacher				
Yrs Exp			-.114 (-1.759)	-.145 (-2.052)*
Salary			-.125 (-1.479)	.414 (2.950)**
MA+			.210 (2.765)**	.027 (.335)
R <sup>2</sup>	.040	.191	.077	.222
N	303	303	303	303

\*\* $p < .01$ ; \* $p < .05$ . T-values are listed in parentheses. For locale, the reference group is urban. For school level, the reference group is elementary. For an explanation of abbreviations, see Table 12.

*Mathematics and Professional Development*

When mathematics growth is regressed on professional development, the same pattern emerges that was seen in communication arts growth and professional development. However, in Model 4, not only is the coefficient for professional development greatly reduced, the sign of the professional development coefficient goes from positive to negative (see Table 15).

Table 15

*Regression of Mathematics Growth on Professional Development*

	Model 1	Model 2	Model 3	Model 4
PD	.202 (3.579)**	.008 (.137)	.112 (1.987)*	-.032 (-.563)
School				
Suburb		-.020 (-.267)		-.046 (-.589)
Town		.039 (.528)		.080 (1.049)
Rural		-.118 (-1.088)		-.010 (-.084)
Middle		-.076 (-1.357)		-.085 (-1.541)
Other Level		-.249 (-4.445)**		-.242 (-4.376)**
Enroll		-.138 (-2.146)*		-.164 (-2.474)*
FRL		-.210 (-2.440)*		-.122 (-1.321)
Minority		-.333 (-3.051)**		-.379 (-3.067)
Teacher				
Yrs Exp			-.006 (-.090)	.030 (.446)
Salary			-.324 (-3.971)**	.044 (.328)
MA+			.403 (5.498)**	.204 (2.668)**
R <sup>2</sup>	.041	.245	.133	.276
N	302	302	302	302

\*\* $p < .01$ ; \* $p < .05$ . T-values are listed in parentheses. For locale, the reference group is urban. For school level, the reference group is elementary. For an explanation of abbreviations, see Table 12.

*Expectation of Outcome for Research Question Three*

As with teacher learning communities, professional development did not meet the expectation of outcome for Research Question Three: Schools where teachers experience high quality professional development will have higher growth in student achievement than schools with lesser quality professional development.

## Learning Community and Professional Development Considered Together

The literature on teacher learning communities and professional development describes the strong connection between the two concepts. Where the characteristics of one are found, so is the likelihood that the other will be. On that premise, I ran an additional model which used both teacher learning community and professional development and all controls. When the index variables for learning community and professional development were used in conjunction, they still did not result in significant coefficients for either variable (see Table 16, Models 2 and 4). The  $R^2$  of Models 2 and 4 are not substantially different than when learning community and professional development were added into the models individually (see Tables 12-15).

Before drawing conclusions about teacher learning communities and professional development and growth in student achievement, I ran alternative regression models for comparison. In the next section, achievement status is used as the dependent variable in all of the models. Following that, I use alternative measurements of teacher learning community and professional development with achievement growth as the dependent variable. Finally, I ran the regressions by subgroups of school level and by grades tested.

Table 16

*Regression of Communication Arts and Mathematics Growth on Learning Communities and Professional Development*

	Model 1	Model 2	Model 3	Model 4
LC	.159 (2.852)**	.052 (.936)	.127 (2.264)*	.024 (.440)
PD	.198 (3.560)**	.035 (.581)	.201 (3.579)**	-.030 (-.525)
School				
Suburb		-.183 (-2.282)*		-.044 (-.564)
Town		.005 .065		.083 (1.087)
Rural		-.078 (-.645)		-.004 (-.035)
Middle		-.059 (-1.013)		-.083 (-1.485)
Other level		-.067 (-1.158)		-.239 (-4.296)**
Enroll		-.235 (-3.393)**		-.160 (-2.389)*
FRL		-.107 (-1.108)		-.118 (-1.270)
Minority		-.440 (3.418)**		-.373 (-2.999)**
Teacher				
Yrs Exp		-.138 (-1.948)		.034 (.488)
Salary		.401 (2.851)**		.039 (.285)
MA+		.027 (.341)		.205 (2.666)**
R <sup>2</sup>	.065	.224	.057	.277
N	303	303	302	302

\*\* $p < .01$ ; \* $p < .05$ . T-values are listed in parentheses. For locale, the reference group is urban. For school level, the reference group is elementary. In Models 1 and 2, communication arts growth is the dependent variable. In Models 3 and 4, mathematics growth is the dependent variable. For an explanation of abbreviations, see Table 12.

### Further Examination of Poverty and Minorities

In the main regression models, teacher learning communities and professional development had a null effect on growth in student achievement. Because the percentage of students eligible for free or reduced lunch and the percentage of minority students in a school had a consistent negative relationship with growth in student achievement, I chose

to look more closely at the interaction of these two variables with teacher learning communities and professional development. I created four new variables: LC  $\times$  FRL, LC  $\times$  Minority, PD  $\times$  FRL, and PD  $\times$  Minority.

