This is to certify that the
dissertation entitled

HOW DO DISTRICT AND SCHOOL CONTEXTS RELATE TO TEACHERS' OPPORTUNITIES TO LEARN? MULTIPLEVEL ANALYSIS OF THE 2000 SASS DATABASE

presented by

KYOUNG-OH SONG

has been accepted towards fulfillment
of the requirements for the

Ph.D degree in Education Policy

Barry Sykes

Major Professor's Signature

8/15/06

Date

DATE DUE	DATE DUE	DATE DUE
MAR 06 1 9 2 1 0 2010		

HOW DO DISTRICT AND SCHOOL CONTEXTS RELATE TO TEACHERS' OPPORTUNITITES TO LEARN? MULTILEVEL ANALYSIS OF THE 2000 SASS DATABASE

By

KYOUNG-OH SONG

A DISSERTATION

Submitted to
Michigan State University
In partial fulfillment of the requirements
For the degree of

DOCTOR OF PHILOSOPHY

Education Policy
College of Education

2006

ABSTRACT

HOW DO DISTRICT AND SCHOOL CONTEXTS RELATE TO TEACHERS' OPPORTUNITIES TO LEARN? MULTILEVEL ANALYSIS OF THE 2000 SASS DATABASE

By

KYOUNG-OH SONG

"Teachers' opportunities" to learn (TOL) has emerged as one of the most important policy issues in the context of standards based reform. Consequently, policy and school contexts that influence TOL are clearly the next critical issue on the agenda. This dissertation investigates the relationship between district and school contexts, and TOL, based on a conceptual frame that derives from the multi-perspective embedded context model developed by McLaughlin and Talbert (2001). This conceptual approach contributes to a better understanding about the relationship between multiple and embedded "real" school contexts and TOL, through conceiving of "context" as a complex and interactive construct.

Using a series of HLM/3L (3-level Hierarchical Linear Modeling) statistical analyses of a large dataset that is nationally representative, the 1999-2000 Schools and Staffing Survey, this dissertation provides several noticeable findings regarding the relationship between embedded district and school contexts and TOL. First, this study found that a substantial proportion of the variation in TOL is attributed to two multi-level district and school contexts. In particular, district contexts apparently contribute more to

the variability of TOL than school contexts. Furthermore, it may be that district administrative contexts relate to the effects of professional learning communities on TOL. Second, the findings of this study show that diverse social system contexts, administrative and organizational contexts, and institutional contexts factors at the school and district level have complex and interactive relationships with TOL. Finally, this study found that institutional contexts identified in this study by three factors – community circumstances, parents' socio-economic conditions, and diversity of students' race – are significantly related to TOL.

For policy researchers, this dissertation suggests that adopting the multi-perspective embedded context model as a conceptual framework would provide a more complete understanding of how multiple and embedded contexts shape TOL. This dissertation also provides three implications for policy makers and educational leaders. First, district units have to be given more attention in terms of the improvement of TOL. In addition, the importance of institutional contexts must be recognized and discussed. Finally, some specific contextual factors thought to influence TOL in the literature are suspect. There is a need for cautiously verifying the effectiveness of these contextual factors on TOL.

This dissertation is dedicated to my parents,

Song, Nam-yeol and *Kim, Hyungsim,*

who, through their example, have shown their children the diligent life is valuable.

ACKNOWLEDGEMENT

My journey to completing this dissertation was possible with that help of many people whom my Lord Jesus Christ sent, who have guided me, supported me, and prayed for me.

First of all, I would like to express my deepest appreciation to Dr. Gary Sykes who was my graduate advisor and dissertation chair. His steadfast belief in me kept me working toward accomplishing this goal through the times that were tough. From my first year in graduate school, Gary constantly encouraged me and always reminded me that learning is challenging work. My experience working with him through each step of this dissertation – conception, framework, analysis, and write-up – as well as graduate studies have been precious for my development as a novice scholar. I want Gary to know how fortunate I feel to have been advised by him.

I am also grateful for the commitment and support of my dissertation committee. Dr. David Arsen guided me from the beginning of the dissertation in his research practicum class, engaging my ideas and sharing the pleasures of crafting research. Dr. Brian DeLany asked thoughtful and practical questions that helped ensure that my dissertation communicated to educational practitioners and policy researchers. His support for my personal and professional development has meant a lot. To Dr. Kim Maier, I owe a special thanks for the time spent with me in providing statistical advice during my data analysis and detailed editorial review. I am proud and honored to have had them as my dissertation committee.

I am also appreciative to the Graduate School of Education at Michigan State

University for a Dissertation Completion Fellowship that provided me with financial support. In addition, I owe thanks to Dr. David Plank, the former director of the Educational Policy Center at Michigan State University that allowed me to use the data for this study.

During the time of my graduate study, I had the support of numerous colleagues and people in Michigan. Cohort members of the Educational Policy Program, Yongmei, Tara, and Kamila, were not only academically but also psychologically helpful in getting me through graduate school in the U.S.A. We worked our way through courses, comprehensive exams, and dissertations together. Through the various stages of my writing, I have consulted with writing consultants in the MSU Writing Center: Kym Buchanan, Michael Sherry, Ann Sherry, and Steve Sharra. I have benefited from their feedback. To Ann, I owe special thanks for sage advice and editorial suggestions. I also appreciate encouragement and friendship provided by Korean colleagues at Michigan State University. Especially, I express special thanks to Jinyoung Choi, Jeonghee Noh, Wangjun Kim and his wife Eun-Jung Lee, Won-Pyo Hong and Kwanghyun Lee. They have been caring and generous collaborators. In addition, I thank the congregation of the Lansing Korean Catholic Church, Father Baek, and Father Kim. The spiritual community kept me grounded and sustained my journey to the PhD.

Many people in Korea helped me in diverse ways. My parents have always encouraged me to pursue my dreams, instilled in me the belief that I could achieve my dreams, and then helped me do so each and every step of the way in my life. Without their love and support, I could not have made this journey. I am also appreciative to Dr. Chong-Jae Lee who was my advisor in Korea. He showed strong belief in my personal

and intellectual ability to complete this journey.

My friends outside academia cheered me on in my academic endeavors. I really would like to express my thanks to Hyeryung Jung, Su-jung Lee, Minjo Kim, Jungeun Lee, and Yunjung Hwang, for providing much needed support at important times. Hyeryung has provided unfailing friendship as my long-distance cheering person. And my soul mate Bo-Young was the central force from my very first step in a doctoral program to the final moment. She always reminds me what is truly important in life.

Finally and most importantly, I dedicate this humble work to my Lord Jesus Christ who has given me love and strength so genuinely and unselfishly throughout all my life.

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

CHAPTER I
INTRODUCTION

Over the past two decades, some educational scholars have focused on "teachers' opportunities" to learn (TOL) as a cornerstone of successful implementation of standards based reform. They argue that educational reform that requires teachers to carry out the demands of high standards in the classroom would succeed if and when teaching quality increases through TOL (AFT, 1995; Ball & Cohen, 1999; Corcoran, 1995; Darling-Hammond & Sykes, 1999; Thompson & Zeuli, 1999; Wilson & Berne, 1999). For example,

> Without professional development, school reform will not happen... The nation can adopt rigorous standards, set forth a visionary scenario, compile the best research about how students learn, change the nature of textbooks and assessment, promote teaching strategies that have been successful with a wide range of students, and change all the other elements involved in systemic reform. But, unless the classroom teacher understands and is committed to the plan and knows how to make it happen, the dream will come to naught (AFT, 1995, pp.1-2).

A common logic of these arguments is that when teachers acquire a deep understanding of the content knowledge and skills they teach through effective and continuous TOL, teaching practices and student learning will be improved. That is, successful instructional reform relies on teachers' knowledge and skills, and their knowledge and skills rely on effective and ongoing TOL (Cohen & Hill, 2001).

Policy makers also have increasingly recognized the importance of TOL in the successful implementation of reform efforts. The recent federal education legislation, the No Child Left Behind (NCLB) Act requires highly-qualified teachers who have in-depth content knowledge in the fields that they teach, reflecting the belief that teachers are

critical to any effort for improving student achievement. A logical extension of this assumption is that TOL is a primary means for upgrading teachers' practices and for promoting student learning. Therefore, the need for an increased focus on TOL for educational reform is prompted not only by educational researchers, but also by policy makers.

The emphasis on TOL as a prominent instrument for successful reform has led to educational researchers' interest in contexts that influence the effectiveness of TOL. They have begun to realize the potential of contexts as critical influences for implementing effective TOL. Smylie (1995) notes, "If we wish to improve schools as places for teachers to learn, we need to be able to identify those workplace conditions that promote or constrain learning" (p. 94). A large literature on influential contexts on TOL can be divided into two distinctively different approaches to effective TOL.

The first approach to TOL focuses on relatively local teacher community as a critical influence on TOL. It argues that particular norms and practices of such a local teacher community shape learning conditions for TOL, assuming that each school constructs its own teacher community (Lieberman 1994; Little 1982, 1990a, 1999b, 2001; Lord, 1994; Perry, 1996). For example, Little (1982) shows that norms of collegiality and experimentation in a teacher community have a significant effect on teacher learning on the job. Teachers are more likely to participate in TOL when they work collaboratively on matters of curriculum and instruction and when professional risk taking is encouraged. In another paper, Little (1990a) helps us think about how teacher community conditions influence TOL, using her distinction of "strong ties" and "weak ties" among teachers in the same school. In communities of "strong ties," teachers work collaboratively on

matters of instruction and develop shared understanding. In such communities, teachers are motivated to pursue professional learning. By contrast, in communities of "weak ties," teachers experience strong individual autonomy and isolate from peers. In such communities, teachers' work and learning are discouraged.

Another approach to TOL focuses on more distal policy as a sources of influence on TOL. It argues that coherent and effective policy strategies at the district or state level can lead to high-quality TOL, expecting significant effects of the policy mechanisms on local practices (Cohen & Hill, 2001; Corcoran, Passantino, & Gerry, 2000; Desimone, Porter, Birman, Garet, & Yoon, 2002; Firestone, Mangin, Martinez, & Polovsky, 2005; Knapp, 2003; Wilson, Darling-Hammond, & Berry, 2001). One representative study supporting this approach is the Eisenhower study that demonstrates statistically significant relationships between self-reports of TOL and district policy strategies, such as alignment, multiple funding sources, continuous efforts for instructional improvement, and district and teachers' participations in TOL (Desimone et al., 2002). In this study, districts' coherent visions and effective management of TOL led to reported high quality TOL, such as participation in active learning and content-focused learning. Wilson and colleagues (2001) also show that a state's consistent long-term investment to enhance the quality of the teaching force have a significant effect on teachers' engagement in learning opportunities and changes in teaching practices. Knapp (2003) concludes that through effective policy instruments, such as mandates, capacity building, inducements, and system changing, districts or states can play an important role in stimulating, guiding, and supporting TOL.

The Problem Statement

Even when taken together, these two approaches to TOL (teacher community influence and policy influence) do not provide a sufficient description of the contexts that influence TOL. These two approaches still assume that context as influence on TOL is one-dimensional; and is most often associated with a particular condition at a single level such as policy strategies at the district level, teachers' collegial relationship at the school level, or students' socioeconomic background.

If we can define context as "the whole situation, background or environment relevant to some happening," (Grossman & Stodolsky, 1994, p.181), then the contexts in which teachers work and learn are multiple and embedded (McLaughlin & Talbert 1990, 2001; Scribner, 1999; Sykes, 2002; Talbert & McLaughlin, 1999). That is, teachers are embedded within the most proximal zone, the school setting, while schools are embedded within a broader administrative zone such as districts and states, and formal educational systems are embedded within larger institutional environments (McLaughlin & Talbert, 2001). In these multiple embedded school contexts, contextual influences may be diverse and overlapping (McLaughlin & Talbert 1990, 2001; Talbert & McLaughlin, 1999).

Each of these multiple and embedded contexts can directly affect teachers' beliefs and thinking about their own learning, and interact with one another to shape teachers' work. For example, social relationships with colleagues in the schools may affect TOL. TOL may be also constructed by the educational policy system and school sector; and by larger institutional and community culture; by higher education, professional associations, and networks. Subject departments may shape TOL as well. Further, TOL is constructed by the complex interplay of contexts that mutually reinforce

and/or compete with another (McLaughlin & Talbert, 2001). Therefore, contextual influences on TOL should be conceived as highly complex and diverse.

Although contemporary approaches to TOL have made significant contributions to our knowledge about influences of the single level contexts (i.e., district or school), these approaches afford little opportunity to account for these diverse and interactive influences on TOL. A more complete understanding of the relationship between contexts and TOL requires an approach that is capable of capturing the multifaceted and interactive influences of these embedded contexts.

The current study proposes a more promising conceptual approach framework to explore the relationship between embedded district and school level contexts and TOL, drawn from important assumptions of McLaughlin and Talbert's (2001) multi-perspective embedded context model. This model considers the complexity of the forces influencing the life of a teacher – not as a simple set of one-to-one connections, but through several different lenses. It is also able to demonstrate complex interactions among layers of contexts and diverse influences of each context. Therefore, the multiple perspective embedded model is a particularly useful framework for studying school environments and their influences on TOL. This study will claim that a more systematic and comprehensive approach capable of capturing the diverse and interactive contextual influences might provide a more complete insight into the relationship between TOL and contexts.

Research Questions

The research interest of this study is how embedded district and school contexts

relate to teachers' opportunities to learn (TOL). The specific research questions are as follows:

1. What district level contextual factors influence TOL? How do they do so?
2. What school level contextual factors influence TOL? How do they do so?
3. How do these district and school level factors relate to one another and how do these relationships affect TOL?

This study proposes that these research questions could be well answered using the multi-perspective context embedded model. Drawn from the main notions (multiple theoretical perspectives and embedded contexts) of this model, the current study develops and tests the hypotheses regarding the relationships between district and school contexts and TOL.

Research Design Overview

This study involves a cross-sectional examination of the relationship between embedded district and school contexts and TOL, using nationally representative data from the 1999-2000 Schools and Staffing Survey (SASS), a database developed and managed by the National Center for Educational Statistics (NCES). Data from the SASS 2000 is used to address the hypotheses relevant to the issue of what and how district and school level factors influence TOL.

A series of HLM/3L analyses (three-Level Hierarchical Linear Modeling) is performed to investigate variations in TOL that occur within school, between schools, and between districts. It also allows the examination of cross-level interactive effect between district and school levels.

Significance of the Study

First, this study provides policy makers and educational leaders with more comprehensive information about the relationship between district and school contexts and TOL. By simultaneously taking into account the effects of these two contexts on TOL, this study explores roles of school level contextual factors advocated by traditional social system theorists while it points out conditions under which the role of district policy may predominate. It goes beyond prior research that tends to treat district and school contextual influences as mutually exclusive. A more comprehensive understanding of the relationship between district and school contexts and TOL would help policy makers to consider effective and efficient policy strategies to create resources and conditions for TOL. Furthermore, it would enable educational leaders to guide and support teachers' engagement in learning opportunities, by modifying social and organizational conditions as well as incentive structures for TOL.

Second, this study provides a powerful case to explain school contexts as highly interactive and quite sophisticated. While the data used for this study do not permit complete modeling of the embedded context formulation, the study is illustrative of the general approach that conceives of "context" as a complex construct.

Finally, this study complements prior quantitative research on contexts for TOL, by employing the statistical technique of hierarchical linear modeling (HLM). The prior research on school contexts on TOL that used OLS regression methodologies fails to simultaneously estimate each district-and school-level effect on TOL. This study moves beyond these previous methodological difficulties of analyzing these multilevel phenomena. Hierarchical linear modeling permits a more accurate and direct estimation

of the effects of the embedded district and school contexts on TOL simultaneously. However, reliance on cross-sectional data creates problems of influence that will be discussed in Chapter 6.

Overview of the Dissertation

Chapter 1 presents a brief statement of the background and problem for the study, together with the research questions, their significance, and an overview of the research design.

Chapter 2 reviews literature about influences on TOL and investigates the strengths and limitations of the contemporary approaches to TOL. To address the shortcomings of these approaches, this chapter presents another approach to TOL, drawn from McLaughlin and Talbert's multi-perspective embedded context model.

Chapter 3 discusses the definitions of TOL and indicators of effective TOL. Then, based on the main assumptions of the multi-perspective embedded context model, I develop five hypotheses to examine the relationship between district and school contexts and TOL contexts for this study.

Chapter 4 discusses the methodology employed in this study, including a brief description of data sources for this study, the dependent variables and independent variables; and how these variables are selected and constructed for this study. I also provide analytical techniques used in this study.

Chapter 5 presents findings from the HLM analyses employed to examine the variations in TOL within-school, between-schools, and between-districts. This chapter represents the results of hypotheses tests regarding district and school factors related to

TOL and the results of hypotheses tests regarding interactive relationships between district and school factors. Also included is a discussion of study limitations.

Chapter 6 discusses the strengths and limitations of this study. Then, I provide some implications for policy research, and policy and practices. I conclude my study with final thoughts about effective approaches to TOL.

CHAPTER II
LITERATURE REVIEW (PART I)

The literature review of this study is divided into two chapters. The first chapter (Chapter II) initiates a review of literature on influences on TOL, together with a new model for exploring influences on TOL. Then, the next chapter (Chapter III) provides a review of literature on TOL definition and indicators, working out specific hypotheses regarding the relationship between district and school contexts and TOL.

This chapter (Chapter II) consists of three sections. The first section presents a general overview of influences on TOL. The second section explores the two contemporary approaches to TOL: the approach to policy as source of influence on TOL, and the approach to TOL through professional community. It also addresses conceptual and methodological limitations of these approaches. The third section introduces another conceptual approach, the multi-perspective embedded context model that specifies the relation between contexts and TOL.

Overview of the Literature on Influences on TOL

During the past two decades, several scholars have explored the contexts that influence TOL. They have articulated a number of influential factors or conditions for TOL, assuming that TOL does not take place in a vacuum.

Studies from general social organizational theories (e.g., Little, 1982) have identified school level social or organizational factors affecting TOL. One facilitating condition mentioned in this line is collegial relationship among teachers and professional norms in a particular school. For example, Little (1982) found that norms of collegiality

and experimentation have a significant effect on teachers' learning on the job. Simply put, teachers are more likely to participate in TOL when they feel the support of colleagues and when professional risk taking is encouraged. Collaboration among teachers also has been regarded as an influential factor for teacher learning. Smylie (1995) indicates, "One of the most salient conditions [that may promote learning in the workplace] is opportunities for individuals to work with and learn from others on an ongoing basis" (p. 103). The level and type of teacher collaboration are significantly associated with the effectiveness of TOL (Little, 1990b; Rosenholtz, 1989; Scribner, 1999; Smylie, 1995). For example, Rosenholtz (1989) found that sharing, help-giving and help-receiving, and joint work among teachers related to instruction and students' work, yield statistically significant effects on teachers' reports of opportunities to learn in their schools. The more teachers have opportunities to work together, the more they tend to be engaged in learning opportunities (Darling-Hammond & McLaughlin, 1995).

More recent research in this line focuses on teacher communities as critical influences on TOL. Studies using this concept assume that each school constructs its own teacher community that encourages or inhibits teacher learning. Each community functions in somewhat distinctive structural and cultural contexts, takes varied forms, and makes a range of contributions to teachers' learning. Some teacher communities enhance teachers' motivation and commitment to teachers or student learning while other communities discourage professional learning (Little, 1999b; McLaughlin, 1994). McLaughlin and Talbert (2001) identify three kinds of teacher communities: weak teacher community, strong traditional teacher community, and strong learning teacher community. Weak communities value individualism and low expectations about teachers

and student learning. In these communities, teachers' work and learning are isolated and discouraged. Not all strong communities encourage teachers' learning. Some strong communities value conservatism about learning and instruction. In such communities, teachers' learning opportunities are often incoherent and not directly associated with reform goals. In contrast, strong learning communities value collegiality norms, mutual respect, and faculty responsibility for the accomplishment of learning. In these learning communities, teachers share the sources of motivation and support for their professional learning and engage in new practices and learning consistent with the reform goals.

Some of the literature on school level factors for TOL focuses on principal leadership as a critical influence for TOL. One area in which principals have particular influences on TOL relates to the degree to which the principal supports the development of shared goals that focus on teacher learning and student performance and directs resources toward attaining those goals (Sykes, 2002; Youngs & King, 2002). Sykes (2002) identifies this leadership as "learning-centered principal leadership", arguing that these principals place a high value on teacher learning, seek to connect professional development to the common mission, and consider their role to be the "learner in chief" responsible for creating conditions that encourage continuous professional growth in teachers. Youngs and King (2002) add another area of principal leadership that creates a school culture and structure cultivating teachers' learning. In the research on principal leadership for TOL in urban elementary schools, Youngs and King (2002) found that an effective principal can enhance school's capacity to promote TOL by creating structures or organizing resources for teachers to collaborate and reflect on their practices, establishing shared commitment to school goals, and connecting teachers to external

expertise. While much research points to principals as being key leaders in TOL, it is also true that others can take on facilitative leadership and support roles. Cox (1993) notes that while principals seem to play an important role in clarifying expectations and goals about teacher learning and instructional practices, principals who often know more about a specific practice and facilitate collaborative school cultures can effectively support teachers in their attempts to participate in TOL and change their instructional practices. Such a "facilitative" leadership provides teacher feedback, promotes a positive learning climate, and encourages a sense of community in the school (Clement & Vandenberghe, 2000; Scribner, 1999).

Some studies on school level influences on TOL also underscore teachers' autonomy as another important school organizational factor facilitating TOL (Clement & Vandenberghe, 2000; Poulson & Avramidis, 2003; Smylie, 1988). In particular, involving teachers in making decisions that affect professional development and instructional policy can provide an opportunity for them to examine their current assumptions and practices and increase their responsibilities for professional enhancement (Smylie, 1988). Clement and Vandenberghe's research (2000) shows that working in a school that recognizes autonomous dimensions of TOL makes teachers want to engage in their learning opportunities and get better at what they do. Furthermore, teachers' autonomy is directly linked to collegiality, so that the combination of autonomy and collegiality is more likely to lead to organizational incentives for teacher learning opportunities (Clement & Vandenberghe, 2000; Poulson & Avramidis, 2003).

Although school level social or organizational conditions have long been recognized as significantly influential factors in TOL, increasing attention is being paid

to the broader context of districts, states, and federal level. In particular, recent literature that considers TOL as a key instrument for instructional reform underscores the critical role of district and state policies stimulating and supporting TOL.

Some studies in this line have investigated whether the features of systemic reform that emphasize clear and ambitious standards, aligned assessment systems, and a strong accountability framework have a significant effect on teachers' engagement in learning opportunities and changes in teaching practices. For example, David, McDiarmid, and Corcoran (2000) studied Kentucky's reform efforts to support TOL as part of its systematic reform. In the early stage of the reform, educational reformers in Kentucky expected that strong guidance from the state's standards and accountability systems have an effect on TOL. State policy makers assumed that if performance goals are clear, and accountability for student learning is available, teachers would demand high-quality forms of TOL in order to achieve the goals. However, David et al. (2000) found that Kentucky teachers have adhered to familiar forms of professional development and have been reluctant to embrace promising approaches, such as mentoring and coaching.

Berry and colleagues' (2003) study shows similar results with Kentucky's case. Employing teacher survey and case studies in six states, the researchers found that despite strong state accountability systems, teachers did not change in their learning and practices since they did not fully understand the accountability systems in which they worked. That is, teachers did not necessarily believe that all students could not reach the academic standards posed by the accountability tests, nor did they regard current professional development as better than what they had experienced in the past. The researchers

conclude that teachers' professional learning would be improved when they sufficiently understand the features of accountability systems and what they need to know and implement to influence the results in a serious way.

Other research on Connecticut's reforms found that the state's long-term investment to enhance the quality of the teaching force has a significant effect on teachers' engagement in learning opportunities and changes in teaching practices (Wilson et al., 2001). To create greater capacity for the teaching force, Connecticut built new infrastructure to guide and support teachers, such as mentorship programs for beginning teachers, and the Beginning Educator Support and Training system, while it required a certification system and licensing standards for teachers. The districts were also required to create linked plans for incentives, professional development, and evaluation of teachers' work. The effects of these state policy actions were powerful. Almost half of Connecticut's teachers had participated in the program as beginning teachers, mentors, and assessors and three quarters found that it helped them to reflect on their teaching (Fisk, 1997, cited in Knapp, 2003).

Some of the literature in this line underscores the effects of district policy mechanisms on high quality TOL. That is, some scholars argue that district policy strategies that combine strong district mandates with creation of local capacity, and that increase districts' overall investment in professional learning tend to enhance TOL (Elmore & Burney, 1999; Knapp, 2003; Togneri & Anderson, 2003). For example, New York City Community School District 2 mandated the direction of TOL, and the system of accountability for performance in relation to what students were learning. The district also reallocated substantial resources to support these mandates and sent consistent and

strong signals to all about what teachers needed to know and be able to do. At the same time, the district has strengthened capacity at all levels in the educational system, including school principals and school-based staff developers and created new structures for supporting teaching, such as the Professional Development Laboratory, and inter-visitation among classrooms. The district has also spent a specific proportion of the budget as an expression of the priority it places on teacher learning. Consequently, teachers in this district had numerous and varied opportunities to encounter ideas about improved teaching, and student achievement have showed sustained improvements (David & Shields, 2001; Elmore & Burney, 1999; Fink & Resnick, 2001).

In addition to the effects of educational policy mechanisms, some scholars argue that districts' organizational conditions can have a strong effect on TOL as well. That is, district climate has been considered as a key organizational factor. For example, Spillane and Thompson (1997) found that trust among teachers and between teachers and administrators in a district are associated with TOL. In their research, administrators did not trust teachers to initiate change. Teachers did not trust administrators to support change. Teachers did not trust each other to implement meaningful change. In such a district, distrust diminished opportunities for meaningful and substantive discussion about instruction with their colleagues and collaboration among educators.

District leadership also makes an important contribution to learning for teachers (Elmore & Burney, 1999; McLaughlin, 1994; Rosenholtz, 1989). Rosenholtz's study shows that a learning-minded and instruction-oriented district leadership can stimulate teachers' learning opportunities. In this study, the "moving superintendents," who had strong district goals for improvement, conducted active performance monitoring, and

carefully selected school principals and teachers were more likely to encourage and create plentiful learning opportunities for principals and teachers. In these districts, teachers' engagement in their learning opportunities increased. By contrast, the "stuck superintendents," who directed their districts via uncertain and wavering goals of school improvement did not make efforts to advance neither their own knowledge, nor that of principals and teachers. In these districts, teachers' engagement in learning opportunities was discouraged.

In sum, the literature on TOL provides numerous lists of social and organizational factors at the school level, state or district policy strategies, district administrative conditions that shape TOL. Although these studies have made significant contributions to our knowledge about influences of a particular condition (such as schools' fiscal resources or districts' leadership), these studies, which underscore single level approach to TOL do not account for complex and interactive contextual influences on TOL. In the next section, this study examines strengths and weaknesses of these contemporary approaches to TOL.

Contemporary Approaches to TOL: Strengths and Weaknesses

Studies of influences on TOL have typically adopted two different approaches. One is to consider policy as a source of influence on TOL. This approach focuses on district or state policy effects on TOL, assuming that coherent policy strategies can stimulate and support high quality TOL. Another is to approach TOL through professional community. This approach underscores influences of local teacher community, assuming that particular norms and practices of the teacher community

construct learning environments for TOL. Each approach to TOL has particular strengths and limitations in its conception and methods. The next section will highlight advantages and disadvantages of contemporary approaches to TOL, through the review of two empirical studies.

"Policy" as Source of Influence on TOL

A representative study supporting policy effects on TOL is *The Eisenhower Evaluation Study (EES)* conducted by the American Institutes for Research (AIR). The purpose of the EES was to examine the effectiveness of district policies on TOL in districts that received federal funding from the Eisenhower Professional Development Program. The Eisenhower study was conducted in two parts. The first part was to identify features of high quality TOL and to explore how the features of high quality TOL relate to one another and to teacher outcomes (teachers' knowledge and skills, and teaching practices). The second part was to examine how districts build a vision for the high quality TOL, and plan and evaluate Eisenhower-assisted activities supporting high quality TOL. The current study here will mainly discuss the approach to TOL with the second part of the Eisenhower study.

The Eisenhower study shows that district policy mechanisms are related to high quality TOL (Desimone et al., 2002). The researchers surveyed a nationally representative sample of 400 professional development coordinators in districts funded from the federal government. Using OLS regression, they found that the quality of TOL was more likely to be improved through particular district policy strategies, such as alignment of TOL with standards, multiple funding sources for TOL, continuous

improvement efforts, and teacher involvement in planning for TOL.

Using a path model, the researchers indicate a flow of district policy influences from coherent and effective district vision and implementation to high quality TOL. Specifically, districts which build coherent visions of TOL through the strategies of alignment and co-funding, tend to monitor and manage these visions of TOL using the continuous improvement efforts such as strategies of accountability and teachers' involvement in planning for TOL. Then, these policy strategies result in high quality TOL (such as participation in reform types of TOL, active learning, and the longer duration of activities) (Desimone et al., 2002). In conclusion, the researchers note, "Alignment and coordination activities require districts to be thoughtful about planning and continuous improvement strategies, such as use of data, needs assessment, and evaluation, and that all of these activities can affect the quality of the professional development" (Desimone et al., 2002; p. 1287).

The Eisenhower study focusing on the policy effects as an approach to TOL provides a useful insight into how district policy mechanisms affect high quality TOL. Yet, it has little to tell us about the effects and reactions from inside schools on TOL. School conditions and factors, such as local professional communities can construct directly teachers' work, and furthermore interpret and mediate the effects of the broader contexts (Darling-Hammond et al., 2003; Little, 1999a, 2001; McLaughlin & Talbert, 2001; Rosenholtz, 1989). For example, Darling-Hammond and her colleagues (2002) show that teachers in two different teacher communities within the same district have distinctively different professional experiences and learning opportunities. In addition, they respond differently to professional resources and support at the district level. For

instance, teachers in a teacher community that values individualism may undermine opportunities to assess these professional resources at the district level. However, the policy influence approach tends to ignore these effects of school contexts. By only stressing policy effects in the macro-level, this approach to TOL affords little opportunity to capture the direct and mediated effects of school conditions such as teacher communities.

Another limitation of the research that focuses on the policy influence approach to TOL is founded in its' methodology. These studies often adopt OLS regression techniques with large-scale survey data in order to estimate policy effects. Yet, such techniques are not appropriate for analyzing the inherently hierarchical structures that encompass a variety of hierarchical relationships, such as educational systems (Raudenbush & Bryk, 2002). In the multilevel data, variables exist at more than one level of analysis (e.g., a lower level teacher or school and both lower level and higher level district or state predictors). In this case, studies using OLS regression (including the Eisenhower evaluation study) aggregate teacher or school data to the district or state level. However, this approach discards potentially meaningful lower level variance by aggregating lower level data. For example, the Eisenhower study on the district policy effects on TOL did not care about lower level (teacher or school level) variance. Furthermore, the use of aggregating data tends to increase any relationship found between variables. In the Eisenhower study, the estimation of relationship between average teachers' participation in decision-making of a district and school mean of teachers' response to participation in learning opportunities would be greater than the estimation between teachers level responses to decision-making and to TOL. Such an

aggregation bias reduces random error. Due to these problems, researchers suggest the technique of multi-level modeling to analyze separately the effects of different level variables.