While there are some fluctuations in the coefficients for professional development, the more notable changes are in the changes to the teacher learning community variable when mathematics growth is the dependent variable (see Table 17) . The teacher learning community coefficient increased from .024 (in Table 16) to .392 ( $p < .01$ ) (See Model 2 of Table 17). In the same model, the coefficient for the LC  $\times$  FRL variable was -3.99 ( $p < .01$ ). This result indicates that teacher learning communities have a stronger effect on student growth in schools with a lower percentage of students in poverty.

Though the changes in the coefficients were not as dramatic, a similar phenomenon is seen when the LC  $\times$  Minority variable is added into the model. The positive relationship of teacher learning communities to growth in mathematics achievement is lessened in schools with higher minority populations.

Keeping in mind that the instrument for measuring teacher learning communities and professional development is a survey of teachers' perceptions of the quality of these school improvement initiatives in their schools, the results of this analysis indicate that teachers' positive attitudes about their learning communities show a relationship with student growth if the school is in a low poverty school with a lower percentage of minority students.



Table 17

*Regression of Communication Arts and Mathematics Growth on Learning Community and Professional Development with Additional Measures of Poverty and Minority Effect*

	Model 1	Model 2	Model 3	Model 4
LC	.234 (1.771)	.392 (3.121)**	.122 (1.699)	.150 (2.180)*
LC*FRL	-.189 (-1.480)	-.399 (-3.279)**		
LC*Min			-.083 (-1.158)	-.207 (-2.993)**
PD	.115 (.790)	-.025 (-.176)	.099 (1.375)	-.027 (-.395)
PD*FRL	-.078 (-.520)	.021 (.149)		
PD*Min			-.118 (-1.341)	.044 (.518)
School				
Suburban	-.185 (-2.296)	-.053 (-.691)	-.181 (-2.248)*	-.057 (-.736)
Town	.018 (.231)	.107 (1.415)	.023 (.294)	.099 (1.300)
Rural	-.065 (-.534)	.029 (.248)	-.076 (-.634)	.011 (.097)
Middle	-.057 (-.985)	-.081 (-1.476)	-.061 (-1.053)	-.089 (-1.605)
Other level	-.062 (-1.068)	-.231 (-4.208)**	-.059 (-1.019)	-.234 (-4.243)**
Enroll	-.233 (-3.346)**	-.161 (-2.443)*	-.242 (-3.488)**	-.157 (-2.366)*
FRL	-.079 (-.805)	-.080 (-.849)	-.096 (-.991)	-.088 (-.951)
Minority	-.470 (-3.553)**	-.401 (-3.182)**	-.527 (-3.823)**	-.396 (-2.999)**
Teacher				
Yrs Exp	-.144 (-2.025)*	.022 (.319)	-.147 (-2.065)*	.022 (.316)
Salary	.411 (2.896)**	.077 (.572)	.435 (3.075)**	.059 (.437)
MA+	.024 (.295)	.197 (2.599)*	.023 (.284)	.223 (2.915)**
R <sup>2</sup>	.230	.303	.234	.299
N	303	302	303	302

\*\* $p < .01$ ; \* $p < .05$ . T-values are listed in parentheses. For locale, the reference group is urban. For school level, the reference group is elementary. Models 1 & 3 communication arts growth is the dependent variable Models 2 & 4 mathematics growth is the dependent variable. For an explanation of abbreviations, see Table 12.

### Achievement Status as Dependent Variable

In this section, the original regression models were rerun with achievement status in communication arts and mathematics as the dependent variables in order to examine the differences in the interactions of the independent variables.

#### *Communication Arts and Teacher Learning Community*

Unlike the models using growth as the dependent variable, the presence of a strong learning community is consistently a positive and significant predictor of communication arts status (see Table 18). Although the strength of the learning community coefficient decreases as the school level variables are incorporated, the coefficient is still twice as strong (.100) as it was in the model with the same predictors and growth as the dependent variable (.049).

Learning community is positive and significant in all four models. The  $R^2$  increased to .705 in Model 4 as compared to an  $R^2$  of .223 for the regression of communication arts growth on learning community when all controls were included.

Table 18

*Regression of Communication Arts Status on Learning Community*

	Model 1	Model 2	Model 3	Model 4
LC	.286 (5.177)**	.106 (3.097)**	.239 (4.600)**	.100 (2.950)**
School				
Suburb		.051 (1.071)		.021 (.423)
Town		-.036 (-.758)		.004 (.091)
Rural		-.089 (-1.283)		-.016 (-.217)
Middle		.043 (1.226)		.034 (.962)
Other Level		-.071 (-2.067)*		-.067 (-1.955)
Enroll		-.094 (-2.301)*		-.121 (-2.855)**
FRL		-.568 (-10.303)**		-.471 (-6.011)**
Minority		-.343 (-4.997)**		-.503 (-8.490)**
Teacher				
Yrs Exp			-.188 (-3.129)**	-.012 (-.274)
Salary			-.260 (-3.467)**	.258 (2.985)**
MA+			.435 (6.489)**	-.058 (-1.200)
R <sup>2</sup>	.082	.694	.229	.705
N	303	303	303	303

\*\* $p < .01$ ; \* $p < .05$ . T-values are listed in parentheses. For locale, the reference group is urban. For school level, the reference group is elementary. For an explanation of abbreviations, see Table 12.

*Mathematics and Teacher Learning Community*

When mathematics status is the dependent variable, the coefficients for learning community follow a similar pattern though they are slightly stronger than when communication arts status is the dependent variable (see Table 19).

Table 19

*Regression of Mathematics Status on Learning Community*

	Model 1	Model 2	Model 3	Model 4
LC	.346 (6.408)**	.160 (4.955)**	.299 (5.954)**	.159 (4.920)**
School				
Suburban		.040 (.889)		.029 (.616)
Town		-.064 (-1.437)		-.044 (-.942)
Rural		-.157 (-2.389)*		-.113 (-1.609)
Middle		.028 (.847)		.025 (.758)
Other Level		-.062 (-1.911)		-.060 (-1.842)
Enroll		-.084 (-2.165)*		-.094 (-2.324)*
FRL		-.546 (-10.497)**		-.507 (-8.982)**
Minority		-.393 (-6.019)**		-.465 (-6.227)**
Teacher				
Yrs Exp			-.170 (-2.931)**	.027 (.636)
Salary			-.288 (-3.971)**	.119 (1.440)
MA+			.467 (7.215)**	-.018 (-.386)
R <sup>2</sup>	.120	.728	.279	.732
N	303	303	303	303

\*\* $p < .01$ ; \* $p < .05$ . T-values are listed in parentheses. For locale, the reference group is urban. For school level, the reference group is elementary. For an explanation of abbreviations, see Table 12.

School enrollment, percentage of students eligible for free or reduced lunch, and percentage of minority students are the strongest coefficients and are consistently negative.

*Communication Arts and Professional Development*

With professional development as an independent variable and communication arts status as the dependent variable, the coefficients for professional development are

also positive and similar in strength to the coefficients for learning community in the status models (see Table 20).

### *Mathematics and Professional Development*

While the influence of professional development is greatly increased in the mathematics status model over the mathematics growth model, so is the negative influence of poverty. The strength of the coefficient for free or reduced lunch went from -.122 and not significant in the regression of mathematics growth on professional development with all control variables to -.540 and significant in the status model using the same variables (see Tables 15 and 21). Other factors such as enrollment size and percentage of minority students also have a negative relationship with status, but percentage of students eligible for free or reduced lunch shows the largest difference between growth and status.

Table 20

*Regression of Communication Arts Status on Professional Development*

	Model 1	Model 2	Model 3	Model 4
PD	.359 (6.674)**	.135 (3.749)**	.279 (5.306)**	.128 (3.526)**
School				
Suburb		.027 (.559)		-.001 (-.013)
Town		-.064 (-1.390)		-.026 (-.539)
Rural		-.149 (-2.176)*		-.084 (-1.144)
Middle		.054 (1.539)		.044 (1.253)
Other Level		-.046 (-1.290)		-.045 (-1.265)
Enroll		-.092 (-2.268)*		-.118 (-2.800)**
FRL		-.580 (-10.685)**		-.525 (-8.951)**
Minority		-.331 (-4.802)**		-.452 (-5.769)**
Teacher				
Yrs Exp			-.228 (-3.868)**	-.025 (-.573)
Salary			-.132 (-1.740)	.260 (3.028)**
MA+			.364 (5.310)**	-.083 (-1.709)
R <sup>2</sup>	.129	.698	.246	.709
N	303	303	303	303

\*\* $p < .01$ ; \* $p < .05$ . T-values are listed in parentheses. For locale, the reference group is urban. For school level, the reference group is elementary. For an explanation of abbreviations, see Table 12.

This indicator of the influence of poverty was not unique to mathematics status and professional development, but can be seen when comparing any of the status models to the growth models.

Table 21

*Regression of Mathematics Status on Professional Development*

	Model 1	Model 2	Model 3	Model 4
PD	.364 (6.787)**	.143 (4.135)**	.277 (5.340)**	.139 (3.919)**
School				
Suburb		.012 (.269)		.002 (.035)
Town		-.103 (-2.326)*		-.085 (-1.802)
Rural		-.236 (-3.575)**		-.200 (-2.803)**
Middle		.036 (1.065)		.032 (.928)
Other Level		-.040 (-1.159)		-.040 (-1.172)
Enroll		-.087 (-2.235)*		-.098 (-2.408)*
FRL		-.569 (-10.903)**		-.540 (-9.463)**
Minority		-.385 (5.810)**		-.455 (-5.976)**
Teacher				
Yrs Exp			-.220 (-3.786)**	.006 (.146)
Salary			-.153 (-2.035)*	.132 (1.579)
MA+			.404 (5.964)**	-.046 (-.973)
R <sup>2</sup>	.132	.721	.264	.724
N	303	303	303	303

\*\* $p < .01$ ; \* $p < .05$ . T-values are listed in parentheses. For locale, the reference group is urban. For school level, the reference group is elementary. For an explanation of abbreviations, see Table 12.