Approaching TOL through Professional Community

In contrast to the approach focused on policy effects on TOL, other studies approach TOL through professional community. One representative study supporting this approach is *The School Restructuring Study* conducted by Little and colleagues. The purpose of this study was to evaluate the progress of reform in schools funded by California's state-sponsored School Restructuring Demonstration Program. The study examined the degree of fit between high school reform and TOL, and the effectiveness of TOL on a school's capacity.

In the school restructuring study, the researchers show that the effectiveness of reform efforts on instructional practices and TOL varies depending on the school conditions (Little, 1999b). Using an in-depth case study of three high schools which participated in the California Restructuring Program, the researchers found that school conditions, in particular collegial norms and practices of local teacher communities interpret and mediate the effects of broader reform efforts. Further, these norms and practices are important sources that encourage teachers to engage in their learning opportunities. For example, strong teacher communities indicate that teachers view their colleagues as open to innovation, respectful of one another, and generally both able and inclined to offer support and good advice. In such communities, teachers are encouraged to share important resources for instruction, to design together new instructional practices,

and to pursue professional learning concerning new reform ideas (Little, 1999b). By contrast, weak teacher communities value comparatively more conservatism, and individualism, and have low expectations about student learning. In these communities, teachers' work and learning are isolated and discouraged. The contents of learning opportunities are often irrelevant to reform goals.

These different features of teacher communities are presented not only in school units, but also across subject departments. The school restructuring study shows different TOL patterns within and across six departments in the three schools. In this study, not all strong teacher communities derive their strength from a commitment of learning. A teacher community of a subject department that preserves traditional beliefs and values related to instruction and learning, inhibit teachers to challenge teaching routines and to approach to learning opportunities about new reform ideas. In the conclusion, Little (1999b) argues that TOL for the successful implementation of ambitious instructional reforms would be enforced within a professional community that sustains professional norms and collegial relationships.

Although the professional community approach to TOL has made significant contributions to our knowledge of dynamic influences of professional communities, this approach has little to tell us about the interactive effects between professional communities and broader educational environments. In other words, professional communities alone may have variable effects on teachers' beliefs and activity, but the professional communities also affect TOL by incorporating with certain broader contextual conditions such as district policies or institutional environments (Knapp, 2003; McLaughlin & Talbert, 2001). For example, Knapp (2003) asserts that professional

communities that encourage teachers' learning can be established or strengthened through districts' consistent messages about professionalism and expectations on instruction. However, the approach to focusing on professional community as an influence on TOL does not capture these interactive relationships. By restricting its scope to the school level, the professional community approach to TOL affords little opportunity to account for the interactive relationships between proximal school conditions and distal contexts.

Further, most intensive case studies of professional community influences on TOL, such as the school restructuring study have been conducted with small samples of teachers and schools. Even though these intensive case studies are able to provide rich and detailed information about the relationships between TOL and professional communities, they provide little diversity across schools (McLaughlin & Talbert, 2001). For example, the result of the school restructuring study that professional communities are significant variables in TOL is on the basis of only three schools. Consequently, it is difficult for these small sample studies to generalize the results of the study to broader groups of teachers.

In sum, it seems clear from the review of these illustrative studies that contemporary approaches to TOL are insufficient in providing a complete understanding of how multiple and embedded contexts affect TOL. These approaches fail conceptually and methodologically to capture the features of embedded contexts due to their single perspective on contexts and to certain methodological limitations. These limitations call for a new conceptual approach taking a deep and broad look at the multifaceted influences on teachers.

Another Conceptual Approach: The Multi-perspective Embedded Context Model

To address the limitations of the contemporary approaches to TOL, this study uses a conceptual framework that considers the multiple and complex influences on TOL, based on McLaughlin and Talbert's multi-perspective embedded context model. This model begins with the assumption that school settings where teachers work are inherently multi-embedded: teachers are embedded within the most proximal zone, the school setting; schools are embedded within a broader administrative zone influenced by district and state factors; and formal educational systems are embedded within institutional environments (McLaughlin & Talbert, 2001). Each of these contexts influences teachers' work. Furthermore, these diverse contexts interact to shape teachers' professional roles and dispositions. In this section, this study discusses several main tenets and advantages of this model for the current study.

Theory and Method must be 'Integrated'

The multi-perspective embedded context model underscores the 'integration' of theoretical perspectives as well as the 'integration' of research methods to examine school contexts for teachers' work. McLaughlin and Talbert (2001) argue that theory and method must be integrated because a single theoretical framework and method tend to miss the embedded character of school contexts. Integration among the theoretical perspectives enables us to see how situated realities of school settings are constructed from diverse contextual conditions and processes. For example, social systems theories can provide insight into how professional norms and communities of practice shape TOL. Organization systems theories may enable us to see how school organization and

governance affect TOL. An institutional perspective may explain the ways in which social class cultures frame TOL. Therefore, integration of theoretical perspectives can provide comprehensive insights into how multiple contexts shape TOL

The multi-perspective embedded context model also calls for an integration of quantitative and qualitative research methods in order to capture teachers' experiences within the multiple embedded contexts. That is, using quantitative measurement techniques enables the detection of overall tendencies of the effects on teachers' schooling experiences at each level of multiple contexts while using qualitative techniques helps account for interdependency or interaction among complex contexts (McLaughlin & Talbert, 2001). Through such a strategic integration of the two research methods, the model offers a contextually rich understanding of teachers' work.

Multiple Theoretical Perspectives

The multi-perspective embedded contexts model suggests taking three multiple theoretical perspectives on school contexts for teachers' work: social system, administrative and organizational, and institutional perspectives. These multiple theoretical perspectives help provide a complete understanding of school contexts for teachers' work (McLaughlin & Talbert, 2001).

Social system perspective

This perspective focuses on school-level interactions among teachers and administrators, as critical contexts of teachers' work. It assumes that professional norms and collegial relations within social systems account for differences in teaching and

learning between schools (Talbert & McLaughlin, 1999). Teacher communities are considered primary social systems of teachers' work. Particular norms and values of these communities frame teachers' practices. For instance, in the teacher community that encourages professional experimentation and supports collaboration among colleagues, teachers are more likely to engage in TOL (Little, 1982).

Administrative and organizational perspective

This perspective underscores administrative contexts (such as subject area departments, school organizational conditions, and state or district policies) as critical influences on teachers' work. It assumes that educational policies, resource levels and allocation patterns, and programs within administrative contexts affect teachers' work. In McLaughlin and Talbert's model, administrative contexts are divided into intra- and extra-school aspects. Intra-school administrative contexts encompass school organizational resources, governance, and leadership that affect teachers' work. For example, involving teachers in making decisions that affect their learning opportunities and instruction can increase their responsibilities for professional enhancement, and then increase teachers' engagement in TOL (Smylie, 1988). Extra-school administrative contexts encompass state or district policies and organizational contexts at the district level. State and district policies nurture or discourage teachers' work. For example, standards-based reform strategies that aim to increase coherence in frameworks for curriculum, accountability, and professional development may stimulate and support improvement in teachers' work. Apart from educational policies, differences in the organizational contexts at the district level may matter for teaching and learning. Spillane

(2004) captures this point nicely in his study of how district officials mediate state policy through "sense-making" or interpretation of policy. Hence, not only do resource decisions at the district level affect policy implementation but also the meanings that district officials glean from external policies in processes of interpretation and understanding.

Institutional perspective

Multiple perspective embedded contexts model also suggest that teachers' work can be shaped by institutional environments outside of school systems. In other words, institutional contexts (such as norms of higher education institutions, subject areas' cultures, local labor markets' conditions, and community and parents' culture or demographics) of K-12 schooling frame the works of teachers in ways quite independent of educational policies and professional communities' cultures (Talbert & McLaughlin, 1999).

For example, subject disciplines' cultures within the same school constitute significantly different teachers' beliefs about instruction. For instance, social studies teachers tend to view their fields as changing continually, and generating new knowledge, while mathematics teachers tend to see their subject as relatively constant, assuming the same content and pedagogy regardless of student or organizational contexts (Grossman & Stodolsky, 1994). Parents' social economic conditions and local communities' circumstances are also critical institutional contexts that shaped the quality of teaches' work life (McLaughlin & Talbert, 1999). Teachers in suburban schools, serving students from middle-class and well-educated families may tend to have high expectations to student performance while teachers in urban schools, serving students from widely

diverse social class, race, and language contexts may tend to have low expectations.

Consequently, the multi-perspective embedded context model suggests that through taking these three multiple theoretical perspectives (social system perspective, administrative and organizational perspective, and institutional perspective), we can understand more completely about diverse influences of each school context on teachers' work.

Nested Contexts vs. Embedded Contexts

Another tenet of this model is the emphasis on 'embeddedness' of contexts. McLaughlin and Talbert (2001) distinguish embedded from nested context. Nested context, which is commonly used in social studies, presume linear and hierarchical relationships among contexts, with influences transmitted from higher-level to lower-level settings. The effects of nested contexts add up to affect teachers' work. For example, states' systematic reform strategies such as professional accountability would result in efforts by districts to give high quality learning opportunities for teachers, and accordingly lead to high rates of teachers' participation in learning opportunities and improved teaching practices.

By contrast, the view of embedded contexts does not accept the assumption of simply additive effects among contexts, because it assumes interactive and transactive relationships among multiple contexts. Rather than the effects of contexts necessarily transmitted in a linear way from higher level to local practices, the influence arrow might point not only from policy to practice, but also from practice to policy; or from organizational features to policy.

For a more complete understanding of the notion of embedded contexts, it is necessary to note three assumptions. First, broader contexts of schooling, such as state or district administrative contexts or institutional cultures are experienced directly in local practices. That is, higher-level educational policies directly permeate micro-school settings and teachers' work. Cultures or norms of local communities also frame directly teachers' daily school life in ways quite independent of official school policies and social relations in schools. For instance, a state policy on mathematics instruction can directly affect teachers' use of particular texts and assessments, regardless of school actions. Incoherent instruction of policies at the district level can discourage teachers' practices, even in a supportive school environment with strong principal leadership. In this sense, McLaughlin and Talbert (2001) note, "Elements of educational culture from multiple school contexts are incorporated, or enacted, by individuals in school settings" (p. 145).

Second, local teacher communities and school settings in the embedded contexts yield substantially different teachers' work and cultures within the same school organization, district administration, and state policy system. That is, teachers' work can be differently constructed by social relationships among colleagues, disregarding broader contexts conditions. For example, despite rich district conditions and supportive leadership, the positive influences of these macro contexts conditions are not transmitted automatically into positive teachers' professional experiences in a professional community that values individualism and privacy (McLaughlin & Talbert, 2001). The privacy norms and practices of such teacher communities may have different influences on teachers' work, mediating positive effects of the district and school leadership on teachers' experiences.

Finally, the embedded contexts assume that cross-domain linkages among contexts conditions can affect teachers' work. That is, different combinations of context conditions can have qualitatively different impacts on teachers' work (McLaughlin & Talbert, 2001). For instance, states' mandated demands for higher standards for instruction may have the desired effect in school settings where the school culture emphasizes the value that all students have the ability to learn and where there is ongoing teacher training about the best ways to implement higher standards. Yet a much less desirable set of outcomes may occur in a school setting where teachers do not believe that their students have the capacity to meet higher standards or where teachers are unsure of how to change their teaching to achieve the new standards (Talbert & McLaughlin, 1999).

Consequently, these three assumptions of embedded contexts- permeability of macro contexts; diverse influences of local teacher communities; and interactive effects among contexts - make a distinction of embedded contexts from the nested contexts, which is a more common view of school contexts. That is, while the notion of nested contexts which assumes the influences of higher-level contexts conditions directly add up to teaching practices relying on a "chain of command"(Talbert & McLaughlin, 1999), the notion of embedded contexts assume substantial influences of each contexts conditions at the macro- and micro-school contexts levels, and the interactive effects among diverse contexts conditions. In such manners, the multi-perspective embedded context model enables us to understand the influences of multiple embedded contexts that are related one to another in complex ways and interact to shape teachers' work.

McLaughlin and Talbert's multi-perspective embedded context model has several advantages for research on the relationship between school contexts and teachers'

work. First, it enables us to model influences on teachers' work in a comprehensive fashion, by simultaneously accounting for the effects of multiple contextual conditions. That is, integration of three different theoretical perspectives (institutional, administrative and organizational, social system) enables us to inclusively consider a wide variety of contextual factors that relate to teachers' work.

Second, the multi-perspective embedded context model makes a contribution to a better understanding of contextual influences on teachers' work via the construct of embedded contexts in contradistinction to the simple nested model. Three notions of embedded contexts - permeability of macro contexts; influences of local teacher communities; and interactive effects among contexts - make it possible to conceptualize highly interactive and quite complex contextual influences on TOL.

Therefore, it is a useful framework for studying the influences of the complex and highly interactive school contexts on teachers' work. Drawn from the main tenets (multiple theoretical perspectives and embedded contexts) of the multi-perspective embedded context model, the current study develops the hypotheses regarding the relationship between TOL and contexts in the next chapter.

CHAPTER III
LITERATURE REVIEW (PART II)

This chapter continues the exposition of the literature on TOL, working out specific hypotheses regarding the relationship between district and school contexts and TOL. In this first section, this study presents the definitions of TOL and indicators of effective TOL used for this study. The second section provides five hypotheses and rationale to test them, as grounded in the literature, and as a basis for use of the multi-perspective embedded context model.

TOL Definitions and Indicators

While numerous studies have emphasized the importance of TOL for improving the quality of teaching and student achievement, to say that teachers should have learning opportunities in order to implement instructional reform successfully leaves much unspecified and under-explored. Do instructional improvements relate to the formalized TOL generally provided from districts or to the spontaneous learning opportunities occurring in teachers' daily work? What evidence demonstrates particular forms of effective TOL for the improvement of teaching and learning? As expectations about TOL increase, these issues and conceptions require clarification.

Defining TOL

TOL is often equated with the term 'professional development', which is defined in turn as the formal learning opportunities that are pre-planned and designed in some way to improve the skill, knowledge, and dispositions of teachers (Bellanca, 1995; Fenstermacher & Berliner, 1985). These learning opportunities unfold through

participation in the formalized structures within the educational system (e.g., federal, state, and district agencies, universities, professional networks, and others). Formal learning opportunities take place outside of classroom practice and are often mandated. A vast array of specific activities, such as district-or school-sponsored workshops, university courses, summer institutes and seminars encompass these learning opportunities.

Some scholars have asserted that learning opportunities for teachers need to be broadened to include not only formal but also informal learning activities, pointing out that formal learning opportunities are narrow and detached from real-time learning during the normal workday (Fullan, 1995; Knapp, 2003). Fullan (1995) says, "Professional development is the sum-total of formal and informal learning pursued and experienced by the teacher in a compelling learning environment under conditions of complexity and dynamic change" (p.265). In contrast to formal learning opportunities, informal learning opportunities are less structured and planned. The goals and objectives may or may not be obvious. These learning opportunities often occur while a teacher is teaching, when a teacher reflects on a particular instructional activity, or when a teacher discusses content or pedagogical issues with colleagues. For instance, a teacher might have learning opportunities through an unprepared reflective discussion among colleagues about strategies to improve the performance of struggling readers during a lunch break. A teacher also might have learning opportunities by reading and processing cues from students during a lesson and adjusting her practice accordingly. In this sense, informal learning opportunities tend to be more spontaneous and reflective in that they are typically generated out of real-time experiences (Smylie, 1995). Since these learning

opportunities take place within teachers' practice itself, they tend to draw more easily implications for their daily work or in their individual classroom.

Yet, defining TOL as conceptions that include only these formal or informal learning opportunities is still not enough, for explaining the nature of teacher learning may vary from teacher to teacher. That is, formal or informal learning opportunities may be provided, but not all teachers learn from these opportunities (Sykes, 2005). Some teachers may learn from them, but others may not, depending on an individual teacher's psychological aspects or an individual teacher's social interactions.

TOL can be constructed through an individual teacher's psychological aspects. The prior knowledge and beliefs that teachers have heavily influence what teachers learn and how they interpret and organize their own learning opportunities (Borko & Putnam, 1996; Bransford, Brown, & Cocking, 1999). The logic behind this point is that, because teachers can best judge their own learning needs, this enables them to construct their own learning opportunities based on prior knowledge and beliefs about learning. For example, a teacher may be intrinsically motivated to engage in learning opportunities when they feel the deficits about their content knowledge and pedagogical skill (Scribner, 1999).

A cognitive psychological perspective on teacher learning makes a significant contribution to this notion of TOL (e.g., Bransford et al., 1999; Confrey, 1990; Putnam & Borko, 2000). In this perspective, teachers are active learners who reconstruct their existing knowledge structures, rather than passively assimilating the learning process. All knowledge teachers experience is constructed by the teachers. Teachers do not simply absorb. Due to the personal activity and the inevitable autonomy of intellectual work done by teachers, the concepts, skills, and beliefs they create are unique (von Glasersfeld,

1984). Thus, teachers as active learners may accept, transform, or even disregard diverse learning opportunities and sources through their own knowledge and beliefs about teaching, learning, and subject-matter. For example, some teachers may feel the needs and responsibilities to promote professional knowledge and skills, and engage in learning opportunities, given the provision of learning opportunities. In contrast, others may not be motivated by their own needs, and do not engage in learning opportunities.

In the cognitive psychological perspective, reflection is a key component to facilitating teachers' learning opportunities. Teachers transform their knowledge, and beliefs through reflection (Confrey, 1990; Schon, 1983). In reflection, teachers determine whether previous ways of thinking are workable given new information learned through experience and interaction (Cobb & Bauersfeld, 1995). When dissonance arises between what was previously thought and new experiences, personal reflection is critical in spurring the creation of new ways of thinking, believing, and acting. Reflection may also account for dissonance in ways that do not require such new developments. In this way, reflection assists teachers in making sense of their knowledge and practices, seeing the difference between new information and current beliefs, questioning those experiences, and then feeling the need to engage in learning opportunities. Without reflection to facilitate learning opportunities, teachers would be forced to either build up an increasing collection of unrelated experiences or reject all experiences that do not perfectly align with their prior knowledge and beliefs. In this sense, TOL is most likely to occur in favorable learning environments, in which teachers have been encouraged to reflect on teaching experiences.

TOL also can be constructed through social interactions with colleagues. Social

interactions, such as discussion concerning problems of practice where teachers work strongly affect teachers' engagement in TOL (King & Newmann, 2000; Lieberman, 1996; Scribner, 1999; Smylie, 1995). The logic here is that TOL springs not only from the individual teachers' thought process, but also from social interaction with colleagues because teachers can construct ideas related to instruction and student work while working together with other colleagues.

This concept of TOL is significantly influenced by social learning theories, which focus on the social relationship that comprises learning (e.g., Bandura, 1986; Vygotsky & Cole, 1978). In this view, teachers learn from and with one another. Knowledge is not considered as an individual property but is in nature communal and constructed through social interaction (Lave & Wenger, 1991). The view of knowledge as distributed, situated, and socially constructed highlights the importance of others as well as the cultural and social environment in the process of learning (Vygotsky & Cole, 1978). Colleagues, especially experienced ones, play important roles in the learning and development of an individual. For example, a teacher's current level of understanding can be elevated to a more complex level when that teacher socially engages with colleagues who possess more advanced levels of understanding (such as veteran teachers). Therefore, teachers are more likely to learn and change their practice if they engage in rich deliberations and conversations with colleagues about their practice (Spillane & Zeuli, 1999).

In this perspective, teacher communities are a key factor in supporting teachers' learning and practices. Teacher communities serve as psychological tools that mediate teachers' thoughts and practices (McLaughlin & Talbert, 2001). These communities

motivate teachers to engage in learning in order to develop and sustain learners' identities in the communities in which they participate. By participating in teacher communities, teachers have opportunities to participate in practices of inquiry and learning, and to develop disciplinary practices of argument and discourse. Furthermore, the communities grow and change over time through the participation of their members. In this sense, the community is both a place for members to acquire knowledge of the community, and a place where participants collectively generate new knowledge and practices within the community. Teachers, therefore, tend to learn by engaging in a "culture" or "teacher community" that supports favorable social interaction. For instance, teachers can learn about the ways to change their teaching practices by trying new ideas surfaced in peer observations, helpful feedback, or grade-level conferences around particular problems of instruction.

Therefore, TOL can be defined using the four concepts: formal, informal, psychologically constructed, and socially constructed TOL. Figure 3-1 presents the concepts of TOL defined for this study. TOL is divided into two different types of learning opportunities - formal and informal. These learning opportunities can also be constructed psychologically or socially.

Specifically, ① represents formal learning opportunities shaped through individual teacher's prior knowledge and beliefs about teaching, learning, or subject-matter. For example, formal learning opportunities such as seminars or university courses may be provided, and some teachers who believe that these learning opportunities are useful for improving teaching practices may take on and learn from these formal opportunities.

However, other teachers who believe these learning opportunities are not useful for teaching practices may not participate or learn from them.

Figure 3.1 TOL Definition used for This Study

② Informal & Psychologically Constructed TOL	① Formal & Psychologically Constructed TOL
④ Informal & Socially Constructed TOL	③ Formal & Socially Constructed TOL

② represents informal learning opportunities shaped through individual teacher's prior knowledge and beliefs about teaching, learning, or subject-matter. For example, informal learning opportunities, such as reading an educational journal or conducting and independent study may be given, and some teachers who believe these informal learning opportunities are useful for promoting teaching practices may learn from them. However, other teachers who believe that these informal learning opportunities are not useful for teaching practices may not learn from them. Therefore, both formal & psychologically constructed TOL (①) and informal & psychologically constructed TOL (②) are more likely to occur when teachers are encouraged to reflect about ways of their knowledge and practices.

③ represent formal learning opportunities constructed through social interactions with colleagues. For example, formal learning opportunities such as school-

level subject workshops may be provided, and some teachers in teacher communities which encourage rich deliberations and conversations with colleagues may be more likely to take on these formal learning opportunities and learn from them. However, teacher communities which value individualism and do not encourage interactions with colleagues are less likely to promote these learning opportunities.

④ represent informal learning opportunities shaped through social interactions with colleagues. For example, informal learning opportunities, such as for participation in an informal study group may be offered, and some teachers may experience these informal learning opportunities and learn from them. However, other teachers in teacher communities which value individualism and do not encourage interaction with colleagues may be less likely to experience these learning opportunities. Hence, both formal & socially constructed TOL (③) and informal & socially constructed TOL (④) are more likely to occur in a school culture or teacher community that supports favorable social interaction.

In sum, provision of learning opportunities and learning are often treated as one and the same, but this is obviously not the same. When we define TOL as conceptions that include not only these provisions of formal or informal learning opportunities but also psychologically or socially constructed learning opportunities, a more in-depth discussion of school contexts that affect these provisions of learning opportunities as well as constructed learning opportunities opens up.

Literature on Effective TOL Indicators

During the past decade, a considerable body of literature has identified the

features of effective TOL for improving teaching practices and student learning (e.g., Darling-Hammond & McLaughlin, 1995; Elmore, 2002; Hawley & Valli, 1999; Knapp, 2003; Locks-Horsley, Hewson, Love, & Stiles, 1998; Sykes, 2002). For example, Knapp (2003) describes the main features of effective TOL based on a range of theoretical and empirical studies.

> To be powerful, professional learning experiences should: 1) Concentrate on classroom teaching that emphasizes high learning standards and on evidence of students' learning to standard. 2) Focus on building teachers' pedagogical content knowledge. 3) Model "preferred" instructional practices (e.g., active learning), both in classrooms and in adult learning situations. 4) Locate professional learning in collaborative, collegial - and generally school-based- learning environments. 5) Offer rigorous and cumulative opportunities for professional learning over time. 6) Align with reform initiatives (p.172).

Still, much of the literature on the features of effective TOL is not grounded in empirical evidence about its effects on teaching practices or on student learning. Furthermore, some studies about effect of TOL are compromised, by methodological limitations that rely on a variety of approximations for indicators of student learning or overestimate actual implementation due to teachers' self-reports of their teaching practices (Knapp, 2003). Nevertheless, there are several useful empirical studies that explore indicators of effective TOL and/or how effective TOL is measured.

Content-focus

One line of empirical research on effective TOL focuses on the content. What teachers actually learn matters for changes in teaching practices and student achievement. These studies indicate that TOL is effective on teaching practices and student learning when it is directly linked to specific content knowledge and how students learn that

content (e.g., Cohen & Hill, 2001; Garet, Porter, Desimone, Birman, & Yoon, 2001; Ingvarson, Meiers, Beavis, 2005; Kennedy, 1998).

For example, in a study of mathematics instructional reform and TOL in California, Cohen and Hill (2001) show that TOL focused on specific mathematics curriculum content impacts classroom practices and student achievement. In this study, the researchers examine the effects of two categories of the TOL curriculum provided from the formal workshops. One is specific mathematics curriculum teachers would be teaching to students, which focused on student mathematics thinking, instructional standards, and mathematics subject matter. Another is general curriculum, which is not focused directly on mathematics curriculum, such as gender equality in the math classroom. Using cross-sectional teacher-level data with OLS regression, the researchers found that teachers who participated in formal learning opportunities focused on specific mathematics curriculum were more likely to adopt new, reform-oriented teaching practices.

Further, TOL focused on specific mathematics curriculum is also positively associated with student achievement. In the second part of the research, Cohen and Hill (2001) explore whether students of teachers who received learning opportunities focused on subject matter and state assessments achieve at higher levels on the state mathematics achievement test. Using student achievement on the California Learning Assessment System, the researchers found that schools were more likely to have high student achievement when teachers took part in formal learning opportunities that focused on subject matter and state assessments. By contrast, when teachers spent most of their time on learning opportunities studying general curriculum, their students did not perform as

well. These findings suggest that TOL is effective on teaching practices and student achievement when it focuses on the specific subject curriculum focal to state assessments, student mathematics thinking, and subject matter they would teach.

Another study examining student achievement on the California Learning Assessment System also supports the effects of the content-focused TOL. Wiley and Yoon (1995) explored the relationship between 'reform-oriented curriculum TOL' and teachers' classroom practices and student performance in mathematics. In their research, two outcome variables were used to measure the 'reform-oriented curriculum TOL'. One variable was the degree of teachers' familiarity with reform-oriented documentation, and another was teachers' participation in in-service training involving curriculum activities (e.g., grade-level workshops led by mentor teachers, or mathematics specialists). The study found that students perform at higher levels across all grades when their teachers participated in opportunities to learn about specific and standards-based curriculum and instruction.

Some case studies also show that TOL focused on specific content has an effect on teaching and learning. McCutchen and colleagues (2002) examined the relationship between TOL focused on reading-content and teaching practices, and student learning. In this study, the researchers provided formal opportunities for one teachers group to learn specific reading content knowledge (such as knowledge of word sounds and structure), whereas the other group had no additional learning opportunities regarding specific subject content. At the end of the school year, teachers who had learning opportunities focused on specific reading content knowledge spent more time explicitly using reform-oriented instructional strategies such as building blocks of words and language and

encouraged students to seek different methods of finding answers. Moreover, these teachers' students did better on tests of word reading, spelling, and comprehension. By contrast, teachers who did not have additional learning opportunities on specific reading content knowledge did not try out new practices in the classroom.

In sum, several large-scale studies and small case research indicate that to be effective on teaching practices and student learning, the contents of TOL matter. These contents of TOL should focus on specific subject knowledge, subject curriculum standards, and understanding about students' learning such as student assessments that require higher-level thinking skills.

Active Learning: Pedagogy of TOL

The empirical studies about the effective TOL focus not only on the content but also on the pedagogy of the TOL. That is, how teachers have been taught also matters for changes in teaching practices and student achievement. These studies indicate that improved teaching practices and student achievement result when teachers engage in intellectual and active learning opportunities that allow teachers to understand deeply any new instructional approaches (Garet et al., 2001; Ingvarson et al., 2005; Lieberman, 1996).

In the evaluation study of the Eisenhower program for professional development (1996~1998), for example, Garet and colleagues (2001) show that active learning opportunities provided formally or informally have significant effect on the changes in teaching practices. In this study, the researchers explore the relationship between teachers' knowledge, skills, and teaching practices and six features of high

quality TOL. These six indicators encompass (1) the degree to which the activity is focused on subject content knowledge; (2) the degree to which the activity is active; (3) the degree to which the activity is coherent with other activities, standards, and assessments; (4) the form of the activity (reform type vs. traditional type); (5) the degree to which the activity emphasizes collective participation of teachers from the same school, department, or grade level; and (6) the duration of the activity. In particular, active learning includes four dimensions in their research: (1) observing teaching; (2) planning for classroom implementation; (3) reviewing student works; and (4) presenting, leading, and writing. On the basis of a nationally representative sample of teachers, Garet and colleagues (2001) found that content-focus, coherence of learning, and active learning had a direct effect on teacher outcomes variables (teachers' knowledge, skills, and teaching practices). The other features, which were often regarded as structural features of TOL (such as duration, collective participation, and reform activity) had indirect effects on teacher outcomes variables. These findings suggest that TOL is more effective when it focuses not only on content specific but also on active learning in terms of the pedagogy of the TOL.

Ingvarson and colleagues (2005) also confirm the importance of active learning in the effectiveness of TOL. In the study of the Australian Government Quality Teacher Program, they (2005) examined whether the features of effective TOL are related to teachers' knowledge, practice, and efficacy, and student learning outcomes. To measure effective TOL, the researchers used six indicators of TOL: (1) emphasis on content, (2) active learning, (3) the amount of time for feedback, (4) collaborative examination of student work, (5) follow-up and ongoing assistance in the classroom, and (6) total hours

of TOL. In particular, active learning includes two dimensions: reflecting on practice, and testing new teaching practice. Using the teacher-level survey data, the researchers found that content-focus, active learning, and time for follow-up have significant direct effects on teacher and student outcomes. Feedback and collaborative examination have the least influence. Thus, Ingvarson et al. (2005) also support that active learning is an important indicator of TOL to improving teaching practices and students learning.

In sum, several empirical studies emphasize teachers' active learning as an important indicator of high quality learning experiences for teachers. This active learning mainly includes talking back, raising questions, observing expert teachers, engaging in local experiments, study groups and research, and leading discussion. By engaging in these activities, teachers are encouraged to criticize ideas and resources, and to construct their own learning on the basis of their experience, and in turn teachers upgrade their knowledge and skills and change their teaching practices (Garet et al., 2001; Sykes, 2002).

Duration

Some studies on effective TOL argue that how TOL is designed (structure of TOL) is also an important aspect of high quality TOL, even though this structure is not directly linked to effects on teaching practices nor to student learning. In particular, the time teachers spend for TOL is expected to impact teacher and student outcomes when it is related to the core aspects of effective TOL (i.e., content-focus, or active learning) (Cohen & Hill, 2001; Garet et al., 2001; Parsad, Lewis, & Farris, 2001).

Garet and colleagues (2001) explore the relationship between teaching practices and two dimensions of time for TOL: total contact hours of TOL, and the span of time

which the activity was spread. The researchers found that time span and total hours had less impact on teachers' practices than core features of TOL (such as content-focus or active learning opportunities), but they had substantial effects indirectly on teacher outcomes by affecting the substance aspects of TOL. That is, a longer duration of TOL can provide opportunities for in-depth discussion of content and pedagogical strategies while span time (learning activities that extend over time) enables teachers to try out new practices in the classroom and obtain feedback on their teaching.

The important influences of combination of time spent and content focused or active learning are found in the Cohen and Hill's study (2001). They found that teachers who spent more time on mathematics from a new curriculum or assessment and on how to teach the subject, reported practices that were more closely linked to reform objectives. Even large investments of time in less content-focused workshops were not associated with more of the practices that reformers proposed. Further, shorter-term learning opportunities did not allow teachers to learn about either student curricula or their work on assessments, and these teachers did not report practices close to reformers' goals.

In summary, these studies about the effectiveness of duration of TOL suggest that duration is also an important indicator of effective TOL. In particular, TOL is likely to be more effective if it is sustained over time and involves a significant number of hours. These dimensions of time for TOL influence indirectly teacher or student outcomes by combining with the substantive aspects of TOL.

From the several empirical studies, three indicators of effective TOL appear. The first indicator would be content focus TOL. It includes the dimensions of specific subject knowledge, standards, and learning about student learning such as student

assessments. When teachers have such learning activities, they can understand new instructional approaches, reflect more deeply on their own practices and assumptions, and make substantive changes in their instructional practices. The content-focused TOL can be provided formally or informally. In particular, content-focus TOL is more likely to relate to the formal learning opportunities provided from educational institutions directly linked to the state and to district standards, assessments, and curriculum guidance.

The second indicator of effective TOL would be active learning. Active learning means that teachers actively participate in meaningful opportunities to engage with new instructional ideas and resources. When teachers have such learning activities, they can understand new instructional approaches, more deeply reflect on their own practices and assumptions, and make substantive changes in their instructional practices. More importantly, when teachers experience such active learning, they are more likely to teach in ways that the policy expects to provide for students (Cohen & Barnes, 1993). Opportunities for active learning can take a number of forms, including the opportunity to observe expert teachers and to be observed teaching; to plan how new curriculum materials and new teaching methods will be used in the classroom; to review student work in the topic areas being covered; and to lead discussions and engage in written work (Garet et al., 2001; Lieberman, 1996). Active learning can be provided formally or informally. Further, these learning opportunities are more likely to be constructed through social interaction with colleagues such as peer-coaching or mentoring. For instance, Garet and colleagues (2001) emphasize active learning which happens when teachers meet informally with other colleagues or leaders in order to discuss or review classroom implementation.

Finally, the duration of TOL is also an important indicator of effective TOL. Although it does not exert a strong direct effect on teacher or student outcomes, duration can enhance effects of content or pedagogy of TOL. The duration includes two dimensions such as total number of contact hours spent in the learning opportunities, and period of time which the activity was spread.

Several large-scale quantitative studies reviewed in this chapter capture formal or informal learning opportunities, and socially constructed TOL. However, it is difficult to articulate the aspect of how teachers construct TOL through their prior knowledge and belief. Qualitative studies with in-depth interviews are required to learn more about the psychological aspects of TOL. Therefore, the current study does not examine the psychological aspects of TOL empirically because the SASS data do not provide information on this aspect. Time span, one aspect of duration used in the previous research, is also omitted because it is not available in the SASS dataset.

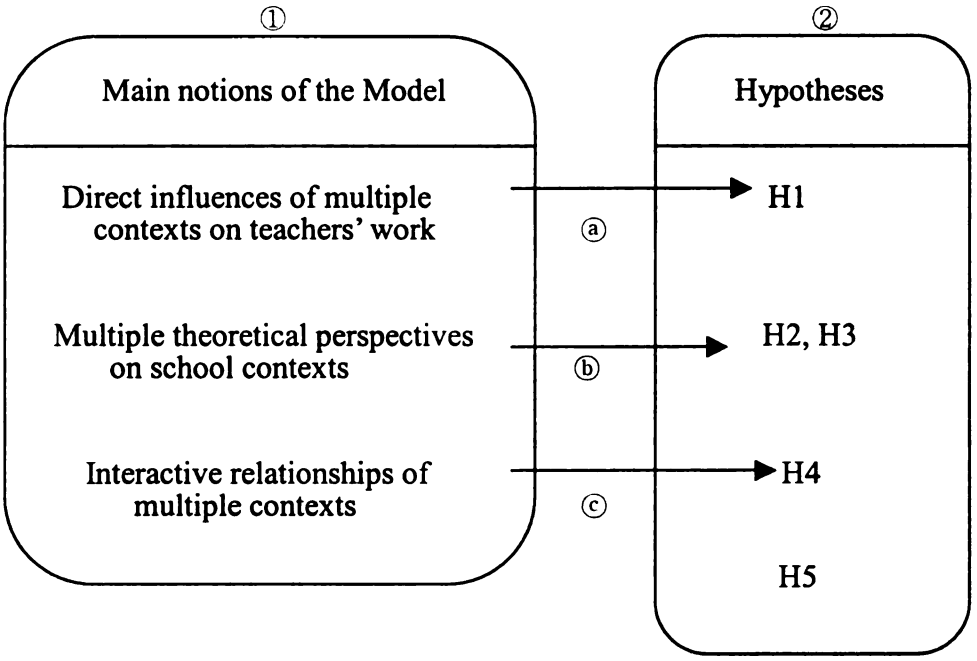
Hypotheses about the Relationship between District and School Contexts and TOL

The purpose of this study is to explore how contexts relate to three TOL indicators, which were identified in the previous section. This study proposes that the multi-perspective embedded model reviewed in Chapter II is a useful conceptual framework for exploring the relationships between embedded contexts and the three TOL indicators. Drawn from the main notions of the model (for example, the notions of multiple theoretical perspectives and embedded contexts), this study develops and tests five hypotheses regarding the relationship between contexts and TOL. It illustrates but does not fully model an embedded context, multi-perspective approach by concentrating

on district and school levels. Other contexts such as states or subject departments also contribute to variations in TOL (McLaughlin & Talbert, 2001), but the primary interest of this study is to demonstrate the utility but not fully represent the model that McLaughlin and Talbert developed. The current study is restricted to these two levels based on the data available in the SASS survey.

Figure 3-2 shows how the main notions of the multi-perspective embedded context model are operationalized into hypotheses for this study.

Figure 3-2 Main Notions of the Multi-Perspective Embedded Context Model and Five Hypotheses



Panel ① represents the main notions of the multi-perspective embedded context model. The first assumption is direct effects of multiple contexts on teachers' work. A second assumption is multiple theoretical perspectives (social system perspectives, administrative perspectives, and institutional perspectives) on school contexts. A third assumption is interactive effects of multiple contexts on teachers' work. Panel ② represents five hypotheses operationalized from these assumptions of the multi-

perspective embedded context model. Specifically, based on the first notion that each of the multiple contexts directly influences teachers' work, this study develops the first hypothesis that three TOL indicators (content-focus, active learning, and duration) vary across schools and districts (see the arrow ⓐ). In other words, this study assumes that district and school level contexts directly contribute to the variation of TOL.

Second, based on the second notion that multiple theoretical perspectives on school contexts provide a more complete understanding for teachers' work, this study develops the second hypothesis that social system contextual factors, administrative contextual factors, and institutional contextual factors are associated with TOL at the district-and school-level (see the arrow ⓑ). In other words, this study expects that the variations of TOL may be explained by a wide variety of contextual factors, drawn from the three theoretical perspectives (social system, administrative, and institutional perspectives) on teachers' work.

Third, based on the third notion of interactive relationships among multiple contexts, this study develops the fourth hypothesis that the interactive relationships between district level administrative contexts and school level social system contexts influence the three TOL indicators.

Finally, this study also assumes that the influence of contexts at the school and district level on TOL vary across the three TOL indicators. Although this hypothesis is not directly drawn from the model, several recent empirical studies report that some contextual factors have different effects on TOL, depending on the aspects of TOL(e.g., Desimone et al., 2002; Scribner, 1999). In the following section, this study provides the rationale for theses five hypotheses in detail.

The Rationale for Hypothesis 1

The multi-perspectives embedded context model (McLaughlin & Talbert, 2001; Talbert & McLaughlin, 1999) assumes that each of the multiple contexts directly affects teachers' work. For example, school settings may yield different professional cultures. States or districts' policies also may affect directly teachers' daily school life. Further, the cultures of local communities or economic conditions of labor markets may permeate teachers' belief about teaching practices.

Based on this idea of the model, the current study assumes that school-and district-level contexts significantly influence the variability of TOL. A large body of scholars who have looked inside schools (e.g., Bryk & Driscoll 1988; Little 1982, 1999a, 1999b ; Metz 1990; Newmann, 1996; Rosenholtz 1989) found that TOL varies from school to school, affected by characteristics of teacher communities, strength of school mission, or school organizational conditions. For example, different levels of collegiality norms, respect, and trust among teachers generate significantly different school cultures that either bolstered or eroded teachers' sense of professional learning (Little 1982; McLaughlin 1994). Also, district differences in policy strategies or organizational contexts contribute to the variations in TOL. Recent studies, including those by Spillane (2004) and Firestone et al. (2004) confirm the importance of district influences, while a great body of prior research has shown the importance of school level effects. For example, Firestone and colleagues (2004) through an analysis of three urban school districts in New Jersey, show that district leaderships in relatively similar demographic and policy contexts take very different approaches to offering TOL.

Building on this rationale, the first hypothesis about the relationship between

contexts and TOL states that:

H_1: Three TOL indicators (content-focus, active learning, duration) vary across schools and districts.

The Rationale for Hypothesis 2

Another notion of the multi-perspective embedded context model, *multiple theoretical perspectives on school contexts provide a more complete understanding for teachers' work*, is important for the current study because it enables us to consider a wide variety of contextual factors related to TOL. The model suggests three theoretical perspectives to assessing school contexts; 1) the social system perspective assuming that professional norms and collegial relations within social system contexts, such as teacher communities make differences in teaching and learning between schools, 2) the administrative and organizational perspective, assuming that educational policies, resource levels and allocation patterns, and programs within administrative contexts affect teachers' work, 3) the institutional perspective, assuming that cultures or conditions of institutional environments (such as local community circumstances or cultures, and parents' socio-economic conditions) permeate teachers' experiences.

Building on these ideas of the model, this study presumes that three categories of contextual factors must be associated with TOL at the school level.

Social system contextual factor

Professional learning community From the social system perspective, professional community is often considered a critical context of teachers' work. A

substantial body of research argues that professional communities characterized by shared beliefs about the school mission and collaboration with peers are essential for promoting TOL (Bryk, Camburn, & Louis, 1999; Little 1982, 1990b; Newmann, 1996).

Yet, some recent studies assert that effects of professional community on TOL require considerably more than mere cordiality among staff (Little, 1999b; McLaughlin & Talbert, 2001). For example, McLaughlin and Talbert (2001) distinguish traditional communities from learning communities, assuming that not all professional communities encourage TOL. In the empirical research combining case studies and large-scale surveys, they found that learning communities that value innovation and learning and encourage staff to design new practices are more likely to support teachers' on-going inquiries and to organize professional learning collectively. Hence, the current study assumes that "professional learning community" is a critical contextual factor for TOL.

School organizational factors

From the administrative and organizational perspective, several school organizational factors are regarded as critical contexts related to TOL. Drawing on the existing theoretical and empirical literature, this study identifies five organizational factors related to TOL.

Supportive principal leadership: It is frequently observed that principal leadership plays a key role in nurturing TOL by creating learning environments. However, specific aspects of principal leadership that promote TOL are elusive to pin down. Some analysts argue that facilitative principal leadership who leads to a better school climate is associated with promoting TOL (e.g., Clement & Vandenberghe, 2000; Zheng, 1996).

Other studies have found that instructional supervision of principals, guiding achievement of school goals, and close monitoring of instruction, are more likely to motivate TOL (e.g., Scribner, 1999; Youngs & King, 2002). Further, other scholars underscore the attitude of principals who place a high value on teacher learning and seek to connect TOL to school improvement (e.g., Sykes, 2002). This study assumes that supportive leadership style may be significantly associated with TOL.

Teacher autonomy Two forms of teacher autonomy are in general highlighted for teachers' learning and practices. One is faculty influence, which means the influence collectively wielded by faculties over school policy-making. Another is individual autonomy, which means teachers' freedom to determine planning and teaching in their classrooms (Ingersoll & Alsalam, 1997). Proponents of increases in faculty influence and individual autonomy assert that teachers will be highly committed to their learning and instruction if they participate in making decisions about instruction and school policy (Ingersoll & Alsalam, 1997; Poulson & Avramidis, 2003; Rosenholtz, 1989). However, some scholars suspect that individual autonomy in the self-contained classroom serves to sustain teachers' isolation from peers and to limit their sense of community, which brings about negative effects on TOL (Little, 1990a). The current study assumes that the directions of effects of these two forms of teacher autonomy (faculty influence and individual autonomy) on TOL may be different respectively.

Teachers' workload It is often presumed that teachers' workload negatively influence the possibility of creating TOL. Over-working places limitations on available teachers' time and energy to participate in learning opportunities. Little (1990a) notes two aspects of teachers' workload related to TOL. One is teacher-student ratio. The

greater the number of student teachers must teach, the greater the amount of time required to evaluate student assignments, or manage student paperwork, and accordingly the time for teachers' learning opportunities decrease. Another aspect of teachers' workload is planning and preparation burden created by course-loads. The greater the amount of time required to prepare for daily work, the less time available to reflect on how that work is going or to pursue new ideas, materials, or methods. Given these arguments, the current study expects the results of the negative relationships between teachers' workload and TOL, in terms of two aspects.

School size School size has been shown to have a significant effect on the teachers' work and student outcomes, yet the direction of the effect is inconsistent. Two conflicting perspectives can be found in the literature on the effects of school size. One perspective underscores the positive effects of increased size, drawing on the assumption of economies of scale. Another perspective highlights negative effects, centering on the more impersonal social interactions as impeding success (Lee, Smith, & Bryk, 1993). Recently, research evidence is accumulating to support the argument that teachers' learning decreases in bigger schools. Greater school size is shown to be associated with reduced interpersonal relationship and teacher collaboration on interdisciplinary units, and increased teachers' resistance to innovation (Klonsky, 2002). Based on these research findings, the current study assumes that there is a negative relationship between bigger school size and TOL.

School level Elementary and secondary schools generally exert different influences on teachers' work as a result of the differences in structural and institutional factors (McLaughlin & Talbert, 2001; Firestone, Herriott, & Wilson, 1984; Miller, 2003).

In American education, it is often assumed that teachers in secondary schools that generally have larger enrollments and a more complex and differentiated structure (i.e., departmentalized) than do elementary schools are less likely to participate in TOL.

Institutional contextual factors[1]

From the institutional perspective, TOL also can be shaped through the broad and diverse institutional contexts outside of educational systems. Although little research has been conducted on the effects of institutional contexts on teacher learning, two contextual factors are considered as critical institutional contexts for TOL at the school level.

Local Community Circumstances It is often observed that local community' socio-economic circumstances or cultures are highly salient to teachers and constitute key contexts of their work. For instance, in suburban schools, local communities tend to have much more impact on the schools and give abundant material resources such as additional funding, amenities, and professional support (Metz, 1990). Teachers in these schools are inclined to have low expectations for student performance and teachers' willingness to learn increase. By contrast, local communities located in metropolitan areas tend to have fewer resources to share with schools (Metz, 1990). Teachers in these schools are inclined to perceive their students as lacking in motivation, and instituted a large number of rules and procedures governing curriculum, and testing procedures (Metz, 1990; Smylie, 1994). In such an environment, teachers' willingness to learn may decrease.

[1] The term "institutional context" is often used by sociologists, political scientists, and economists to describe the phenomena that individual's preferences and choices are shaped by institutional settings. These institutional conditions generally include economic institutions (such as the competitive markets), government regulations, the rules and norms of the formal organizations (For more review, see North, 1990; Ostrom, 1990). McLaughlin and Talbert extend the concept of "institutional context" to the contexts including the broader cultural arena, local communities' circumstances, and parents' demographics and educational preferences that can affect teachers' work.

For this reason, the current study assumes that local community circumstances have significant relationships with TOL.

Diversity of students' race some ethnographic studies (e.g., McLaughlin & Talbert, 2001; Metz, 1990) note that diversity of students' body in terms of race, culture, and language within a school is significantly related to teachers' expectations of student performance and sense of professional effectiveness. For example, Metz (1990) found that teachers working in the schools that have racially diverse student body often assume that minority students are less likely to be successful for their academic achievement because of cultural obstacles attributed to language barriers, learning styles, or any other factors. In these schools, teachers' willingness to learn is more likely to decrease. By contrast, McLaughlin and Talbert (2001) argue that diversity of students' body can create pressure for development and teacher learning. In other words, with diversity of students' race, culture, and language, teachers have been more often challenged to innovate and are required to participate in more learning opportunities in order to increase these students' learning. Therefore, the current study expects the positive relationship between diversity of students' race and TOL.

Building on these ideas, the second hypothesis about the relationship between contexts and TOL states that:

H_2: At the school level, social systems contextual factors (professional learning community), organizational contextual factors (such as supportive principal leadership, teacher autonomy, teachers' workload, school size, and school level), and institutional contextual factors (such as local community circumstances and diversity of students' race) are associated with the three TOL indicators.

The Rationale for Hypothesis 3

The notion of multiple theoretical perspectives on school contexts also enables us to identify several district level contextual factors associated with TOL. Despite skepticism about the potential of district policy actions for supporting educational improvement, recent studies on school reform indicate that districts have considerable human, social, and physical resources to influence teaching practices and learning opportunities (e.g., see Desimone et al. 2002; Elmore & Burney 1999; Firestone et al. 2004; Hightower, Knapp, Marsh, & McLaughlin 2002; Spillane, 2004). Drawing on the existing theoretical and empirical literature, this study assumes that six administrative contextual factors are significantly related with TOL at the district level.

Administrative contextual factors

Districts' efforts for continuous improvement Several researchers assert that district efforts for continuous improvement (for example, establishing school goals, using performance indicators for school improvements, or accountability systems) contributes to increasing TOL (Desimone et al., 2002; Knapp, 2003; Rosenholtz, 1989). For example, districts' efforts for school goal setting have substantial effects on increasing TOL. In a study of eight districts, for example, Rosenholtz (1989) found that in districts requiring schools to set instructional goals, teachers were more likely to have improved TOL and high levels of commitment. Districts' efforts for school goal setting help schools and districts to communicate about target local priorities. Through these communications, districts and schools can provide consistent learning opportunities aligned to district goals and standards to teachers (Knapp, 2003; Rosenholtz, 1989).

District accountability strategies such as performance indicators also lead to increased teachers' learning through providing useful information about teachers' weaknesses (Desimone et al., 2002; Gusky, 1997). These accountability strategies have the primary assumption that would participate in learning opportunities to make better progress when they are held accountable for outcomes of TOL and when TOL is evaluated based on teacher and student outcomes (Desimone et al., 2002). Using a nationally representative district level data, Desimone and colleagues (2002) found that district strategies of continuous improvement (including performance indicators for school improvements) have statistically significant relationships with increased opportunities for active learning and increased teachers' learning opportunities for at risk students. Given these empirical supports, the current study expects that district efforts for continuous improvement are positively related to TOL.

District coordination of multiple funding sources for PD Some evidence indicates that coordination of multiple funding sources significantly affects the quality of TOL (Desimone et al., 2002; Togneri & Anderson, 2003). For example, Desimone et al.(2002) found that district coordination of multiple funding sources is the most important variable to explain differences in the types of TOL (i.e., workshop, mentoring, and coaching). Case studies also indicate that a pervasive use of external resources enables support for diverse types of TOL, such as mentoring or inviting expertise (Togneri & Anderson, 2003).

However, other researchers point to the weak linkage among multiple funding sources that can yield fragmented and uncoordinated local practices. Further, over-dependence on external funding sources has been criticized for making long range

planning difficult (Massell, 1998). The current study expects negative relationship between district coordination of multiple funding sources and TOL.

Time and financial support Although district resources such as time and money for TOL are frequently considered obvious correlates for teachers' engagement in learning opportunities, there is little evidence about the effects of resources on TOL. One case study (David et al., 2000) in a study of three districts in Kentucky shows that teachers in a district which paid stipends for in-service teacher professional development are more likely to pursue reform ideas grounded in curriculum and instruction. Darling-Hammond & McLaughlin (1995) note that by having adequate time for learning, teachers can engage in opportunities to acquire, practice, and reflect on new concepts and skills, as well as opportunities to collaborate and interact with peers. Also, funding for additional personnel or for additional hours for existing personnel would enable teachers to participate in new programs, and to collaborate around instruction. Based on these arguments, the current study assumes that two resources (time and money) for TOL would be positively related to TOL.

Professional development for Principals It is frequently observed that districts' provision of professional development programs for principals is associated with improved TOL. For example, the research on New York Community District #2 shows that principals engaging in professional observation and inter-visitation tend to support and encourage teachers' engagement in learning opportunities (Elmore & Burney, 1999; Stein, D'Amico, & Israel, 1998). The primary assumption about these strategies is that if districts seek to augment the expertise of principals through formal professional development, instructional capacity of principals can support teachers' professional

learning.

Yet, the specific aspects of professional development for principals that foster TOL are less clear. Some studies document that instructionally-focused training programs for principals, (such as learning opportunities for critical inquiry, refining pedagogical repertoires, rigorous discourse, and internal visitation) make improvements for TOL (Knapp, 2003; Rosenholtz, 1989; Sykes, 2002). Hence, the current study assumes that principals' professional development "focused on instructional matters" would constitute meaningful assistance for TOL.

Decentralization of PD Some analysts believe that district decentralization of responsibilities for both planning and implementing TOL will promote TOL. The assumption here is that locally guided decision-making motivates teachers to participate in their learning opportunities and helps address the knowledge and skills relevant to teachers' needs (Desimone et al., 2002; Guskey, 1997; Loucks-Horsley et al., 1998).

However, the effects of district decentralization have been highly contested. Recent studies indicate that too much control at the school site over TOL is as dangerous as providing too much control at the district level (Knapp, 2003). For this reason, Knapp (2003) advocates a balance of responsibilities that enables schools and districts to complement each other's strengths and weaknesses in the design and conduct of TOL. Based on this rationale, the current study assumes that decentralization of PD would be significantly related to TOL.

District Size In general, large districts have been associated with both inefficiencies and ineffectiveness in teacher quality and instructional practices. Some analysts assert that students in large districts too often are taught by novice teachers with

emergency certification or by experienced teachers who have systematically been deprived of TOL throughout their careers (Darling-Hammond, 1995).

Other studies argue however that successful investment for TOL in large districts can lead to improved TOL (Desimone et al., 2002; Firestone, Mayrowetz, & Fairman, 1998; Hannaway & Kimball, 1998). That is, large districts can provide high quality TOL due to their better infrastructure for planning and delivering TOL, their investments of greater amounts and sources of funds, and having more access to expertise for supporting TOL. For example, Desimone et al. (2002) show that larger districts are more likely to provide much aligned TOL with standards, and to have multiple sources and personnel such as subject-area specialists for supporting TOL. Given the inconsistent empirical findings about the impact of district size, the current study will examine the direction of the effects of district size on TOL in an exploratory way.

District level institutional contextual factors

Parents' socio-economic condition Some recent studies argue that districts with a higher proportion of students in poverty are more likely to provide higher quality professional development for teachers. For example, Desimone et al.'s (2002) study show that high-poverty districts can employ more continuous improvement efforts for professional development because they tend to receive funding from multiple federal programs. The existence of multiple sources of funding may create greater opportunities for co-funding and create opportunities for supporting teachers' learning (Desimone et al., 2002). Furthermore, high-poverty districts are expected to conduct more continuous

improvement in TOL than other districts because the funding supports from these federal programs require the district's use of accountability strategies.

However, it is frequently assumed that teachers in high-poverty districts generally often become demoralized and lose their enthusiasm for the difficult task of improving student performance under difficult conditions (Darling-Hammond, 1995). That is, institutional contexts such as parents' low socio-economic conditions are more likely to negatively affect teachers' attitudes toward students and instructional practices. Based on this rationale, the current study assumes that a significant relationship between parents' socio-economic conditions and TOL would be found at the district level.

Building on these ideas, the third hypothesis about the relationship between contexts and TOL states that:

H_3: At the district level, <u>administrative contextual factors</u> (such as districts' efforts for continuous improvement, district coordination of multiple funding sources for PD, time and financial support, professional development for principals, decentralization of PD, and district size) and <u>institutional contextual factors</u> (such as parents' socio-economic conditions) are associated with the three TOL indicators.

The Rationale for Hypothesis 4

Another main notion of the multi-perspective embedded context model is 'interactive relationships among multiple contexts'. That is, different combinations of context conditions can have qualitatively different effects on teachers' work (McLaughlin & Talbert, 2001). For instance, states' mandates for higher standards for instruction are more likely to lead to the positive effect in school settings where the school culture

emphasizes the value that all students have the ability to learn and where there is ongoing professional learning about the best ways to implement higher standards. Yet, a much less positive effect on outcomes may occur in a school setting where teachers do not believe that their students have the ability to meet higher standards or where teachers do not know how to change their teaching to achieve the new standards (McLaughlin & Talbert, 2001).

Based on this idea of the model, the current study assumes that there are interactive relationships between district administrative contexts and school level social system contexts and these interactive relationships make different effects on three TOL indicators. There must be other interactive relationships among multiple contexts, but a full explication of all possible interactions is beyond the scope of this study. The current study only examines interactive relationships between district administrative contexts and social system contexts in order to explore the possibility of interactions between these two contextual conditions.

Some studies (Knapp, 2003; McLaughlin & Talbert, 2001; Rosenholtz, 1989) underscore these interactive relationships between district level administrative contexts and school level social contexts. For example, Knapp (2003) notes that particular district policies can support and guide professional learning through strengthening professional communities. For instance, teacher communities would encourage teachers' learning if districts establish school goals, send the consistent message about the importance of learning, or set norms of collegiality.

Building on these ideas, the fourth hypothesis about the relationship between contexts and TOL is that:

H_4: Interactive relationships between professional learning community and districts level administrative contextual factors affect three TOL indicators.

The Rationale for Hypothesis 5

The fifth hypothesis of this study is that the influences of contexts at the school and district level on TOL vary across the three indicators of TOL. This hypothesis was not drawn from the multi-perspective embedded context model, but some empirical studies (Desimone et al., 2002; Scribner, 1999) indicate the different contextual influences on TOL depending on the different aspects of TOL. For example, Desimone et al. (2002) found that teachers' participation in planning professional development is more related to active learning for teachers than other aspects of professional development while district level planning is more related to longer time for professional development. Scribner's (1999) case study also shows that school wide factors, such as professional communities or teachers' autonomy are more likely to affect teachers' active learning than content-focused TOL because local professional communities can encourage teachers to engage in active learning, such as intellectual discussion and meaningful feedback occurring during the process of classroom instruction rather than formal learning environments for teachers. These variations across three TOL indicators may provide some useful implications for policy strategies for improving the quality of TOL. Thus, it is reasonable to develop and examine this hypothesis in this study. The current study assumes, based on some empirical supports, that the effects of district and school contextual conditions on TOL are diverse across the three TOL indicators (content-focus, active learning, and duration).

Building on these ideas, the fifth hypothesis about the relationship between contexts and TOL predicts that:

H_5: The relationships between contextual conditions and TOL vary across the three TOL indicators.

In Chapter V, hypotheses 1 to 5 are tested to determine the relationship between district and school contexts and TOL. The general conclusions reached by reviewing the results of this study are discussed in Chapter VI.

CHAPTER IV
RESEARCH METHODS

As noted in the previous chapter, the current study adopts the multi-perspective embedded context model as a conceptual approach. This model calls for an integration of quantitative and qualitative research methods in order to capture teachers' experiences within the multiple embedded contexts. That is, using quantitative measurement techniques enables detection of overall tendencies of the effects on teachers' schooling experiences at each level of a large number of contrasting multiple contexts while using qualitative techniques helps account for interdependency or interaction among complex contexts (McLaughlin & Talbert, 2001)

The current study suggests that using a new quantitative technique (Hierarchical Linear Model) with a nationally representative data set also enables large-scale comparative analysis of embedded contexts. Specifically, the nationally representative Schools and Staffing and Survey (SASS) enables the McLaughlin and Talbert model to be extended to the analysis of national samples of teachers within national samples of schools and districts in embedded school contexts. Further, applying the Hierarchical Linear Model (HLM) to the multi-perspective embedded context model captures not only overall tendencies of the effects on teachers' experiences at each level but also direct or interactive influences of embedded contexts. For example, in the preliminary step, HLM can detect which contextual levels make differences in TOL, by estimating models that partition the variation in TOL across educational level at the same time. In the next step, the HLM can detect what specific factors within each contextual level affect TOL, by building an explanatory model to account for this variability of TOL. Then, HLM can

allow estimation of interactive models, in which the effects of diverse contexts interact with other contexts to affect TOL. Therefore, this study extends the multi-perspectives embedded context model methodologically, by utilizing the HLM methodology with nationally representative SASS data.

Based on such a study rationale, this chapter describes the research design and methods. It begins with a description of the data source used for this study. It is followed with a discussion of construction, and properties of the measures used in each research model. This chapter concludes by describing the statistical methods applied for each particular analysis.

Data Sources

To estimate a model of the relationship between TOL and embedded district and school contexts in a broader context, this study uses the 1999-2000 Schools and Staffing Survey (SASS) sponsored by the National Center for Education Statistics (NCES). The SASS data is a cross-sectional and large-scale data set that includes public, private, and charter schools. The SASS data selects a nationally representative random sample of public schools stratified by state, sector, district, and school level. A detailed description of the procedures used to gather these data is found in Tourkin, et al. (2004).

The 1999-2000 SASS includes public sector sample data on 42,086 teachers in 8,432 school and 4,690 districts. However, not all schools had teachers who participated in the study, not all districts had schools that participated in the study, and not all teachers could be matched to schools and districts. Thus, the filtering procedures left a total of 32,951 teachers in 6,718 in 3,992. Since the purpose of this study is to estimate the

national population of teachers, schools, and districts, this study use weighting functions assigned by NCES to each teacher, school, district. The weighting produces unbiased estimates of the national population of public school teachers, including adjustment for non-response using respondents' data, and adjustment of the sample totals to the frame totals to reduce sampling variability (See Tourkin, et al., 2004) Therefore, the current study uses a weighted data set of 12,159 districts, 68,841 schools, and 2,402,862 teachers.

The SASS provides an advantage over other available datasets in the number and range of schools and districts included in the survey. It is the only national data set in which large portions of the survey target schools and districts serve as distinct units of analysis. Thus, the SASS data offer researchers a powerful tool to evaluate TOL. Second, the SASS data is also useful because it facilitates multilevel analyses and links data provided by schools with their respective teachers, principals, and districts. Finally, the SASS provides appropriate data for analyzing not only teachers' learning opportunities and teachers' perceptions of their school social and organizational conditions but also districts' organizational characteristics and policies related to TOL. Yet SASS lacks the full range of variables one would need to replicate all prior research on TOL. For example, the SASS data do not provide information on time span, which is one of variables of TOL used in the previous studies.