*Teacher Learning Community and Professional Development and Achievement Status*

The final set of regression models with achievement status as the dependent variable includes both learning community and professional development in the models (see Table 22). When status is the dependent variable, learning community and professional development are consistently positive and significant. In addition, the coefficients for learning community and professional development are much stronger than those observed in the models with growth as the dependent variable.

Table 22

*Regression of Communication Arts Status and Mathematics Status on Professional Development and Learning Communities*

	Model 1	Model 2	Model 3	Model 4
LC	.283 (5.513)**	.111 (3.325)**	.343 (6.875)**	.171 (5.439)**
PD	.356 (6.949)**	.138 (3.847)**	.361 (7.234)**	.154 (4.539)**
School				
Suburb		.007 (.151)		.014 (.304)
Town		-.010 (-.205)		-.059 (-1.321)
Rural		-.057 (-.786)		-.159 (-2.313)*
Middle		.056 (1.608)		.050 (1.524)
Other Level		-.033 (-.944)		-.022 (-.672)
Enroll		-.099 (-2.366)*		-.069 (-1.756)
FRL		-.506 (-8.730)**		-.510 (-9.328)**
Minority		-.425 (-5.487)**		-.414 (-5.658)**
Teacher				
Yrs Exp		-.011 (-.247)		.028 (.697)
Salary		.234 (2.761)*		.092 (1.147)
MA+		-.082 (-1.716)		.044 (-.984)
R <sup>2</sup>	.208	.719	.250	.750
N	303	303	303	303

\*\* $p < .01$ ; \* $p < .05$ . T-values are listed in parentheses. For locale, the reference group is urban. For school level, the reference group is elementary. In Models 1 and 2, communication arts growth is the dependent variable. In Models 3 and 4, mathematics growth is the dependent variable. For an explanation of abbreviations, see Table 12.

In Models 2 and 4, R<sup>2</sup> is .719 and .750 respectively. In any of the models with status as the dependent variable and all independent variables are included, the R<sup>2</sup> is always higher than .7.

Because the regression models which consider achievement status indicate a positive relationship between teacher learning communities and professional



development and students' achievement levels, it would be tempting to focus exclusively on this as evidence of the value of teacher learning communities and professional development. However, because that relationship does not hold true in models with student growth as the measurement, it calls in to question the legitimacy of any such claims regarding teacher learning communities and professional development. One possibility is that the positive associations between teacher learning community and professional development in status models is a reflection of the resources available to the teacher in schools with higher SES indicators.

Clearly status measures alone cannot effectively evaluate the role of teacher learning community and professional development in student outcomes. To continue to examine the relationship between teacher learning communities, professional development, and growth in student achievement, I explored other possible measures of teacher learning community and professional development.

#### Alternate Analyses

##### *Alternate Calculations of Learning Community and Professional Development*

Earlier in Chapter Four, I describe the process for creating the index variables for learning community and professional development. In order to best evaluate the influence of these concepts, I created three alternative measures for these variables (see Table 23). The  $R^2$  are all between .2 and .3 for these models, the same as for the models with the original learning community and professional development variables where achievement growth was the dependent variable.

Table 23

*Regression of Communication Arts Growth and Mathematics Growth on Alternate Measures of Learning Communities and Professional Development*

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Alt LC	.052 (.936)	.024 (.440)				
Alt PD	.035 (.581)	-.030 (-.525)				
Alt Index 1			.042 (.782)	.071 (1.361)		
Alt Index 2					.063 (1.050)	.000 (-.005)
School						
Suburb	-.183 (-2.282)*	-.044 (-.564)	-.184 (-2.301)*	-.049 (-.640)	-.185 (-2.312)*	-.049 (-.634)
Town	.005 (.065)	.083 (1.087)	.005 (.063)	.083 (1.094)	.003 (.042)	.076 (1.004)
Rural	-.078 (-.645)	-.004 (-.035)	-.078 (-.655)	-.014 (-.122)	-.082 (-.695)	-.020 (-.174)
Middle	-.059 (-1.013)	-.083 (-1.485)	-.073 (-1.280)	-.088 (-1.598)	-.058 (-1.006)	-.081 (-1.447)
Other Level	-.067 (-1.158)	-.239 (-4.296)**	-.084 (-1.495)	-.241 (-4.490)**	-.066 (-1.145)	-.234 (-4.244)**
Enroll	-.235 (-3.393)**	-.160 (-2.389)*	-.248 (-3.647)**	-.158 (-2.417)*	-.235 (-3.397)**	-.159 (-2.380)*
FRL	-.107 (-1.108)	-.118 (-1.270)	-.114 (-1.191)	-.122 (-1.317)	-.108 (-1.127)	-.123 (-1.327)
Minority	-.440 (-3.418)**	-.373 (-2.999)**	-.472 (-3.711)**	-.385 (-3.144)**	-.439 (-3.419)**	-.369 (-2.971)**
Teacher						
Yrs Exp	-.138 (-1.948)	.034 (.488)	-.147 (-2.079)*	.027 (.398)	-.139 (-1.966)*	.030 (.443)
Salary	.401 (2.851)**	.039 (.285)	.419 (3.000)**	.042 (.310)	.401 (2.856)**	.040 (.291)
MA+	.027 (.341)	.205 (2.666)**	.035 (.446)	.205 (2.697)**	.026 (.324)	.199 (2.608)*
R <sup>2</sup>	.224	.277	.222	.280	.224	.275
N	303	302	303	302	303	302