Measures

This section describes the variables used to measure effective TOL, district contexts, school contexts, and teacher background. In addition, this section also discusses the process of how each of these variables is constructed. A summary of the 2000 SASS

items used in constructing these measures is presented in Appendix A. This study begins by describing the three dependent outcomes measuring three TOL indicators.

Measures of TOL

In Chapter III, this study identifies three indicators for effective TOL. The first indicator is content-focus, which means that TOL should be directly linked to specific subject knowledge, subject curriculum standards, and understanding about students learning. A second indicator is active learning, which means that TOL should be active engagement in meaningful discussion, planning, and practice. A third indicator is duration, which include two dimensions such as total number of contact hours spent in the learning opportunities, and period of time which the activity was spread. This study will use theses three indicators as measures of TOL.

The first variable of TOL is **content-focus,** which indicates the degree to which teachers participate in learning opportunities focused on content. It is constructed by summing three items that indicated if a teacher had a learning opportunity coincided with : (1) in-depth study of the content in the teachers' main assignment field; (2) content and performance standards in teachers' main assignment field; (3) student assessment, such as methods of testing, evaluation, and performance assessment.

The items used for the content focus variable correspond nearly to the content focus indicators discussed in the literature. For example, all items used in the current study were used in similar items by Cohen and Hill (2001). Garet et al. (2001) and Ingvarson et al. (2005), and Wiley and Yoon (1995) also included the items concerning in-depth study of the content and content standards.

Factor analysis[1] confirms that all of these items are associated with a single factor indicating an eigenvalue of 1.593 and explaining 53.11 percent of the combined variance. This statistical evidence suggests that the three items work together to measure content focus TOL. The scale value for the content focus TOL variable ranges from 0 to 3, with 3 indicating that teachers have participated in learning opportunities focused on content to a large extent, and 0 indicating that teacher have not participated in learning opportunities focused on content at all.

A second variable of TOL is **active learning**, which indicates the degree to which teachers engage in active and meaningful learning opportunities such as observation and presentation. This variable is constructed by summing four items that indicated whether or not a teacher engaged in learning opportunities of : (1) observational visits, (2) individual or collaborative research professionally, (3) mentoring, peer observation, and coaching, and (4) presenting in workshops or conferences.

The items used for this variable correspond with those used by Garet et al. (2001) and Ingvarson et al. (2005). For example, the first item, observational visits was used in similar form by Garet et al. (2001) and the second item, individual or collaborative research, was also used in Garet et al.'s study (2001) and in Ingvarson et al.'s study (2005). The third item, mentoring or peer observation was used by Garet et al. (2001), and by Ingvarson et al.(2005). The fourth item, presenter in workshops was used by Garet et al. (2001).

---

[2] A factor analysis is an important tool when working with variables that seem to measure similar constructs. It is employed to define specific constructs, or factors, from the available variables. Through this analysis, a few general constructs, or factors, can be extracted from a set of variables. This study employs a principal components analysis as part of an exploratory factor analysis. The principal components analysis involves the estimation of the variance that each variable shares with the other variables. This procedure assumes that all of the variance in a given measure can be explained by the factors resulting from the analysis.

Factor analysis confirms that all of these items are associated with a single factor indicating an eigenvalue of 1.551 and explaining 33.77 percent of the combined variance. This statistical evidence suggests that the active learning can be measured using these four items. The scale value for this variable ranges from 0 to 4, with 4 indicating that teachers have engaged in active and meaningful learning opportunities to a large extent, and 0 indicating that teachers have engaged in active and meaningful learning opportunities at all.

The previous studies have used two variables as measure of duration (for example, Garet al., 2001; Ingvarson et al., 2005). One is 'total number of hours' that teachers spent in activities related to the professional development program. Another is 'time span' that indicates the total time the professional development activity covered. To deal with indicating the proximate duration, both variables (total number of hours and time span) should be used. However, the current study only includes **total hours** as a third variable of TOL because the SASS data do not provide information on time span.

It would be ideal to examine total number of hours teachers spent in all components of the activity related to the TOL during the 1-year period. But the items in SASS only cover the time teachers spent in the six areas of TOL. Thus, to construct this variable, I summed 6 items concerning the hours teachers spent in the six areas of TOL. The dimensions covered by these items include how many hours teachers spend on the following activities in the past 12 months: (1) in-depth study of the content in the teachers' main assignment field; (2) content and performance standards in teachers' main assignment field; (3) student assessment, such as methods of testing, evaluation, and performance assessment; and (4) methods of teaching, (5) discipline and management in

the classroom, and (6) use of computers for instruction. (each item scale: 0 = did not participate; 1 = 8 hours or less; 2 = 9 to 16 hours; 3 = 17 to 32 hours; and 4 = 33 hours or more) The reliability analysis confirms that it is possible to conclude that the scale of this variable is reliable for the purpose intended. The reliability estimates for the SASS data for total hours of TOL variable is 0.66. Table 4-1 provides the operational definitions of each of three TOL variables.

Table 4-1 Dependent Variables

Variable Names	What Is Measured
Content-focus	The degree to which teachers participate in learning opportunities focused on content (three dimensions: in-depth study of the content, content and performance standards, and student assessment).
Active learning	The degree to which teachers engage in active and meaningful learning opportunities (four dimensions: observation, individual and collaborative research, mentoring, and presentation).
Total hours	Total hours that teachers have spent on TOL during the 1-year period in the six areas: content, standards, student assessment, teaching methods, classroom management, and computers for instruction.

School Level Variables

This study assumed one social system contextual factor (professional learning community), five school organizational contextual factors (supportive leadership, teacher autonomy, teacher's workload, school level, and school size), and two institutional contextual factors (community circumstances and diversity of student's race) are associated with three TOL indicators at the school level. These factors are operationalized into eight school level variables. The scales of school level variables are based on items

appearing in a number of studies about school level social or organizational features associated with teachers' learning or practices advocated by traditional social system theorists and organizational theory (e.g., Bryk & Driscoll, 1988; Darling-Hammond & McLaughlin, 1995; Grodsky & Gamoran, 2003; Little, 1999a).

First, professional learning community is measured by one **professional learning community variable** indicating the extent to which school staff collaborates concerning instruction and share beliefs about school mission (McLaughlin & Talbert, 2001). This variable is a mean of five items. The dimensions covered by these items include the extent to which staff members (1) share beliefs about the central mission of the school, (2) cooperate with fellow staff, (3) coordinate course content, (4) plan with the library media specialist for the integration of media services into teaching, and (5) principals talk frequently about instructional practices. The items used here are based on components of professional learning community developed by McLaughlin and Talbert (2001) and these items appeared in some studies on staff cooperation or collaborative climate for supporting teacher learning (e.g., Byk et al., 1999; Smith & Rowley, 2005).

Factor analysis confirms that all of these items are associated with a single factor (or construct) indicating an eigenvalue of 3.234 and explaining 72.6 percent of the combined variance. The internal consistency of this scale produces an alpha reliability .59. The school-level measure for this variable is created by taking the mean of teachers' responses within a school and aggregating at the school level. The scale value for this variable ranges from 1 to 4, with 4 indicating that school staff collaborates concerning instruction and shares beliefs about school mission to a large extent, and 1 indicating that school staff does not.

Second, supportive leadership is measured by one **supportive leadership variable** indicating the extent to which principals are perceived to employ a supportive leadership by teachers (Byk et al., 1999; Smith & Rowley, 2005). This variable is a mean of five items. The dimensions covered by these items include the extent to which the principal (1) is supportive, (2) lets staff members know what is expected of them, (3) backs up when teachers as needed, (4) communicates what kind of school s/he wants to the staff, and (5) school staff are recognized from teachers a job well done. The items used here are derived from the studies about principal leadership supporting learning environment (e.g., Smith & Rowley, 2005; Zheng, 1996). For example, all items used in this study were used in identical form by Smith & Rowley (2005) to access supportive administrations.

Factor analysis confirms that all of these items are associated with a single factor (or construct) indicating an eigenvalue of 3.234 and explaining 64.68 percent of the combined variance. The internal consistency of this scale produces an alpha reliability .76. The school-level measure for this variable is created by taking the mean of teachers' responses within a school and aggregating at the school level. The scale value for this variable ranges from 1 to 4, with 4 indicating that principals are perceived to employ a supportive leadership to a large extent, and 1 indicating that principals are not.

Third, teacher autonomy is measured by two variables, one indicating the degree of teachers' collective faculty influence over school policy, and another indicating the degree of teachers' individual autonomy over classroom policy (Ingersoll & Alsalam, 1997). **Collective autonomy** is a mean of seven items. The items cover a wide-range of policy dimensions including (1) performance standard, (2) curriculum, (3) in-service

professional development programs, (4) evaluation, (5) hiring, (6) discipline policy, and (7) school budget. All items used in this study correspond with the items used by Ingersoll & Alsalam (1997).

Factor analysis confirmed that all of these items are associated with a single factor indicating an eigenvalue of 3.205 and explaining 45.78 percent of the combined variance. The internal consistency of this scale produces an alpha reliability .80. The school-level measure for this variable is created by taking the mean of teachers' responses within a school and aggregating at the school level. The scale value for this variable ranges from 1 to 5, with 5 indicating a great deal of teachers' collective autonomy over school policy, and 1 indicating no influence.

Individual autonomy is a mean of six items. The items cover a wide-range of classroom policy dimensions including (1) course texts, (2) course content, (3) teaching technique, (4) evaluating students, (5) disciplining students, and (6) determining homework. All items used in this study were used by Ingersoll and Alsalam (1997) in identical form to measure individual autonomy.

Factor analysis confirms that all of these items are associated with a single factor indicating an eigenvalue of 2.921 and explaining 48.69 percent of the combined variance. The internal consistency of this scale produces an alpha reliability .77. The school-level measure for this variable is created by taking the mean of teachers' responses within a school and aggregating at the school level. The scale value for this variable ranges from 1 to 5, with 5 indicating a great deal of teachers' individual autonomy over classroom policy, and 1 indicating no autonomy.

Fourth, teachers' workload is measured by two variables, one indicating the

amount teachers scheduled school time for planning, and another indicating the number of students per teacher in the school (Little, 1990a). **Planning time** is a composite continuous variable created by NCES. The school-level measure for this variable is created by aggregating at the school level and standardized. **Teacher-student ratio** is a continuous variable that indicates the number of students per full-time equivalent teacher in the school, also created by NCES.

Fifth, **secondary school** variable is used in order to indicate the effect of school level because the current study assumes that teachers in the secondary school are less likely to engage in TOL. Secondary school is a dummy variable, which takes the value 1 if the school is secondary, 0 otherwise.

Sixth, school size is measured by **student total enrollment**. Student total enrollment is the total number of students enrolled in the school in grades K-12.

Seventh, **suburban** variable[3] is used to indicate community circumstances because the current study assumes that teachers in suburban schools are more likely to engage in three TOL indicators. Suburban is a dummy variable that indicates the school is located at suburban area.

Eighth, there is little research that measures 'diversity of students' race' at the school level. Although there might be several ways to measure 'diversity of students' race', the current study uses **percent of minority students** as a measure of 'diversity of students' race'. It is a continuous variable indicating the percent of minority students within schools.

Table 4-2 provides the operational definitions of each of school level variables

[3] Conceptually, it makes sense that 'suburban' is a district-level variable rather than school-level variable. However, due to multicollinearity with 'percent of free lunch students' variable at the district level, this study uses 'suburban' as a school-level variable.

used in this study.

Table 4-2 School Level Variables

School variable	What Is Measured
Professional learning community	The extent to which school staff collaborates concerning instruction and share beliefs about school mission (Range from 1 to 4)
Supportive leadership	The degree to which principals are perceived to employ a supportive leadership style (Range from 1 to 4)
Collective autonomy	The degree of teachers' collective faculty influence over school policy (Range from 1 to 5)
Individual autonomy	The degree of teachers' individual autonomy over classroom policy (Range from 1 to 5)
Planning time	The amount of which teachers have scheduled school time for planning (Range from 0 to 50 hours)
Teacher-student ratio	The number of students per full-time equivalent teacher in the school
Secondary school	Dummy variable indicating secondary school (second =1, otherwise = 0)
Student total enrollment	The total number of students enrolled in the school in grades K-12
Suburban	Dummy variable that indicates the school is located at suburban area (suburban = 1, otherwise = 0)
Percent minority	Continuous variable indicating the portion of minority students within schools

District Level Variables

This study assumed that administrative contextual factors (time and financial resources for TOL, districts' coordination of multi-funding sources, professional development for principals, district efforts for continuous improvement, decentralization of professional development, and district size) and institutional contextual factors (parents' socioeconomic condition) are associated with three TOL indicators at the district level. These factors are operationalized into eleven district level variables. The scales of

district level variables are based on items that have appeared in recent discussions of school district leadership in TOL and research on school district reform (for example, David et al., 2000; Desimone et al., 2002; Elmore & Burney, 1999; Togneri & Anderson, 2003).

First, time and financial resource for TOL is measured by four variables (time support I, time support II, money support I, money support II), which indicate whether teachers receive time or financial support for their professional development. **Time support I** is a dummy variable, which takes the value 1 if the teacher receives release time for teaching (i.e., regular teaching responsibilities are temporarily assigned to someone else). **Time support II** is a dummy variable, which takes the value 1 if the teacher receives scheduled time in the contract year for professional development. **Monetary support I** is a dummy variable, which takes the value 1 if the teacher receives stipends for professional development. **Monetary support II** is a dummy variable, which takes the value 1 if the teacher receives reimbursement of college tuition, conferences, or travel for professional development.

Second, district coordination of multiple funding sources is measured by co-funding variable, which indicates the extent to which districts combine multi-funding sources for professional development (Desimone et al., 2002). **Co-funding** variable is constructed by summing seven items. The dimensions covered by these items include whether districts use (1) state professional development funds, (2) special project budgets, (3) school improvement funds, (4) Title I, (5) Eisenhower program, (6) other federal programs, and (7) private sector grants for TOL. The items used here were used in similar form by Desimone et al. (2002). They construct a co-funding variable measuring the

extent to which districts coordinate funding sources, by summing 10 items. In the current study, the co-funding variable is a composite variable with a range from 0 to 7, which indicates the total number of funding sources for TOL that districts have combined (of a possible 7).

Third, districts' provision of professional development for principals is measured by principal learning variable, which indicates the extent to which districts provide professional development opportunities for principals involving instructional matter. **Principals learning** variable is constructed by summing five items. The dimensions covered by these items include whether districts provide (1) evaluation and supervision, (2) technology for planning, decision-making, and reporting, (3) curriculum and assessment, (4) networking opportunities, and (5) serving as mentors.

The items used here are derived from studies of the training programs of principals for augmenting the instructional capacity of district and school leadership (Elmore & Burney, 1999; Fink & Resnick, 2001; Rosenholtz, 1989). Factor analysis confirms that all of these items are associated with a single factor indicating an eigenvalue of 2.49 and explaining 49.74 percent of the combined variance. The scale value for this variable ranges from 0 to 5, with 5 indicating that the district provides professional development programs for principals involving instructional matter to a large extent, and 0 indicating which to no support.

Fourth, districts' effort for continuous improvements is measured by two variables, with one indicating whether the district uses performance indicators to evaluate the progress of students, and another indicating whether the district reward or sanction related to performance (Desimone et al., 2002). **Performance indicator** is a dummy

variable, which takes the value 1 if the district uses performance reports. **Accountability** is a dummy variable, which takes the value 1 if the district use rewards or sanctions related to performance.

Fifth, district decentralization of professional development is measured by teachers' responsibility for PD variable, which indicates the extent to which teachers have primary responsibilities for the in-service professional development activities. **Teachers' responsibility for PD** is constructed by summing three items. The dimensions covered by these items include whether teachers have primary responsibility for professional development in (1) deciding the content, (2) designing and planning the activities, and (3) conducting the activities.

The items nearly correspond to the items used by Desimone et al. (2002). They used the items concerning teacher involvement in planning and conducting the learning opportunities in order to measure the degree of teachers' participation in decision-making for PD. Only teachers' responsibility for TOL in deciding the content is new for this study. Factor analysis confirms that all of these items are associated with a single factor (or construct) indicating an eigenvalue of 1.995 and explaining 66.49 percent of the combined variance. The scale value for this variable ranges from 0 to 3, with 3 indicating that teachers have primary responsibility for professional development to a large extent, and 0 indicating that teachers do not have.

Sixth, district size is measured by the total number of students enrolled in the district[4]. **District total enrollment** is a continuous variable indicating the total number of

[4] There are several ways to measure 'district size'. For example, Hannaway and Kimball (1998) measure district size by dividing the total number of students by four levels (such as districts with enrollments between 300 and 2500, between 2501 and 10,000, and between 10,001 and 25,000+). Desimone et al. (2001) categorize school districts by three levels of the total number of teachers in the district, such as

students enrolled in the district in all grade level.

Seventh, parents' socio-economic conditions is measured by **percent of free-lunch students,** a continuous variable indicating percent of K-12 students in district who were approved for free or reduced-price lunches. It was created by NCES.

Table 4-3 provides the operational definitions of each of district level variables used in this study.

Table 4-3 District Level Variables

Variable Names	What Is Measured
Time support I	Whether the teacher receives release time for teaching (0 or1)
Time support II	Whether the teacher receives scheduled time for professional development (0 or1)
Money support I	Whether the teacher receives stipends for professional development (0 or1)
Money support II	Whether the teacher receives reimbursement of college tuition, conferences, or travel for professional development (0 or1)
Co-funding	The extent to which the district combines multi-funding sources for professional development (Range from 0 to 7)
Principal learning	The extent to which the district provides professional development opportunities for principals involving instructional matter (Range from 0 to 6)
Performance indicator	Whether the district uses performance indicators (0 or1)
Accountability	Whether the district uses rewards or sanctions related to performance (0 or1)
Teachers' responsibility for PD	The extent to which teachers have primary responsibility for the in-service professional development activities (Range from 0 to 3)
District total enrollment	Total number of students enrolled in the district in all grade level
Percent free-lunch	Percent of K-12 students in district who were approved for free or reduced-price lunches

small (1-249 teachers), medium (250-499 teachers), and large (500 or more teachers). The present study uses the total number of students enrolled in the district, as measured by Bickel and Howley (2000).

Teacher Background Variable

It is reasonable to expect that some teachers are more predisposed to seek out and participate in TOL than others and that their personal background characteristics may explain some of this variance. For example, it is often argued that female teachers tend to have high expectations and commitment for their instruction and professional learning (Miller, 2003). From the literature review, the current study considers how three teachers' background characteristics (such as gender, teaching experience, and subjects taught) are related to the TOL indicators. Each of the teacher background variables is constructed as follows. **Female** is a dummy variable, which takes the value 1 if the teacher is female. **Teaching experience** is a continuous variable indicating the teacher's total number of years teaching full or part-time in public schools. It was created by NCES. **Math** is a dummy variable, which takes the value 1 if the teacher is teaching math. **English** is a dummy variable, which takes the value 1 if the teacher is teaching English.

Table 4-4 provides the operational definitions of each of the teacher background variables.

Table 4-4 Teacher Background Variables

Variable Names	What Is Measured
Female	Female teacher
Total years of experience	Teacher's total number of years teaching full or part-time in public schools
Math	Teacher who is teaching math
English	Teacher who is teaching English

Statistical Modeling

This study uses Hierarchical Linear Modeling (HLM) to test hypotheses developed in Chapter III. By using hierarchical linear models, it is possible to simultaneously estimate the effects of teacher-, school-, and district-level on three TOL variables while estimating the effects of district and school level variables across contexts on three TOL variables. Furthermore, HLM facilitates modeling for cross-level interaction effects. The current study, using the analytical software package HLM 6 for Windows estimates the parameters of these models.

Before beginning to model the contextual effects on three TOL variables, it is important to note the advantage of HLM over other statistical approaches. The traditional approaches (i.e., OLS Regression) to hierarchically organized data (i.e., teachers sampled within schools) are to aggregate the lower level units (i.e., teacher or school) to the higher level (i.e., school or district) or to disaggregate the higher level units to the lower level. The first approach, "higher level as the unit of analysis approach" would lead to aggregation bias in the estimated effects of lower-level variables on the dependent outcomes. In such an approach, the dependent variables would be district or school averages of the TOL variables for each teacher. The use of aggregating data tends to inflate any relationship found between variables. Consequently, such an aggregation leads to the aggregation bias because of the reduction of random error.

The second approach, "lower level as the unit of analysis," suffers from other methodological problems. In such an approach, variables measuring properties of schools would be indexed to each teacher and all analyses conducted at the teacher level. This procedure ignores the fact that groups of teachers within the sample share membership in

the same schools. In other words, the second approach assumes that levels of individual professionalism are independent of any "nesting" of the individual within groups. However, teachers are influenced by the school environment in which they work, and much of the variation in individual levels of professionalism can be attributed to variations between schools in the overall level of commitment and community among the teachers. As a result, estimates of school level variables would not yield statistically independent effects on the teacher repots of TOL. This violation of statistical independence in ordinary least squares (OLS) regression leads to mis-estimated precision, where the standard errors of regression coefficients will be deceptively small, leading analysts to mistakenly assume statistically significant effects (Raudenbush & Bryk , 2002). Because of these problems with the traditional OLS approaches, educational researchers have increasingly used multilevel statistical models to analyze the effects of different-level variables. By using hierarchical linear models, we can simultaneously estimate the effects of different level variables on an outcome without having to choose between either aggregation or dis-aggregation of data. This study, with a more advanced statistical method, examines three sets of models in order to test the five hypotheses.

HLM Analysis for Testing Hypothesis 1

To test the first hypothesis that three TOL indicators vary across schools and districts, this study adopts an unconditional HLM. An unconditional HLM analysis provides information about how much of the variation in the three TOL variables lies at the teacher level, at the school level, and at the district level.

The form of these models is presented in equation 1 through equation 3 below.

The first equation is for level 1 model (within-school). For the level 1 model, the level of each of three TOL variables for a teacher is modeled as a function of a school mean across all teachers plus the deviation of each of three TOL variables from the school mean (level 1 random error)

Unconditional HLM level-1 equation

$$Y_{ijk} = \pi_{0jk} + e_{ijk}$$

(Equation 1)

Y_{ijk} : level of each of the three TOL variables (content-focus, active learning, and total hours) for teacher $_i$ in school $_j$ in district $_k$

π_{0jk} : school mean of each of the three variables of TOL in school $_j$ in district $_k$

e_{ijk} : random error of teacher $_i$ in school $_j$ in district $_k$, normally distributed with a mean of 0 and variance σ^2

The second equation is for the level 2 model (between-school). For the level 2 model, school mean of each of three TOL variables is modeled as an outcome of district mean of each of three TOL variables plus the deviation of the school mean from the district mean (level 2 random error).

Unconditional HLM level-2 equation

$$\pi_{0jk} = \beta_{00k} + r_{0jk}$$

(Equation 2)

π_{0jk} : school mean of each of the three variables of TOL in school $_j$ in district $_k$

β_{00k} : district mean of each of three TOL variables of TOL in district $_k$

r_{0jk} : random error of school $_j$ in district $_k$, normally distributed with mean of 0 and variance τ_π.

The third equation is for the level 3 model (between-district). The level 3 model presents the variability among districts. The district means vary randomly around a grand

mean and the deviation of a district's mean from the grand mean (level 3 random error)

Unconditional HLM level-3 equation

$$\beta_{00k} = \gamma_{000} + u_{00k} \qquad \text{(Equation 3)}$$

β_{00k} : district mean of each of three TOL variables in district $_k$

γ_{000} : grand mean of each of three TOL variables

u_{00k}: random error of in district $_k$, is normally distributed with mean of 0 and variance τ_β.

The computer program HLM 6 provides estimates for the values of variance for each level (σ^2, τ_π, and τ_β) and these variance components are used to estimate the percentage of variance in three TOL outcome variables that lies with-schools, between-schools, and between-districts.

HLM Analysis for Testing Hypothesis 2 and 3

To test the second and third hypotheses about district and school level factors related to three TOL variables, an intercepts as outcomes HLM analysis is used. This analysis estimates the separate effects of each independent variable at the teacher, school, and district level on three TOL variables. The model of the analysis is presented in equation 4 through equation 6 below.

The fourth equation is the within-school (level-1) equation of intercepts-as-outcomes analysis. At level 1 each of three TOL variables for a teacher is modeled as a function of school mean across all teachers plus the deviation of each of three TOL variables from the school mean (level 1 random error), and teacher background variables (female, teaching experience, math, and English).

An intercepts as outcomes HLM level-1 equation

$$Y_{ijk} = \pi_{0_{jk}} + \pi_{1jk} * (F) + \pi_{2jk} * (\text{Tch. Ex.}) + \pi_{3jk} * (\text{Math}) + \pi_{4jk} * (\text{Eng}) + e_{ijk} \quad \text{(Equation 4)}$$

Y_{ijk} : level of each of the three TOL variables (content-focus, active learning, and total hours) for teacher $_i$ in school $_j$ in district $_k$

$\pi_{0_{jk}}$: school mean level of one of three TOL variables in school $_j$ in district $_k$, controlling for the independent variables

$\pi_{1jk} \sim \pi_{4jk}$: regression coefficient expressing the direction and strength of relationship between teacher background variables (female, teaching experience, math, and English) and each of the three TOL variables in school $_j$ in district $_k$

e_{ijk} : random error of teacher $_i$ in school $_j$ in district $_k$

The fifth equation is the between-school (level 2) equation of intercepts-as-outcomes analysis. At level 2 expected school mean of each of three TOL variables is modeled as a function of district mean, the deviation of the school mean from the district mean (level 2 random error), and school level variables (professional learning community, supportive leadership, collective autonomy, individual autonomy, planning time, student-teacher ratio, secondary school, student total enrollment, suburban, and percent minority).

An intercepts as outcomes HLM level-2 equation

$$\pi_{0_{jk}} = \beta_{00k} + \beta_{01k} * (\text{professional learning community}) + \beta_{02k} * (\text{supportive leadership}) + \beta_{03k} * (\text{collective autonomy}) + \beta_{04k} * (\text{individual autonomy}) + \beta_{05k} * (\text{planning time}) + \beta_{06k} * (\text{st\_ratio}) + \beta_{07k} * (\text{secondary school}) + \beta_{08k} * (\text{student enrollment}) + \beta_{09k} * (\text{suburban}) + \beta_{010k} * (\text{percent minority}) + r_{0jk} \quad \text{(Equation 5)}$$

$\pi_{0_{jk}}$: school mean of each of three TOL variables in school $_j$ in district $_k$

β_{00k} : district mean of each of three TOL variables (content-focus, active learning, and total hours) in district $_k$, controlling for the independent variables

$\beta_{01k} \sim \beta_{010k}$: regression coefficient expressing the direction and strength of relationship between school level variables (professional learning

community, supportive leadership, collective autonomy, individual autonomy, planning time, student-teacher ratio, secondary school, student total enrollment, suburban, and percent minority) and school mean of each of the three TOL variables in district $_k$

r_{0jk} : random error of school $_j$ in district $_k$

The sixth equation is the between-school (level 3) equation of intercepts-as-outcomes analysis. At level 3 the district mean of each of three TOL variables are viewed as a function of the grand mean, the deviation of the district mean from the grand mean, and district level variables (time support I, time support II, money support I, money support II, co-funding, principal learning, performance indicator, accountability, teachers' responsibility for PD, district total enrollment, and percent free-lunch)

An intercepts as outcomes HLM level-3 equation

$$\beta_{00k} = \gamma_{000} + \gamma_{001}*(\text{time I}) + \gamma_{002}*(\text{time II}) + \gamma_{003}*(\text{money I}) + \gamma_{004}*(\text{money II}) + \gamma_{005}*(\text{co-funding}) + \gamma_{006}*(\text{principal learning}) + \gamma_{007}*(\text{performance indicator}) + \gamma_{008}*(\text{accountability}) + \gamma_{009}*(\text{teachers' responsibility for PD}) + \gamma_{0010}*(\text{district total enrollment}) + \gamma_{0011}*(\text{percent free-lunch}) + u_{00k} \quad \text{(Equation 6)}$$

β_{00k} : district mean of each of three TOL variables (content-focus, active learning, and total hours) in district $_k$

γ_{000} : grand mean of each of three TOL variables (content-focus, active learning, and total hours)

$\gamma_{001} \sim \gamma_{0011}$: regression coefficient expressing the direction and strength of relationship between district level variables (time I, time II, money I, money II, co-funding, principal learning, performance indicator, accountability, teachers' responsibility for PD, district total enrollment, and percent free-lunch) and district mean TOL level

u_{00k} : random error of district k

HLM Analysis for Testing Hypothesis 4

To test the fourth hypothesis about interactive relationships between school level professional learning community and district level administrative contextual factors, a

slope-as-outcomes model is used. This analysis estimates cross-level interaction effects between district level variables and school-level variables. In particular, this study focuses on analysis of the cross level interactions between district level two variables (performance indicator and accountability) and the professional learning community variable. The form of these analyses is presented in equation 7 through equation 9 below.

The seventh equation is the within-school equation (level-1) of a slope-as-outcomes analysis. This level 1 equation is the same the equation 4 (level 1 equation of the intercept-as outcomes analysis).

A slope-as-outcomes HLM level-1 equation

$$Y_{ijk} = \pi_{0jk} + \pi_{1jk}*(\text{Female}) + \pi_{2jk}*(\text{Tch. Ex.}) + \pi_{3jk}*(\text{Math}) + \pi_{4jk}*(\text{Eng}) + e_{ijk} \quad \text{(Equation 7)}$$

Y_{ijk} : level of each of the three TOL variables (content-focus, active learning, and total hours) for teacher $_i$ in school $_j$ in district $_k$

π_{0jk} : school mean level of one of three TOL variables in school $_j$ in district $_k$

$\pi_{1jk} \sim \pi_{4jk}$: regression coefficient expressing the direction and strength of relationship between teacher background variables (female, teaching experience, math, and English) and each of the three TOL variables in school $_j$ in district $_k$

e_{ijk} : random error of teacher $_i$ in school $_j$ in district $_k$

The eighth equation is the within-school equation (level-2) of slope-as-outcomes analysis. This equation is also the same as equation 8 (the level 2 equation of the intercept-as outcome analysis)

A slope-as-outcomes HLM level-2 equation

$$\pi_{0jk} = \beta_{00k} + \beta_{01k}*(\text{professional learning community}) + \beta_{02k}*(\text{supportive leadership}) + \beta_{03k}*(\text{collective autonomy}) + \beta_{04k}*(\text{individual autonomy}) + \beta_{05k}*(\text{planning time}) + \beta_{06k}*(\text{st\_ratio}) + \beta_{07k}*(\text{secondary school}) + \beta_{08k}$$

$$*(\text{student enrollment}) + \beta_{09k} *(\text{suburban}) + \beta_{010k} *(\text{percent minority}) + r_{0jk}$$

(Equation 8)

π_{0jk} : school mean of each of three TOL variables in school $_j$ in district $_k$

β_{00k} : district mean of each of three TOL variables (content-focus, active learning, and total hours) in district $_k$

$\beta_{01k} \sim \beta_{010k}$: regression coefficient expressing the direction and strength of relationship between school level variables (professional learning community, supportive leadership, collective autonomy, individual autonomy, planning time, student-teacher ratio, secondary school, student total enrollment, suburban, and percent minority) and school mean of each of the three TOL variables in district $_k$

r_{0jk} : random error of school $_j$ in district $_k$

The ninth and tenth equations are the between-district equation (level-3) of slope-as-outcomes analysis. They address cross-level interactions between district level and school level. The ninth equation remains the same as the equation 6 (the level 3 equation of intercept-as outcome model), but the tenth equation adds at the level-3 model. The tenth equation indicates performance indicator (or accountability) variable at the district level of analysis moderates regression coefficient (β_{01k}) expressing the relationship between professional learning community variable and school mean total hour (or active learning) variable.

<u>A slope-as-outcomes HLM level-3 equation</u>

$$\beta_{00k} = \gamma_{000} + \gamma_{001} *(\text{time I}) + \gamma_{002} *(\text{time II}) + \gamma_{003} *(\text{money I}) + \gamma_{004} *(\text{money II}) + \gamma_{005} *(\text{co-funding}) + \gamma_{006} *(\text{principal learning}) + \gamma_{007} *(\text{performance indicator}) + \gamma_{008} *(\text{accountability}) + \gamma_{009} *(\text{teachers' responsibility for PD}) + \gamma_{0010} *(\text{district total enrollment}) + \gamma_{0011} *(\text{percent free-lunch}) + u_{00k}$$

(Equation 9)

$$\beta_{01k} = \gamma_{010} + \gamma_{010} *(\text{performance indicator or accountability}) + u_{01k}$$

(Equation 10)

γ_{000} : grand mean of total hour (or active learning)

γ_{001}~ γ_{0011} : regression coefficient expressing the direction and strength of relationship between district level variables (time I, time II, money I, money II, co-funding, principal learning, performance indicator, accountability, teachers' responsibility for PD, district total enrollment, and percent free-lunch) and district mean TOL level

u_{00k} : random error of district $_k$

β_{01k} : regression coefficient expressing the direction and strength of the relationship between school level professional learning community variable and school mean total hour (or active learning) in district $_k$

In the models estimated here, all school- and district-level predictors are centered around their sample grand mean values because this study assumes that variations in TOL are estimated across the entire sample of schools, not within each school. When grand mean centering is used, the intercept can be interpreted as an adjusted mean from school j and the variance of the intercept is the variance among schools with adjusted means (for more review, see Kreft & Leeuw, 1995).

Analytical Model for the Study

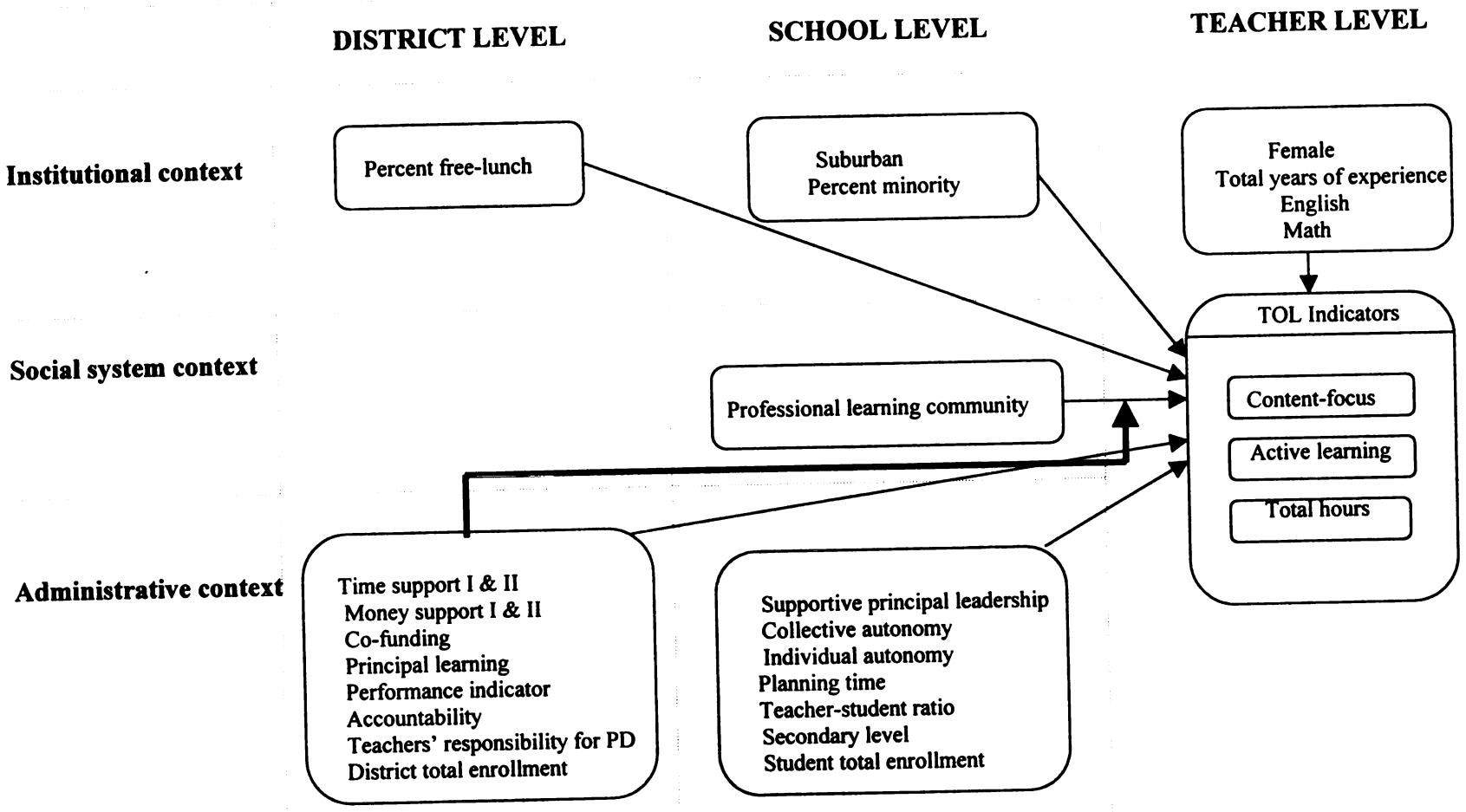
Figure 4-1 displays an analytical model to test five hypotheses developed in this study. This model was developed based on McLaughlin and Talbert's multi-perspective embedded context model.

First of all, the horizontal headings indicate the multiple level of educational system in this model: district level, school level, and teacher level. These multiple levels were developed based on the assumption of embedded contexts that each of multilevel contexts shapes teachers' work. Based on this assumption, this study tests the first hypothesis that three TOL indicators vary at the embedded district and school level.

Second, the vertical headings indicate multiple theoretical perspectives on school contexts, such as institutional perspective, administrative perspective, and social system perspective. I integrated these three theoretical perspective in the model based on McLaughlin and Talbert's argument that theories must be integrated to capture the embedded characters of school contexts. The boxes in the figures 4-1 indicate contextual factors (variables) of each level of educational system, drawn from these multiple perspectives. For instance, professional learning community is a social system contextual factor at the school level. Solid lines indicate direct effects of these contextual factors (variables) on three TOL indicators.

Third, the bold lines indicate the interactions between district administrative factors (variables) and school level professional learning community. In these interactions, administrative factors (variables) at the district level moderate the effects of professional learning community on three TOL indicators. With this analytical model, this study will test the hypotheses regarding the relationship between district and school contexts and three TOL indicators in the next chapter.

Figure 4-1 A Model used to analyze the Relationship between District and School Contexts and TOL



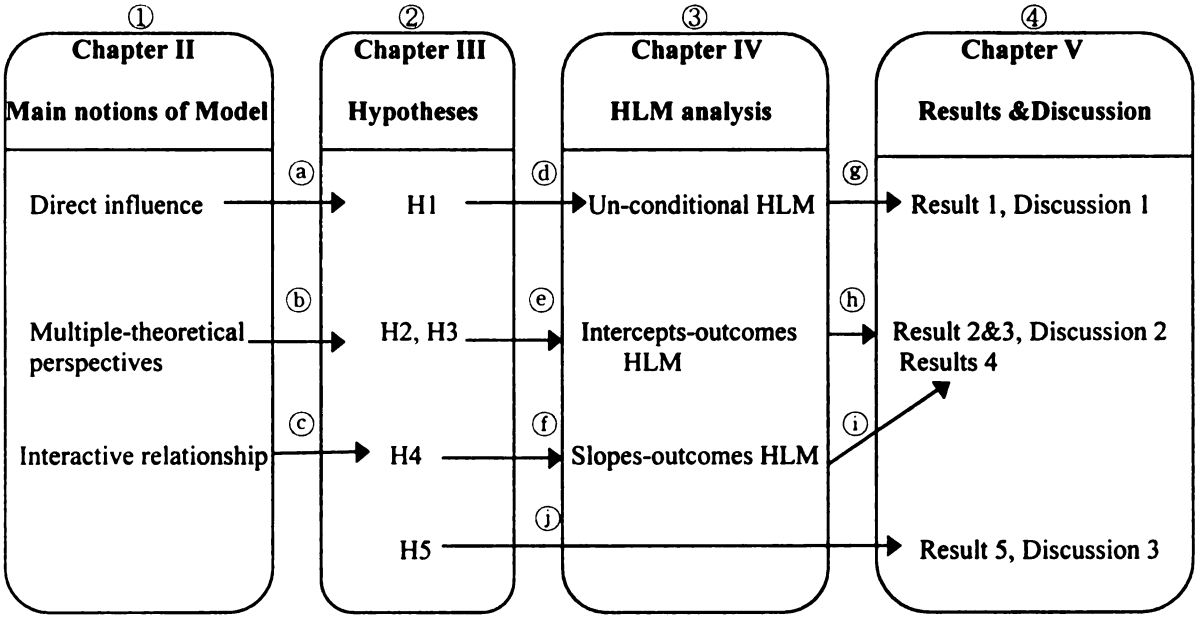
① ⟶ : Direct effect
② ⟶ : Cross-level interaction effect

CHAPTER V
RESULTS AND DISCUSSION

This chapter presents the test results of hypotheses proposed in Chapter III and, provides a discussion of the findings regarding the relationship between district and school contexts and TOL. It begins with a brief presentation of the descriptive statistics and correlation analysis for all variables included in the data analysis. The second section presents the results from the HLM analysis. Finally, this chapter concludes with a discussion of significant findings.

Figure 5-1 represents the roadmap, which helps the reader to understand how the chapters proceed.

Figure 5-1 Roadmap representing the Structure of How the Chapters proceed



The panel ① represents the main notions of the multi-perspective embedded context model – direct influences of each multiple contexts, interactive relationship among contexts, and multiple theoretical perspectives on school contexts(social system

perspectives, administrative perspectives, and institutional perspectives). All of these were reviewed in Chapter II. The panel ② represents how these three main assumptions of the model are operationalized into five hypotheses to explore the relationship between district and school contexts and TOL. Four of them are directly drawn from the multi-perspective embedded context model while the fifth hypothesis is drawn from some empirical studies of contextual influences on TOL. All of these were discussed in Chapter III. The panel ③ represents the statistical modeling used for testing the five hypotheses. Three HLM analysis models are used for this study; unconditional HLM, an intercepts as outcomes HLM, and a slopes as outcomes HLM. All of these were noted in Chapter IV. The panel ④ represents the results from each statistical modeling and a discussion of the significant findings. The results and discussions will be provided in the second and third section of this chapter (Chapter V) respectively.

Specifically, from the notion of direct influences of each the multiple contexts on teachers' work, this study developed the first hypothesis that three TOL indicators (content-focus, active learning, and duration) vary across schools and districts (see the arrow ⓐ). This hypothesis was tested using an unconditional HLM, which provides information about how much of the variation in the TOL outcome variables lies at the teacher level, at the school level, and at the district level(see the arrow ⓓ). Then, from the HLM analysis, this study provides result 1 in the second section, and discussion regarding district and school level variability of TOL (discussion 1) in the third section of this chapter (see the arrow ⓖ).

From the notion of integration of multiple theoretical perspectives, this study developed the second hypothesis that at the school level, social system contextual factors,

administrative contextual factors, and institutional contextual factors associate with TOL, and the third hypothesis that at the district level, administrative contextual factors and institutional contextual factors associate with TOL (see the arrow ⓑ). These two hypotheses were tested using an intercepts as outcomes HLM, which estimates the separate effects of the each independent variable at the teacher, school, and district level on TOL outcome variables (see the arrow ⓔ). From the HLM analyses, this study provides results 2 and 3 in the second section, and discussion regarding contextual factors related to TOL regarding district and school level variability of TOL (discussion 2) in the third section of this chapter (see the arrow ⓗ).

From the notion of interactive relationships among multiple contexts, this study developed the fourth hypothesis that interactive relationships between professional learning community and districts administrative contextual factors affect three TOL indicators (see the arrow ⓒ). This hypothesis was tested using a slopes as outcomes HLM, which estimates the cross-level interaction effects between district level administrative factors and school-level professional learning community (see the arrow ⓕ). From the HLM analyses, this study provides result 4 in the second section, and discussion regarding contextual factors related to TOL regarding district and school level variability of TOL (discussion 2) in the third section of this chapter (see the arrow ⓘ).

Finally, based on some empirical studies on the relationship between contexts and TOL, this study develops the fifth hypothesis that the relationship between contextual conditions and TOL varies across the three indicators of TOL. The results of this hypothesis test is reported in result 5 and discussed in discussion 3 (see the arrow ⓙ).

Before testing the proposed hypotheses, this study presents the descriptive

statistics for all variables included in the data analyses. These statistics are particularly interesting as they are derived from a large, nationally representative data of teachers, schools, and districts in the United States. This chapter next presents the correlations among selected variables in the study as they provide useful information about relationships among the independent variables.

Descriptive Statistics

Table 5-1 shows the descriptive statistics (such as mean, standard deviation, maximum value, and minimum value) for the teacher, school, and district-level variables in this study. Teacher-level descriptive statistics are weighted using the SASS teacher weights, school-level descriptive statistics are weighted using the SASS school weights, and district-level descriptive statistics are weighted using the SASS district weights. As this is a large, nationally representative database, some of the descriptive data are worthy of review.

Table 5-1 Descriptive Statistics (The entries in this table are weighted)

	Variable	Mean	SD	Min	Max
Teacher level (N=2,402,862)	Content-focus	1.95	1.03	0	3
	Active learning	1.98	1.2	0	4
	Total hours	7.53	4.56	0	24
	Female	.75	.43	0	1
	Teaching experience	14.71	10.1	1	57
	Math	.07	.25	0	1
	English	.11	.30	0	1
School level (K=68,841)	Prof. Learning community	2.89	.35	1	4
	Supportive leadership	3.17	.49	1	4
	Collective autonomy	2.58	.55	1	5
	Individual autonomy	4.04	.44	1	5
	Planning time	9.93	4.26	0	50
	Student-teacher ratio	15.56	13.04	.55	745.60
	Student total enrollment	544.66	432.37	2	5380
	Secondary school	.25	.43	0	1
	Suburban	.43	.49	0	1
	Percent minority	32.71	33.07	0	100
District level (J=12,159)	Time support I (release)	.75	.24	0	1
	Time support II (scheduled)	.59	.28	0	1
	Money support I (stipend)	.40	.30	0	1
	Money support II (reimburse)	.60	.29	0	1
	Co-funding	4.91	1.70	0	7
	Tchr. Responsibility for PD	.72	1.06	0	3
	Principal learning	3.31	1.72	0	5
	Accountability	.20	.31	0	1
	Performance Indicator	.96	.19	0	1
	District total enrollment	3530.77	6658.27	2	1,093,071
	Percent free-lunch	33.44	23.57	0	100

In terms of teacher characteristics, almost 75% of the U.S. teachers are female. Teachers average 14.71 years of teaching experience. English teachers compose 11% of the U.S. teachers while math teachers compose 7% of the U.S. teachers.

The descriptive statistics also show that the U.S. teachers report a medium level of professional learning community (mean: 2.89, range from 1 to 4), while they report a somewhat high level of supportive leadership of principal (mean: 3.17, range from 1 to 4). The U.S. teachers report a very high level of their individual control over classroom policy (mean: 4.04, range from 1 to 5) while they report a medium level of collective faculty influence over school policy (mean: 2.58, range from 1 to 5). The average level of student-teacher ratio in U.S. is approximately 15 and the U.S. teachers have on average 10 hours scheduled time for planning in a week. The mean of student enrollment is 545.66. The percentage of secondary school in U.S. is 25% while the percentage of schools located at suburban is 43%. The school average of minority student enrollment is 32.71%.

The descriptive statistics indicate that 75% of teachers in U.S. receive release time for teaching at the district level while 59% of teachers receive scheduled time for professional development. 40% of teachers in U.S. receive stipends for professional development at the district level while 60% of teachers receive reimbursement for college tuition, conferences, or travel for professional development. The data show that the U.S. districts provide a somewhat high level of professional development opportunities for principals regarding instructional matters (mean: 3.31, range from 0 to 5) and coordinate high level of multiple funding sources for professional development (mean: 4.91, range from 0 to 7). The average level of districts' report of the degree of which teachers have

primary responsibility for professional development is 0.72, with range from 0 to 3. 96% of the districts report that they use performance indicators to evaluate the progress of students while 20% of the districts reports that they use rewards or sanctions related to performance. The mean of district enrollment is 3530.77. The average of students participating in the national school free lunch program is 33.44%.

Correlations

The correlation matrix representing all variables used in this study is presented on Table 1 and is placed in Appendix B[5]. to improve the efficiency of data presentation. The correlation matrix includes the complete list of items and scales used in this research, but the following discussion will be limited to a select set of measures. Table 1 in Appendix B. shows the bivariate correlations among all variables included in this study presented at the teacher-level. These correlations are a preliminary form of analysis providing an estimate of expected associations and strength of relationships.

Correlations among Outcome Measures

Content-focus is correlated with total hours at .66 ($p < .01$), and active learning is correlated with total hours at .37 ($p < .01$). The relationship between content-focus and active learning shows strength at .34 ($p < .01$). The correlation results indicate that each of these TOL variables is related constructs, but not to the extent that multi-collinearity

[5] This study measured the correlation between two variables, using the Pearson's r, the most common type of measure of correlation. It also used two special types of correlation to handle the special characteristics of such types of variables as dichotomies. For example, when both variables are dichotomies (i.e., female vs. math teacher), this study used Phi and when one variable is a true dichotomy and the other is continuous variable (i.e., female vs. teaching experience), it used Point-biserial correlation (for more review, http://www2.chass.ncsu.edu/garson/PA765/correl.htm)

issues would arise in advanced data analyses. Moreover, each item is treated as a separate independent variable in the series of advanced statistical models used in this study.

While these three outcomes are ordinal, linear models were used. While not standard, Goodman (1978) suggests that the use of linear models with ordinal outcomes is merited in cases where the distribution of responses fit a particular pattern.

Correlations of Teacher Background to Three TOL Variables

All teacher background variables were significantly related to three TOL variables ($p < .01$). Although effect size for these correlations were small, the correlation coefficients of the teacher background variables with the three dependent variables ranged from -.03 to .14 for content-focus variable, from -.05 to .02 for active learning variable, and from -.03 to .11 for total hours variable.

Among the teacher background variables, female variable had the highest positive correlation coefficients for content-focus (.14), and total hours (.11). The correlation between female and active learning was also positive but very small (.02). This finding indicates that female teachers appear more likely than male teachers to report higher levels of content-focus learning opportunities and to spend more time on their learning.

The relationships of years of teaching experience and three TOL variables were significantly correlated but the correlation coefficients are small (content-focus: .06, active learning: .02, and total hour: .05). English teacher variable also shows quite small correlations with all three TOL variables (content-focus: .02, active learning: .01, total hours: .01). Math teachers and all three TOL variables were negatively correlated with

low correlation coefficients (content-focus: -.03, active learning: -.05, total hour: -.03).

Correlation of School Level Variables to Three TOL Variables

All school level variables, except one variable (suburban) were significantly related to three TOL variables ($p < .01$). The correlation coefficients of the school level variables with the three dependent variables ranged from -.17 to .11 for content-focus variable, from -.06 to .12 for active learning variable, and from -.11 to .11 for total hours variable.

Among the school level variables, secondary level variable had the highest correlation coefficients for content-focus (-.17) and total hours (-.11). Professional learning community had positive and high correlation coefficients for content-focus (.11), active learning (.12), and total hours (.11). These finding indicate that teachers in secondary schools are less likely to participate in content-focus and to spend less time on their learning opportunities while teachers in professional learning community are more likely to engage in content-focus, and active learning and to spend more time on learning.

Collective autonomy variable and all three TOL variables were positively correlated (content-focus: .06, active learning: .1, and total hours: .08), while individual autonomy variable and all three TOL variables were negatively correlated with small correlation coefficients (content-focus: - .07, active learning: .003, and total hours: -.04). Percent of minority students was positively related to all three TOL variables. In particular, the strength of the correlations between percent of minority students and three TOL variables were modest (.1, .04, .1 respectively). The relationships of supportive leadership and three TOL variables were significantly correlated but the correlation

coefficients were modest (content-focus: .05, active learning: .08, and total hours: .05).

While planning time for instruction, student-teacher ratio, and school size were significantly related to three TOL variables, the strength of the correlation between these school level variables and TOL variables were small. Suburban was positively correlated with active learning (.02), and negatively related with total hours variable (-.02) but the strength of these correlations were very weak. Furthermore, suburban was found to be insignificantly related to content-focus variable.

Correlation of District Level Variables to Three TOL Variables

Most district level variables were significantly related to three TOL variables ($p < .01$). The correlation coefficients of the district level variables with the three dependent variables ranged from .003 to .19 for content-focus variable, from -.01 to .15 for active learning variable, and from .001 to .20 for total hours variable.

Overall, time or money supports for TOL were more moderately correlated with three TOL variables than were any other district variables. For example, both time support I (release) and time support II (scheduled time) had moderate correlation coefficients for content-focus (.16, .15), active learning (.15, .10), and total hours (.14, .09). The relationships of money I (stipend) and money II (reimbursement) to all three TOL variables were also moderately correlated (m I: .2, .13, .20, m II: .10, .03, .14, respectively), except the correlation between money II and active learning (.03). These findings suggest that time or money supports for TOL would be important factors for TOL.

Principal learning was correlated to marginally higher levels of all three TOL

variables (content-focus: .07, active learning: .04, and total hours: .05). Co-funding and accountability had modest correlation coefficients for content-focus (.05, and .04 respectively), and total hours (.04, and .03 respectively) while these independent variables had very small correlation coefficients for active learning (.007, and .008 respectively). Performance indicator and teachers' primary responsibility for PD were positively correlated with three TOL variables, but correlation coefficients were quite small. Furthermore, the relationship between teachers' responsibility and total hours variable was insignificant.

Percent of free lunch students was positively correlated with content-focus and total hours but this variable is negatively related to active learning. However, the strengths of these correlations were modest.

District total enrollment had marginally high correlation coefficients for content-focus (.07) and quite small correlation coefficients for total hours (.02). The relationship between district total enrollment and active learning was insignificant.

It should be recalled that this preliminary analysis is performed at the teacher level. A properly controlled multilevel model, performed at the appropriate levels of aggregation, may yield the expected results in a more consistent manner.

HLM Model Results

This section presents the results of the HLM analysis. It begins with the results of the first hypothesis in which I partitioned each of the TOL indicators for each analysis series into within-and between-school, and between-district variance components.

Result 1: Results of the First Hypothesis Test

The first hypothesis for this study was that the three TOL indicators vary across schools and districts. The analysis results from an unconditional (i.e., no predictors at the teacher, school, or district levels) Hierarchical Linear Model (HLM) confirms the first hypothesis. An unconditional HLM analysis provides useful information about how much of the variation in the three TOL outcome variables lies at the teacher level, at the school level, and at the district level.

For the level 1 (within-school) model, the level of each of three TOL variables for a teacher is modeled as a function of a school mean across all teachers (level-1 intercept) plus the deviation of each of three TOL variables from the school mean (level-1 random error term). For the level 2 model, school mean of each of three TOL variables is modeled as an outcome of district mean of each of three TOL variables (level-2 intercept) plus the deviation of the school mean from the district mean (level-2 random error term). The level 3 model presents the variability among districts. The district means vary randomly around a grand mean and a random district effect, that is, the deviation of a district's mean from the grand mean. In all cases, the random effects are assumed to be normally distributed with a mean of 0. The computer program HLM 6 provides estimates for the values for each level variance (σ^2, τ_π, and τ_β) and these variance components are used to estimate the percentage of variance in three TOL outcome variables that lies within-schools, between-schools, and between-districts.

Table 5-2 reports the results of this variance decomposition. From the HLM analysis results, variances in the three TOL variables are found across three levels - teachers, schools, and districts. Although the largest percentage of the total variance is

among teachers, a substantial, though smaller, percentage lies between schools within districts, and a yet smaller percentage lies between districts. These variations across levels are statistically significant.

Specifically, for the content-focus, approximately 69% of the variance in teachers' reports lies in teachers, 6% of the variance lies among schools, and approximately 25% of the variance among districts. For the active learning variable, approximately 69% of the variance in teachers' reports lies in teachers, 6% of the variance lies among schools, and approximately 25% of the variance among districts. For the total hours variable, approximately 74% of the variance in teachers' reports lies in teachers, 6% of the variance lies among schools, and approximately 20% of the variance among districts. Hence, as hypothesized in this study, teachers' opportunities to learn vary across schools and districts.

Table 5-2 Unconditional HLM Analysis for Three TOL Variables (Content-focus, Active learning, and Total hours)

Model I Content-focus		
Fixed Effects	Coefficient	P- value
Model intercept (Average district mean)	1.822	0.000
Random Effect	Variance Component	Percent of Total Variation
Level 1- Teachers	0.684	68.9%
Level 2 - Schools	0.056	5.6%
Level 3- Districts	0.252	25.5%
Model II Active learning		
Fixed Effects	Coefficient	P value
Model intercept (Average district mean)	1.846	0.000
Random Effect	Variance Component	Percent of Total Variation
Level 1- Teachers	0.908	69.5%
Level 2 – Schools	0.074	5.6%
Level 3- Districts	0.325	24.9%
Model III Total hours		
Fixed Effects	Coefficient	P value
Model intercept (Average district mean)	7.136	0.000
Random Effect	Variance Component	Percent of Total Variation
Level 1- Teachers	13.737	73.6 %
Level 2 – Schools	1.101	5.9 %
Level 3- Districts	3.829	20.5 %

Result 2: Results of the Second Hypothesis Test

The second hypothesis for this study was that at the school level, social system contextual factors (such as professional learning communities), administrative contextual factors (teacher autonomy, supportive leadership, teachers' workload, school level, school size), and institutional contextual factors (such as community circumstances and diversity of students' race) are associated with three TOL indicators. The results from 'an intercepts as outcomes HLM' analysis confirm the second hypothesis. This HLM model allows estimation of the separate effects of the each independent variable at the teacher, school, and district level on three TOL indicators.

Building on the previous model (unconditional HLM), teacher background level variables, school level variables, and district level variables are introduced as separate predictors at the first, second, and third levels, respectively. At level 1 each of three TOL variables for a teacher is modeled as a function of school mean across all teachers plus the deviation of each of three TOL variables from the school mean, and teacher background variables (such as female, teaching experience, math teacher, and English teacher). At level 2 expected school mean of each of three TOL outcomes is modeled as a function of district mean, the deviation of the school mean from the district mean, and school level explanatory variables (e.g., professional learning community, supportive leadership, and collective autonomy). At level 3 the district means of each of three TOL outcomes are viewed as a function of the grand mean, the deviation of the district mean from the grand mean, and district level explanatory variables (e.g., time support I, money support I, and principal learning).

In multilevel analysis, the intercept is interpreted as the expected value of the

outcome value, when all explanatory variables have the value zero. For instance, the intercept at level 1 is interpreted as the expected outcome of TOL variable for the average person, disregarding teacher background variables such as female. To aid a model interpretation, all variables at the teacher, school, and district level are grand mean centered. When the explanatory variables are grand mean centered, the mean of each variable is subtracted from each teacher's raw score to rescale each variable to have mean of 0 (Hox, 2002). By centering around the grand mean, the interpretation of coefficient of dichotomous variables such as gender (coded as 0=male, 1=female) become how much the outcome variable is expected to change as the ratio of male and female teachers changes within a school. The intercept of the model at any level becomes expected value for the average unit within the context, controlling for the various independent variables (for more review, see Hox, 2002).

The results of this study show that the variability of TOL at the school is associated with social system contextual factors, administrative contextual factors, and institutional contextual factors. Before presenting the analysis results of school level contextual factors, it is also meaningful to examine the relationship between teacher background variables and TOL. Table 5-3, 5-4, and 5-5 present the relationships of teacher background variables used in this study with three TOL variables.

Most teacher background variables are significantly related to TOL variables. First, female teacher is significantly related to three TOL variables. The coefficients for female teacher are .17 /-.07 / .58 for content-focus, active learning, and total hours respectively. This means that as the ratio of females to males increases, teachers in a school report on average experiencing a level of content-focus 0.17 units high and

spending a 0.5 hours more on their learning, while they report on average experiencing a level of active 0.07 units low. These results imply that female teachers are more likely to participate in the opportunities for content-focus and spend more time on their learning than male teachers while they are less likely to participate in the opportunities for active learning than male teachers.

Second, teaching experience has a positively significant relationship to three TOL variables. The coefficients for teaching experience are .007/ .005/ .024 for content-focus, active learning, and total hours respectively. These results are interpreted to mean that as years of teacher experience increase by 1, the level of three TOL variables increase by .007, .005, and .024 units. These results imply that teachers with more experience tend to participate slightly more in opportunities for content-focus and active learning, and spend slightly more time on their learning than those with less teaching experience.

Third, math teacher is only significantly related to active learning. The coefficients for math teacher are -.11 for active learning. This means that as the ratio of math teachers to other subject teachers increase, teachers in a school report on average experiencing a level of active learning 0.11 units lower. This implies that math teachers are less likely to participate in the opportunities for active learning than those taught other subjects.

Finally, English teacher is only significantly related to content-focus variable. The coefficients for English teacher are .11 for content-focus. This means that as the ratio of English teachers to other subject teachers increase, teachers in a school report on average experiencing a level of active learning 0.11 units higher. This implies that

English teachers are more likely to participate in the opportunities for content-focus than those teaching other subjects.

Table 5-3, 5-4, and 5-5 also present the results of HLM analyses regarding the relationships of school level contextual factors to the three variables of TOL. It provides the HLM estimates of coefficients for the school-level contextual factors related to the three TOL variables. Each coefficient provides a measure of direct relationship of a given independent variable to the specified outcome variable. The results of the second hypothesis test are here represented in terms of three contexts: social system contexts, administrative contexts, and institutional contexts.