\*\* $p < .01$ ; \* $p < .05$ . Alt LC = learning community index variable created from alternate principal components analysis; Alt PD = professional development variable created from alternate principal components analysis. Alt Index 1 = alternate index variable that is the product of the original learning community and professional development index variables. Alt Index 2 = alternate index variable created from the eighteen AQ items used in the original data reduction. In Models 1, 3, and 5 communication arts growth is the dependent variable. In Models 2, 4, and 6 mathematics growth is the dependent variable. For an explanation of abbreviations, see Table 12.

### *Index Variables from Reduced Data*

In the first alternative calculation of learning community and professional development, I took the nine items that originally loaded with learning community through the data reduction and used only those nine items in a principal components analysis to create a new value for learning community which excluded any interaction with the items that originally loaded with professional development. Then I used the same procedure to isolate the nine items which originally loaded with professional development. This process was intended to create stronger variables for learning community and professional development. In the models using all controls, the alternative coefficients for learning community and professional development showed almost no variation from the original learning community and professional development variables.

### *Index Variable from Learning Community and Professional Development Multiplied*

In the second alternative calculation of learning community and professional development, I created a variable to represent both concepts as one independent variable by simply multiplying the original learning community and professional development variables together. In Chapter Two, the literature on learning communities and professional development revealed a strong, arguably inseparable, linkage between the two concepts. Therefore, assessing the impact of the two concepts treated as one variable representing professionalism in the teacher work environment was justified. Using one variable for professionalism did not result in a significant coefficient for this concept.

### *Index Variable from All AQ Items*

In the third alternative calculation of learning community and professional development, I took the original eighteen items from the AQ used to create the index variables and ran the data reduction again, this time choosing to load all the items into one factor. This is another way to try to capture the combined influence of learning community and professional development within a broader concept of professionalism in the teacher work environment. As with the multiplication of learning community and professional development into one variable, the combination of all eighteen AQ items one variable did not result in a significant coefficient for this variable.

### *Regression Excluding K-4 Schools*

Individually identifiable student records have been available since 2006. For students with 2006 MAP scores (i.e., students in grades five through eight), the 2006 scores were used as controls in the OSEDA/Betebenner growth model. Because the sample included thirteen schools which did not include any of grades five through eight, I reran the models which included both index variables and all controls. The exclusion of these schools did not cause any notable differences in the results (see Table 24, Models 1 and 2 ).

### *Regression by Number of Grades Tested*

Another possibility I wanted to consider is whether or not the number of grades tested within a school affects the interaction of teacher learning community and professional development with student achievement growth. Schools with two years of grades represented in their median growth percentile are the most common within the sample and is used as the reference group. There is some indication that this variable has

Table 24

*Regression of Professional Development and Learning Communities on Communication Arts Growth and Mathematics Growth: Consideration of Grade Levels and Years Tested*

	Model 1	Model 2	Model 3	Model 4
LC	.047 (.821)	.022 (.395)	.067 (1.208)	.066 (1.214)
PD	.044 (.720)	-.037 (-.633)	.034 (.579)	.000 (.003)
School				
Suburb	-.179 (-2.183)*	-.040 (-.507)	-.177 (-2.211)*	-.039 (-.492)
Town	-.025 (-.308)	.072 (.933)	.011 (.146)	.097 (1.258)
Rural	-.097 (-.756)	-.021 (-.170)	-.069 (-.571)	-.027 (-.227)
Middle	-.049 (-.813)	-.096 (-1.655)		
Other Level	-.069 (-1.158)	-.249 (-4.378)**		
One Gr Test			.000 (-.017)	-.031 (-.565)
Three Gr Test			-.053 (-.898)	.015 (.255)
Four Gr Test			-.042 (-.786)	-.015 (-.292)
Five Gr Test			.106 (1.850)	.182 (3.242)**
Enroll	-.229 (-3.169)**	-.143 (-2.072)*	-.234 (-3.388)**	-.134 (-1.971)*
FRL	-.129 (-1.296)	-.130 (-1.362)	-.092 (-.954)	-.076 (-.807)
Minority	-.420 (-3.165)**	-.391 (-3.079)**	-.437 (-3.387)**	-.398 (-3.130)**
Teacher				
Yrs Exp	-.119 (-1.616)	.039 (.557)	-.136 (-1.929)	.006 (.085)
Salary	.341 (2.231)*	.022 (.150)	.438 (3.102)**	.120 (.867)
MA+	.032 (.396)	.039 (.557)	.017 (.212)	.203 (2.607)*
R <sup>2</sup>	.221	.289	.235	.260
N	290	289	303	302