Social system contextual factor

This study hypothesizes that social system contextual factors are associated with three TOL indicators. In this study, the social system contextual factor was measured by professional learning community, which indicates the extent to which school staff collaborates concerning instruction and share beliefs about school mission. The dimensions of this variable are as follows.

Dimensions of professional learning community variable
The extent to which staff members (1) share beliefs about the central mission of the school, (2) cooperate with fellow staff, (3) coordinate course content, (4) plan with the library media specialist for the integration of media services into teaching, and (5) principals talk frequently about instructional practices (Range from 1 to 4)

As hypothesized in this study, professional learning community is significantly related to three TOL variables. The coefficients for professional learning community are .22 / .32 / 1.1 for content-focus, active learning, and total hours respectively. This means that as the professional learning community level increase by one unit, three TOL

indicators are expected to increase by .22 units of content-focus, .32 units of active learning, and 1.1 hours for learning opportunities. The results imply that teachers who experience a higher level of professional learning community are more likely to engage in opportunities for content-focus, and active learning and spending more time on their learning.

The results from this study support the assumption that building professional learning communities which cooperate concerning instruction and share beliefs about school mission are important for fostering TOL. The discussion regarding the important findings will be provided in detail in the discussion section.

School organizational contextual factors

This study assumed that school organizational contextual factors (such as supportive leadership, teacher autonomy, teacher's workload, school size, and school level) are associated with three TOL indicators. In this study, these school organizational contextual factors are measured by the following variables. First, supportive leadership was measured by supportive leadership variable, which indicates the extent to which principals are perceived to employ a supportive leadership style.

Supportive leadership variable: The extent to which the principal (1) is supportive, (2) lets staff members know what is expected of them, (3) backs up when teachers as needed, (4) communicates what kind of school s/he wants to the staff, and (5) school staff are recognized for a job well done. (Range from 1 to 4)

Second, teachers' autonomy was measured by two variables, one indicating the degree of teachers' collective faculty influence over school policy, and another indicating the degree of teachers' individual autonomy over classroom policy.

Collective autonomy variable: The extent to which teachers have autonomy over school policy dimensions including (1) performance standard, (2) curriculum, (3) in-service professional development programs, (4) evaluation, (5) hiring, (6) discipline policy, and (7) school budget. (Range from 1 to 5)
Individual autonomy variable: The extent to which teachers have control over classroom policy dimensions including (1) course texts, (2) course content, (3) teaching technique, (4) evaluating students, (5) disciplining students, and (6) determining homework. (Range from 1 to 5)

Third, teachers' workload was also measured by two variables, one indicating the amount of which teachers have scheduled school time for planning, and another indicating the number of students per teachers.

Planning time for instruction: The amount of time which teachers have scheduled school time for planning (Range from 0 to 50 hours)
Student-teacher ratio: The number of students per full-time equivalent teacher in the school

Fourth, school size was measured the total number of students enrolled in this school in grades K-12. Finally, school level was measured by one dummy variable indicating secondary school.

Among school organizational contextual factors proposed in this study, teacher autonomy and school level are significantly related to three TOL indicators. Specifically, collective autonomy is positively related to three TOL variables. The coefficients for collective autonomy are .17 / .25 / .69 for content-focus, active learning, and total hours respectively. This means that as the collective autonomy increase by one level, three TOL indicators are expected to increase by 0.17 units of content-focus, 0.25 units of active learning, and 0.69 hours of learning opportunities. This implies that teachers who have more collective autonomy in school policy are more likely to engage in opportunities for content-focus, and active learning and spending more time on their learning.

By contrast, individual autonomy is negatively related to three TOL variables.

The coefficients for individual autonomy are -.12 / -.14 / -.36 for content-focus, active learning, and total hours respectively. This means that as individual autonomy increases by one unit, three TOL indicators are expected to decrease by 0.12 units of content-focus, 0.14 units of active learning, and 0.36 hours of learning opportunities. That is, teachers who have more individual autonomy in classroom instruction are less likely to engage in opportunities for content-focus, and active learning and spending less time on their learning.

Secondary school level is also significantly related to three TOL variables. The coefficients for secondary school are -.25 / -.10 / -.52 for content-focus, active learning, and total hours respectively. This means that as the ratio of secondary school to elementary school increases, teachers report on average experiencing a level of content-focus 0.25 units and active learning 0.1 units low, and spending 0.49 hours less in their learning opportunities. These results imply that teachers in secondary school are less likely to participate in opportunities for content-focus and active learning, and less likely to spend time on their learning, than those in elementary school. Student total enrollment is significantly related to opportunities for active learning, but the strength of the coefficient for student total enrollment is too small to assume significant relationship between these two variables.

While these results support the hypothesis that school organizational contextual factors are associated with TOL, some relationships of organizational factors (such as supportive leadership, planning time, and student-teacher ratio) to TOL are not precisely as predicted in the hypotheses stated in this study. Specifically, this study did not find statistically significant relationships of supportive leadership with all three TOL variables.

Planning time for instruction and student-teacher ratio also do not have significant relationships with three TOL variables. Theses results provide limited support for the hypothesis that school organizational contextual factors are associated with TOL.

Consequently, some school organizational variables (such as collective autonomy, individual control, school level, and student total enrollment) are significantly associated with three variables of TOL, but not all organizational factors proposed in the literature have a significant relationship to TOL. In particular, it is noteworthy that supportive leadership does not associate with the variability of TOL. Teachers' workload also does not account for this between-school variance of TOL. The discussion regarding these findings will be provided in the next section.

Institutional contextual factors

This study hypothesized that institutional contextual factors at the school level are associated with three TOL indicators. In this study, local community circumstances and diversity of students' race were regarded as important institutional contexts for TOL. Community circumstance was measured by one dummy variable indicating suburban and diversity of students' race was measured by percent of minority students.

The analysis results show that suburban is significantly related to active learning. The coefficient for suburban is .14 for active learning. This means that as the ratio of suburban school to other areas (such as urban or rural) increases, teachers report on average experiencing a level of active learning 0.13 units higher. This implies that teachers in suburban schools are more likely to participate in opportunities for active learning than those in other areas such as urban or rural. As hypothesized in this study,

one possible interpretation for this result may be that teachers working in suburban schools are more likely to engage in opportunities for active learning because material and professional support in suburban communities encourage teachers to engage in professional development that involves hands-on and inquiry-oriented learning.

The data also indicates that the percent of minority students has a significant relationship with all three TOL variables. The coefficients for percent of minority student are .002/ .002/. 012 for content-focus, active learning, and total hours respectively, which mean that as the percentage of minority students increases by 1, content-focus level, active learning level, and total hour can be expected to increase by 0.002, 0.002, and 0.012 and correspondingly that as minority percent increase by 10% above the average minority students, the content-focus level, active learning level, and total hour would be expected to increase by 0.02, 0.02, and 0.012. However, the magnitude of theses coefficients is quite small.

Overall, the findings provide evidence supporting the hypothesis that at the school level, social system contextual factors, administrative contextual factors, and institutional contextual factors are associated with TOL, although some relationships of organizational factors (such as supportive leadership, planning time, and student-teacher ratio) to TOL are not precisely as predicted in the hypotheses stated in this study.

Table 5-3 Intercepts as Outcomes HLM Analysis (I): All Teacher, School, and District Level Variables and Content-focus as the Dependent Variables

	Content focus TOL	
Predictor	*Coefficients*	*Standard errors*
Teacher Level		
Female	0.167***	0.044
Teaching experience	0.007**	0.002
Math	0.173	0.090
English	0.113*	0.042
School Level		
Social system context		
Professional learning community	0.215***	0.058
Administrative context		
Supportive leadership	-0.058	-0.034
Collective autonomy	0.171***	0.042
Individual autonomy	-0.122**	0.041
Planning time	-0.002	0.003
Student-teacher ratio	-0.001	0.001
Student total enrollment	0.001	0.001
Secondary school	-0.248***	-0.032
Institutional context		
Suburban	0.053	0.033
% minority	0.002**	0.001
District Level		
Intercept	1.658***	0.054
Administrative context		
Time support I (Release)	0.076	0.041
Time support II (Scheduled)	0.110**	0.039
Money support I (Stipend)	0.151***	0.036
Money support II (Reimburse)	0.038	0.035
Co-funding	0.013	0.012
Principal learning	0.095	0.058
Performance indicator	-0.004	-0.094
Accountability	-0.031	-0.044
Teachers' responsibility for PD	-0.004	-0.027
District total enrollment	0.001	0.001
Institutional context		
% free lunch	-0.003	0.001
Variance Components		
Within schools	0.671***	
Between schools	0.048***	
Between districts	0.194***	

* indicates significance at $p \leq .05$, ** indicates significance at $p \leq .01$, *** indicates significance at $p \leq .001$
Note. Numbers in parentheses are standards errors

Table 5-4 Intercepts as Outcomes HLM Analysis (II): All Teacher, School, and District Level Variables and Active learning as the Dependent Variables

	Active learning	
Predictor	*Coefficients*	*Standard errors*
Teacher Level		
Female	-0.074*	0.033
Teaching experience	0.005**	0.001
Math	-0.106*	0.044
English	0.033	0.052
School Level		
Social system context		
Professional learning community	0.321***	0.081
Administrative context		
Supportive leadership	-0.024	0.043
Collective autonomy	0.245***	0.062
Individual autonomy	-0.138**	0.049
Planning time	-0.004	0.005
Student-teacher ratio	0.001	0.001
Student total enrollment	0.001***	0.001
Secondary school	-0.103**	0.033
Institutional context		
Suburban	0.139**	0.039
% minority	0.002*	0.001
District Level		
Intercept	1.833***	0.049
Administrative context		
Time support I (Release)	0.062	0.047
Time support II (Scheduled)	0.133*	0.051
Money support I (Stipend)	0.061	0.044
Money support II (Reimburse)	0.129**	0.042
Co-funding	0.031	0.025
Principal learning	0.189*	0.075
Performance indicator	0.022	0.074
Accountability	-0.012*	0.054
Teachers' responsibility for PD	-0.024	0.022
District total enrollment	0.001	0.001
Institutional context		
% free lunch	-0.001 (.001)	0.001
Variance Components		
Within schools	0.901***	
Between schools	0.068***	
Between districts	0.254***	

* indicates significance at $p \leq .05$, ** indicates significance at $p \leq .01$, *** indicates significance at $p \leq .001$
Note. Numbers in parentheses are standards errors

Table 5-5 Intercepts as Outcomes HLM Analysis (III): All Teacher, School, and District Level Variables and Total hours as the Dependent Variables

	Total hours	
Predictor	*Coefficients*	*Standard errors*
Teacher Level		
Female	0.576**	0.203
Teaching experience	0.024**	0.008
Math	0.384	0.417
English	0.192	0.176
School Level		
Social system context		
Professional learning community	1.070***	0.237
Administrative context		
Supportive leadership	-0.187	0.154
Collective autonomy	0.685***	0.169
Individual autonomy	-0.356*	0.182
Planning time	-0.021	0.017
Student-teacher ratio	0.001	0.004
Student total enrollment	0.001	0.001
Secondary school	-0.515***	0.140
Institutional context		
Suburban	0.148	0.139
% minority	0.012***	0.003
District Level		
Intercept	7.097***	0.067
Administrative context		
Time support I (Release)	-0.003	0.147
Time support II (Scheduled)	0.197	0.160
Money support I (Stipend)	0.761***	0.138
Money support II (Reimburse)	0.238	0.157
Co-funding	0.026	0.048
Principal learning	0.749**	0.237
Performance indicator	0.492*	0.243
Accountability related to performance	-0.099	0.153
Teachers' responsibility for PD	-0.055	0.061
District total enrollment	0.001	0.001
Institutional context		
% free lunch	0.002	0.004
Variance Components		
Within schools	13.607***	
Between schools	1.007***	
Between districts	2.963***	

* indicates significance at $p \leq .05$, ** indicates significance at $p \leq .01$, *** indicates significance at $p \leq .001$
Note. Numbers in parentheses are standards errors

Result 3: Results of the Third Hypothesis Test

This study assumed that at the district level, administrative contextual factors (time resources, money resources, professional development for principals, decentralization of PD, coordination of multiple funding sources, districts' efforts for continuous improvement, district size), and institutional contextual factors (parents' socio-economic condition) are associated with three TOL indicators. The results from 'an intercepts as outcomes HLM' confirm the third hypothesis as well. To aid a model interpretation, all variables at the teacher, school, and district level are grand mean centered. When the explanatory variables are grand mean centered, the mean of each variable is subtracted from each teacher's raw score to rescale each variable to have mean of 0 (Hox, 2002). The results show that the variability of TOL was associated with district level administrative factors, and district level institutional factors.

Table 5-3, 5-4, and 5-5 provide the HLM estimates of coefficients for the district-level contextual factors related to the three variables of TOL. The results of the third hypothesis test are here represented in terms of administrative and institutional contexts.

District level administrative factors

In this study, district level administrative factors were measured by the following variables. First, resources for professional development were measured by four variables (time support I, time support II, money support I, money support II), indicating whether teachers receive time or money support for their professional development.

Time support I: Whether teachers receive release time for teaching (i.e., regular teaching responsibilities were temporarily assigned to someone else)

Time support II: Whether teachers receive scheduled time in the contract year for professional development
Money support I: Whether teachers receive stipends for professional development
Money support II: Whether teachers receive reimbursement of college tuition, conferences, or travel for professional development

Second, districts' coordination of multiple funding sources was measured by co-funding, which indicates the extent to which districts combine multi-funding sources for professional development.

Co-funding (Sum of seven items): Whether districts use (1) state professional development funds, (2) special project budgets, (3) school improvement funds, (4) Title I, (5) Eisenhower program, (6) other federal programs, and (7) private sector grants for TOL.

Third, districts' provision of professional development for principals was measured by the principal learning variable, indicating the extent to which districts provide professional development for principals involving instructional matter.

Principal learning (sum of six items): Whether districts provide (1) evaluation and supervision, (2) technology for planning, (3) decision-making and reporting, (4) curriculum and assessment, (5) networking opportunities, and (6) serving as mentors

Fourth, districts' effort for continuous improvements was measured by two variables, with one indicating whether the district uses performance indicators to evaluate the progress of students, and another indicating whether the district uses rewards or sanctions related to performance.

Accountability: Whether the district uses rewards or sanctions related to performance
Performance indicator: Whether the district uses performance indicators to evaluate the progress of students

Fifth, districts' decentralization of professional development was measured by teachers' responsibility for PD, indicating the extent to which teachers have primary

responsibilities for the in-service professional development activities.

Teachers' responsibility for PD (Sum of three items): Whether teachers have primary responsibility for professional development in (1) deciding the content, (2) designing and planning the activities, and (3) conducting the activities.

Sixth, district size was measured by district total enrollment.

The results of this study show that most district administrative variables proposed in this study are significantly related to three TOL variables. Among ten variables, six variables were found to be significantly related to TOL variables.

Specifically, time support II is significantly related to content-focus and active learning variables. The coefficients for time support II (scheduled time) are .11 / .13 for content-focus and active learning respectively. This means that as the ratio of teachers receiving scheduled time to those who are not receiving increases, teachers report on average experiencing a level of content-focus 0.11 units, and active learning 0.13 units high. These imply that teachers who receive scheduled time for professional development, are more likely to participate in opportunities for content-focus, and active learning than those who do not receive scheduled time.

Money support I (stipend) is also significantly related to content-focus and total hours variable. The coefficients for money support I (stipend) are .15 / .76 for content-focus and total hours respectively. This means that as the ratio of teachers receiving stipends to those who do not receive increases, teachers report on average experiencing a level of content-focus 0.15 units high and spending 0.76 hours more on their learning. This implies that teachers who receive stipends for professional development are more likely to engage in opportunities for content-focus, and spend more time on their learning.

Money support II (reimbursement) has a significant relationship only to active

learning variable. The coefficient for money support II is .13 for active learning. This means that as the ratio of teachers receiving reimbursement to those who do not receive increases, teachers report on average experiencing a level of active learning 0.13 units high. This implies that teachers who receive reimbursement of college tuition, conferences, or travel for professional development are more likely to engage in opportunities for active learning than those who do not receive.

Principal learning is significantly related to active learning and total hours. The coefficients for principal learning are .19 / .75 for active learning and total hours respectively. This means that as the principal learning variable increases by one level, active learning level and total hours can be expected to increase by 0.19 units, 0.75 hours. That is, teachers in the district that provides more professional development for principals are more likely to engage in opportunities for active learning, and spending more time on teachers' learning.

Performance indicator is significantly related to total hours. The coefficient for performance indicator is 0.49 for total hours, which means that as the ratio of districts that use performance indicators to districts that do not use increases, teachers in a district report on average spending 0.49 hours more on their learning. This result implies that teachers in the districts that use performance indicator are more likely to spend more time on their learning than those in the districts that do not use performance indicator.

Accountability related to performance has a significant and negative relationship to active learning. The coefficient for accountability is - 0.12 for active learning, which means that as the ratio of districts that use rewards or sanctions related to performance to districts that do not increase, teachers report on average experiencing a level of active

learning 0.12 units lower. This result implies that teachers in the districts that use rewards or sanctions related to performance are less likely to participate in active learning than those in the districts that do not use rewards or sanctions.

Consequently, these results provide sufficient evidence for supporting the hypothesis that administrative contextual factors are associated with TOL at the district level, although this study did not find statistically significant relationships of some administrative variables with three TOL variables. The discussion regarding these findings will be provided in the next section.

Institutional contextual factors

This study hypothesized that parents' socio-economic condition is a critical institutional contextual factor for three TOL indicators. Parents' socio-economic condition as a factor was measured by percentage of free lunch at the district level. The data shows that percent of free lunch students is not significantly related to any variable of TOL although this variable is negatively related to all three variables. Thus, this finding does not provide evidence that supports for the hypothesis that at the district level, institutional contextual factors are associated with TOL indicators. That is, the relationships of the percent of free-lunch students to three TOL variables are not precisely as predicted in the hypotheses. The discussion regarding this finding will be provided in the next section.

Result 4: Results of the Fourth Hypothesis Test

The fourth hypothesis for this study was that interactive relationships between

professional learning community and districts administrative contextual factors affect three TOL indicators. This study limited the analysis to the cross interactions between district level administrative factors and school level social system conditions for the reason that a full explication of all possible interactions is beyond the scope of this study. A slopes-as-outcomes HLM provides useful information about the effects of cross-level interactive relationships between professional learning community and districts level factors on three TOL indicators. This model estimates the degree to which district level administrative variables influence the strength of the relationship between school level professional learning community and TOL (i.e., a cross-level interaction), holding constant all of the variables included in the prior model (an intercepts-as-outcomes HLM). The results from the HLM analysis show that some district administrative variables have cross interaction effects with professional learning community on TOL variables.

First, this study found that accountability variable has statistically significant interaction effects with professional learning community and main effects on active learning. Table 5-6 presents the estimates from the model with this cross-level interaction between accountability and professional learning community.

Professional learning community still predicts high level of active learning, with increased coefficient from 0.32 of the previous model to 0.36 of the current model. This means that as the professional learning community level increases by one unit, active learning is expected to increase by 0.36 units. Accountability variable is also significantly related to active learning, with a much more decreased coefficient from - 0.12 of the previous model to -.401 of the current model. This means that as the ratio of districts that use rewards or sanctions related to performance to districts that do not, teachers report on

average experiencing a level of active learning 0.40 units lower.

The regression coefficient for the cross-level interaction is -.401, which is very big and significant. This interaction is formed by multiplying the levels for the variables 'professional learning community' and 'accountability,' and the negative value of interaction term (-.401) means that in districts that use rewards or sanctions related to performance, the advantage that teaches working in the professional learning community are more likely to participate in active learning, is smaller than expected from the direct effects of professional learning community only. Thus, the effects of professional learning community on teachers' opportunities for active learning are considerably smaller in districts that uses rewards or sanctions related to performance.

Table 5-6 Cross-Level Interactive Effects between District-Level Accountability and School- Level Professional Learning Community on Active Learning

Model for active learning outcome variable, Selected Term	
Intercept	1.833 (.049)***
Learning community (G010)	.356 (.073)***
Interaction with accountability (G011)	-.401 (.169)*
Accountability (G001)	-.106 (.048)*

Note. Numbers in parentheses are standards errors.
* indicates significance at $p \leq .05$,
*** indicates significance at $p \leq .001$

Another district level variable, performance indicator also has statistically significant interaction effects and main effects on total hours. Table 5-7 presents the estimates from the model with this cross-level interaction between performance indicator and professional learning community.

Professional learning community still predicts high level of total hour, with increased coefficient from 1.07 of the previous model to 1.10 of the current model. This

means that as the professional learning community level increases by one unit, total hours of TOL are expected to increase by 1.07 hours. Performance indicator is also significantly related to total hours, with positive coefficient of 0.48. This means that as the ratio of districts that use performance indicators to districts that do not use, teachers report on average spending 0.48 hours more on their learning.

The regression coefficient for the cross-level interaction is 1.65, which is big and significant. This interaction is formed by multiplying the scores for the variables 'professional learning community' and 'performance indicator,' and the positive value of interaction term (1.65) means that in the districts with district performance indicator, the advantage that teachers working in the professional learning community spend more time on their learning is bigger than expected from the direct effects of professional learning community only. Thus, the relationship of professional learning community to total hours is stronger in districts that use performance indicators.

Table 5-7 Cross-Level Interactive Effects between District Level Performance Indicator and School Level Professional Learning Community on Total Hours

Model for total hours outcome variable, Selected Term	
Intercept	7.09 (0.07)***
Professional learning community (G010)	1.10 (0.24)***
Interaction with district performance indicators (G011)	1.65 (0.61)**
Performance indicators (G001)	0.48 (0.20)*

Note. Numbers in parentheses are standards errors
* indicates significance at $p \leq .05$,
** indicates significance at $p \leq .01$,
*** indicates significance at $p \leq .001$

In sum, through the cross-level interaction, this study found that the strength of this relationship varies across different types of district policies, such as accountability related to performance or performance indicator. For example, professional learning

community is a stronger predictor of three TOL variables when districts use performance indicators for school improvement. In contrast, districts' use of rewards or sanctions related to performance results in professional learning communities having a weaker relationship with active learning. Consequently, the results of this study support the hypothesis that interactive relationships between professional learning community and districts administrative contextual factors affect three TOL indicators. The discussion regarding the important findings will be provided in detail in the discussion section.

Result 5: Results of the Fifth Hypothesis Test

The fifth hypothesis for this study was that the relationships between contextual conditions and TOL vary across the three TOL indicators. The results of this hypothesis are provided by synthesizing the results of the previous hypotheses 2 and 3 rather than by performing a particular HLM analysis. The analysis confirms that some relationships between district or school level contextual conditions and TOL vary across the three TOL indicators. Table 5-8 presents coefficients and significance for the school and district variables, which indicate the different relationship across three TOL variables (content-focus, active learning, and total hours).

First, among school level variables, student total enrollment and suburban are only significantly related to active learning. The significant coefficient for suburban is .14 for active learning, which means that as the ratio of suburban to other areas increases, teachers report on average experiencing a level of active learning 0.14 units higher. Student total enrollment is only significantly related to opportunities for active learning, but the strength of the coefficient is so small.

Second, among district level administrative factors, time or money resources for TOL have diverse relationships with three TOL variables. For example, time support II is significantly related to content-focus and active learning variables. The coefficients for time support II (scheduled time) are .11 / .13 for content-focus and active learning respectively, which means that as the ratio of teachers receiving scheduled time to those who are not receiving increases, teachers report on average experiencing a level of content-focus 0.11 units, and active learning 0.13 units higher. Money support I is significantly related to content-focus and total hours. The coefficients for money support I (stipend) are .15 / .76 for content-focus and total hours respectively, which means that as the ratio of teachers receiving stipends to those who are not receiving increases, teachers report on average experiencing a level of content-focus 0.15 units higher and spending a 0.76 hours more on their learning. In addition, money support II has only significant relationship to active learning variable. The coefficient for money support II (reimbursement) is .13 for active learning, which means that as the ratio of teachers receiving reimbursement to those who are not receiving increases, teachers report on average experiencing a level of active learning 0.13 units higher.

Third, among district level administrative variables, principal learning, accountability, performance indicators, and co-funding are only significantly related to active learning and total hours. For example, principal learning variable is significantly related to total hours and active learning variable. The coefficients for principal learning for principal learning are .19 / .75 for active learning and total hours respectively, which means that as the principal learning increases by one level, active learning level and total hours can be expected to increase by 0.19 units, 0.75 hours. Performance indicator is

significantly related to total hours TOL variable. The coefficient for performance indicator is 0.49 for total hours, which means that as the ratio of districts that use performance indicators to districts that do not use increases, teachers in a district report on average spending 0.49 hours more on their learning. By contrast, accountability, money support II (reimbursement), and co-funding are only significantly related to active learning, with regression coefficient at -0.12, 0.13, and 0.03 respectively, which means that as the ratio of districts that use rewards or sanctions related to performance to districts that do not increase, teachers report on average experiencing a level of active learning 0.12 units lower.

Table 5-8 Different Relationships with Contextual Factors across Three TOL Variables

	Content-focus	Active learning	Total hours
School level			
Student total enrollment	.000 (.000)	.001 (.001)***	.000 (.000)
Suburban	.053 (.033)	.139 (.039)**	.148 (.139)
District level			
Time support II (Scheduled)	.110 (.039)**	.133 (.051)*	.197(.160)
Money support I (Stipend)	.151 (.036)***	.061(.044)	.761(.138)***
Money support II (Reimburse)	.038 (.035)	.129(.042)**	.238(.157)
Co-funding	.013 (.012)	.031 (.015)	.026 (.048)
Principal learning	.095 (.058)	.189 (.075)*	.749 (.237)**
Performance indicator	-.004 (.094)	.022 (.074)	.492 (.243)*
Accountability	-.031 (.044)	-.117 (.054)*	-.099 (.153)

Consequently, although not all contextual factors are related to these variations across three variables of TOL, the results of this study have sufficient evidence supporting the hypothesis that the relationship between contextual conditions and TOL varies across the three indicators of TOL (content-focus, active learning, and total hours). In the discussion section, this study will discuss these important findings more in detail.

Summary Remarks

From the results of the three separate HLM analyses, this study found mixed evidence for the five hypotheses regarding the relationship between district and school contexts and TOL. First, this study found evidence supporting the first hypothesis that three TOL indicators vary across schools and districts. As proposed in this study, a substantial proportion of the variation in three TOL indicators is attributed to district-and school-level contexts.

Second, not all of the stated contextual factors were confirmed in their relationship with TOL. But the results support the notion of multiple perspectives and of embedded contexts as affecting TOL, by providing sufficient evidence that multiple contexts conditions (such as social system contexts, administrative and organizational contexts, and institutional contexts) are significantly associated with three TOL indicators at the district or school level.

Furthermore, although this study did not explore all possible interactions among contextual factors, the results confirm the notion of embedded contexts that assume interactive relationships among contexts conditions, by providing sufficient evidence that districts' administrative contexts conditions moderate the relationship between schools' social system contexts conditions and TOL. The results also confirm the fifth hypothesis that the relationship between contextual conditions and TOL varies across the three indicators of TOL (content-focus, active learning, and total hours).

Discussion

The first purpose of this discussion is to suggest some possible interpretations for the results of this study. Although the primary focus of this study was to test the utility of the conceptual model, there are some implications for policy and practice that may be addressed from the findings.

This section presents three topics: First, a discussion regarding district and school-level variability of TOL is presented based on significant findings from the first hypothesis test. Then, a discussion about contextual factors related to TOL is presented on the basis of the important findings from the second, third, and fourth hypotheses tests. Finally, a discussion regarding diverse influences of contexts across TOL indicators is presented based on the findings from the fifth hypothesis.

Discussion 1: Relationship between Multilevel School Contexts and TOL

This study hypothesized that teachers' opportunities to learn vary across schools and districts. If very little or none of the variance was the result of between-school or between-district differences, then there was no practical reason to study multilevel school contexts for TOL. The results of this study confirmed that a substantial proportion of the variation in three TOL indicators is attributed to district-and school-level contexts although much of this is attributable to differences in teacher background characteristics within schools. Specifically, approximately 20% of the variance in three TOL indicators was explainable by between-district differences and approximately 6% of the variance in three TOL indicators was explainable by between-school differences.

Several aspects of these findings are noteworthy. First, although a substantial

percentage of the variance is found at the district-and school level, almost 70% of the variance is still at the teacher level. If we assume that TOL is a multi-level contextual construct, then the evidence that most of the variance is found at the teacher level raises an issue regarding the precise estimation of variance.

One possible explanation for these findings is that small within-school samples of the SASS data may make it difficult to pick up the variation between schools. The SASS data has on average of only five or six teachers per school. Smith and Rowely's study (2005) using the 2000 SASS also show the similar results in the variation of TOL. In this study, they found that only 4.1% of the variance in total hours of TOL was explained by school level factors (including administrative support, collaboration, autonomy, and other structural conditions) and 2.7% of the variance in total hours was explained by state level factors (including teacher certification and accountability), leaving 93% of the variance in total hours within the schools. A new national survey data designed more carefully within a nested sample may enable us to increase the precision of variance estimates in teacher outcome variables within schools (Talbert & McLaughlin, 1994).

Another possible explanation is that TOL would be also constructed through subgroups within a school. For example, TOL tend to inhere in the grade level or the area of subject specification. The field observations conducted by Little (1999b) and McLaughlin and Talbert (2001) show that different TOL patterns within and across different subject departments in the same schools. For this reason, I have reason to expect high within-school variation in TOL.

Second, the findings of this study indicate that district contexts matter for TOL as

much as school contexts. In this study, differences among districts apparently contribute more to the variability of TOL than school differences. These findings are interesting and surprising because many educational reformers and researchers have generally argued that schools rather than districts can make differences in teacher learning. Yet, the findings of this study suggest the importance of the district relative to the school as a primary agent of teachers' professional development.

Some critics may contend that high between- district variance may occur because the SASS data is more likely to represent formal learning rather than informal learning. That is, since teachers' informal learning tends to occur spontaneously (Smylie, 1995), large survey SASS data has limitations in capturing the aspects of informal learning opportunities and thus the data may include more components of formal learning provided at the district level than informal learning. This may be a possible explanation for the high between-district variance in TOL because districts are generally regarded as dominant providers of formal learning (Little, 1990a). Further, it should be noted that a some of previous research (e.g., Desimone et al., 2002; Firestone et al., 2004; Spillane, 2004) is consistent with these findings. Although I find little research that simultaneously explores between - school and district variance in TOL, several studies suggest that districts can play a facilitating role in increasing formal or informal teachers' learning. For example, Desimone et al.'s (2002) study using a nationally representative sample of district coordinators found that district policy mechanisms guide and support high quality TOL. In particular, their study takes comprehensive indicators of TOL, which include not only three features used in the current study (such as content-focus, active learning opportunities, duration), but also collective participation, coherence, and type of activity.

Further, these indicators of TOL include the component of informal as well as formal learning.

Third, this study found that by simultaneously estimating the effects of two embedded contexts, each one has a significant relationship with TOL. These findings challenge the results of prior research that report the effects of district and school contexts as mutually exclusive. Findings from this study suggest that the variability of three TOL indicators may be attributable to multi-level school contexts. Although this study is restricted to two levels due to the data available in the SASS survey, it supports the assumption that each of the multiple embedded contexts (including states or subject departments) may affect TOL.

Discussion 2: Relationship between Contextual Factors and TOL

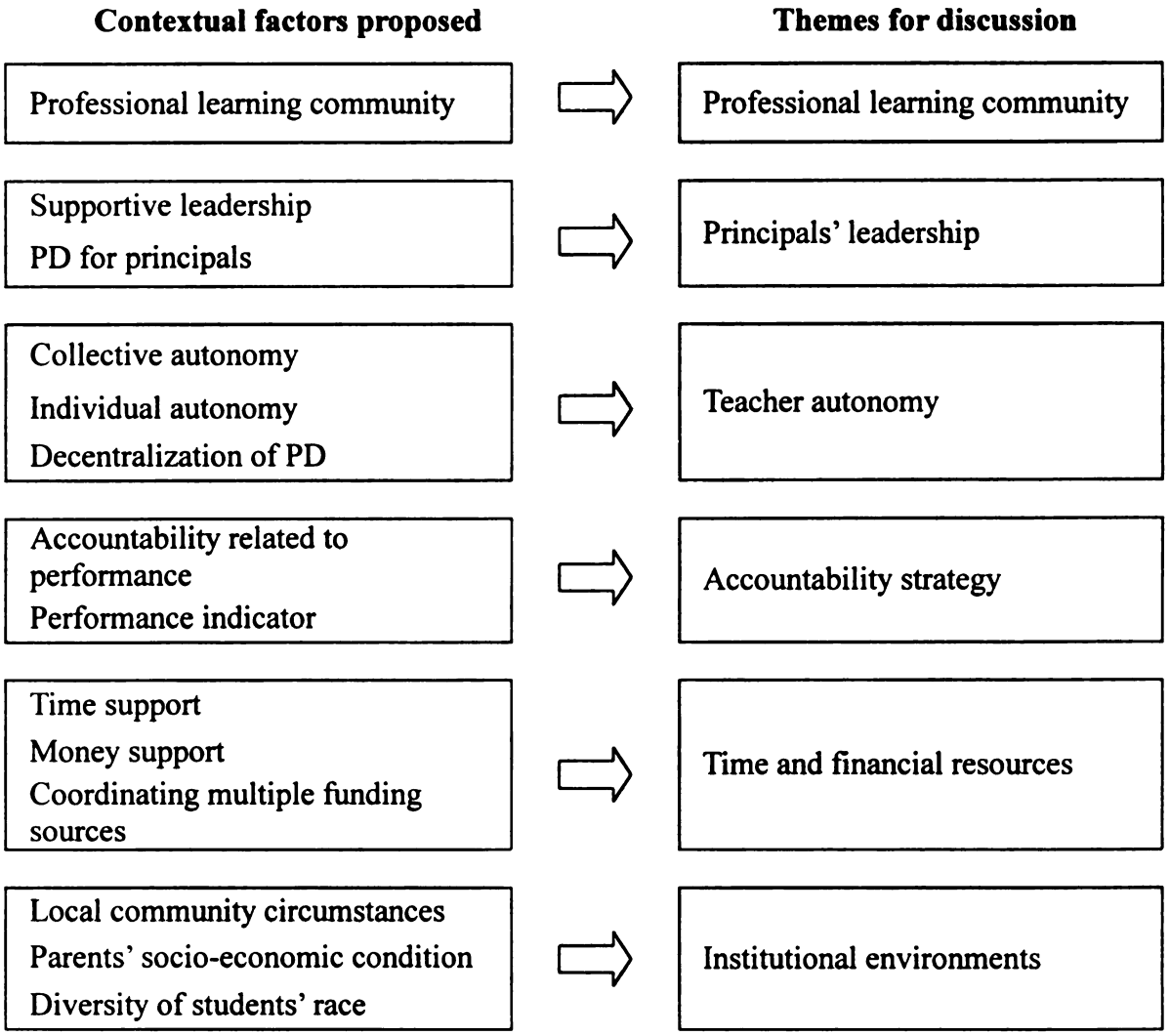
This study assumed that multiple contexts (social system contexts, administrative contexts, and institutional contexts) at the district and school level are associated with TOL. Results from the HLM analyses confirmed that most of the proposed contextual factors are significantly associated with three TOL indicators (content-focus, active learning, and total hours). Further, regarding a range of specific contextual factors assumed to influence TOL, there was a lot of complexity, under-specification, and interactive effects.

This section provides a discussion regarding the complex and interactive relationships between contextual factors and three TOL indicators. Because contextual factors are often interrelated with one another, synthesizing these factors with common themes can provide a better interpretation of the results and implications for policy and

practices (Knapp, 2003). Here, this study discusses the relationships between contextual factors and TOL using six themes.

Table 5-2 illustrates how contextual factors proposed in this study are related to six themes. Each theme is elaborated below.

Figure 5-2 Contextual Factors Proposed in this Study and Six Themes



Professional learning community

The results of this study show that professional learning community is a critical context for TOL. Specifically, this study found that teachers working in the professional learning community are more likely to engage in learning opportunities for content-focus and active learning, and are more likely to devote their time to learning. These findings support the notion that building and nurturing professional learning community where teachers engage socially with colleagues and share the sources of knowledge can contribute to increasing TOL. In particular, the professional learning communities should be connected to the learning or instructional matter rather than to simply helping teachers feel good about each other or their working situation.

These findings are consistent with field observations offered in Little (1999b) and McLaughlin and Talbert (2001) that underscore the importance of professional learning community in teacher learning and teaching practices. For example, McLaughlin and Talbert (2001) found that strong learning communities that value innovation for instructional practices and teachers' collaboration for learning are more likely to support teachers' on-going learning. By contrast, strong traditional communities that value conservatism about learning and instruction isolate teachers from peers and discourage teachers' learning. Although the current study did not include the relationships of other kinds of professional communities (such as traditional communities) to TOL, it provides empirical confirmation on consensus assumptions about the effects of professional learning community on TOL.

The results of this study also extend the prior literature on professional learning community, by finding the interactive relationships between professional learning

community and district level administrative contextual factors. That is, this study found that the effects of professional learning community on TOL are stronger or weaker depending on different types of districts' accountability strategy. In the current study, teachers working in the professional learning communities tend to spend more time on their professional development when districts adopt performance indicators for school improvement. Knapp (2003) explains by noting that professional communities that encourage teachers' learning can be established or strengthened through district policies. For instance, the collegial relations and the value of inquiry in professional communities would be strengthened if districts mandate tasks that are to be performed collaboratively, such as planning for school improvement or establishing goal setting (Knapp, 2003). While participating in these tasks, teachers may spend time together, and learn from each other.

By contrast, the results of this study show the effects of professional learning communities on TOL can be weakened through district strategies. In the current study, teachers in the professional learning communities are less likely to engage in active learning when districts adopt rewards or sanctions related to performance. District rewards or sanctions related performance may undercut the general value of collegiality and the specific commitment to an improvement agenda by isolating teachers from peers, or inhibiting teachers' attempts to undertake innovative practices and learning (Firestone et al., 2004).

Consequently, it is certain that professional learning communities contribute substantively to TOL. When teachers collaborate to design new instructional practices and have shared norms concerning learning, teachers are more likely to engage in

content-focused and active learning. They are also more likely to devote time to their learning. In particular, professional communities can be effective on TOL when they are strongly connected to the learning or instructional matters. Furthermore, these professional communities have interactive relationships with district level administrative contextual factors. For example, professional learning communities would lead to increased TOL if district strategies convey norms and expectations regarding teacher learning and teaching practices. By contrast, the effects of professional learning communities on TOL would decrease if district strategies destroy the value of collegial norms and innovation.

Principals' leadership

The conventional wisdom is that the principal matters for teachers' learning. In some parts, the results of this study support these arguments. For example, this study found that in districts where principals participate in professional development program, teachers are more likely to engage in active learning and devote their time for professional development.

This is consistent with several studies (Rosenholtz, 1989; Fink & Resnick, 2001; Firestone et al., 2005) that report the importance of principals' professional development for teachers' learning. For instance, Fink and Resnick (2001) found that in districts that offer professional development programs for principals (such as visiting other schools, classroom observations, discussion involving curriculum and pedagogical repertories, or learning from exemplary instructional practices), principals are more likely to develop their understanding of high quality instruction and provide practical advice for

overcoming obstacles to realizing reform goals and performing new teaching practices. In particular, these programs for principals are effective for teacher learning when the programs are directly related to instructional matters (Rosenholtz, 1989). That is, principals' instructional capacity developed through professional development programs focused on instructional matters can improve TOL. This is a critical linkage that is often overlooked in conventional professional development programs.

Despite the importance of principals in the enhancement of teacher learning, this study did not find significant relationships between supportive leadership of principals and increased TOL. This puzzle turns up in several other studies which contend that supportive principals' leadership does not directly lead to increased TOL although it encourages collaborative relations among teachers (Firestone et al., 2005; Little, 1999b). Rather, teachers are more likely to experience their learning cumulatively and substantively when they have regular contact with principals who have the requisite expertise to diagnose and exhibit productive instructional practices, guide achievement of school goals, and give teachers feedback on classroom practices (Knapp, 2003; Youngs & King, 2002). "Supportive leadership" as measured in this study, is apparently not connected tightly and specifically enough to teacher learning or instructional matters.

Consequently, the findings of this study suggest that the specific aspects of principal leadership that promote TOL are elusive to pin down. Although we speculate that principals' instructional capacity developed through professional development provided by districts tends to increase TOL, the principals' leadership affecting TOL is still left unspecified and under-explored. More information is needed on the aspects of principals' leadership available to improve effective TOL.

Teacher autonomy

Although common wisdom posits that teacher autonomy leads to increased TOL, the results of this study indicate a complex relationship between teacher autonomy and TOL. For instance, this study found that teachers' collective autonomy predictor increase in three TOL indicators (content-focus, active learning, and total hours) while individual autonomy leads to decrease in three TOL indicators. Specifically, when teachers exercise a great deal of collective influence on school policy and instruction, teachers tend to engage in content-focus and active learning and spend more time on their learning. These findings are consistent with the contention of several scholars (Little, 1990a; Marks & Louis, 1999; Newmann, 1993; Smlylie, 1994) that collective influence of teachers on making decisions affects professional development and instructional practices. For example, Smylie (1994) argues that teachers are more likely to examine their current assumptions and practices and increase their responsibilities for professional enhancement while experiencing collective autonomy.

By contrast, the findings of this study show that teachers' individual autonomy over classroom processes decreases effective TOL. This finding can be explained by Marks and Louis's (1999) contention that increasing the individual autonomy of teachers who then exercise their freedom in disparate directions may undermine a unified focus on curriculum and pedagogy and support teachers' isolation from peers. Teachers' isolation from peers has a gradually dangerous effect on teacher learning by creating invisible walls among teachers and decreasing the beneficial role that activities such as collaboration can have in their practices (Scribner, 1999).

Interestingly, despite the effects of teachers' collective or individual autonomy

on TOL, this study did not find significant relationships between districts' decentralization of professional development and TOL. Marks and Louis (1999) explain this finding by noting that once decentralization provides the school with autonomy, both capacity for organizational learning and empowerment are largely a matter of internal relationships among people. In other words, school autonomy that leads to increased TOL is more closely related to school culture rather than district policies that provide a great deal of decentralization.

Again, the district emerges as an important agent of TOL, and this makes sense. When districts play a minor role in PD (i.e., via "decentralization" of this function), then TOL is decreased as well. This is an important finding if it holds up as a central factor. At the same time, the findings of this study suggest that efforts to empower teachers can contribute to increased capacities for teacher learning on the part of the school. Teachers are willing to be committed to their learning in the learning environment focused on teachers' collective autonomy while their learning opportunities decrease in the school culture focused on individual autonomy. Furthermore, we speculate, district engagement in PD can enhance teacher influence by bringing them out of isolated settings to engage in common learning. This combination of district direction with teacher collective engagement appears to be a crucial aspect of enhanced TOL. Still, based just on these data, this is a hypothesis that requires further study.

Accountability strategies

Some scholars presume that strong accountability strategies lead to increased TOL, but the empirical findings using the national data do not necessarily support this

proposition. The results of this study show that districts' use of performance indicators predict teachers' more extended professional development while district rewards or sanctions related to performance lead to decreased teachers' active learning. The positive relationship between districts' use of performance indicators and TOL would be explained by the contention of several scholars (i.e., Desimone et al., 2001; Knapp, 2003; Murphy & Hallinger, 1988; Rosenholtz, 1989) who emphasize districts' role in improving teachers' learning or practices. For example, Knapp (2001) argues that districts' use of performance indicators can lead to increased professionalism within schools, through conveying districts' messages about general norms and expectations. These accountability strategies also provide useful information on weaknesses that need to be addressed (Desimone et al., 2001).

By contrast, the negative effects of rewards or sanctions related to performance could be explained by critics of accountability systems (i.e., Firestone et al., 2004) arguing that strong accountability polices can have perverse effects on teacher outcomes. Firestone et al. (2004) note that the accountability-related performance, ranging from extra pay for increased student performance to school closure for chronic underperformance, leads to decreased TOL, by creating an environment which inhibits teacher risk taking and experimentation, and isolates teachers from peers.

Consequently, the findings of this study suggest that, at least with regard to TOL, districts' accountability strategies do not necessarily lead to increased TOL. Accountability strategies generally assume that if teachers are evaluated based on teacher and student outcome, they would participate in professional development to make better progress. But these accountability strategies would lead to decreased teachers' aspiration

to inquiry-oriented learning opportunities if teachers feel pressured to raise test scores due to accountability policy. Rather, these accountability strategies would be more effective if such strategies were to focus more on fostering learning environments that share and communicate the importance of learning and school improvement. Further studies using more developed measurements or in-depth case studies can provide better information about the effects of accountability strategies on TOL.

Time and Financial Resources

The findings of this study show that the availability of time and financial support for professional development significantly increase TOL. For example, teachers receiving scheduled time for professional development are more likely to engage in opportunities for content-focus, and active learning. In addition, the availability of stipends or reimbursement for professional development is more likely to enable teachers to participate in opportunities for content-focus, and active learning and to devote their time for professional development.

Findings of this study are consistent with the evidence of some case studies (i.e., David et al., 2000; Scribner, 1999). In a study of three districts in Kentucky, David et al. (2000) found that teachers in a district which paid stipends for in-service teacher professional development were more likely to pursue their professional development focused on reform ideas. Scribner's (1999) study shows that teachers are more likely to conduct highly valued learning activities (such as individual inquiry and collaboration) and engage in learning opportunities to meet their needs when the scheduled time for teacher learning is given. Darling-Hammond and McLaughlin (1995) note that

organization of time for teacher learning is a critical factor for facilitating teachers' professional development because by having adequate time for learning, teachers can have opportunities to acquire, practice, and reflect on new concepts and skills to collaborate and interact with peers.

Interestingly, however, the findings of the current study show that all financial resources or time availability are not necessarily effective for TOL. For example, this study did not find significant relationships between released time for professional development and TOL indicators. In other words, provision of time for teacher learning would be effective when the time is officially scheduled for teachers' professional development rather than when the time is freely given to teachers by simply releasing teaching time from teachers. These findings suggest that the effects of time or financial resources on effective TOL need to be investigated cautiously.

Despite the importance of financial resources, districts' efforts to coordinate multiple funding sources of professional development do not predict increased TOL. The current study did not find significant effects of multiple funding sources on increased TOL. This finding contrasts with Desimone et al. (2002) who found that districts' coordination of funding from multiple sources supports coherent TOL activities. One possible explanation for this would be that while Desimone et al. found the significant effects of multiple funding sources on structural features of TOL, the current study did not include such aspects of TOL as outcome variables. That is, significantly related outcome variables of TOL from the study of Desimone et al. (2002) were reform types of TOL and collective participation, but this study focuses on content-focus, active learning, and total hours of TOL as TOL outcome variables.

Another possible explanation for this is the weak connection between districts' effort to coordinate multiple funding sources and the core features of TOL such as content-focus or active learning. Because external funding sources are often fragmented into different funding streams and uncoordinated with other programs, over-dependence on external funding sources can make it difficult to plan and provide the core features of TOL which generally require substantive and long term investments.

Consequently, it is certain that time availability and financial resources for teachers' professional development can significantly contribute to improving TOL. However, all provisions of these resources are not effective on teacher learning. Furthermore, the impact of financial resources does not necessarily rely on multiple funding sources.

Institutional environments

This study assumed that institutional contexts outside of the educational systems (such as local community circumstances, parents' socioeconomic conditions, and diversity of students' race) also matter for TOL. The results of this study are mixed. As hypothesized, in suburban schools where local communities generally have much more impact on the schools and give abundant material resources, teachers' opportunities for active learning are more likely to increase. In addition, in schools with a high portion of minority students, teachers tend to more engage in the opportunities for content-specific and active learning. In these schools, teachers are more likely to devote their time to professional development as well.

By contrast, the current study did not find significant relationships between

parents' socioeconomic conditions and TOL at the district level. One possible explanation of this finding is that although high poverty districts receive funds from multiple programs, these provisions may not solve the problems of generally low teachers' engagement in TOL due to institutional contexts such as parents' socioeconomic conditions. In some ways, the funding may be used for providing professional development for teachers. However, the provision of funding for professional development is not enough to stimulate teachers' willingness to engage in learning opportunities in high-poverty districts. Because low socio-economic status of students creates teachers' low expectations of student performance and their own efficacy, teachers' psychological discouragement would not be recovered only by providing the funding for professional development. Furthermore, these funds often tend to be fragmented into different funding streams in poverty districts. Based on these ideas, I speculate that multiple funding sources and the institutional contexts (such as parents' socioeconomic conditions) in high-poverty districts may lead to a zero-sum impact on teacher learning.

Taken as a whole, the evidence from this analysis suggests that institutional contexts constitute TOL as well. The national data indicates that teachers' willingness to engaging in learning opportunities is more likely to be attributed to the socioeconomic conditions and cultures particular to different local communities, student body, and parents. These findings are important because up to now, policy makers and policy researchers had not paid much attention to the influences of institutional contexts on TOL. The issue of institutional contexts is one that should be closely examined in further research.

Discussion 3: Variability across Three TOL Indicators

The current study hypothesized that the relationships between contextual conditions and TOL vary across the three TOL indicators. The findings of this study show that some contextual factors have different effects on three TOL indicators.

First, local community circumstances are more likely to affect teachers' active learning than content-focus learning or total hours. These findings seem to be attributed to the nature of active learning. That is, active learning referring to teachers' active engagement in intelligent and meaningful discussion, planning, and practices are more likely to occur in the learning environments that encourage teachers' new experimentation and support teachers' professional work. Generally, suburban schools in which local communities offer abundant material resources and professional support are more likely to support and encourage teachers' professional experimentation and professional work.

By contrast, teachers' active learning is more sensitive to accountability strategies related to student performance rather than other indicators of TOL. The findings of this study show that districts' rewards or sanctions related to student performance are negatively related to active learning. Strong accountability related to performance may inhibit teachers' deep understanding about new instructional approaches or criticism on the basis of their experiences, by emphasizing conventional didactic practice or test preparation.

Second, time availability for professional development is more associated with the core aspects of TOL than the structural aspects. This study found that scheduled time for professional development has significant relationships with teachers' content-focus

and active learning. These findings make sense because increasing the core aspects of TOL (such as content-focus, active learning) requires substantive and long term investments.

Third, districts' accountability strategies using the performance indicators seem to have a relationship with total hours rather than the core aspects of TOL (content-focus and active learning). The findings of this study suggest that despite extended time for professional development, districts' accountability strategies do not guarantee the quality of TOL.

Consequently, the findings of this study suggest that the indicators of TOL are sensitive to level or context effects. In particular districts' policies that guarantee extended time for professional development do not necessarily increase teachers' opportunities for the content-focus and active learning. Thus, policies for improving the quality of TOL need to be cautiously developed.

CHAPTER VI
CONCLUSIONS

Chapter five presented and discussed the test results of five hypotheses proposed in this study regarding the relationship between district and school contexts and TOL. Three kinds of HLM analyses enabled examination of these hypotheses. This research was conducted using a SASS national database providing parallel measures of TOL, and providing the necessary information regarding school and district level contextual factors. This final chapter provides a brief discussion of the strengths and limitations of this study, and presents some implications for policy research, and policy and practices.

Strengths and Limitations

This study provides new evidence on the utility of a conceptual model exploring the relationship between contexts and TOL. Although a more complete understanding of the relationship between contexts and TOL requires a comprehensive approach that is capable of capturing the diverse and interactive contextual influences on TOL, the contemporary approaches tend to treat contextual levels of educational systems as mutually exclusive. By simultaneously estimating the connection between district and school contexts and TOL, this study has demonstrated the relationship between complex contexts and TOL. Furthermore, this study also affirms the value of multilevel statistical techniques as a means to extend McLaughlin and Talbert's model methodologically.

However, as with most research, this study also has methodological shortcomings. First, the SASS data used in the current study are cross-sectional. All information was collected during the 1999-2000 school year. This is problematic for two

reasons. First, the relationship between district and school level factors and three TOL indicators (content-focus, active learning, and total hours of TOL) may be influenced by temporally prior learning opportunities. Second, there may be a time lag among the relationships under investigation. For instance, districts' investment for principals' professional development might not be expected to affect three TOL indicators in the year in which the investment for principals was begun, but rather in the years after the investment projects are completed.

Therefore, it is not possible to draw inferences about the direction of causation for the relationships that were discovered. It may be that high levels of professional learning communities cause increased TOL, or it may be that having high teachers' learning opportunities create professional learning communities. Due to these limitations in causal inferences, the results of this study were carefully qualified and delimited. For example, when this study addressed the results of the relationship between contexts and three TOL indicators, it limited the language by using 'related' or 'associated' rather than 'affect' or 'influence'. To confirm the causal direction hypothesized in this study, subsequent research should replicate the results using longitudinal data.

Second, the results of this study are based on analysis of secondary data limited to variables about which information was collected by the National Center for Education Statistics. Of course, studying the relationship between TOL and contextual factors using such a large national data set of teachers, schools, and districts creates a worthwhile opportunity. Nevertheless, only a portion of the variance in the reported TOL is accounted for by the variables examined in each model. Although it is not obvious from the literature review and theory whether important variables are missing from the models, it

is always possible that variables exist that have not been identified. If such variables do exist and are not included in the models this can lead to specification error or biased coefficients and potentially misleading statements. Due to these limitations, this study addressed the results cautiously.

Finally, some critics may contend that not much empirical support was found for the proposed hypotheses regarding the relationship between contexts and three TOL indicators, because this research employed relatively weak measures in terms of some independent variables. For example, as reported in Chapter IV, the reliability estimate of the measures for the professional learning community variable is .59, which means that the magnitude of this reliability estimate is modest.[6] Measurement error can also lead to bias in predictors. That is, the measure developed here is more likely to fail to tap important dimensions of professional learning community construct and so to be an invalid measure of the underlying theoretical constructs. Due to this limitation, it could be argued that better measures of the professional learning community variable would have modest effects on teachers' learning opportunities. This is possible, but it is also worth noting that a substantial body of previous research is consistent with these findings (for a review, see McLaughlin & Talbert, 2001).

[6] Future studies using Item Response Theory (IRT) may improve the reliability of measures for the variables. IRT is considered the most effective way to increase reliability by providing information about measurement error in the variables. That is, higher levels of IRT information indicate higher precision and thus greater reliability. By incorporating IRT information about measurement error in hierarchical models, Raudenbush and Bryks (2002) mobilize an advanced HLM that handles measurement error in the latent variables and increases the reliability of the latent variables. In this model, the level 1 analysis represents a measurement model for the latent variables, by designing a matrix linked to the item responses with the "true scores" or latent variables being measured for each individual. At level 2, the latent variables varied among individuals within groups. And at level 3, the coefficients of the level-2 model vary randomly across higher level groups (for more review, see Raudenbush & Bryks, 2002, p. 148). However, the current study did not adopt the advanced HLM because the model does not technically allow weighting variables.

Implications of the Study

Based on the results presented in the previous chapter, this study offers implications for policy research in support of McLaughlin and Talbert's multi-perspective embedded context model as a useful conceptual approach for a better understanding of relationships between contexts and TOL. Further, it draws policy and practice implications for the improvement of TOL. Yet, all of these implications for policy and practice should be taken cautiously due to the methodological limitations just noted. Hence, the implications for policy and practice in this study are speculative, not definitive.

Implications for Policy Research

This study provides several useful implications for policy researchers that investigate the relationship between school contexts and effective TOL.

First, this study suggests that the multi-perspective embedded context model is a useful framework for policy researchers that examine the relationship between school contexts and TOL. This model provides a better understanding of the highly interactive and quite complex contextual influences on TOL via the construct of embedded contexts – macro and micro contexts directly or interactively affect TOL. Throughout the series of analyses presented in this study, empirical evidence was found supporting the general approach drawn from McLaughlin and Talbert. The findings of this study indicate that diverse contexts at the school and district level are interrelated.

Further, this study suggests the complex and interactive relationships not only between multilevel school contexts and TOL, but also between diverse contextual factors

and TOL and among contextual factors. By comprehensively considering a wide variety of contextual factors drawn from the three perspectives of the model, this study demonstrates that diverse social system contexts, administrative contexts, and institutional contexts factors have complex and interactive relationships with TOL. For example, conventional wisdom is that teacher autonomy contributes to improving TOL. However, this study, using the multi-perspective embedded context model, showed that different aspects of teacher autonomy can have different effects on TOL and accordingly all aspects of teacher autonomy are not necessarily effective for TOL. Thus, adopting the multi-perspective embedded context model as a conceptual framework would help policy researchers understand the complex and interactive relationships between the specific factors in the multilevel school contexts and TOL. For instance, one possible research question for policy researchers would be how collective autonomy and individual autonomy affect effective TOL in secondary and elementary schools respectively.

Consequently, the multi-perspective embedded context model is a useful conceptual approach that deserves policy researchers' further attention. The conceptual approach that conceives of "context" as a complex construct contributes to a better understanding about the relationship between multiple embedded "real" school contexts and TOL. Although this study is restricted to two levels based on the data available in the SASS survey, it supports the assumption that the full model of multiple embedded contexts (including states or subject departments) may show the complex and interactive relationships between these multilevel contexts and diverse contextual factors at each level and TOL.

Second, this study demonstrates the possibility of operationalizing the multiple

perspective embedded context model using the multilevel statistical technique (HLM). To capture teachers' experiences within the multilevel and embedded contexts, McLaughlin and Talbert (2001) suggest a combination of both qualitative and quantitative measurement techniques. They expect that using quantitative measurement techniques enables detection of overall tendencies of the effects on teachers' schooling experiences at each school level, while using qualitative techniques helps account for interdependency or interaction among complex contexts. Instead of a combination of both qualitative and quantitative methods, this study captures the features of multilevel and embedded contexts using a new quantitative technique such as Hierarchical Linear Model (HLM). First, HLM can estimate overall tendencies of the effects on teachers' experiences at each school level, through estimating the model that partitions the variation in TOL across educational system levels at the same time. Then, it estimates interactive effects of diverse contextual factors on teachers' experiences[7], by mobilizing interactive models.

The advantage of HLM to capture the nature of multilevel and embedded contexts is supported by literature that focuses on the utility of the HLM technique in the complex process of schooling. For example, Frank (1998) points out that HLM technique can help us achieve important insights and understanding about the nature, causes, and consequences of relations among contexts. By considering the effects of different levels of the educational system, (such as the district, school, and classroom) and by examining relations among contexts, HLM addresses the limitations of traditional methods for quantitative analyses which have a moderate capacity to address these complex processes.

[7] Traditional regression models can also estimate the interaction of two attributes using interaction terms. However, the models fail to capture the characterization of schools as complex organizations partially defined by relations among people affiliated with the school due to the assumption of independent error terms. By contrast, the HLM technique is capable of capturing the complexity of the organization of schooling, by estimating one source of dependency among teachers, the common schools with which they are affiliated.

Further, the variance decomposition technique (nested ANOVA) used by McLaughlin and Talbert (2001) was quite similar in principle to the HLM procedure (Grodksy & Gamoran, 2003), even though they did not use HLM.

Consequently, the multilevel statistical technique (HLM) is a possible methodological approach to studying teachers' experiences within the multilevel and embedded school contexts. Using this technique enables policy researchers to estimate not only overall tendencies of the influences on teachers' experiences at each level of school systems but also independent or interactive effects among diverse contextual factors.

Implications for Policy and Practice

As TOL has been underscored as central to the standards-based reform, there are increasing discussions on the potential of contexts as critical influences for TOL. The purpose of the current study contributes to these efforts to understand the relationship between contexts and TOL.

First, district units have to be given more attention in terms of the improvement of TOL. The evidence from the national data suggests that districts can play an important role in providing teachers' professional development and facilitating teachers' learning. Several aspects of district policies could be considered useful for effective strategies for TOL. For example, districts' provision of professional development programs for principals may help teachers in a timely manner. Principals' instructional capacity developed through participation in the professional development programs is more likely to improve TOL not only by providing practical advice for teachers, but also enabling

teachers to connect their learning experiences over time. Districts' policy makers can also stimulate teachers' participation in learning opportunities by considering useful strategies for continuous improvement, such as sending messages about general expectations of school improvement and specific commitment to teacher learning. Furthermore, district administrative contexts can promote the professional learning communities that value and support teachers' learning. By requiring tasks that are to be done collaboratively or establishing goal setting for school improvements, districts can strengthen collegial relationships among teachers, and support a culture of inquiry. In these communities, teachers can have more opportunities to improve their knowledge of subject matter content, actively engage in intellectual and meaningful discussion, observation, and presentation, and spend more time on their learning. Therefore, both policymakers and educational leaders need to consider how district strategies enhance effective TOL independently or by combination with school level contextual factors.

Second, the importance of institutional contexts must be recognized and discussed by policy makers. The national data suggests that differences in teachers' learning are partly attributable to the differences in institutional environments outside of educational systems. For example, teachers' expectations of student learning or teachers' willingness to learn is partly shaped by communities' circumstances. The differences in communities' circumstances are mainly connected to the differences in socio-economic conditions (Metz, 1990). Therefore, policymakers must consider that educational policy will weaken the influences from the different institutional contexts, in particular social or economic conditions on teachers' learning.

Finally, some specific contextual factors thought to influence TOL in the

literature are suspect. The evidence from the national SASS data suggests that despite the premise of effects of teacher autonomy on TOL, teacher autonomy does not always help teacher learning. High levels of individual autonomy may discourage teachers from making attempts at innovate or to learn from colleagues while teachers' collective autonomy encourages teachers' learning. Moreover, all kinds of district resources or accountability strategies are not necessarily effective on TOL either. Scheduled time for TOL rather than simply releasing teachers from their teaching would be effective on TOL. Furthermore, while district strategies using the performance indicators would be useful for stimulating teachers' participation in learning opportunities, district strategies focused on accountability related to performance have perverse effects. Hence, policymakers and educational leaders need to verify cautiously the effectiveness of these factors in order to use as strategies for improvements of TOL.

APPENDICES

Appendix A

2000 SASS VARIABLES AND ITEMS USED IN DATA ANALYSIS

TOL Measures

Content Focus [3 items]

In the past 12 months, have you participated in any professional development activities that?