Note: \*\* $p < .01$ ; \* $p \leq .05$ . Models 1 and 3 – communication arts growth is the dependent variable. Models 2 and 4 – mathematics growth is the dependent variable. One Gr Test = one grade level with growth measurement; Three Gr Test = three grade levels with growth measurement; Four Gr Test = four grade levels with growth measurement; Five Gr Test = five grade levels with growth measurement. For an explanation of all other abbreviations, see Table 12.

a relationship with achievement growth. The schools with five grades represented in their median growth percentile had a stronger relationship with mathematics growth than the reference group (See Table 24, Models 3 and 4).

#### *Regression Analysis by School Level*

When schools are separated by level and the regression models with achievement growth as the dependent variable are rerun, a few interesting findings emerge (see Table 25). First, although the learning community and professional development variables have not had significant coefficients in the other models with achievement growth as the dependent variable and all controls included, the sign of the coefficients has always been positive except for professional development when mathematics growth is dependent variable. However, for mathematics growth in elementary schools, both learning community and professional development have negative, though nonsignificant, coefficients.

When communication arts growth in middle schools is the dependent variable, professional development has a positive and significant coefficient. This is the only significant coefficient for learning community or professional development that has been observed in any of the models with all controls included and achievement growth as the dependent variable.

The models testing middle schools have  $R^2$  values of .446 and .368 respectively, higher than any other models with all controls included and achievement growth as the dependent variable.

Table 25

*Regression of Communication Arts Growth and Mathematics Growth on Learning Communities and Professional Development by School Level*

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
LC	.014 (.202)	-.021 (-.312)	.130 (1.231)	.178 (1.569)	.115 (.613)	.117 (.554)
PD	.011 (.157)	-.005 (-.074)	.235 (2.054)*	-.015 (-.121)	.088 (.496)	-.281 (-1.394)
School						
Suburb	-.135 (-1.491)	.014 (.156)	-.310 (-1.593)	-.316 (-1.520)	0 <sup>a</sup> 0	0 <sup>a</sup> 0
Town	.124 (1.485)	.137 (1.651)	-.423 (-2.150)*	-.175 (-.833)	-1.253 (-1.522)	.114 (.118)
Rural	.014 (.107)	.109 (.816)	-.420 (-1.800)	-.386 (-1.551)	-1.953 (-1.251)	.094 (.052)
Enroll	-.242 (-3.075)**	-.242 (-3.108)**	-.279 (-1.825)	-.123 (-.750)	-.080 (-.302)	.171 (.565)
FRL	-.204 (-1.778)	-.144 (-1.267)	-.035 (-.156)	-.233 (-.968)	.352 (1.520)	.269 (1.009)
Minority	-.395 (-2.596)*	-.352 (-2.337)*	-.542 (-2.101)*	-.402 (-1.457)	-2.113 (-1.662)	-.352 (-2.239)
Teacher						
Yrs Exp	-.083 (-.988)	-.007 (-.079)	.042 (.277)	.113 (.669)	-.345 (-1.067)	.199 (.518)
Salary	.443 (2.674)**	.124 (.756)	.010 (.032)	-.117 (-.357)	.471 (1.081)	-.019 (-.037)
MA+	.080 (.822)	.216 (2.248)*	-.249 (-1.524)	.098 (.561)	-.090 (-.409)	.072 (.285)
R <sup>2</sup>	.288	.304	.446	.368	.330	.158
N	197	197	68	68	36	35

\*\* $p < .01$ ; \* $p < .05$ . Models 1 and 2 are elementary schools. Models 3 and 4 are middle schools. Models 5 and 6 are other levels of schools. In Models 1, 3, and 5 communication arts growth is the dependent variable. In Models 2, 4, and 6 mathematics growth is the dependent variable. For an explanation of abbreviations, see Table 12.

<sup>a</sup>Suburban was dropped from the model because there were no suburban schools in this subsample.

### Chapter Summary

With the exception of professional development and middle school communication arts achievement growth, the regression analyses showed no significant influence of learning community or professional development on achievement growth, only on achievement status. The control variables had strong influence as anticipated. School enrollment, percentage of students eligible for free or reduced lunch, and

percentage of minority students consistently had a negative relationship with student achievement growth. As for other control variables, there was little influence by locale or school level, and the influence of teacher characteristics was inconsistent across the different models.

These results raise several questions including the accuracy of teachers' perceptions on assessing the quality of their experiences in learning communities and with professional development, the use of the median growth percentile as the most accurate measure of school/teacher contribution to learning, and the possibility of school and student characteristics shaping teachers' overall perceptions of their work environment which they may be misattributing to the quality of learning communities or professional development. For example, when the statement from AQ item 47 (Our professional development improves student achievement) is included in a regression model with all control variables, it is not a significant predictor of either communication arts growth or mathematics growth. In fact, for communication arts growth, the coefficient is negative. The variables which are significant predictors in both of those models are school enrollment ( $\beta = -.234$ ,  $t = -3.392$ ,  $p < .01$ , dependent variable = communication arts growth;  $\beta = -.154$ ,  $t = -2.308$ ,  $p < .05$ , dependent variable = mathematics growth) and percentage of minority students ( $\beta = -.430$ ,  $t = -3.343$ ,  $p < .01$ , dependent variable = communication arts growth;  $\beta = -.375$ ,  $t = -2.999$ ,  $p < .01$ , dependent variable = mathematics growth).

Chapter Five explores the implications of these findings, the limitations of the study, and suggestions for further research.



## Chapter Five

### DISCUSSION OF FINDINGS

#### Introduction

This chapter begins by revisiting the statement of the problem and the purpose for this study. Then, I answer and discuss each research question and whether the expectations for the outcomes were met. From there I discuss the alternate regression models, making note of distinctions in the differences in outcomes from the original models. Finally, I discuss the implications for this study and limitations of this study and conclude with suggestions for future research.

#### Review of the Study

A challenge faced by education reformers is how to most effectively and efficiently improve struggling schools and raise student achievement. Of the many interventions available, teaching quality has been the focus for many education leaders and policymakers. Each year Missouri commits million of dollars to strengthening teacher quality. Furthermore, Missouri has detailed data on student and teacher demographics and student achievement, as well as survey data collected during the accreditation review process. However, to date there has been no research which has examined the relationships between different variables and gains in student achievement. With continuing decline of public resources and the extreme disparity in achievement across Missouri's public schools, it is imperative to conduct research which seeks to identify those interventions with the strongest connection to growth in student achievement.

The goal of this study was to examine quality teaching from the school level and to describe the relationship with growth in student achievement. The measure of quality teaching was the teachers' self-described professional learning environment, as evidenced through learning communities and professional development, and how teachers perceived that culture and those efforts as being related to student outcomes. Teacher questionnaire responses from the Missouri elementary and middle schools participating in the accreditation review process in 2007-2008 provided the data that represented teacher learning communities and professional development. From the MAP exam data for individual students, growth measurements for each student were used to calculate median growth for the school. The percentile rank for each school based on this measurement was the primary dependent variable.

#### Discussion of Findings for Research Question One

The results of Research Question One demonstrated the diversity of public schools across Missouri, particularly in ethnicity and socioeconomic status. Student demographic controls were relatively consistent in their degree of relationship and significance in models with achievement growth as the dependent variable. However, those relationships were much more pronounced in models used for comparison with status as the dependent variable. Teacher characteristics also varied widely across the schools in the sample, but those characteristics did not have a persistent pattern.

In looking at the data used to create the two primary index variables (teacher learning community and professional development), teachers had generally positive feelings about the impact of learning communities and professional development on their practice and on student outcomes. However, from the correlations between variables

examined in Research Question One, I saw the first indication of the negative relationship between poverty and teachers' perceptions of their learning environment, particularly professional development, which would emerge in the findings from Research Questions Two and Three.

#### Discussion of Findings for Research Questions Two and Three

When used in a simple regression, teacher learning community and professional development are significant predictors of communication arts growth and mathematics growth. However, by adding school controls, significance for the learning community coefficient is lost and the value drops by more than half. In fact, in the full model in which mathematics growth is regressed on professional development, the sign of the professional development coefficient is negative. The  $R^2$  values for the full models indicate that there is still a great deal of variance that is unaccounted for when student growth percentiles are the dependent variable.

The results of Research Questions Two and Three did not meet the expectation of outcomes. Variations in the coefficients for the index variables may be an indication that the teachers' perceptions of the teacher learning community and professional development are linked to school and student characteristics.

#### Achievement Status as the Dependent Variable

The use of achievement status as the dependent variable is where the greatest differences were seen. The predictive value of the full models increased from  $R^2$  values of .20 to .25 to  $R^2$  values of .70 to .75. By far, school enrollment, percentage of students eligible for free or reduced lunch, and percentage of minority students are the strongest, most consistent predictors of any measure of student outcomes.

However, in every status model teacher learning community and professional development were *always* significant and positive; whereas with achievement growth as the dependent variable, teacher learning community and professional development were *never* significant. Luyten (2005) suggested research that would go beyond acknowledging that input variables matter to examining how and why they matter. If one looks at the research of Griffith (2003) who described the characteristics of a strong learning community and used those as the independent variable and used teacher attitudes about the work environment as the dependent variable, there was not an attempt in that study to draw connections to student outcomes. That study demonstrates that research can make connections between professional learning environment and teacher satisfaction without necessarily acknowledging any correlation with student outcomes.

In this study, teacher learning community and professional development were only significant in models which were dominated by the influences of student- and school-level characteristics. One potential explanation of these findings is that the outcomes teachers associate with quality learning communities and professional development could be a manifestation of positive feelings reflecting the school and student characteristics. Teachers may be more positive about the school learning environment if students are academically successful (Johnson & Stevens, 2006). Furthermore, McKenzie and Scheurich (2008) noted in their study that teachers were quick to note external characteristics as the greatest barriers to improving student outcomes.

## Discussion of Findings for Alternative Analyses

Before reaching conclusions about the relationship between learning communities and professional development and achievement growth, I explored alternate measurements with the data I had available to see if there was any variation in the effects. As noted in Chapter Four, I tested three alternate measurements of learning community and professional development. None of these alternatives made substantive differences in the learning community or professional development coefficients or on the  $R^2$  for the full models.

However, in the alternate analysis which looked more closely at poverty and percentage of minority students within a school, the results indicate that teachers' perceptions of their learning community have a stronger relationship with growth in student achievement if the school has fewer students in poverty and fewer minority students. The fact that teachers' perceptions of learning community and professional development fluctuate with socioeconomic status and percentage of minority students has many implications which are discussed in the next section.

### Implications of the Findings

If there is an assertion that teacher learning communities and professional development hold the potential to improve teaching quality, what logically follows is the expectation for evidence which would support this theory. Furthermore, because of the investment of public dollars in teacher learning communities and professional development, one would expect to be able to draw some connection between investment and outcomes. Although in this study the effects from teacher learning communities and professional development on growth in student achievement were small, that does not

mean those characteristics are not relevant to the discussion of contributions to increased student outcomes. Seidel and Shavelson (2007) noted that even a small effect can be meaningful. Publication bias skews expectations for effect size (Wayne & Youngs, 2003). Another possible explanation for the small effect size is the way in which professional development and teacher learning communities are typically evaluated in other studies compared to this study. Other studies showing more substantial effects from professional development or teacher learning communities may be research based on the implementation and evaluation of a specific intervention rather than a more holistic evaluation representative of the overall quality of the professional learning environment.

The changes in effect based on student and school characteristics warrant closer study. The literature presented in Chapter Two demonstrates that there is enough of a research base to justify continuing to explore teaching quality as more than the traits or skills of the individual teacher. One consideration is that using the Advanced Questionnaire as a measure of the teachers' professional learning environment may not be the best tool. In addition, there are other ways to measure growth in student achievement, and those measures might give the student and teacher variables more explanatory value. Both of these possibilities are explored further in the section on Suggestions for Future Research.

#### Limitations of the Study

This study was limited to the data available from the MSIP review process. The sample of schools used was driven by the cohort participating in the 2007-2008 MSIP review. The items on the teacher AQ were not written by me, instead items were selected which best represented the concepts to be measured. Any study relying on self-reported

data is inherently limited. With the AQ that limitation may be further complicated by the fact that the AQ is a required component of the district accreditation process. Whether or not this purpose created a bias in the responses from teachers than if the survey instrument had been used strictly for this study cannot be determined.

### Suggestions for Future Research

Future research should not abandon the idea of studying the relationship between a teacher's professional environment and student outcomes; rather it should focus on refining the way in which the professional environment and student outcomes are measured. First, future research could focus on more concrete data on learning communities and professional development. The research could investigate the characteristics which are present in schools rather than relying on teachers' perceptions of the value of those practices. This would also allow researchers to identify whether or not the length of time in which a true learning community had been functioning within a school or a particular professional development initiative had been implemented showed a difference in the degree of influence of the intervention on student outcomes.

Another way to capture teacher data on learning communities and professional development is through qualitative studies using observations or interviews or both. Although the sample size would be smaller than a quantitative study, the potential depth of information to be gained makes this a worthwhile consideration.

The results of the study also leave open the possibility that measuring growth differently could yield different results with significant coefficients for teacher learning community and professional development and greater  $R^2$  values. A simple model using differences in student scale scores from one year to the next or a measurement of a

student's progress toward an established standard could be other ways of measuring growth. As more years of MOSIS data are available, student growth will be able to be tracked over longer periods of time. This in conjunction with an examination and evaluation of various growth calculations may result in stronger predictive value of many of the independent variables.

### Conclusion

The current policy environment creates the expectation for educational interventions to have the ability to demonstrate measurable results. Accountability is at the center of all education policy discussions, and for any initiative policymakers expect to see a return on investment. As public resources continue to decline, this expectation will only increase. If through their practice, teachers and administrators have come to believe in the value of teacher learning communities and professional development, data will be necessary to support their instincts in order to justify the public investment.



## APPENDIX

### *AQ Item Unrotated Component Matrix*

Item Abbreviation	Factor 1	Factor 2
EPL	.811	.097
CPS	.901	-.098
AGI	.683	-.124
TIL	.896	-.069
MNL	.642	.256
ISP	.709	.252
PDA	.863	.258
PDC	.767	.372
PDI	.695	.350
HEL	.810	.071
PDT	.754	.404
CAS	.791	.181
CAP	.859	-.170
SDP	.815	-.298
FCC	.816	-.401
ERT	.797	-.350
PIN	.831	-.314
OCC	.887	-.210

Note. LC = learning community; PD = professional development. For explanation of item abbreviations, please see Table 7.

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## VITA

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