T0159	In-depth study of the content in your MAIN teaching assignment field
T0162	Content and performance standards in your MAIN teaching assignment
T0171	Student assessment, such as methods of testing, evaluation, performance assessment, etc

Active Learning [4 items]

In the past 12 months, have you participated in the following activities related to teaching?

T0152	Observational visits to other schools
T0153	Individual or collaborative research on a topic of interest to you professionally
T0155	Mentoring and/or peer observation and coaching, as part of a formal arrangement that is recognized or supported by the school or district
T0158	Workshops, conferences or training in which you were the presenter

Total Hours [6 items]

In the past 12 months, how many hours did you spend on the activities?

T0160	In-depth study of the content in your MAIN teaching assignment field
T0163	Content and performance standards in your MAIN teaching assignment field
T0166	Methods of teaching
T0169	Uses of computers for instruction
T0172	Student assessment, such as methods of testing, evaluation, performance assessment, etc
T0175	Student discipline and management in the classroom

Teacher Background Variables

Female

T0356 Are you male or female?

Teaching Experience

TOTEXPER Teacher's total number of years teaching full or part-time in public

Math

T0102 This school year, what is your main teaching assignment field at this school, that is, the field in which you teach the most classes?
(Math = 1 Others = 0)

English

T0102 This school year, what is your main teaching assignment field at this s school, that is, the field in which you teach the most classes?
(English = 1 Others = 0)

School Level Variables

Professional Learning Community [5 items]

Do you agree or disagree with each of the following statements?
(Strongly agree =1, Strongly disagree = 4)

T0307 The principal talks with me frequently about my instructional practices
T0309 Most of my colleagues share my beliefs and values about what the central mission of the school should be.
T0311 There is a great deal of cooperative effort among the staff members.
T0316 I make a conscious effort to coordinate the content of my courses with that of other teachers.
T0319 I plan with the library media specialist/librarian for the integration of library media services into my teaching.

Supportive Leadership [5 items]

Do you agree or disagree with each of the following statements?
(Strongly agree =1, Strongly disagree = 4)

T0299 The principal lets staff members know what is expected of them.
T0300 The school administration's behavior toward the staff is supportive and encouraging.

T0306	My principal enforces school rules for student conduct and backs me up when I need it.
T0310	The principal knows what kind of school he/she wants and has communicated it to the staff.
T0312	In this school, staff members is recognized for a job well done.

Collective Autonomy [7 items]

Using the scale 1-5, where 1 means "No influence" and 5 means "A great deal of influence," how much actual influence do you think teachers have over school policy at this school in each of the following areas?

(No influence =1, A great deal of influence =5)

T0286	Setting performance standards for students at this school
T0287	Establishing curriculum
T0288	Determining the content of in-service professional development programs
T0289	Evaluating teachers
T0290	Hiring new full-time teachers
T0291	Setting discipline policy
T0292	Deciding how the school budget will be spent

Individual Autonomy [6 items]

Using the scale 1-5, where 1 means "No control" and 5 means "Complete control," how much control do you think you have in your classroom at this school over each of the following areas of your planning and teaching?

(No control =1 Complete control =5)

T0293	Selecting textbooks and other instructional materials
T0294	Selecting content, topics, and skills to be taught
T0295	Selecting teaching techniques
T0296	Evaluating and grading students
T0297	Disciplining students
T0298	Determining the amount of homework to be assigned

Planning Time

T0274	In your most recent full week of teaching, how much scheduled school time did you have for planning? Hours

Student-Teacher Ratio

STU_TCH	Number of students per full-time equivalent teacher in the school

Student Total Enrollment

S0092 Around The first of October, what was the total number of students enrolled in this school in grades K-12 and comparable ungraded levels?

Secondary School

SCHLEVEL NCES Created Variable
(Elementary =1 Secondary = 2 Combined = 3)

Suburban

URBANIC (Large or mid-size central city =1 Urban fringe of large or mid-size city = 2 Small town/Rural = 3)

% Minority

MINENR Percent minority students NCES Created Variable

District Level Variables

Time Support I

T0179 For the professional development in which you participated in the last 12 months, did you receive the following types of support? Release time from teaching (i.e., your regular teaching responsibilities were temporarily assigned to someone else)

Time Support II

T0180 For the professional development in which you participated in the last 12 months, did you receive the following types of support? Scheduled time in the contract year for professional development

Money Support I

T0181 For the professional development in which you participated in the last 12 months, did you receive the following types of support? Stipend for professional development activities that took place outside regular work hours

Money Support II [2 items]

For the professional development in which you participated in the last 12 months, did you receive the following types of support?

T0182 Full or partial reimbursement of college tuition
T0183 Reimbursement for conference or workshop fees

Co-funding [7 items]

Are the following sources of funding for teacher professional development activities used in this district?

D1104 State professional development funds
D1605 Special project budgets
D1606 School improvement funds
D1607 Title I
D1608 Eisenhower program
D1609 Other federal program
D1610 Private sector grants

Principal Learning [5 items]

Does this district provide the following professional development opportunities for school or district administrators?

D1590 Training in evaluation and supervision
D1591 Training to use technology for planning, budgeting, decision-making, and reporting
D1592 Training about advances in curriculum, teaching, and assessment
D1593 Formal networking opportunities for personnel with similar responsibilities
D1596 Opportunities to serve as mentors within the district

Decentralization of PD [3 items]

With regard to the in-service professional development activities for TEACHERS in this district, who has PRIMARY responsibility for (teacher)
Teacher = 1 Principals or other school staff = 2 District staff = 3 Outside professional development providers (e.g., university or college faculty, professional organizations) = 4

D1599 Deciding the content
D1600 Designing and planning the activities
D1601 Conducting the activities

Performance Indicator

D1533 Does this district use performance reports to evaluate the progress of students in your district or schools?

Accountability [2 items]

D1542 Does this DISTRICT reward schools for student achievement?
D1543 Does this DISTRICT sanction schools for poor student achievement?

District Total Enrollment

D0456 Around the first of October, what was the total number of students enrolled in this district in ALL grade levels?

% Free-lunch

NSLAPP Percent of K-12 students in district who were approved for free or reduced-price lunches in the National School Lunch Program.

Appendix B

Table A.1 2000 SASS Bivariate Correlation Matrix for Items Presented in HLM Analysis (The entries in this table are weighted)

Variables	Pet. free lunch	District total enrollment	Perform. Indicator	Accountability	Principal learning	Tchr. Responsibility	Co-funding	Money supp.2	Money supp.1
Content-focus	.055**	.071**	.003**	.044**	.066**	.018**	.047**	.104**	.193**
Active	-.012**	.000	.018**	.008**	.041**	.041**	.007**	.030**	.127**
Total hours	.053**	.017**	.006**	.032**	.054**	.001	.042**	.137**	.203**
Female.	.018**	-.031**	.010**	-.001**	.012**	-.006**	.012**	.021**	.063**
Yrs. Exp.	-.016**	-.022**	-.006**	-.022**	-.018**	.000	-.033**	-.019**	-.019**
Math	-.016**	.001	.006**	.005**	.014**	.004**	.004**	.021**	.023**
English	.014**	-.005**	-.001	.007**	.019**	.001	.001**	.011**	-.010**
Learning community	-.060**	-.125**	.014**	-.038**	-.025**	-.020**	-.063**	.044**	.043**
Supportive leadership	-.062**	-.058**	.021**	-.014**	.010**	-.013**	.013**	.020**	.022**
Collect autonomy	-.162**	-.128**	.015**	-.084**	-.036**	.030**	-.051**	.128**	.049**
Ind. Autonomy	-.175**	-.149**	-.020**	-.115**	-.121**	.028**	-.148**	.138**.	-.036**
Plan. Time	-.084**	.006**	.015**	-.016**	.010**	.028**	-.032**	.032**	-.020**
ST-ratio	.010**	.099**	-.036**	-.008**	.087**	.019**	.163**	-.016**	.030**
Secondary level	-.059**	-.034**	-.013**	-.017**	.005**	-.002**	-.025**	.038**	-.087**
Student total enroll	-.004**	.261**	.003**	.081**	.164**	.025**	.162**	-.078**	-.042**
Suburb	-.404**	-.153**	.008**	-.133**	.032**	-.017**	-.065**	.029**	-.034**
Pet. minority	.558**	.407**	.046**	.307**	.046**	-.054**	.282**	-.175**	.068**
Time supp.1	-.042**	-.026**	.007**	-.031**	-.021**	-.005**	-.025**	.266**	.116**
Time supp.2	.000	-.009**	.021**	.016**	.005**	.007**	-.037**	.069**	.084**
Money supp.1	.051**	.020**	.002**	.012**	.017**	.011**	.068**	.134**	
Money supp.2	-.101**	-.168**	.007**	-.094**	-.077**	.004**	-.091**		
Co-funding	.169**	.240**	.018**	.116**	.301**	.030**			
Tchr. Responsibility	.002**	.073**	.039**	-.023**	.058**				
Principal learning	.062**	.174**	.041**	.135**					
Accountability	.238**	.301**	.068**						
Perform. Indicator	.018**	.021**							
District total enroll	.231**								
Pet. Free lunch									

* p< .05 ** p<.01

Table A.1 2000 SASS Bivariate Correlation Matrix for Items Presented in HLM Analysis (The entries in this table are weighted)

Variables	Time supp.2	Time supp.1	Pet. minority	Suburb	Student total enrollment	Secondary level	ST-ratio	Plan. time	Ind. autonomy
Content-focus	.147**	.158**	.099**	.000	-.054**	-.169**	.027**	-.046**	-.067**
Active	.100**	.148**	.037**	.022**	-.002**	-.059**	.016**	-.009**	.003**
Total hours	.094**	.137**	.099**	-.016**	-.046**	-.114**	.024**	-.027**	-.039**
Female	.030**	.055**	.017**	.022**	-.160**	-.309**	-.004**	-.091**	-.094**
Yrs. Exp.	.037**	-.022**	-.062**	-.025**	.000	.027**	-.020**	.032**	.009**
Math	-.004**	-.012**	-.020**	.007**	.114**	.160**	.002**	.053**	.049**
English	.020**	.006**	.013**	-.017**	.081**	.109**	-.005**	.068**	.038**
Learning community	.070**	.070**	-.110**	.027**	-.277**	-.277**	-.038**	-.066**	.097**
Supportive leadership	.055**	.049**	-.077**	.080**	-.074**	-.128**	.017**	-.019**	.191**
Collect Autonomy	.070**	.088**	-.186**	.067**	-.112**	-.042**	-.025**	.046**	.431**
Ind. Autonomy	.047**	.061**	-.294**	.011**	-.004**	.242**	-.066**	.128**	
Plan. Time	.021**	.011**	-.068**	.029**	.129**	.253**	-.063**		
ST-ratio	-.034**	-.003**	.087**	.093**	.285**	.009**			
Secondary level	-.041**	-.068**	-.067**	.004**	.467**				
School	-.050**	-.074**	.170**	.102**					
Suburb	-.015**	.042**	-.210**						
Pet. minority	-.029**	-.040**							
Time supp.1	,192**								
Time supp.2									

* p< .05 ** p<.01

Table A.1 2000 SASS Bivariate Correlation Matrix for Items Presented in HLM Analysis (The entries in this table are weighted)

Variables	Collect Au.	Supportive leadership	Learning community	English	Math	Yrs. Exp	Female	Total hours	Active
Content-focus	.062**	.053**	.113**	.016**	-.034**	.058**	.136**	.660**	.340**
Active	.105**	.075**	.115**	.008**	-.049**	.019**	.018**	.373**	
Total hours	.075**	.047**	.111**	.013**	-.034**	.047**	.106**		
Female	.023**	.063**	.154**	.060**	-.089**	-.033**			
Yrs. Exp.	-.021**	-.008**	.018**	.020**	-.002**				
Math	-.011**	-.026**	-.080**	-.094**					
English	-.012**	-.028**	-.055**						
Learning community	.372**	.611**							
Supportive leadership	.432**								

* p< .05 ** p<.01

REFERENCES

American Federation of Teachers (1995). *Principles for professional development: AFT's guidelines for creating professional development programs that make a difference.* Washington, D. C.

Ball, D. L., & Cohen, D. K. (1999). Developing practice, developing practitioners: Toward a practice-based theory of professional development. In L. Darling-Hammond & G. Skyes (Eds.), *Teaching as the learning professional: Handbook of policy and practice* (pp. 3-32). San Francisco: Jossey-Bass.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, N.J.: Prentice-Hall.

Bellanca, J. A. (1995). *Designing professional development for change: A systemic approach.* Palatine, IL: IRI/Skylight Pub.

Berry, B., Turchi, L., Johnson, D., Hare, D., Owens, D., & Clements, S. (2003). *The impact of high-stakes accountability on teachers' professional development: Evidence from the South.* Chapel Hill, NC: Southeast Center for Teaching Quality, Inc. Retrieved June 7, 2004, from http://www.teachingquality.org/resources/pdfs/Spencer_FinalReport.pdf.

Bickel, R., & Howley, C. (2000). The influence of scale on student performance: A multi-level extension of the Mattew Principle. Education Policy Analysis Archives, 8 (22).

Borko, H., & Putnam, R. (1996). Learning to teach. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 673-708). NY: Macmillan.

Bransford, J., Brown, A. L., & Cocking, R. R. (1999). *How people learn: Brain, mind, experience, and school.* Washington, D.C.: National Academy Press.

Bryk, A. S., & Driscoll, M. E. (1988). *The school as community: Theoretical foundations, contextual influences, and consequences for students and teachers.* Chicago: Center for School Improvement at the University of Chicago.

Bryk, A., Camburn, E., & Louis, K. S. (1999). Professional community in chicago elementary schools: Facilitating factors and organizational consequences. *Educational Administration Quarterly, 35,* 751-781.

Bryk, A. S., & Raudenbush, S. W. (2002). *Hierarchical linear models* (2nd ed.). Newbury Park: Sage.

Clement, M., & Vandenberghe, R. (2000). Teachers' professional development: A

solitary or collegial (ad)venture? *Teaching and Teacher Education, 16*, 81-101.

Cobb, P., & Bauersfeld, H. (1995). *The emergence of mathematical meaning: Interaction in classroom cultures*. Hillsdale, N.J.: L. Erlbaum Associates.

Cohen, D. K., & Barnes, C. A. (1993). Pedagogy and policy. In D. K. Cohen, M. W. McLaughlin & J. E. Talbert (Eds.), *Teaching for understanding: Challenges for policy* (pp. 207-239). San Francisco: Jossey-Bass Inc.

Cohen, D. K., & Hill, H. C. (2001). *Learning Policy: when state education reform works*. New Haven: Yale University Press.

Confrey, J. (1990). A review of the research on student conceptions in mathematics, science, and programming. In C. Cazden (Ed.), *Review of Research in Education* (Vol. 16, pp. 3-56). Washington, D.C.: American Educational Research Association.

Corcoran, T. C. (1995). *Transforming professional development for teachers: A guide of state policymakers*. Washington, D.C.: National Governors' Association.

Corcoran, T. C., Passantino, C., & Gerry, G. (2000). *Mapping professional development opportunities: A pilot study of two subjects in three regions*. Lexington: Partnership for Kentucky Schools.

Cox, T. (1993). *Cultural diversity in organizations: Theory, research, and practice* (1st ed.). San Francisco, Calif.: Berrett-Koehler.

Darling-Hammond, L. (1995). Inequality and access to knowledge. In J. A. Banks & C. A. Banks (Eds.), *Handbook of research on multicultural education* (pp. 465-483). NewYork: Macmillan.

Darling-Hammond, L., & McLaughlin, M. (1995). Policies that support professional development in an era of reform. *Phi Delta Kappan, 76*(8), 597-604.

Darling-Hammond, L., & Sykes, G. (1999). *Teaching as the learning profession: Handbook of policy and practice* (1st ed.). San Francisco: Jossey-Bass Publishers.

Darling-Hammond, L., Hightower, A. M., Husbands, J. L., LaFors, J. R., Young, V. M., & Christopher, C. (2003). *Building instructional quality: "Inside-out" and "outside-in" perspectives on San Diego's school reform.* University of Washington Center for the Study of Teaching and Policy, document R-03-3.

David, J. L., McDiarmid, G. W., & Corcoran, T. B. (2000). *District leadership in professional development: Exemplary cases*. Lexington: Partnership for Kentucky Schools.

David, J. L., & Shields, P. M. (2001). *When theory hits reality: standards-based reform in urban districts*. Mnlopark, CA: SRI International.

Desimone, L., Porter, A. C., Birman, B. F., Garet, M. S., & Yoon, K. S. (2002). How do district management and implementation strategies relate to the quality of the professional development that districts provide to teachers? *Teachers College Record, 104*(7), 1265-1312.

Elmore, R. (2002). *Bridging the gap between standards and achievement: The imperative for professional development in education*. New York: Albert Shanker Institute.

Elmore, R., & Burney, D. (1999). Investing in teacher learning: Staff development and instructional improvement. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice* (pp. 263-291). San Francisco: Jossey Bass.

Fenstermacher, G. D., & Berliner, D. C. (1985). A conceptual framework for evaluating staff development. *Elementary School Journal, 85*, 281-314.

Fink, E., & Resnick, L. (2001). Developing principals as instructional leaders. *Phi Delta Kappan, 82*(8), 598-606.

Firestone, W. A., Herriott, R. E., & Wilson, B. L. (1984). *Explaining differences in between elementary and secondary schools: Individual, organizational, and institutional perspectives*. Philadelphia, PA: Research for Better Schools, Inc.

Firestone, W. A., Mayrowetz, D., & Fairman, J. (1998). Performance-based assessment and instructional change: The effects of testing in Maine and Maryland. *Educational Evaluation and Policy Analysis, 20*(2), 95-113.

Firestone, W. A., Monfils, L. F., & Schorr, R. Y. (2004). *The ambiguity of teaching to the test: Standards, assessment, and educational reform*. Mahwah, NJ: L. Erlbaum Associates Publishers.

Firestone, W. A., Mangin, M. M., Martinez, M. C., & Polovsky, T. (2005). Leading coherent professional development: A comparison of three districts. *Educational Administration Quarterly, 41*(3), 413-448.

Fisk, C. W. (1997, April) *The costs and benefits of designing and implementing a portfolio-based support and assessment system for beginning teachers.* Paper presented at the Annual Meeting of the American Educational Research Association, Chicago.

Frank, K. A. (1998). Quantitative methods for studying social context in multilevels and through interpersonal relations. *Review of Research in Education, 23*, 171-216.

Fullan, M. (1995). The limits and the potential of professional development. In T. R. Guskey & M. Huberman (Eds.), *Professional development in education: New paradigms and practices* (pp. 253-267). New York: Teachers College Press.

Garet, M., Porter, A., Desimone, L., Birman, B., & Yoon, S. K. (2001). What makes professional development effective? Analysis of a national sample of teachers. *American Education Research Journal, 38*(4), 915-945.

Goodman, L. A. (1978). *Analyzing qualitative/categorical data: Log-linear models and latent-structure analysis*. Cambridge, Mass.: Abt Books.

Grodsky, E., & Gamoran, A. (2003). The relationship between professional development and professional community in American schools. *School effectiveness and school improvement, 14*(1), 1-29.

Grossman, P. L., & Stodolsky, S. S. (1994). Considerations of Content and the Circumstances of Secondary School Teaching. In L. Darling-Hammond (Ed.), *Review of Research in Education* (Vol. 20, pp. 179-221). Washington, D.C.: American Educational Research Association.

Guskey, T. R. (1997). *Research needs to link professional development and student learning. Retrieved 11-13-04 from http://www.nsdc.org/library/jsd/jsdgusk.html.*

Hannaway, J. & Kimball, K. (1998). *Big isn't always bad: School district size, poverty, and standards-based reform.* Report prepared for the planning and evaluation service of the U.S. Department of Education. The Urban Institute, Washington, D.C.

Hawley, W., & Valli, L. (1999). The essentials of effective professional development: A new consensus. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice* (pp. 151-180). San Francisco: Jossey Bass.

Hightower, A., Knapp, M. S., Marsh, J., & McLaughlin, M. (2002). *School districts and instructional Renewal.* New York: Teachers College Press.

Hox, J. (2002). *Multilevel analysis: Techniques and applications*. Mahwah, NJ: Erlbaum.

Ingersoll, R. M., & Alsalam, N. (1997). Teacher professionalization and teacher commitment: A multilevel analysis (NCES 97-069). In *Statistical analysis report.* Washington, D. C.: National Center for Education Statistics.

Ingvarson, L., Meiers, M., & Beavis, A. (2005). Factors affecting the impact of professional development programs on teachers' knowledge, practice, student outcomes & efficacy. *Education Policy Analysis Archives, 13*(10).

Kennedy, M. (1998). *Form and substance in in-service teacher education.* Arlington, VA: National Science Foundation.

King, M. B., & Newmann, F. M. (2000). Will teacher learning advance school goals? *Phi Delta Kappan, 81*, 576-580.

Klonsky, M. (2002). How smaller schools prevent school violence. *Educational Leadership, 59*(5), 65-69.

Knapp, M. S. (2003). Professional development as a policy pathway. *Review of Research in Education, 27*, 109-157.

Kreft, I. G. G., DeLeeuw, J., & Aiken, L. S. (1995). The effect of different forms of centering in hierarchical linear models. *Multivariate Behavioral Research*, 30(1), 1-21.

Lee, V. E., Smith, J., & Bryk, A. S. (1993). The organization of effective secondary schools. In L. Darling-Hammond (Ed.), *Review of Research in Education* (Vol. 19, pp. 171-267).

Lieberman, A. (1994). Teacher development: Commitment and challenge. In P. P. Grimmett & J. Neufeld (Eds.), *Teacher development and the struggle for authenticity: Professional growth and restructuring in the context of change* (pp. 15-30). New York: Teachers College Press.

Lieberman, A. (1996). Practices that support teacher development: Transforming conceptions of professional learning. In M. W. McLaughlin & I. Oberman (Eds.), *Teacher learning: New policies, new practices* (pp. 185-201). New York: Teachers College Press.

Little, J. W. (1982). Norms of collegiality and experimentation: Workplace conditions of school success. *American Educational Research Journal, 19*(3), 325-340.

Little, J. W. (1990a). The persistence of privacy: Autonomy and initiative in teachers' professional relations. *Teachers College Record, 91*(4), 509-536.

Little, J. W. (1990b). Conditions of professional development in secondary schools. In M. W. McLaughlin & J. E. Talbert (Eds.), *The contexts in question: The secondary school workplace* (pp. 187-223). New York: Teachers College Press.

Little, J. W. (1999a). Organizing schools for teacher learning. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession. Handbook of policy and practice* (pp. 233-262). San Francisco: Jossey Bass.

Little, J. W. (1999b). *Teachers' professional development in the context of high school reform: Findings from a three-year study of restructuring schools.* Washington, D.

C.: National Partnership for Excellence and Accountability in Teaching.

Little, J. W. (2001). Professional development and the pursuit of reform. In A. L. a. L. Miller (Ed.), *Teachers caught in the action: Professional development that matters* (pp. 23-44). New York: Teachers College Press.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge, England: Cambridge University Press.

Lord, B. (1994). Teachers' professional development: Critical colleagueship and the role of professional communities. In N. Cobb (Ed.), *The future of education: Perspectives on national standards in education* (pp. 175-204). New York: College Entrance Examination Board.

Loucks-Horsley, S., Hewson, P. W., Love, N., & Stiles, K. E. (1998). *Designing professional development for teachers of science and mathematics.* Thousand Oaks, Calif.: Corwin Press.

Marks, H. M., & Louis, K. S. (1999). Teacher empowerment and the capacity for organizational learning. *Educational Administration Quarterly, 35*, 707-750.

Massell, D. (1998). *State strategies for building local capacity: Addressing the needs of standards-based reform.* Philadelphia: Consortium for Policy Research in Education.

McCutchen, D., Abbott, R. D., Green, L. B., Beretvas, S. N., Cox, S., Potter, N. S., et al. (2002). Beginning literacy: Links among teacher knowledge, teacher practice, and student learning. *Journal of Learning Disabilities, 35*, 69-86.

McLaughlin, M. W. (1994). Strategic sites for teachers' professional development. In P. P. Grimmett & J. Neufeld (Eds.), *Teacher development and the struggle for authenticity: Professional growth and restructuring in the context of change* (pp. 31-51). New York: Teachers College Press.

McLaughlin, M. W., & Talbert, J. E. (1990). The contexts in question: The secondary school workplace. In M. W. McLaughlin, J. E. Talbert & N. Bascia (Eds.), *The contexts of teaching in secondary schools* (pp. 1-14). New York: Teachers College Press.

McLaughlin, M. W., & Talbert, J. E. (2001). *Professional communities and the work of high school teaching.* Chicago: University of Chicago Press.

Metz, H. M. (1990). How social class differences shape teachers' work. In M. W. McLaughlin, J. E. Talbert & N. Bascia (Eds.), *The contexts of teaching in secondary schools* (pp. 40-107). New York: Teachers College Press.

Miller, R. J. (2003). *The sources and consequences of organic management in public*

elementary and secondary schools. Unpublished Ph.D dissertation, The University of Michigan, Michigan.

Murphy, J., & Hallinger, P. (1988). Characteristics of instructionally effective school districts. *Journal of Educational Research, 81*(3), 175-181.

Newmann, F. M. (1993). Beyond common sense in educational restructuring: The issues of content and linkage. *Educational Researcher, 22*(2), 4-13.

Newmann, F. M. (1996). *Center on organization and restructuring of schools: Activities and accomplishments, 1990-1996. Final report.* Madison, WI: Center on Organization and Restructuring of Schools.

North, D. (1992). *Institutions, Institutional Change and Economic Performance.* Cambridge University Press.

Ostrom, E. (1990). Governing *the Commons: Institutions for collective action.* Cambridge University Press

Parsad, B., Lewis, L., & Farris, E. (2001). *Teacher preparation and professional development.* Washington, DC: National Center for Education Statistics.

Perry, R. (1996). *The role of teachers' professional communities in the implementation of California Mathematics reform.* Unpublished Ph.D dissertation, Stanford University, California.

Poulson, L., & Avramidis, E. (2003). Pathways and possibilities in professional development: Case studies of effective teachers of literacy. *British Educational Research Journal, 29*(4), 543-560.

Putnam, R., & Borko, H. (2000). What do new views of knowledge and thinking have to say about research on teacher learning? *Educational Researcher, 29*(1), 4-15.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks: Sage Publications.

Rosenholtz, S. (1989). *Teachers' workplace: The social organization of schools.* New York: Longman.

Rowan, B. (1990). Commitment and control: Alternative strategies for the organizational design of schools. *Review of Research in Education, 16.*

Schon, D. A. (1983). *The reflective practitioner: How professionals think in action.* New York: Basic Books.

Scott, W. R. (1982). *Organizations: Rational, Natural and Open Systems (4th Edition).*

Englewood Cliffs, NJ: Prentice-Hall.

Scribner, J. (1999). Professional development: Untangling the influence of work context on teacher learning. *Educational Administration Quarterly, 35*(2), 238-266.

Smith, M. T., & Rowley, J. K. (2005). Enhancing commitment or tightening control:The function of teacher professional development in an era of accountability. *Educational Policy, 19*(1), 126-154.

Smylie, M. A. (1988). The enhancement function of staff development: Organizational and psychological antecedents to individual teacher change. *American Educational Research Journal, 25*(1), 1-30.

Smylie, M. A. (1994). Redesigning teachers' work: Connections to the classroom. *Review of Research in Education, 20*, 129-177.

Smylie, M. A. (1995). Teacher learning in the workplace: implications for school reform. In T. R. Guskey & M. Huberman (Eds.), *Professional development in education: New paradigms and practices* (pp. 92-113). New York: Teachers College Press.

Spillane, J., & Thompson, C. (1997). Reconstructing Conceptions of Local Capacity: The Local Education Agency's Capacity For Ambitious Instructional Reform. *Educational Evaluation and Policy Analysis, 19*(2), 185 - 203.

Spillane, J., & Zeuli, J. (1999). Reform and teaching: Exploring patterns of practice in the context of national and state mathematics reforms. *Educational Evaluation and Policy Analysis, 21*(1), 1-27.

Spillane, J. P. (2004). *Standards deviation: How schools misunderstand education policy.* Cambridge, Mass.: Harvard University Press.

Stein, M. K., D'Amico, L., & Israel, N. (1998). *Observations, conversations, and negotiations: Administrator support of literacy practices*. Pittsburgh: Learning Research and Development Center, University of Pittsburgh.

Sykes, G. (2002). *Professional development for teachers: Principles, practices, and context.* Washington, D. C.: Learning First Alliance.

Sykes, G. (2005). *An inquiry concerning professional development for teachers*: NEA. Unpublished manuscript.

Talbert, J. E., & McLaughlin, W. M. (1994). Teacher professionalism in local school contexts. *American Journal of Education*, 102, 123-153.

Talbert, E. J., & McLaughlin, W. M. (1999). Assessing the school environment: Embedded contexts and bottom-up research strategies. In L. S. W. Friedman, D. T.

(Ed.), *Measuring Environment Across the Life Span* (pp. 197-227). Washington, DC: American Psychological Association.

Thompson, C. L., & Zeuli, J. S. (1999). The frame and the tapestry: Standards-based reform and professional development. In L. Darling-Hammond & G.Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice* (pp. 341-375). San Francisco: Jossey-Bass.

Togneri, W., & Anderson, S. E. (2003). *Beyond islands of excellence: What districts can do to improve instruction and achievement in all schools*. Washington, DC: Learning FirstAlliance.

Tourkin, C. S., Pugh, K. W., Fondelier, S. E., Parmer, R. J., Cole, C., Jackson, B., Warner, T., Weant, G., Walter, E., Gruber, K., Zhao, L. (2004). 1999-2000 *Schools and Staffing Survey (SASS) Data File User's Manual*. Washington, D.C.: National Center for Education Statistics.

von Glasersfeld, E. (1984). An introduction to radical constructivism. In P. Watzlawick (Ed.), *The Invented Reality* (pp. 17-40). New York: W.W. Norton & Company.

Vygotsky, L. S., & Cole, M. (1978). *Mind in society: The development of higher psychological processes*. Cambridge: Harvard University Press.

Wiley, D., & Yoon, B. (1995). Teacher reports of opportunity to learn: Analyses of the 1993 California Learning Assessment System. *Educational Evaluation and Policy Analysis, 17*(3), 355-370.

Wilson, S. M., & Berne, J. (1999). Teacher learning and the acquisition of professional knowledge: An examination of research on contemporary professional development. *Review of Research in Education, 24*, 173-209.

Wilson, S. M., Darling-Hammond, L., & Berry, B. (2001). *A case of successful teaching policy Connecticut's long-term efforts to improve teaching and learning*. Seattle: University of Washington, Center for the Study of Teaching and Policy.

Youngs, P., & King, M. B. (2002). Principal leadership for professional development to build school capacity. *Educational Administration Quarterly, 38*(5), 643-670.

Zheng, H. Y. (1996). *School contexts, principal characteristics, and instructional leadership effectiveness: A statistical analysis.* Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY.