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ACCEPTANCE

This dissertation, EVALUATING THE TEACHER-INTERN-PROFESSOR MODEL IN A PROFESSIONAL DEVELOPMENT SCHOOL PARTNERSHIP SETTING USING A BAYESIAN APPROACH TO MIX METHODS, by AUGUST E. OGLETREE, was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree Doctor of Philosophy in the College of Education, Georgia State University.

The Dissertation Advisory Committee and the student's Department Chair, as representatives of the faculty, certify that this dissertation has met all standards of excellence and scholarship as determined by the faculty. The Dean of the College of Education concurs.

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ABSTRACT

Evaluating the Teacher-Intern-Professor Model in a Professional Development School Partnership Setting using a Bayesian Approach to Mix Methods
by
August E. Ogletree

Two needs of Georgia State University Professional Development School Partnerships are to show increases in both student academic achievement and teacher efficacy. The Teacher-Intern-Professor (TIP) Model was designed to address these needs. The TIP model focuses on using the university and school partnership to support Georgia State University student intern preparedness and student academic achievement for those participating in the program. TIP Model outcomes were analyzed using a quasi-experimental design for achievement data and a Bayesian approach to mix methods for efficacy data. Quantitative data, in the form of test scores, were analyzed to compare mean student academic achievement at the classroom level. Mean differences between treatment and comparison groups were not significant for the TIP treatment factor ($F(1, 60) = .248$, $p = .620$) as measured by a benchmark test. Results favored the treatment group over control group for the TIP treatment factor ($F(1, 56) = 17.967$, $p < .001$) on a geometry test. A methodological contribution is the exploration and development of an approach to mix methods using Bayesian statistics to combine quantitative and qualitative data. Bayesian statistics allows for incorporation of the researcher's prior belief into the data analysis. Narrative Inquiry was the qualitative framework employed to gain understanding of the participants' qualitative data, thus providing a particular way

of prior belief elicitation. More specifically, a content analysis of the qualitative data, which included interviews, observations, and artifacts, was used in conjunction with quantitative historical data to elicit prior beliefs. The Bayesian approach to mix methods combined prior beliefs from the teacher efficacy qualitative data with the quantitative data from Gibson's and Dembo's Teacher Efficacy Scale to obtain posterior distributions, which summarized beliefs for the themes of teacher efficacy and personal efficacy.

EVALUATING THE TEACHER–INTERN–PROFESSOR MODEL IN A PROFESSIONAL DEVELOPMENT SCHOOL PARTNERSHIP SETTING USING A BAYESIAN APPROCH TO MIX METHODS

by
August E. Ogletree

A Dissertation

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Degree of Doctor of Philosophy
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in
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in
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Georgia State University

Atlanta, Georgia
2009

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ABBREVIATIONS

CRCT	Criterion-Referenced Competency Tests
ECE	Early Childhood Education
ESOL	English as a Second Language
GACE	Georgia Assessment for the Certification of Educators
GPS	Georgia Performance Standards
GSU	Georgia State University
NAPDS	National Association for Professional Development Schools
NCATE	National Council for Accreditation of Teacher Education
PDS	Professional Development School
PDS^2	Professional Development Schools Partnerships Deliver Success Grant
PTLM	Plan, Teach, Learn Model
QUEST	Quality Urban Education and Support for Teachers
TIP	Teacher–Intern–Professor

CHAPTER 1

INTRODUCTION

A Nation at Risk (National Council on Excellence in Education, 1984) criticized the U.S. educational system, in part, for having low standards for student achievement and substandard requirements for teacher preparation. The low standards resulted in U.S. citizens who did not have the education or skills to compete in the global economy. The Holmes group responded with a plan to restructure teaching, schools, and education programs in their works, *Tomorrow's Teachers* (1986), *Tomorrow's Schools* (Holmes, 1990), and *Tomorrow's Schools of Education* (1995). The report of the Carnegie Foundation for the Advancement of Teaching, *A Nation Prepared* (1986), also called for a restructuring of the U.S. educational system, which included creating national professional teaching standards, providing a professional teaching environment, competitive pay, more stringent certification requirements, and relating teacher incentives to school wide performance. Both the Holmes Group and the Carnegie Foundation advocated for a restructuring of education in the United States to address the deficiencies identified by the National Commission on Excellence in Education.

In *Tomorrow's Schools*, Holmes (1990) advocates for collaboration among schools and universities to improve teaching and teacher preparation. One way of achieving this goal is through the establishment of professional development schools. A professional development school (PDS) is established through the partnering of a teacher-preparation university and K-12 school(s). This partnership connects the university with

the local school(s) and establishes common goals, such as (a) improving student achievement, (b) preparing student teachers for the classroom, and (c) providing professional development for established teachers (Levine, 2002). Members of the executive board from the National Association for Professional Development Schools (NAPDS; 2008) recently held a summit with the purpose of establishing the essential elements needed to maintain a partnership between the school and university. These Essential Nine were developed by the group to define their interpretation of characteristics of a Professional Development school:

1. A comprehensive mission that is broader in its outreach and scope than the mission of any partner and that furthers the education profession and its responsibility to advance equity within schools and, by potential extension, the broader community
2. A school-university culture committed to the preparation of future educators that embraces their active engagement in the school community
3. Ongoing and reciprocal professional development for all participants guided by need
4. A shared commitment to innovative and reflective practice bay all participants
5. Engagement in and public sharing of the results of deliberate investigations of practice by respective participants
6. An articulation in a Professional Development School model, emphasis is placed on preservice
7. A structure that allows all participants a forum for ongoing governance, reflection, and collaboration
8. Work by college/university faculty and P-12 faculty in formal roles across institutional settings
9. Dedicated and shared resources and formal rewards and recognition structures. (NAPDS, p. 2)

The Essential Nine are divided into two groups with Essentials 1 through 5 focusing on philosophical foundations for the partnership and Essentials 6 through 9 describing the logistics of a PDS partnership. The Essential Nine are discussed in more detail in the literature review.

Teachers' should engage in extended authentic classroom experiences as part of their teaching preparation (Darling-Hammond, 1996, 2000; Holmes, 1990; Holmes Group, 1986, 1995). Through extended field experiences, preservice teachers have time to develop and demonstrate teaching skills that help them to become successful classroom teachers. Multiple models for supporting preservice and beginning teacher have been designed. Characteristics common over research include the need for continuing support for preservice teacher through the first several years of teaching (Johnson, 2002; Odell & Huling, 2000). Emphasis is also placed on building trust among group members (Costa & Garmston, 1994; Johnson; Schville, Nagels, & DeBolt, 2000). A model which supports preservice teachers requires it to be flexible enough to accommodate the needs of beginning teachers and still provide relevant material for preservice teachers.

Research Questions

Through a quasi-experimental (Shadish, Cook, & Campbell, 2001) design in which methods were mixed, I examined the effects of the Theme Teacher-Intern-Professor (TIP) model on participating Georgia State University interns and student academic achievement. The model was implemented in a PDS school. I addressed the following questions:

1. How does the Theme TIP model affect elementary grade mean student achievement as measured by the County Benchmark Test?
2. Are there significant differences in mean student achievement test scores between elementary Theme TIP model classrooms and control classrooms using teacher made tests?
3. What programmatic differences are there for student teacher interns between the Theme TIP model internship and the original PDS model internship?
4. How can Bayesian approaches be combined with narrative inquiry qualitative research for a mixed-methods approach?

5. How does the implementation of the Theme TIP model affect student teacher intern efficacy when compared to student teacher intern efficacy score data from the original PDS model using a Bayesian mixed-methods approach?

Research questions 1, 2, 3, and 5 are programmatic, and question 4 is methodological.

Methodological Overview

For this study, I used a mixed-methods approach, collecting both quantitative and qualitative data. Quantitative data were collected in the form of student test scores from county benchmark tests and on a teacher created pre/post tests. Qualitative data were collected in the form of interviews, classroom observations, lesson plans, and intern portfolios. This dissertation has two purposes. The first is to analyze school data related to the TIP model intervention while addressing program questions. The second purpose is to explore combining Bayesian statistics with qualitative and quantitative data collection to address the methodological question.

Teacher-Intern-Professor Model

The Teacher-Intern-Professor (Curlette, 2007) model, as part of federally funded Atlanta area PDS program, examined the affects of an extended intern teacher experiences and student achievement. One of the PDS movement's goal is to provide new models in education where school systems and universities work collaboratively to improve student academic achievement (Byrd & McIntryre, 1999; Darling-Hammond, 2005; Holmes Group, 1986, Stallings & Kowalski, 1990). The TIP model meets this goal by establishing a clearly articulated partnership between the university and the local school to support preparation of intern teachers. The TIP model group consists of a classroom teacher, student intern, and professor from the university who agree to work collaboratively toward a shared goal. The TIP members meet bi-monthly and may choose

to participate in a research project which supports shared group objectives and also addresses student academic achievement. Student achievement, another positive outcome, was monitored as part of the project. While much research has been conducted on teacher mentoring and intern teacher preparation, the TIP model differs in its organizational structure.

Significance

In 2007, quantitative analysis of year-1 implementation data were used to evaluate students achievement of schools participating in an Atlanta-area professional development schools program. The Theme Teacher-Intern-Professor model grew out of a need that arose from multiple data sources. Research on beginning teachers states that a large number of them do not remain in the field for more than 3-5 years (Schlechty & Vance, 1982; Smith, 1993). Consequently, there is a need to increase teacher retention in the schools. Data collected from 2006-2007 showed that student achievement was not significantly increasing for students in participating this PDS program's classrooms. The TIP approach addresses both of these areas. Student achievement is being influenced through the benefit of a TIP group which meets bimonthly to address topics affecting teachers and teaching interns in the classroom. TIP members work together to address these identified areas in their classroom. Teaching interns are given the opportunity to work both with their classroom teacher and university professor to help strengthen their teaching experiences. The teaching interns benefit by having a support group that bridges university and school learning while completing their internship.

A methodological contribution of this dissertation is the examination of how quantitative and qualitative data can be combined using Bayesian statistics. Curlette

(2006) addresses how quantitative and qualitative research can be combined in one study, in the context of Individual Psychology (Ansbacher & Ansbacher, 1956). Qualitative data, captured in the form of interviews, classroom and meeting observations, and artifacts, were triangulated to support themes which emerged from the data. Quantitative data were collected in the form of a survey and student academic achievement test scores. Elicitation of the prior belief was determined by the researcher based on quantitative and qualitative data. The quantitative historical data and qualitative data inform the researcher's prior belief, which is combined with the observed data to calculate the posterior distribution. This methodological contribution is presenting a method for combining data from a narrative inquiry qualitative framework with quantitative data using Bayesian statistics.

Definitions

The TIP model is a focused intervention approach designed to support student interns and classroom students through a collaborative partnership between the school and university. The purpose of the intervention is to focus on a specific need within the school, identified by the PDS program's design team and school administration, and support that area of need. (The design team consists of representatives from partnering professional development schools and university professors and support staff.) The work in this group is conducted over an approximate time period of 3-5 years. During that time, participants work in a collaborative group to improve teaching practice, support student interns, and increase student academic achievement through the creation and implementation of strategic plans tailored to meet individualized school needs. This group used a TIP model to support PDS participant schools in meeting needs outlined

within their strategic plan. Resources at the university and within the school were used to help achieve these goals.

In the TIP model, there were three key roles: teacher, intern, and professor. The teacher, who serves as a mentor, supports the intern with curriculum content and instructional strategies and modeling and provides daily support at the school (Dynak & DeBolt, 2000; Kyle, Moore, & Sanders 1999). The intern is a student who is participating in an internship program as part of his or her required curriculum at the university. The professor is defined as a faculty representative from the partnership university who bridges practice from the university to classroom application.

The Georgia Performance Standards (GPS) are the current curriculum standards that outline content knowledge for K-12 students in the state of Georgia. The GPS have been aligned to national standards and also align classroom instruction with state assessment. Standards which guide classroom instruction are derived from the Georgia Performance Standards. Assessment in the classroom should check for understanding of knowledge reflected in state standards.

The Holmes Group (1986, 1995; Holmes, 1990) outline the founding principles for establishing professional development schools. The National Council for Accreditation of Teacher Education (NCATE; 2001) has defined PDS and created standards for establishing and maintaining a PDS. NCATE defines a PDS as

> innovative institutions formed through partnerships between professional education programs and P-12 schools. Their mission is professional preparation of candidates, faculty development, inquiry directed at the improvement of practice, and enhanced student learning. (p. 1)

Through shared goals by the university and school system, emphasis can be placed on increasing teacher quality and student achievement. Five standards have been outlined to

help PDS partnerships achieve their common goals. The standards are Learning Community, Accountability and Quality Assurance, Collaboration, Diversity and Equity, and Structures, Resources, and Roles. The TIP group is a form of learning community that is focused on supporting teaching interns and increasing student academic achievement. Through collaborative work, members can move toward changes in teaching practices that are linked to research. The TIP group targets weak areas within the school where accountability and quality assurance can be strengthened. Additionally, the TIP group is a collaborative effort that works toward shared identified educational goals at both the university and school level. The Diversity and Equity standard is integrated into the work of the TIP group as members strive to meet the needs of a diverse student population. Further developing structures, resources, and roles within the participating TIP school are other levels of work which occur.

Professional Development Schools Partnerships Deliver Success (PDS^2) is a federally funded grant with two of its goals being increasing students' achievement and teacher retention across four metropolitan public schools systems in the Atlanta, GA, area. Partners working with the TIP group include representatives from Georgia State University's Professional Education Faculty and teachers in a participating PDS school setting. Following the Institutional Review Boards protocol, officials in each school system approved the research and require that pseudonyms be used in place of participant names.

Hypothesis, Assumptions, and Limitations

My research hypothesis is that the focused intervention shows changes in student achievement at the classroom level not seen in analysis of school level data. The TIP

model monitors changes in student academic achievement at the classroom level. This level of analysis provides an opportunity for analyses of data that links PDS classroom level implementation to student academic achievement.

An assumption of my study is that teaching interns in a PDS placement receive more support and professional development, during their internship experiences, for teaching math through the TIP group. Furthermore, I assumed that the TIP model supports student teachers so that they will be more successful beginning teachers when they complete the teaching program.

The TIP approach has several limitations regarding implementation, most of which were overcome in this study. The first and most significant limitation is the coordination of the program with the university and school system. The university professor must be willing to partner with the PDS school and conduct work in the TIP group which may not be recognized toward tenure requirements at the university. The participating teachers must (a) meet the requirements and be willing to accept a student teachers, (b) be willing to participate in a TIP group, and (c) provide additional support to the intern with regards to work in the TIP group. The intern must be willing to remain in the same classroom for and extended period, which means they would not see how other classes in alternate schools are conducted. They must also be willing to provide additional work in the form of journals and documentation that may not be required as part of the university program. The requirements described above limited the number of TIP groups, which affected the sample size for data collection.

The second limitation is that the school district be able to provide needed student-level data for analysis of student academic achievement. The district must have a

benchmark testing system in place that students in participating classrooms complete. The school system must then be willing to supply the university with classroom level, deidentified test score data for further analysis. It is also required that additional comparison data be supplied.

The third limitation is the difficulty in the use of student achievement as a dependent variable to assess the effectiveness of a TIP group. Because of other activities and interventions currently in place in the schools to increase student academic achievement, it can be difficult to attribute work in the TIP group to increases in student academic achievement without a control group or other comparison condition.

A fourth limitation is the appropriateness of the test to unit of instruction with regards to student academic achievement measurement. Benchmark testing often includes content covered in a subject over the course of the school year. The focus of the TIP group is to provide targeted professional development support within the subject area. Benchmark tests used to measure the impact of this targeted assistance more often include additional subject matter making it difficult to tease out impact specifically related to the content supported in the TIP group.

A fifth limitation is a lack of prolonged engagement in the field. Prolonged engagement allows for understanding of the dynamics within the context that the research is based. Ideally, I would have spent more time in the field collecting data. Personal commitments and time constraints prevented this from occurring.

Summary

In this chapter, I have introduced the TIP model and described the roles of mentor teachers, interns, beginning teachers, and professors. Data were collected for evaluation

as part of a large federal grant in participating PDS schools and as individual efforts related to this dissertation. The findings of this study use a more focused approach to analyzing change in PDSs. This study also discusses the purpose, research questions, assumptions, and limitations of this research. The following chapter is the literature review, which provides background for the concepts introduced in this chapter.

CHAPTER 2

REVIEW OF THE LITERATURE

In this chapter, I review current research and models related to professional development school partnerships and preparation of student teachers, including supporting novice teachers. In the first section, I reviewed the background for the concept of professional development schools, which provides the philosophical background of the TIP model. The following sections, addressing research on teacher preparation and supporting beginning teachers, mentoring programs, teacher efficacy, small sample size, and Bayesian statistics (including subjective probability), provide additional background literature on topics related to this dissertation. Information provided in this literature review provides foundational knowledge of concepts presented in Chapters 3 and 4.

Review of Professional Development School Literature

The phrase, "professional development school," was first introduced by the Holmes Group (1986) in *Tomorrow's Teachers*. The original Holmes Group consisted of higher education administrators who felt that the quality of teacher education needed improvement. They formed this group to help raise the standards for teacher education. In *Tomorrow's Teachers*, the Holmes Group outlined an agenda and five goals for improving teacher education: (a) to improve teachers' understanding of their subject matter, (b) to distinguish between teachers' different experiences and ability levels, (c) to create standards for entry into the field of education, (d) to connect universities and schools, and (e) to improve the school work environment for teachers. The ultimate

outcome of these five goals would be to train highly qualified teachers with skills to improve student achievement regardless of their race or socioeconomic status.

The Holmes Group (1986) states that the teacher is the most important resource of students. They argue that "the entire formal and informal curriculum of the school is filtered through the minds and hearts of classroom teachers, making the quality of school learning dependent on the quality of teachers" (p. 23). The Holmes group offers a strategy to help improve teacher quality and provide necessary resources. An argument is made to put into place stringent requirements for individuals wishing to enter the field of education. The Holmes Group presents a case based on changes in teacher induction at the university level. Future teachers would take more classes to extend content knowledge and spend more internship time in the classroom learning about pedagogy. In this work, the Holmes Group outlines an idea for universities and school systems to work collaboratively to promote academic achievement. Further, a seamless transition from internship into the first several years of teaching would continue with additional professional development and faculty mentoring. Stallings and Kowalski (1990) suggest that other benefits from extended teacher preparation should include supervision and mentoring for new teachers, opportunities that recognize the knowledge and abilities of senior teachers, settings that produce new teacher evaluation and more resources for teachers in schools which serve disadvantaged students. Through increasing support and standards for teachers entering the field, the Holmes Group hoped to create a new generation of teachers with the needed skills to educate students.

The current purpose of professional development schools is to provide new models in education where school systems and universities work collaboratively to

improve student academic achievement (Byrd & McIntryre, 1999; Darling-Hammond, 2005; Holmes Group, 1986, Stallings & Kowalski, 1990). Stallings and Kowalski define a professional development school "as a school setting focused on the professional development of teachers and the development of pedagogy" (p. 251). This is done through building partnerships between universities and local school systems. Levine (2006) argues that a PDS provided "the strongest bridge between teacher education and classroom outcomes, academics and clinical education, theory and practice, and schools and colleges" (p. 105). Through this collaboration, knowledge and practice are united to diminish the gap between the research of universities and the practices in classrooms.

A PDS partnership provides many benefits to both the school and university, including the ability of the two institutions to identify and implement new structures of practice. While schools benefit from the knowledge and resources that universities have to offer, universities benefit from access to classrooms and school systems where new structures and strategies of practice can be studied. There is an understood requirement that new strategies undergo rigorous testing to insure their validity in the classroom. The school and university partnership ensures that there is an environment where theory to practice can be implemented and explored. The partnership requires a mutual commitment from both the university and the school toward a shared vision of education. The schools benefit from the partnership by receiving additional resources and support needed to improve student achievement. Universities are provided with the environments that will allow their students to hone their skills and become master teachers (Byrd & McIntyre, 1999; Stallings & Kowalski, 1990). Through the mutual relationship, a strong

connection between knowledge and practice is established (Byrd & McIntyre; Holmes Group, 1986,).

NAPDS Essential Nine

The executive council and board of directors of the National Association for Professional Development Schools (2008) held a summit to discuss what they believe constitutes PDS work. The group developed nine essentials which can identify work completed as being PDS work within a partnership. This type of clarification can be used to help legislators, partners, and outside entities determine if a partnership is indeed a true PDS. The first five essentials deal with the philosophical foundations required for establishing a PDS Partnership, and the remaining four deal with the establishment of the PDS partnership.

Essential 1,

> a comprehensive mission that is broader in its outreach and scope than the mission of any partner and that furthers the education profession and its responsibility to advance equity within schools and, by potential extension, the broader community (NAPDS, 2008, p. 3)

requires that the mission of the partnership incorporate goals of all stakeholders. This requires partners to create a shared mission that they can support and that reflects the ideals of the group while still maintaining their own goals. NAPDS outlined the work required to continue building on the teaching profession and to improve learning at all levels. The mission of the partnership should serve to benefit all members of the group as the partnership grows.

The second essential supports a “school-university culture committed to the preparation of future educators that embraces their active engagement in the school community” (NAPDS, 2008, p. 4). Work in the PDS should be reflective of this goal in

that it supports student teachers in the education and allows for meaningful experiences in the classroom. Some activities and projects supported by the group should reflect this work through ongoing research.

"Ongoing and reciprocal professional development for all participants guided by need" (NAPDS, 2008, p. 4) is the third essential. Continuing learning of educators is critical to the development and refinement of practice in the classroom. Professional development also keeps experienced educators abreast of the latest research and helps them to enhance their instruction in the classroom. Within the PDS partnership, these professional development experiences are specific to the PDS structure, and they reflect the mission and goals of the partnership.

Essential four supports "a shared commitment to innovative and reflective practice by all participants" (NAPDS, 2008, p. 5). The focus of this essential is on "providing what is best for the learning of P-12 students in the PDS" (p. 5). Practices encouraged in the PDS classroom should be deliberately determined, and they should support the works of teachers, college/university faculty, and veteran teachers. Through reflective practice, the incorporation of practices which will support the P-12 learners will be determined through deliberate effort and reflect the overall mission of the PDS in this pursuit.

"Engagement in and public sharing of the results of deliberate investigations of practice by respective participants" (NAPDS, 2008, p. 6) is the fifth essential. The sharing of research results with the public is a way of contributing knowledge to the larger teaching profession. Sharing knowledge allows for PDS partnerships to learn about the effectiveness of practices in the classroom.

Essential number 6 promotes "an articulation agreement developed by the respective participants delineating the roles and responsibilities of all involved" (NAPDS, 2008, p. 6). To establish a PDS partnership, there needs to be a written agreement between partnering institutions. Equitable representation of all possible participants from a variety of institutions should be evident in the agreement. This agreement can help establish the resources responsibilities of the groups in their efforts to support P-12 students.

"A structure that allows all participants a forum for ongoing governance, reflections, and collaboration" (NAPDS, 2008, p. 6) is essential 7. It is vital to the work in a PDS Partnership that partners meet regularly to discuss the work of the group to ensure that goals are being met. Through these meetings, work conducted throughout the PDS Partnership should be reflected on to ensure quality practices are occurring.

Essential 8 examines "work by college/university faculty and P-12 faculty in formal roles across institutional settings" (NAPDS, 2008, p. 7). The focus is on defining roles and responsibilities of those within the partnership. There is a need for those within the group to understand how they function within the partnership to further the group's work. In addition, informal roles may become part of the partnership as projects develop. Roles should be developed with sensitivity to the work of the group and be flexible to changes over time.

Essential 9 calls for "dedicated and shared resources and formal rewards and recognition structures" (NAPDS, 2008, p.8). The focus of essential 9 is on sharing resources within the partnership. Each group brings its own resources, which can be shared within the partnership. Each group should contribute resources and allocation of

those resources can be shared among the group. Resources should be used in such a way that they further the work of the group.

The purpose of the essential nine is to distinguish PDS work from other types of educational partnerships. These standards focus on developing partnerships which are mutually beneficial to schools and universities. They also promote the development of the teaching profession and sharing that information with a larger audience. Through these standards, work and research which affects education and PDS partnerships is established and continually evaluated.

NCATE Standards

The National Council for Accreditation of Teacher Education established standards for PDS partnerships. Several reasons prompted the development of these standards. Members of NCATE see the value and impact that strong PDS partnerships can make and hope to help foster this relationship in several different ways. First, the standards support and further the relationship of PDS partners through their work by providing guidelines to help move schools from one stage to the next (NCATE, 2001). Second, the assessment process developed by NCATE provides feedback on the work produced by the PDS partners. Next, these standards assist policymakers who need guidelines for helping distinguishing significant partnerships (NCATE). “The standards can provide a critical framework for conduction and evaluating research that addresses the question of what outcomes are associated with PDS partnerships” (NCATE, p. 2). Fostering meaningful relationships between PDS partners is a goal of the NCATE standards.

NCATE functions as an agent of accountability to ensure the integrity of PDS partnerships through the use of standards. Assessments measuring this integrity are still in a refining process (Cooper, 2005). The process of assessing the activities, effects, and efficacy of such partnerships may come from the scrutinizing program implementation, overall performance of a school, or the quality of the collaboration efforts. Assessments of PDS programs may include content integration, curriculum, field experience, and alignment with program standards (Cooper). The objective is to design assessments which align with the particular objective being studied within the PDS partnership. Assessment results can then be used to transform practice within the schools.

The five standards NCATE (2001) has developed are (I) Learning Community, (II) Accountability and Quality Assurance, (III) Collaboration, (IV) Diversity and Equity, and (V) Structures, Resources, and Roles. Each of these standards focuses on an element of the partnership. These characteristics do overlap and therefore should be considered together (NCATE). Evaluation of each standard is based on a rubric, which rates each element of the standards as beginning, developing, at standard, or leading. These standards serve as the foundation for establishing and strengthening partnerships between the university and participant schools.

Standard I. Learning Community

Learning Community supports the inquiry-based practice in the development of students, teacher candidates, and PDS partners. Within this standard, elements focus on supporting a variety of learners through field experiences and partnership. This requires university faculty, classroom teachers, and teacher candidates to work together to accomplish common goals. In addition, this group work should practice inquiry-based

learning to inform decision making within the partnership. Development of a common professional vision for teaching and learning which reflects current research and practitioner knowledge is also important to the function of the learning community. This common vision requires school and university partners to share a set of teaching beliefs in relation to all groups touched by the partnership primarily teachers, students, university faculty, and teacher candidates. The learning community partnership can serve as a change agent as the work may inform decision makers in their efforts to inform professional educational reform and school improvement. Finally, work in learning communities may extend to multiple partner schools. Through learning communities, partnerships are developed and strengthened as shared goals are established.

Standard II. Accountability and Quality Assurance

Accountability and Quality Assurance elements highlight ways in which a partnership is accountable to those it affects and work to assure high quality of the partnerships. Developing professional accountability includes the development of assessment techniques, which link outcomes to the purpose and mission of the partnership. Information gained through ongoing assessment can be used to inform decision-making and to help establish new goals for the partnership. It is also important that the partnership be transparent to the public and that evidence gained through the partnership is shared with the community. PDS participation criteria should align with state and national guidelines for accreditation and ongoing professional development. There should be an ongoing information exchange between the PDS and the public. The PDS partnership shares information, gained through the partnership, with the public and uses public information (national and state standards and research) to inform their work.

Through ongoing inquiry, PDS partnerships should engage in an ongoing cycle of assessment development, data collection, and use of results to inform work within the partnership. It is key that the "PDS partnership is engaged in continual dialog with the school district, community, state, professional education unit, and the college/university regarding achievement of goals and impact of institutional/community supports and constraints on PDS work" (NCATE, p.12). There is a need for accountability and an open dialogue between the PDS partnership and the community, in which it is positioned.

Standard III. Collaboration

Shared work within the partnership is celebrated (NCATE, 2001). Engaging in joint partnership work better meets the needs of all participants through collaborative planning and implementation of that work. Establishing shared definitions and norms for roles and structures within the collaborative relationship is also included under this standard. Highlighting and celebrated shared success and creating a relationship where each member equally contributes to the success of the partnership is also imperative to PDS work.

Standard IV. Diversity and Equity

Within the PDS partnership, policies and practices are equitable in learning outcomes of all participants (NCATE, 2001). This can be demonstrated through equitable opportunities to learn. In such cases, data collected through the partnership can be used to identify achievement gaps among racial groups (NCATE). In addition, work in the group should reflect current practices and research which create a community of shared multicultural and global perspectives. Through this type of work all participants receive and equitable education through the partnership. Assessment approaches should reflect

the varied backgrounds of participants to ensure that diverse learning needs are reflected in reports. The diversity of the partnership should be reflected through the background of the PDS partners. The PDS partner institutions should continue to recruit a diverse population of teacher candidates. Through this work, equity and diversity within the university and school can be maintained.

Standard V. Structures, Resources, and Roles

Existing structures within the partnership should ensure that the partnership's mission is met. Roles of partnership members along with structures, programs, and resources should be responsive to changes in the needs of the partnership. Therefore, ongoing modification of these goals should occur to ensure that the partnership continues to work collaboratively toward the mission. This work is supported through the establishment of a governance and support structure. This collaborative body should represent the university in both the areas of education and arts and sciences (content). In addition, local schools and school support organizations should also be represented in this council. The purpose of this is so that the group can ensure that the partnership is equitably represented by the participating groups. Through this body, work across the partnering institutions supports the group mission. To ensure that goals of the partnership are met, there should be an evaluation which assesses needs and effectiveness of work supported by the partnership. As the partnership develops, this standard looks at the creation of roles developed to meet specific needs of the partnership. Boundary-spanning roles which are designed to span the university to school boundary may be established to link work among the organizations and allow for more reflexive approach to changes in the partnership. Allocation of resources to ensure that needs are met is another way in

which work within the partnership can be assessed. Members of the partnership should commit to a shared budget which details resources available and allocation of their use to projects maintained within the partnership. Use of effective communication to transmit shared goals, projects, and work should be established within the partnership. This will ensure that all stakeholders are informed of work maintained through the partnership. Elements of standard V help to establish a partnership which values all participating institutions and supports work within the partnership.

The spirit of the NCATE standards is to support work within PDS partnerships that benefits all partners in their efforts to reach shared goals. Assessment through the NCATE standards looks at how credible the partnership is and evaluates its effectiveness.

Urban Schools

One focus for PDS has been to help teachers and students in low achieving urban schools. This sentiment is echoed in the Holmes's (1990), *Tomorrow's Schools: Principles for the Design of Professional Development Schools*, which supports and promotes teaching and learning for understanding accessible to all students regardless of their cultural or socioeconomic background a goal. Through the PDS partnership, schools can delve into the causes of low student achievement in high needs urban schools.

Through teacher professional development PDS partnerships can help retain highly qualified teachers in urban, low-achieving schools. Neapolitan and Berkeley (2005) state that one of the major problems in urban schools is their inability to retain and maintain highly qualified experienced teachers. They also state that low-achieving schools had the least experienced teachers and the highest levels of teacher turnover.

Through a PDS partnership, strategies can be developed to benefit both teachers and students in low achieving schools.

The teacher serves as the instrument through which knowledge is transmitted and therefore plays a critical role in the PDS partnership. The Holmes Group (1986) says that quality teachers are "central to the vision are competent teachers empowered to make principled judgments and decisions on their students' behalf" (p. 28). It is essential that the classroom teacher work in collaboration with peers both within the school and the university partner (Cantor & Schaar, 2005; Holmes, 1990; Stallings & Kalwalski, 1990). Cantor and Schaar also state that current research indicates that a factor in successful urban schools is collaborative work among teachers. This move toward collaborative planning is in contrast to the past approach of isolated planning in which many teachers engaged (Darling-Hammond, 2005).

Professional Development Schools and Teacher Preparation

Many questions about beginning teacher experiences have been asked and researched in a number of ways. Researchers ponder what causes beginning teachers to leave the field, why beginning teachers remain in the field, and in what ways beginning teachers receive support. Reynolds, Ross, and Rakow (2002) studied students who had completed either a PDS teacher preparation program or a traditional teacher preparation program in the same college. The participating students recruited for this experience graduated in either 1996 or 1998. These two years were selected because they serve as the 4-year or 6-year mark for these students. The 4-year and 6-year marks are critical years in education when most beginning teachers frequently leave the field. The participants were contacted by phone and asked to complete a paper survey and a phone

survey. The principals of these teachers were also contacted and asked to complete an evaluative survey. The results of this study indicated that PDS program participation did not greatly affect teachers' choices to either remain or leave in the field of education. PDS participants did show a greater amount of satisfaction with their program than non-PDS students. Also the principal surveys indicated that PDS teachers rated higher among principals than non-PDS participants on teaching effectiveness. While there is some indication that teacher preparation programs may help to support teachers, it does not necessarily lead to teachers' retention in their teaching fields.

One focus of research has been on why teachers choose to leave the field of education. Alkins, Banks-Santilli, Elliott, Gettenberg, and Kamii (2006) addressed this topic in their case study of the Quality Urban Education and Support for Teachers (QUEST) program. The QUEST program was comprised of higher education and urban classroom teachers who shared a common goal of wanting to increase successful experiences for the students in urban schools. Data from focus groups, interviews, surveys, and teaching autobiographies were collected in this study. The case study lasted 3 years, during which the informant group generally remained the same with few member changes. One of the focuses of the group was to look at why teachers chose to leave teaching in urban settings. Through analysis of collected data, several themes emerged: (a) lack of resources, (b) inferior buildings, (c) absent teachers, (d) isolation, and (e) poor communication. Lack of resources and inferior buildings went back to the setting in which the new teachers were working (Alkins et al.). These teachers felt that they did not have the appropriate materials or classroom setting in which to teach. Also, many of the teachers felt that their peers were excessively absent and that they themselves worked in

isolation. Many of the teachers in this study felt that they did not have support from other teachers on their team. There was also a sense that communication was lacking between the administration and teachers. The authors concluded that teachers needed more support in the form of faculty education and an environment in which beginning teachers can challenge their own teaching choices in the classroom.

Several studies on beginning teachers and the use of mentors to provide support supported the importance of teacher mentors to help guide and support beginning teachers through their early years of teaching. Gustafson, Guilbert, and MacDonald (2002) researched beginning elementary science teachers to learn about mentors and how they can help create the professional development of beginning science teachers in three areas: (a) professional knowledge, (b) reflective practice, and (c) professional community. They were interested in knowing if short-term mentor experiences work as well as long-term mentoring programs. Data were collected from 13 beginning teachers and 13 experienced science teacher mentors through interviews and written reflective journal entries over the course of a year. The data were analyzed using an interactive data analysis system developed by Huberman and Miles (Gustafson et al.). The authors found that the experience helped beginning teachers become more aware of their teaching practices. It also helped to develop beginning teachers' content knowledge of elementary science. Gustafson et al. feel that there is a need to allow beginning teachers repeated observations of experienced teachers in the classroom. The limited mentoring experience provided an opportunity for experienced and beginning teachers to begin building a bond. However, the limited teaching experience was not able to address personal, spiritual, and intellectual development (Gustafson et al.).

Research within the PDS setting has primarily been conducted using qualitative methods around the topic of teacher preparation. Mule (2006) provides an excellent example of how qualitative methods can be used in the PDS setting. The study focused on inquiry as an approach to student learning and the perception of five PDS preservice teachers around the topic of inquiry. Through the use of field notes, interview, and intern reflection text, Mule triangulates data to provide a thorough analysis of the data collected. The three major findings were (a) that inquiry is not a traditional teaching method and takes time to teach students, (b) PDS is a natural fit because of its emphasis on collaboration, and (c) inquiry fosters reflection. Mule's final conclusion was that "concepts of preservice teachers as inquirers allows for the development of future teachers needed for the renewal of the cultures of teaching and education that is the central aim of PDS" (p. 12). This study provides an example of how teacher preparation can be studied using qualitative methods.

Mentor Programs

Teacher support models and increased rigor in teaching preparation programs grew out of a need to retain teachers the education field. Schlechty and Vance (1983) found that 50% of teachers left the field within 7 years. Teaching programs, including cognitive coaching models, collaborative peer coaching, and mentoring, have since been developed to support teachers in an effort to increase teacher retention. Models aimed at supporting preservice and beginning teachers share the general goal of supporting teachers and improving teacher retention.

Multiple models have been developed to support beginning teachers in a myriad of ways. The Cognitive Coaching Model (Costa & Garmston, 1994) is one such model.

In this model, the focus is on coaching the new teacher through his or her first several years of teaching. During this time, mentors model and help new teachers develop reflective teaching practices. The practice of reflective teaching helps to make the new teachers more aware of how they teach. As with most of the models, this model requires a strong relationship between the coach and mentee as they work through the steps of the model. A collaborative peer coaching approach (Allen & LeBlanc, 2005) identifies that there is little chance for peer teaching feedback after the preservice experience has ended. This model focuses on collaboration between new and experienced teachers in an effort to reduce isolation and broaden teaching experiences. In this model, the teachers observe each other teaching lessons. This provides opportunity for formal or informal feedback that can be used to improve teaching practices. In both models, experienced teachers are supporting new teachers through related approaches. The cognitive coaching model focuses on a partnership between the experienced and novice teacher while the peer coaching model has teachers with a variety of experiences working collaboratively together in groups.

Mentoring new teachers is another form of support that has been developed in an effort to support beginning teacher. Odell and Huling (2000) define mentors as "experienced teachers who have as part of their professional assignment the mentoring of preservice or beginning teachers as they are learning to teach: mentors study the pedagogy of mentoring" (p. XV). A purpose of mentoring is to foster a supportive culture for new teachers that encourage learning and growth (Zachary, 2005). In this model, the mentor works to support the mentee in an effort to foster learning and provide additional support through the first years of teaching. The primary component for creating a

meaningful connection between the mentor and mentee is through establishing a meaningful relationship based on trust (Portner, 2002; Zachary). The first step to building a relationship is on purposeful pairing between the mentor and mentee (Johnson, 2002). Mentors and mentees should share a similar teaching philosophy, grade level experience, and content background (Johnson). Subsequent work shared between the mentor and mentee focuses on developing teaching skills of the mentee. The work is based on the needs of the individuals.

Teacher Self-Efficacy

Research surrounding self efficacy in relation to preservice, beginning, and experienced teachers has been conducted by many researchers. Bandura (1977) stated that self-efficacy was "the conviction that one can successfully execute the behavior required to produce outcomes" (p. 193). In a study conducted by Gibson and Dembo (1984), personal efficacy and teacher efficacy emerged as separate factors of efficacy. Personal efficacy was the first factor which appeared. It "reflect(s) the teacher's sense of personal responsibility in student learning and/or behavior and corresponds to Bandura's self-efficacy dimension" (p. 573). Gibson and Dembo described teacher efficacy as a "belief that any teacher's ability to bring about change is significantly limited by factors external to the teacher" (p. 574). Woolfolk and Hoy (1990) decided that teacher efficacy and personal efficacy would be the two variables used for their test. They examined the structure and meaning of efficacy in order to learn about preservice teachers' views of personal efficacy and teaching efficacy. They focused on the teacher's beliefs of the teaching and learning relationship. The results supported the existence of the two efficacy constructs developed by Gibson and Dembo, teacher efficacy and personal efficacy.

Woolfolk and Hoy also indicate that steps need to be taken to move past composite scores and identify high and low efficacy teacher samples. Pajaras (1992) writes that a teacher's sense of self-efficacy affects motivation and behavior in the classroom. Romi and Leyeser (2006) surveyed 1,155 preservice teachers using a modified version of the Gibson and Dembo instrument to measure student efficacy. They found that sense of self-efficacy was lower than that of teacher efficacy. This indicates that preservice teachers may perceive external factors (e.g., home environment) as barriers to effective teaching.

Small Sample Size

The scope of this literature review encompasses, for the purpose of this dissertation, an overview of the literature of related research designs when sample size is small, which includes both traditional and new approaches. The definition of a small samples size varies depending on the technique and purpose of the analysis. For example, a t-test can employ samples sizes as small as 15. Kareev, Leiberman, and Lev (1997) used small sample sizes, n equal to 112 and n equal to 144, in two experiments to assess if smaller groups better predicted correlations than a large sample size (p. 280). Anderson, Doherty, and Friedrich (2008) also used what they considered small sample sizes, $n = 80$ and $n = 77$, while investigating predictions from signal detection simulations. Hoyle (1999) defines a small sample size as one which has an n equal to or smaller than 150. Qingmin, Hongwei, and Jun (2007) analyzed data from a small sample size, $n = 6$, using Bayesian analysis to combine simulation data with test data. Large sample size data sets are typically preferred but not always available for quantitative data analysis. In many research studies, only a small sample of data are available for analysis. Information provided from small sample sets may be used to inform decision making.

Classical discussions of small sample size generally discuss how power is limited and generalizability restricted when findings are discussed. Statistical strategies which allow for flexible application to small sample size need to be emphasized.

There are several common strategies used for statistical analysis when applied to small sample size, including Student's t-test, ANOVA, ANCOVA, and meta-analysis. (These strategies are not limited to small sample size data sets.) There have also been additions to the field with regards to small sample size, such as the counter null for measuring effect size. Typical strategies for analyzing data from small sample sets are reviewed.

Student's t-test can be used to compare the means from two normally distributed samples whose within-group variance the analyst assumes to be equal. The t-test assesses if the difference between sample means is due to more than chance alone. When running a t-test, the analyst identifies null and alternative hypotheses. Under the null hypothesis, the t-test statistic is distributed as a t-distribution with degrees of freedom depending on sample size. For example, if you had a t-test for two independent samples n_1 and n_2, then the degrees of freedom for the t-test is $n_1 + n_2 - 2$. Thus the t-distribution takes into account sample size. Sample size through degrees of freedom is also used in other statistical procedures, such as ANOVA and ANCOVA.

A meta-analysis synthesizes data from multiple empirical studies. Meta-analysis provides procedures for coding study findings and summarizing research across multiple studies with a common topic area. A dilemma which arises in meta-analysis is the use of different instruments across the multiple studies to gather data. To create standardization across each of the studies, effect sizes are calculated. An effect size measures the

relationship or correlation between variables. Mean difference effect size is a way to measure the strength of the relationship between two variables. The nature of the focus research in the meta-analysis should be considered when deciding on an effect size statistic (Lipsey & Wilson, 2001, p.34). When reviewing research for a meta-analysis, a researcher may locate only a limited amount of research on the particular variable of interest. An effect size can be calculated using data from the available research even thought the number of cases is restricted.

In addition, there are times when a researcher may want to use single-subject studies with measurements taken over a period of time for meta-analysis. The challenges which arise when calculating an effect size for this type of study is the ability to measure phases over time within that one level, understanding the effect of the treatment when compared to the control and summarization of the various effect sizes calculated for the single subject (Hershberger, Wallace, Green, & Marquis, 1999). From this data, an effect size can be calculated using data from the treatment and baseline phases of the research. Through this type of analysis, data from single-subject studies can be incorporated into meta-analysis.

An effect size reports the relationship and proportion of variance between independent and dependent variables. This allows for an estimate of how far the findings depart from the null hypothesis. Because effect size is a proportion, it would not be affected by the sample size used in the study (Kramer & Rosenthal, 1999). However, effect size for small sample size data sets is often not significant when tested, even though the effect size may be identical to that of a large sample size data set. The power of the meta-analysis is that it can combine statistics across studies featuring small sample

sizes. Through meta-analysis, there is an accumulation of data from multiple studies which can compensate for the small sample sizes featured in them individually. The contribution of the meta-analysis is through the summary of accumulated statistics that may yield information not available in the individual studies.

A relatively new statistic that can be used to calculate effect size for a small sample size is the counternull (Rosenthal & Rubin, 1994). The counternull value gives an effect size value that is proportionally equivalent to the null value of the effect size. This allows for the effect size of small data sets to be equivalent to the null value effect size. In addition, reporting the counternull clears any misinterpretation by the reader that failure to reject the null is equivalent to an effect size of zero (Rosenthal & Rubin). In larger data sets, where the effect size is generally significant, reporting the nonsignificant counternull will provide a more skeptical view of the significant *p* value. Whereas, a significant counternull in addition to a significant *p* value will provide more support for the findings in studies with a large data set. One requirement of the counternull is that data be either a symmetric distribution or transformed into a symmetrical distribution before the calculation. Calculation of the counternull in the univariate case is two times the obtained effect size minus the null effect size. In cases where the null effect size is equal to zero, the calculated counternull effect size is equal to two times the obtained effect size. In the multivariate case, the counternull is equivalent to two times the obtained mean minus the null mean. Providing the counternull provides additional information regarding study results.

Bayesian statistics allows for incorporation of small sample size. Bayes's theorem allows for weighting of the subjective prior distribution and data. This allows for the

researcher to input his or her belief as to how well the data represents the population from which it was drawn. There may be cases when a large sample size is not available to the researcher. In the study by Qingmin et al. (2007), the authors did not have the resources to test accuracy of their treatment. However, they had six samples of test data and were able to simulate data using a Bayesian approach to test their treatment. Spiegelhalter, Abrams, and Myles (2004) discuss how a decision-theory Bayesian approach can be used to calculate the sample size based on a utility function that takes into account the cost of experimentation. This will produce the minimal sample amount needed to net the predicted maximum benefits to the research. Bayesian analysis takes into account sample size in analysis.

Action Research

Action Research, which combines collaboration with research to help inform teacher practice in the classroom, has long been a part of educational research. Dewey (1938) discusses the merit of collaborative research in the classroom to inform teacher practice. Collaboration within an action research context generally reflects the needs within the school or classroom where it is focused (Shulha & Wilson, 2003). The purpose of action research is to provide reflective practice which informs a component of education.

The use of systematic inquiry in action research requires using the action research process. Models for systematic inquiry using action research have been developed over time. Kemmis and Wilkinson (1998) use a set of steps designed to help develop action research plans. Those steps are plan, act and observe, and reflect. These initial steps are followed by using gathered information to revise the plan and then repeating the steps

which incorporate the updated information. This creates an ongoing cycle of reflection which informs practice in the classroom.

Collaborative action research uses partnerships between the local university and the school setting. Through collaborative action research, the expertise of the collaborators is used to guide the research (Hendricks, 2009). Members of a collaborative action research team unite the university and school in a shared research process that has common goals. Through this research, needs of the school are researched which involves using university resources. Outcome measures from collaborative research can be used to inform teacher practice, but they can also be used to inform program and policy development (Shulha & Wilson, 2003). When the school and university needs are common, collaborative action research can bridge those research needs.

Introduction to Bayesian Statistics

Bayesian analysis is based on the idea that an unknown quantity of interest, sometimes affected by a treatment, is measured and then analyzed using rules of probability to make inferences (Bolstad, 2004). The results of Bayesian analysis focus on changes in opinion about the treatment effect (Speigelhalter et al., 2004) as opposed to classical statistical views, which focus the analysis on treatment results. A Bayesian analysis requires the researcher to state explicitly (a) a reasonable opinion expressing the plausibility of different treatment values prior to the trial (prior distribution), (b) belief for the different values of the treatment, based on data from trial, and (c) final opinion about treatment effects (posterior distribution; Speigelhalter et al.). Bayes's theorem produces a posterior distribution defined by the weighted data from the study combined with the weighted prior distribution.

The three components which make up Bayes's Theorem are the prior distribution, the data, and the posterior distribution. In Bayesian statistics, the researcher's prior knowledge is valued and reflected in a prior distribution. "The prior distribution must be subjective. Each person can have his/her own prior, which contains the relative weights that person gives to every possible parameter value" (Bolstad, 2004, p. 6). The prior distribution is the component of Bayes's Theorem most frequently debated. Prior distributions can be determined in several different ways. A prior distribution may be based on the researcher's belief about future research findings. Prior distributions may be based on previous data collected for a separate research study that is similar to the one about to be conducted. Prior beliefs have the advantage of being able to be updated based on additional information. A prior belief may be revised based on findings of a previous trial in the study. The revision of a prior belief generally occurs at the end of a study as data are analyzed before a new round of the same study is about to be conducted. There are multiple ways to construct prior distributions based on the specific nature of the research (Kass & Wasserman, 1996). A noninformative prior, "a prior that has, asymptotically, large expected distance from the posterior in a given experiment" (Clarke & Wasserman, 1993, p. 1427), is an example of a prior distribution. The data are defined as a "conditional observation distribution evaluated on the reduced universe" (Bolstad, p. 97). The data, which are the observed data, allow for estimation of unknown parameters based on the known parameters, the data that have been collected from the known universe. The posterior distribution is defined as "the relative weights we give to each parameter value after analyzing the data" (Bolstad, p. 6). The posterior distribution is the product of the combination of the prior distribution and data with their respective weights

incorporated into the analysis. The posterior is, in specific cases, a "mean expressed as a weighted average of the prior mean and the observed value with weights proportional to the precisions" (Gelman, Carlin, Stern, & Rubin, 2004, p. 47). Observations are made about the research question based on the posterior distribution and include discussion of establishment of the prior distribution and data curves.

Subjective Probability

Probability theory consists of both mathematical and philosophical components. There is limited controversy related to the mathematics surrounding probability. Conversely, there is much debate over the philosophy of probability theory. In this discussion, I contrast subjective probability theory with logical theory, describing the latter first.

Logical theory (Gillies, 2000, p. 1) "identifies probability with degree of rational belief" and posits that all rational humans will agree upon the same probability given the same information. Novick and Jackson (1974) argue that instead of discussing the probability of *E* one should discuss the probability *E* given the evidence or knowledge of *H*. It is based on the idea that all rational human beings, given the same evidence, will share similar views toward a given outcome. Logical probability theory limits the influence of the researcher on outcomes.

Subjective probability views each individual's degree of belief in the probability of an event as unique. A measure of the strength of the belief feeling is emphasized within the subjective probability framework. Good (1980) defines subjective probability as a "psychological probability modified by the attempt to achieve consistency, when a theory of probability is used combined with mature judgment" (p. 135). Two primary

authors on the topic of subjective probability, as it relates to degree of belief, were Ramsey (1964) and De Finetti (1964). Subjective probability attempts to measure and include the strength of individual's beliefs as part of the data interpretation. Ramsey discussed the measurement of belief degree saying, "it is not enough to measure probability; in order to apportion correctly our belief of the probability we must also be able to measure our degree of belief" (p.69). This allows for individuals to express different beliefs and have those beliefs interpreted through the study. It allows for different interpretations of outcomes of a single event. De Finetti viewed all probabilities as subjective interpretations. Subjective probability allows for the degree of belief to be measured based on individuals beliefs.

Ramsey (1964) pointed out that some degree of belief measurements are easier to capture than others and that this measurement can be an ambiguous process. The ability to capture degree of belief is dependent on the research being conducted, that is, the degree of belief is limited by itself because it does not provide a context in which it is situated. Therefore, for a degree of belief to have merit, the way in which it was measured needs to be specified in order to gain a deeper understanding (Ramsey). The goal when measuring a degree of belief is to match an assigned number to the individual's belief. This will provide multiple subjective interpretations on a singular event. Ramsey viewed subjective probability as one interpretation of probability and that objective probability is another view that can be taken. Application of probability theories are dependent on the setting in which they are used.

Although there were some differences, De Finetti (1964) was similar to Ramsey. De Finnetti discusses subjective probability as being one in which individuals' beliefs are

present in their probabilities. De Finetti also developed exchangeability, which uses reasoning and induction to exchange observations, given specified parameters. Subjective probability allows for the individual's beliefs to be interpreted through the probability. However, De Finetti differed from Ramsey in that he believed probabilities are subjective. De Finetti wrotes that his point of view shows

> that there are rather profound psychological reasons which make the exact of approximate agreement that is observed between the opinions of difference individuals very natural, but that there are no reasons, rational, positive, or metaphysical, that can give this fact any meaning beyond that of a simple agreement of subjective opinions. (p.152)

De Finetti believed that "objective probabilities . . . can be explicated in terms of degree of subjective belief" (Gillies, 2000, p. 69). Through the exchangeability theorem, observations are considered exchangeable if they are independent given a conditional set of parameters. Events are considered exchangeable if the condition is satisfied which indicated that the same probability is equally likely of the events from the class being considered (De Finnetti, p. 81). It is the idea that two or more variables are similar enough that permutations will not significantly alter the results (Spiegelhalter et al., 2004).

Summary

This review of the literature provides background information on topics related to the dissertation. The background on professional development schools, NAPDS Essential Nine, and NCATE Standards discusses the philosophy behind the TIP model and research being conducted. The information on urban schools addresses literature around schools situated in similar urban areas. Professional development school teacher preparation and mentor program literature provides background on models which support student interns and beginning teachers. Teacher self-efficacy is a component of the study

which is also briefly discussed. Literature surrounding methodology, applicable to this dissertation, includes introduction to Bayesian statistics, subjective probability, small sample size, and action research. Information provided through the review of the literature helps build foundational knowledge for upcoming discussions.

CHAPTER 3

METHODOLOGY

Overview

The Teacher-Intern-Professor (TIP) model was developed to provide a more focused intervention approach within the PDS^2 project. The TIP model focuses on student academic achievement and preparing teaching interns for teaching at a classroom level. The advantage of such an approach is that it allows for focused application of resources and collection of data at a classroom level. The first purpose of my study was to analyze real school TIP intervention data and discuss related methodology of small sample size as it pertains to typical Anchor-Action Research studies (Curlette, 2007). The second purpose was to explore methodological issues related to using Bayesian analysis with various qualitative data sources.

Intervention Description

The Theme Teacher-Intern-Professor model was developed as a PDS^2 intervention to support teaching interns' experiences while working to improve student achievement in the classroom. One purpose of the TIP group was to meet needs of schools as outlined by the PDS^2 program's design team. It supported the work outlined within the PDS^2 intervention. The PDS^2 intervention uses individualized strategic plans developed by the design team, which consisted of local school and university partners, to help reach goals including (a) improving student achievement and (b) preparing student teachers for the classroom. Strategic planning meetings were held regularly to assess

progress toward individualized school goals and to reevaluate the plan based on individual school needs. All members of the strategic planning committee are included at these meetings. Members include all school participants, school administrators, university coordinator(s), and the design team which includes investigator, project investigator, the director of research, the project director, the budget director, and one university coordinator each from the university's Department of Early Childhood Education and Department of Middle-Secondary Education and Instructional Technology, depending upon the grade level of the participating school. Each PDS^2 participant schools received, as part of their strategic plan, a university coordinator, funded through the grant. The university coordinator worked one day per week in schools and facilitated preservice teachers placed in that school. The TIP model supported this work and used resources provided by the design team.

The Theme TIP model was developed to help meet goals of the strategic planning committee in the participating schools. One goal of the strategic planning committee and a listed grant objective was to increase teacher retention in the classroom. This model helped to address this goal through developing the teaching intern experience. A second goal was improving student academic achievement through classroom instruction supported by TIP. TIP members worked collaboratively and discussed how to individualize instruction to meet the needs of students in the classroom.

Funds also were provided to encourage action research projects in PDS^2 Theme TIP groups. Funding through the minigrants provided an opportunity for Theme TIP members to conduct action research projects in the classroom. The Theme TIP groups had the advantage of having a university faculty member to help design the research, and

a classroom teacher to provide the setting and conduct the research. The intern benefited through working with the university faculty and classroom teacher to see how action research is conducted. In addition to the action research minigrants, additional funding was available to each PDS[2] participant school for professional development needs as identified by the school. The funding provided through the action research minigrants allowed for the purchase of teaching resources that supported the content of the unit developed through the TIP model.

Methodology

The goals of this study were to explore the impact of the Theme Teacher-Intern-Professor model on teaching intern preparation and student achievement in participating Professional Development Schools Partnerships Deliver Success grant participant school classrooms and to investigate methodological issues involved in combining Bayesian analysis and qualitative data. The context for this work was established through discussion of quasiexperimental design, linking quantitative and qualitative research, and discussion of both the quantitative and qualitative frameworks. The research questions and methodology used to address them are included in this chapter.

Quasiexperimental Design

In this study, I used both quantitative and qualitative data collection methods to explore the effects of the TIP model on teaching intern experiences and student academic achievement. I used a quasiexperimental design because a true experimental design was not feasible. For a true experimental design to be used, random assignment for some unit (school, class) would need to have been used. This was not feasible for this research because of the school setting. The selection of PDS schools was a decision based on the

school's being a high needs school (more than 50% of student receiving free or reduced-price lunch), previous relationships with schools, and agreement of participation from administrators in the school system. The quasiexperimental design had two TIP intervention classes, two comparison/control groups, and pretest and posttest for all classes (Shadish et al., 2002; see Table 1). The treatment school, located within an urban school district, had two 4th grade classrooms which participated in the TIP treatment. The treatment school received the above described program while the comparison and control classrooms did not receive the TIP treatment. There is delineation between the two types of comparison classrooms used in this study. The TIP treatment classrooms were matched to two comparison classrooms at a school within the same system for student academic achievement related to county benchmark tests. The comparison school was matched to the PDS treatment school on criteria including free or reduced-price lunch participation, academic achievement, and racial composition of the student population. Two 4th grade classrooms served as controls within the same school as the TIP treatment classrooms for measuring student achievement on the teacher-made tests. Pretests and posttests were given for both the benchmark and teacher-made tests. There are four types of validity which are vulnerable to threats, as outlined by Shadish et al.: statistical conclusion validity, internal validity, construct validity, and external validity. These four types of threats to validity are discussed below with regards to this dissertation.

Threats to statistical conclusion validity affect inferences about the relationship between the treatment and outcome (Shadish et al., 2002). Examples of these threats may include low statistical power, violated assumptions of statistical tests, fishing and error rate problems, unreliability of measures, and unreliability of treatment. Threats to

Table 1

Design for TIP Treatment, Control, and Comparison Classrooms

Classroom Group	*Classroom*	*Preintervention Instrument(s)*	*Postintervention Instrument(s)*
TIP Treatment	Classroom 1	YT_A, YB_A	YT_B, YB_B
	Classroom 2	YT_A, YB_A	YT_B, YB_B
Control	Classroom 3	YT_A	YT_B
	Classroom 4	YT_A	YT_B
Comparison	Classroom 5	YB_A	YB_B
	Classroom 6	YB_A	YB_B

Note. YT is a teacher created test focusing on geometry content. YB is a system-level benchmark assessment.

statistical conclusion were minimal as a comparison group was used and a blocking feature was used during analysis. The assessments of student academic achievement aligned with the content of the TIP group. The survey completed by participants measured efficacy, another focus for this dissertation. In addition, comparison and control groups were used to minimize this threat by having their outcomes to compare with outcome measures of the TIP group.

Internal validity focuses on, "whether observed covariation between A (the presumed treatment) and B (the presumed outcome) reflects a causal relationship from A to B as those variables were manipulated and measured" (p. 38). Threats to internal validity may include ambiguous temporal precedence, selection, history or events occurring in conjunction with the treatment, maturation, or attrition. Threats to internal validity may have included interactive affects. A potential threat to internal validity may

have been additive and interactive affects. The participating school may have been implementing different programs which influenced student academic achievement. Steps were taken to record the mathematics programs in place at each school setting. How these programs affect student achievement in the classroom will be addressed. Internal validity will be strengthened by identifying and addressing these threats.

Threats to construct validity are concerned with how well matched the study operations are to the constructs used to describe those operations (Shadish et al., 2002). Perceived, predominant threats to construct validity included reactive self-report changes and experimenter expectancies (Shadish et al.). Reactive self-report changes may have emerged as participants reflected on TIP in a way that was motivated by what they felt the researcher wanted to hear instead of sharing their unbiased thoughts. The threat of reactive self-report changes was minimized by collecting multiple sources of data. In addition to interviews, data were collected through artifacts and observations. Because of the interactive nature of the study with the researcher, experimenter expectancies could have been another threat to construct validity. Data were collected from multiple sources to ensure that inferences are based on multiple data sources, including district data from benchmark tests which were not constructed by the teachers in the study or by me. Through these steps, threats to construct validity were minimized.

Threats to external validity affect inferences regarding the cause-effect relationship "over variations in persons, settings, treatments, and outcomes" (Shadish et al., 2002 p. 86). Threats to external validity may include interaction of the causal relationship with units, over treatment variations, with outcomes, and with settings (Shadish et al.). This implies that effects of a treatment found in one setting may not be

transferred to another setting. Threats may be minimized through detailed description of the characteristics in which the treatment was set.

In general, when there are comparison or control groups in quasiexperimental design, most of the threats to internal validity are seen as being minimized. There are at least five threats that are not minimized by the inclusion of a comparison group. These five threats include resentful demoralization, compensatory rivalry, compensatory equalization, novelty effects, and treatment diffusion. Threats of this nature are not minimized because the presence of a comparison group affects the interaction and perceptions of the treatment and control groups. A step that was taken to minimize these threats was not to create a lot of publicity for the TIP treatment group, so members of the other groups were less likely to be aware of the TIP group's existence.

Quantitative and Qualitative Link

For the purposes of this dissertation, quantitative and qualitative data techniques were used in tandem. They are being used because of the different ways in which they inform data collection and analysis in addressing the research questions. The quantitative data provide efficacy data using a survey instrument. Qualitative data provide experiential evidence related to efficacy. These two methods gather data from two distinct viewpoints.

Combining quantitative and qualitative methodology provides more detailed information than would be produced if only one method were used to address the research question. The quantitative survey allows for comparison of participants to a larger population. The qualitative data provides experiential details and allows for specific reflection within the research setting during data collection. The Bayesian

approach allows for the data to be combined in a way that includes both the quantitative survey data and the qualitative data. The qualitative data are reviewed and coded by the researcher and used in eliciting the prior belief which was also informed by historical quantitative survey data. The prior distribution was combined with observed survey data to produce a posterior distribution. I also used themes that emerged from the qualitative data to provide a richer description of the participants experiences that are not reflected in the quantitative survey. Further details of the process are discussed in Chapter 4 of this dissertation. The quantitative and qualitative frameworks provided below provide a context through which data are collected and interpreted.

Quantitative Framework

Subjective probability, as discussed in Chapter 2, allows for the input of prior knowledge about the phenomenon under investigation into the research problem. Press (2003) outlines the advantages of adopting a subjective probability stance for establishing a prior distribution. One advantage includes having a proper prior distribution which totals 1. Another advantage is that the subjective prior produces a posterior distribution that looks as if there were additional data replications included. This adds to the size of a small data set such as used in this dissertation. Additional information which informs the researcher's understanding of the phenomenon under investigation may be incorporated using a subjective prior with a Bayesian approach. In fact, it can be argued that the greatest advantage of a subjective probability stance is the incorporation of additional information into the Bayesian analysis. This may be more applicable in research situations where there is insufficient information to assess a problem using an objective view of probability.

Objective probability limits the input of prior knowledge about the phenomenon and emphasizes the empirical evidence in addressing the research question. Objective prior distributions, in Bayesian statistics, implies that the researcher has limited knowledge or reference on which to base a prior distribution. Press (2003) outlines advantages and disadvantages of using objective prior distributions in Bayesian analysis. One advantage of an objective distribution is that it limits the biases of the researcher. It can also reflect the idea that there is little information available for a particular problem. While the philosophies between frequentist and Bayesians differ, sometimes both can yield similar results if an objective prior is used. Also, if a group of individuals are working toward a policy goal, then the analyst may not want the prior to reflect their opinion and may choose an objective prior which will produce a posterior influenced predominantly by the data (Press). Disadvantages reflect the difficulty in specifying an agreed upon objective prior distribution that meets the variety of conditions that arise.

For the purpose of this dissertation, a subjective view of probability is applied for research questions using Bayesian methodology. A subjective probability stance allows for the combination of quantitative and qualitative data for research questions 4 and 5. A subjective approach allows for the incorporation of both quantitative and qualitative data while setting a prior probability for both teacher efficacy and personal efficacy of participants. The incorporation of the qualitative data would be more difficult if an objective approach were used to address these research questions. The advantage of adopting a subjective view of probability is that it allows for the incorporation of additional information not captured using an objective approach.

Bayesian Emphasis.

In my work, I use Bayesian statistics as an approach to address research questions 4 and 5, which combine quantitative and qualitative research. In addition, I approach the analysis to these questions with a subjective view of probability. Bayesian statistics, with a subjective view of probability, allows me to incorporate other knowledge as I explore the combining of qualitative data with quantitative data to establish a prior. The analysis featured in this dissertation will use a normal distribution with a known variance. The variance in this dissertation will be taken from the historical quantitative data and measured on the same scale as the survey (Novick & Jackson, 1974). For the purposes of this dissertation, known variance is being used because it allows for a more straightforward computational analysis so that the focus of the Bayesian application will be more on conceptual issues related to using a Bayesian analysis with qualitative research for combining methods. The calculation for an unknown variance requires calculated marginal distributions dependent on *n* and estimation of mean standard deviations (Schmitt, 1969). The analysis for unknown variance is more complicated in that it requires the calculation of inverse χ^2 to determine the probability distribution (Novick & Jackson, 1974).

Qualitative Framework

Questions 4 and 5 incorporate qualitative research, through elicitation of the prior belief, in the analysis of teacher efficacy and student efficacy. Qualitative research consists of a variety of research approaches that address research questions which focus on understanding of a particular phenomenon of interest (Bogdan & Biklen, 2007). Qualitative research is typically naturalistic, and it comes from the research site of

interest as the context of the situation is of concern. Understanding of the researcher is viewed as being heightened by observing or collecting data within the context of the research setting. Descriptive data, such as interviews, observations, artifacts, and pictures, are collected and examined as evidence which may lead to deeper understanding of what is being studied. Typically, there is concern with the process of how participants make meaning rather than focusing on a particular outcome. Qualitative researchers typically analyze data inductively and gain understanding based on a preponderance of evidence. This is considered a bottom-up approach. The purpose of the previous four features is that they work toward the fifth qualitative feature, to make meaning. Researchers of qualitative research are interested in how participants make meaning in their lives and which to gain a participant perspective of the phenomenon of interest.

There are many approaches to qualitative research, including ethnography, epoché, grounded theory, and narrative inquiry. Ethnography is oriented toward understanding cultural behaviors through description and interpretation. The researcher is seeking to understand how participants make meaning under ordinary or particular circumstances. The focus is often on one participant, and data are collected over an extended period during which the researcher is immersed in the research setting. Epoché method requires the researcher to distance himself or herself from the research and bracket personal judgments and perceptions about the nature of the experience (Schram, 2006). This approach requires the researcher to distance himself or herself during data collection, analysis, and reporting. Grounded theory is derived from sociological work, and substantive theory is developed that is grounded in the data. In grounded theory, patterns and relationships are interpreted and built over time. Narrative inquiry is

centered on understanding how people understand experience and make sense of events and actions in their lives through stories. The stories provide the participants' perceptions of events in their lives. These are examples of different ways in which qualitative data can be collected and viewed using a distinct method.

Narrative Inquiry

Narrative inquiry provides a framework for collecting data to be used in establishing a Bayesian prior. The advantage of narrative inquiry framework is that it provides experiential data related to the TIP intervention and application in the classrooms. Also, participants have personal views of experiences in the TIP program. Through the elements of narrative inquiry, these experiences can be shared with the researcher. These data provide specific examples that can be used when establishing a prior distribution for Bayesian analysis.

Narrative inquiry as a method is set in a phenomenological framework for the purpose of this study. Phenomenology focuses on making meaning of events and people studied. Schwandt (2001) discusses that a goal of phenomenology is to describe and discuss concepts and experiences which give form and meaning. Narrative inquiry is a better approach than ethnography for conducting this research. There were too many participants to conduct an in-depth ethnography in the time period under which data was collected. Epoché as a method was not applicable to this study because I was not in a position to bracket myself from the research at hand. Narrative inquiry, set within a phenomenological framework, differs from grounded theory, which serves to build theory grounded in experience. Grounded theory "focuses on the process of generating theory rather than a particular theoretical content" (Patton, 2002, p. 125). The steps and

procedures used in a grounded theory framework emphasize the connection of induction and deduction through an ongoing comparative method. Theory generated is grounded in real world experiences and serves to build rather than test theory. Narrative Inquiry, set within a phenomenological framework, requires the understanding of the experience as a whole event and how that is constructed from informant's understanding. Through a phenomenological framework, narrative inquiry provides participants' unique understanding of a shared phenomenon.

Chase (2005) discusses five analytic lenses through which narrative research is viewed, including narrative as a distinct form of discourse, verbal action, stories affected by social circumstances in which they are placed, socially situated, and the researcher is the narrator of the story. The first lens views narrative inquiry as a distinct story told about past experiences of the participant. This story is told from the view of the participant and features his or her interpretations of the experiences which have occurred. The second lens, verbal action, indicates that the researcher as a narrator serves to give voice to the story through questioning and delving for a deeper understanding of the participant's experience. The third lens acknowledges that stories are enabled or constrained by the environment in which they are set. This means that while each participant's story is unique, there may be similarities across multiple narratives that are affected by the context in which they are situated. Socially situated, the fourth lens, indicates that the narrative conveyed to the larger audience was constructed through a joint effort of the participant and the researcher who interacts and questions the participant. The fifth lens is that the researcher is the narrator who interprets the story

based on the four previous lenses. A narrative is produced by the researcher which makes meaning out of the material collected.

Methodological Rationale

Narrative inquiry is a form of study which emphasizes understanding the way people process their experience. Informants share how they have come to understand a particular event in a specific time and setting (Kramp, 2004): "It is through the personal narrative, a life as told, rather than through our observations as researcher, that we come to know a life as experienced" (p. 111). Narrative is "a way of understanding one's own and others' actions, of organizing events and objectives into a meaningful whole, and of connecting and seeing the consequences of actions and events over time" (Chase, 2005, p. 656). One can come to have an understanding as to what is happening in a particular time and place which focuses on how informants came as a way of knowing.

Narrative inquiry can be viewed as a natural way for people to express their understanding. People relate experiences naturally through the story elements (Kramp, 2004; Schram, 2006;). The structure of narrative inquiry as sequential in nature is an important element. Kramp writes that "narrative knowing results in a story, which, though structured, is flexible and attends to the personal, the specific and the particular" (p. 109). This element is a cross cultural way through which people can share their experiences with one another.

Through the use of narrative inquiry elements, I move toward a better understanding of teacher efficacy of the participating student interns. It is through narrative inquiry that I gained a clearer perspective of how these informants view their TIP group experiences and how these experiences have shaped what they come to know about

teaching. Through interviews, classroom and meeting observations, I have a better understanding of informants' experiences throughout this process. It also addresses the threat of reactive self-reporting, discussed earlier in this chapter as a threat to construct validity, because participants provide personal experiences to address questions, making it harder for them to give answers they perceive the researcher wants to hear. Also, this approach addresses the threat to construct validity known as experimenter expectancies. The data from interviews in conjunction with classroom observation and meeting minutes provide multiple data sources from which themes emerge. This allows for the cross-reference of interview data with other data points to determine if the threat, experimenter expectancies, is evident within any point of the data collection process.

Narrative inquiry is a natural fit for a research methodology in this study. The story element is one that is comfortable to participants from previous cultural experience. The sequential nature of narrative inquiry is a strength of the method. The stories will also provide a context from which the prior distributions for Bayesian analysis are set.

Much literature has been written about the benefits of narrative inquiry in the education field as a way of knowing. Dewey (1938) discussed the idea that experience can help individuals think through ideas they may be struggling with. Through sharing these ideas, a person can come to a better way of knowing. One outcome of this research model may be that student interns have a better understanding of who they are through sharing and understanding their experiences. This type of reflection may provide insight on how to improve teacher preparation or support.

Sampling Strategy

This study required purposeful sampling from participants in the TIP group. Only TIP participant members working with the participating PDS[2] school where the program is being implemented were included in this study. There were two classroom teachers and two student interns along with one university professor who participated in this study. The two teachers who taught in 4th grade classrooms in the same PDS participated in this research. There were two student interns who were completing their student teaching internships who also participated. A university professor served to bridge the university to classroom connection for the student interns and provide additional content knowledge support within the TIP group. All members of the group participated in various data collection activities.

Data Collection Methods

Multiple forms of qualitative data were collected as part of this research. The primary qualitative data collection tool was interviews. TIP group participants were interviewed, individually, several times over the course of the study. Questions used during interviews are listed in Appendix A. I conducted observations of meetings and classroom instruction to see how work from the TIP group was transferred into the classroom setting. Additionally, artifacts such as lesson plans and intern portfolios were collected and analyzed. Multiple forms of documentation allowed for triangulation of data. Meeting notes were also collected and analyzed. Details of the research methods and data sources used to answer research questions are provided in Appendix B.

To obtain more information about teacher efficacy and self efficacy, I interviewed TIP participants. Through interviews, I gained insight into the teaching experiences of the

informants constructed prior to and during the course of this study. The belief that there is not a single true experience for everyone is one of the reasons that there are multiple informants in this study. Through interviews about specific experiences of participants' lives, I am able to gain insight into how the TIP model impacted practice. I want to see how understanding is constructed from participant's view points. Through narrative inquiry, a context of understanding participants' views of the TIP experience was incorporated into the Bayesian prior for data analysis.

Multiple observations were conducted over the course of this study. I observed all TIP group meetings and took field notes of my observations. I also collected artifacts such as resources and research shared among group members. Additionally, I also conducted classroom observations during mathematics lessons. The participants and I agreed on times that were amenable for me to observe during a mathematics lesson. During those observations I took field notes. These observations provided information related to the TIP model and how content discussed during meetings was being reflected in classroom practice. They also provided showed how efficacy was reflected in their classroom practice.

Artifacts in the form of lesson plans, copies of intern portfolios, and handouts from meetings were collected for document analysis. I also collected artifacts such as lesson plans, pictures of classroom charts, and student teacher portfolio content from participants. Through collected artifacts, I better understand how participants make meaning of teacher efficacy and how their work in the TIP group has impacted their teacher efficacy.

Researcher's Role

As the researcher, I was an active participant in the study. There was direct interaction between myself and the informants. I served as the primary data collection and interpretation tool of qualitative data during the study. I observed mathematics lessons in the classrooms and TIP meetings. I also conducted interviews related to my research questions. During interviews, the informants discussed themselves and their experiences in the TIP program. I transcribed and coded data from the interviews. I scheduled and conducted follow-up interviews to clarify points I was unclear about from the previous interviews, conducted member-checking, and asked any additional questions which arose as part of the interview review process. I was also responsible for collection of artifacts such as lesson plans and charts used to support the unit of instruction. Classroom and meeting observations served as another form of data collection. The coding process included looking for themes in the qualitative data and merging that data with Bayesian interpretation as a contribution to new methodology. I also assisted the TIP group members with designing the methodology of their action research project and analyzing the student achievement data. I was available to answer questions they had on methodology or data analysis surrounding their action research project.

Trustworthiness

Trustworthiness was upheld in several ways. All interviews were taped and transcribed. The events that I discussed were in recent memory to the participants and they were able to remember, with detail, what happened. I trusted the informants to remember with accuracy and to report with honesty their interpretations of how well they

were prepared for the classroom. I conducted follow-up interviews to clarify points and ask any questions which I might have after reviewing the interview transcriptions.

Trustworthiness was also upheld through triangulation of both quantitative and qualitative data with the initial hypothesis. “Convergence of empirical results is regarded as an indicator for their validity and strengthens the initial assumptions and the theoretical framework that was used to structure the research process” (Erzberger & Kelle, 2002, p. 467). Triangulation included collection of multiple qualitative data sources at multiple points and statistics on a historical quantitative data set. I investigated the analysis of quantitative and qualitative data, as discussed in Chapter 4, for convergence of data.

Research Questions

The previous sections provide background for how the five research questions are addressed. The first three questions focus on the TIP program. The fourth question has a methodology focus of combining quantitative and qualitative data using a Bayesian approach. Although the fifth question also addresses the impact of the TIP, it applies the methodology outlined in research question 4.

1. How does the Theme TIP model affect elementary grade mean student achievement as measured by the County Benchmark Test?

Data, from the school system central office, were collected on the county benchmark testing. The testing for the 2007-2008 school year occurred in August 2007, December 2007, and February 2008. The benchmark test from December 2007 served as the pretest and the benchmark posttest was from February 2008. Those testing dates were chosen because they most closely align to the time period when the geometry unit of instruction was taught. Test scores were collected from participating TIP classrooms and

classrooms from a matched comparison school. Data were analyzed using a factorial analysis with blocking to test mean differences on the dependent variable, mathematics test score. The independent variable is TIP group participation. The December test was used as the blocking variable and is discussed in further detail in Chapter 4. Assignment to treatment or control was a second factor in the analysis.

2. Are there significant differences in mean student achievement test scores between elementary Theme TIP model classrooms and control classrooms using teacher made tests?

Preintervention and postintervention assessments, designed by the TIP group participants, were given to students in TIP group classrooms and comparison classrooms to measure knowledge gains of geometry concepts. The focus of the TIP group was on improving students' academic achievement and teacher understanding of geometry. The teachers designed preintervention and posintervention tests that assessed student understanding of geometry. The data were analyzed using factorial analysis to test mean differences on the dependent variable, mathematics test score. The independent variable is TIP group participation. The preintervention test was used as a blocking variable as discussed in Chapter 4. A second factor in the analysis was assignment to treatment or control groups.

3. What programmatic differences are there for student teacher interns between the Theme TIP model internship and the original PDS model internship?

This descriptive piece details the similarities and differences between the TIP model and the PDS^2 internship model. Data for addressing this topic came from departmental documentation on internship requirements and through interviews with the participating TIP student intern. This question explores the student interns' experiences in

the TIP treatment using interview data. The following describes the TIP intervention in more detail.

The TIP Manual, developed as part of the work in the PDS^2 program, outlined the expectations of student interns participating in the TIP group. Interns were expected to meet the "requirements and guidelines set forth by the University to complete an internship in the participating school system" (Curlette & Ogletree, 2007). In addition, they were also expected to meet and participate in the bimonthly meetings in which they discuss topics to be taught in upcoming lessons of their classrooms. It also was expected that the interns would fulfill all required projects and assignments as required by the Department of Early Childhood Education in order to complete their internship. There was an optional action research component in which TIP members agreed to participate. The action research project provided an opportunity for all TIP members to conduct a joint research project. Group members were also invited to present the results of their project at a PDS^2 grant sponsored retreat with the teachers and university professor.

The Teacher-Intern-Professor model was designed to enhance and support the work of Georgia State University interns during their student teaching internships. As part of the TIP treatment, the interns remained in the same classroom for two consecutive academic terms. Traditionally, interns work in one classroom for the first part of this two-term internship and then move to a different classroom for the second part. This traditional model has begun to shift so students remain in one classroom for both internship experiences.

Work in the TIP group required the two student interns to meet bimonthly with the university professor and two teachers to discuss topics related to mathematics

instruction occurring in the classroom. The meetings lasted 30 minutes and were held during the grade-level planning period, part of the regular school day. The group met seven times between November 2007 and March 2008. (The group was unable to meet during December because of scheduling conflicts.) Topics for TIP meetings included discussion and planning of the action research project, discussion of topics related to the geometry unit, and topics of interest to the interns. The professor served as the leader of the TIP group and actively recruited the interns and teachers. She conducted the meeting in addition to highlighting resources, purchased with sponsored funding, that could be used to teach the geometry topics in addition to supporting math lesson planning for this unit. Additionally, the professor addressed questions the interns had about either their internship or work in the classroom. The teachers and interns shared successful activities and where they needed additional ideas or support. The group collaborated to address concerns that the interns had about teaching various topics related to geometry and mathematics. In addition to the university assigned supervisor, the TIP group professor provided additional support to help bridge experiences between the University and the local school.

4. How can Bayesian approaches be combined with narrative inquiry qualitative research for a mixed-methods approach?

This question addresses methodological issues which arose as quantitative and qualitative data were combined. The model which emerged from this study features a prior belief based on narrative inquiry qualitative research and quantitative historical data. The quantitative data comes from surveys completed by participants. The posterior is discussed based on the outcome of the analysis. In addition, content review of qualitative data reveals themes which were not included on the survey instrument. These themes

are discussed in Chapter 4 an example of how this strategy is applied to combine qualitative data with quantitative survey data are provided.

5. How does the implementation of the Theme TIP model affect student teacher intern efficacy when compared to student intern efficacy score data from the original PDS model using a Bayesian mixed-methods approach?

To address this question, I collected qualitative and quantitative data. Qualitative data were collected in the form of interviews, classroom and meeting observations, and artifacts. A content analysis of the documentation revealed the themes of the qualitative data. Quantitative data were collected in the form of an efficacy survey. Data were analyzed and interpreted through a Bayesian approach.

The Bayesian approach explicitly takes into account my prior belief about teacher efficacy. My prior belief was based on (a) analysis of historical quantitative teacher efficacy survey data, collected in previous years as part of the PDS^2 program and (b) results from the content analysis of the qualitative data which emphasize themes which emerged from the qualitative data. My *normal prior*, based on my belief, had an *n* of 2, weighting it equally with the data. In addition, a mean was established for the prior belief. A common population standard deviation, derived from the historical data set, was assumed for the prior and the data. This meant that I expected the deviation from the mean for the prior to be equivalent to that of the data.

The method selected for the Bayesian data analysis was updating using a normal distribution and known variance. After data collection occurred and the prior belief established, the posterior was calculated and which included the researcher's implicit sample size and the data (Spiegelhalter et al., 2004). The posterior of θ is given by

$$p(\theta|y_m) = N\left[\theta|\frac{n_o\mu+my_m}{n_o+m}, \frac{\sigma^2}{n_o+m}\right] \qquad 1$$

where θ represents a quantity that is currently unknown, n_o is the implicit sample size, μ is the prior mean, *m* is the sample size of the observed data, and y_m is the mean of the observed data. The variance for the posterior distribution is calculated using the known variance for the prior, σ^2, the implicit sample size (n_o), and the size of the observed data (*m*). In other words, the posterior distribution is a normal distribution with a mean of $\frac{n_o\mu+my_m}{n_o+m}$ and a variance of $\frac{\sigma^2}{n_o+m}$.

The credible interval is calculated and included in this dissertation. The credible interval is the shortest interval for a specified amount of area under the distribution that has the highest probability of containing the parameter. The advantage of the Bayesian credible interval, on the posterior distribution, is that it represents the current degree of belief (Bolstad, 2002). For the purposes of this dissertation, an α level of .05 is used when the credible interval is calculated.

Participants

This research was conducted in an urban school district, elementary school which was participating in the PDS^2 program. Statistics provided by the Georgia Department of Education (GADOE; n.d.), indicated that the school had an enrollment of approximately 1,500 students with over 90% receiving free or reduced-price lunch for the 2007-2008 school year. The school is listed as a Title I school, and the ethnic diversity of the student population for the 2007-2008 school year, as listed on the GADOE website, was approximately 6% Asian, 19% Black, 69% Hispanic, 0% Native American/Alaskan Native, 3% White, and 4% Multiracial. The school did meet Adequate Yearly Progress (AYP) goals for the school year (GADOE). The TIP model was implemented at the 4th-grade level at this school.

This study involves two student interns, two classroom teachers, and one university professor. The student interns and classroom teachers both work in 4th grade classrooms in the same PDS participant school. The university professor served as a liaison between the university and participating school. All played an integral role in supporting and implementing the TIP model.

The two student interns completed their student teaching internships during the study. A requirement of the internship is that the interns work in the classroom 5 days a week for the second half of the internship. The TIP model was designed so that interns serve in a single classroom for an extended period of time. Both interns were women of Asian descent. Intern 1 was around 25 years old, and she had lived in Georgia for most of her life. Intern 2 was born and raised in an Asian country before moving to a Midwestern U.S. city, where she attended high school. At the time of this research was conducted, Intern 2 was around 30 years old. Both interns graduated from their programs following data collection.

The two classroom teachers both taught 4th grade at the same school. They had been teaching in this school for several years and had supported student interns, in their classrooms, in prior years. They were familiar with the procedures and activities which accompanied hosting a student intern. Both teachers were female and Caucasian. Teacher A taught in a general education class and had been teaching for over 20 years in this urban school system. Teacher B taught in an intervention classroom, and she had been teaching for over 3 years in this urban school district. Students in an intervention classroom typically were identified as having scored below grade level in reading and

language arts on their third grade Criterion-Referenced Competency Tests (CRCT). Both teachers were experienced with the culture of the participating school.

The participating university professor, a Caucasian woman, had a mathematics background and taught math methods courses for undergraduate students at the university and also worked as a university liaison to the PDS^2 program. The university professor had experience working with faculty in the school for several years prior to the TIP project. This allowed her to develop a relationship with administration, faculty, and staff within the school. Additionally, the university professor regularly taught classes at the school for university students. This allows for students to complete their course work in a setting which allows for modeling and linking of school and university experiences. The professor knew the participating classroom teachers in the school, where the TIP model was implemented. The professor had also taught the math methods course to the participating student interns. She had relationships with the teachers and interns prior to the implementation of the TIP model. The professor did not serve as the supervisor to the student interns because that was perceived as a conflict of interest in that the interns might have felt coerced into participating and it could have been perceived that the professor was providing additional support to these interns and not other interns she supervised. The professor provided support for the TIP group members but did not serve as an evaluator of the interns within the group.

Instruments

Multiple forms of assessment and data collection were incorporated as part of the TIP model. Student achievement gains were measured through County Benchmark Tests and teacher created pre/post test. The county Benchmark Test (CBT) is an assessment

used to measure student achievement gains throughout the year at all grade levels. Student achievement data were also collected over a 6-week period using a teacher created mathematics pretest and posttest. Quantitative teacher efficacy data were collected using a survey developed through the PDS^2 program. Qualitative teacher efficacy data and general TIP program data were collected through interviews, observations, and documents. These instruments provided a range of data to assess the TIP model and measure student academic achievement.

The participating county developed its own assessment based on the Georgia Performance Standards (GPS). This assessment test provided the county with additional information about individual student achievement in mathematics. The initial pretest for all grades was given at the beginning of the academic year. A second benchmark test was administered in December, at the end of the first semester of instruction. The posttest was administered in the spring of the school year, prior to statewide testing. The benchmark test given in December 2007 was used as the pretest because the test administration was closer to the beginning of the TIP model implementation than the initial benchmark pretest in August 2007. The benchmark posttest was administered in February 2008. All benchmark assessments consisted of multiple choice items related to mathematics standards at the 4th grade level.

Participants completed a teacher efficacy survey developed by Woolfolk and Hoy (1990) in their research on examining the efficacy of prospective teachers. The survey focuses on two factors, personal efficacy and teaching efficacy, which emerged as themes from research conducted by Gibson and Dembo (1984). The survey instrument consisted of 22 questions which participants responded to using a 5-point Likert scale ranging from

1 (*strongly disagree*) to 5 (*strongly agree*). This survey provided quantitative data on the teaching efficacy of participating teachers, interns, and the university professor. These data were combined with the coded qualitative data to evaluate the teaching efficacy of participants.

Procedures

Data for this study were collected during Year 3 of the PDS^2 project. Data were collected from one participating urban metropolitan area school system in the southeast. Quantitative data, used to measure student academic achievement, included student mathematic achievements scores on a county benchmark test as well as student test scores on a teacher created pretest and posttest mathematics assessments. Quantitative data, collected to measure teacher efficacy, came from the Teacher Survey developed through the PDS^2 program at GSU. Qualitative data were collected through interviews, observations and additional documents. The ongoing data process and issues, related to combining quantitative and qualitative data, which arise, are documented for discussion in this dissertation.

Expectations

The model is focused at a classroom level, instead of measuring student academic achievement at a school level. This added level of intervention focus allowed for assessment of changes that were not visible at the school level. In addition, qualitative data provided a perspective of the TIP Model not captured using only quantitative measures. The focus of the TIP intervention, in addition to the multiple forms of data collection, provided a focused assessment at the classroom level.

The exploration of combining quantitative and qualitative data using Bayesian statistics contributed to research methodology. The exploration allowed for multiple views toward combining data to be explored, before the actual analysis took place. In addition, the mixed methods, as part of this dissertation regarding teacher efficacy, provided an example for using small sample size, for the quantitative aspect of combing methods.

CHAPTER 4

RESULTS

Data were collected using both quantitative and qualitative means from Teacher-Intern-Professor program participants. Quantitative data in the form of student test scores were collected for assessment of student gains in mathematics. Test scores included county benchmark testing and teacher-created assessment. Additional collected quantitative data included surveys measuring efficacy. Qualitative data were collected through interviews, observations, and other documents as discussed in Chapter 3. I have organized the discussion in this chapter as it relates to each of the five original research questions.

Effect of Theme TIP Model on Student Achievement

My first research question was the following: *How does the Theme TIP model affect elementary grade mean student achievement as measured by the County Benchmark Test?* The preintervention county benchmark was given in December 2007, and the postintervention evaluation was given in February 2008. The treatment and comparison group data were collected from 4th grade classrooms in the PDS^2 participant school and its matched comparison school. The treatment group consisted of the two classrooms receiving the TIP model treatment in a PDS^2 participant school. The control group consisted of two classrooms at the matched comparison school within the same school district. The comparison school was matched to the PDS based on proportion of students receiving free or reduced-price lunch, academic achievement on a state

mandated test, and proportion of diversity of students based on ethnic group composition. Data were collected at the district level so that neither school was inconvenienced during this data collection process. The district personnel who collected the benchmark data ensured that the two comparison classrooms were similar in size and focus as the treatment group. This means that one general education classroom and one intervention classroom were selected from the comparison school. A postintervention test only design was used because equivalency between the preintervention test and postintervention test could not be established. However, both schools were expected to teach the same mathematics content in the same time frame as outlined by the district in their content curriculum map. The benchmark assessment included items covering standards taught over the course of the school year. The assessment included geometry concepts in addition to other mathematics content.

The data analysis to address research question 1 was a two-way factorial ANOVA. One factor was conceptualized as a blocking factor for the pretest using four levels. The other factor was a treatment factor with two levels (TIP intervention, usual instruction). Winer (1962) provided information for completing this analysis, which includes blocking to provide a measure of control for experimental error. This is achieved by reducing the number of units to blocked groups and eliminating the differences between the blocks from experimental error. Blocking was determined using the preintervention test scores in this analysis. The purpose of the factorial analysis was to assess whether the difference between the mean of TIP classroom posttest scores was significantly different from the mean of the posttest scores in the matched control classrooms. The blocking assignment variable was established by dividing students into

four groups. The four blocking groups were determined from the range of preintervention test scores of the combined control and comparison groups. The preintervention scores were divided into four groups of relatively equal size (see Tables 2 & 3, & Figure 1). The postintervention test was the dependent variable. A factorial analysis was conducted to determine the strength of the relationship between student test scores on the posttest benchmark and participation of classrooms using the TIP approach. The dependent variable was student test scores on posttest benchmark. The independent variable consisted of participation in the TIP program at a PDS^2 school versus the comparison school which participated in neither the PDS^2 program or the TIP treatment. As seen in Table 4, the treatment factor was not significant $F(1,60)=.248$, $p=.620$. These results do not favor the TIP group over the control setting.

Table 2

Blocking For Data Analysis: Benchmark Test Scores

		Preintervention Test		*Postintervention Test*		
Block	*Score Range*	*M*	*SD*	*M*	*SD*	*N*
Block I	21–46	37.62	7.72	47.50	16.53	16
Block II	50–61	55.50	3.62	42.69	10.51	16
Block III	64–79	69.72	5.07	58.44	12.37	18
Block IV	82–97	87.50	4.19	80.11	7.45	18

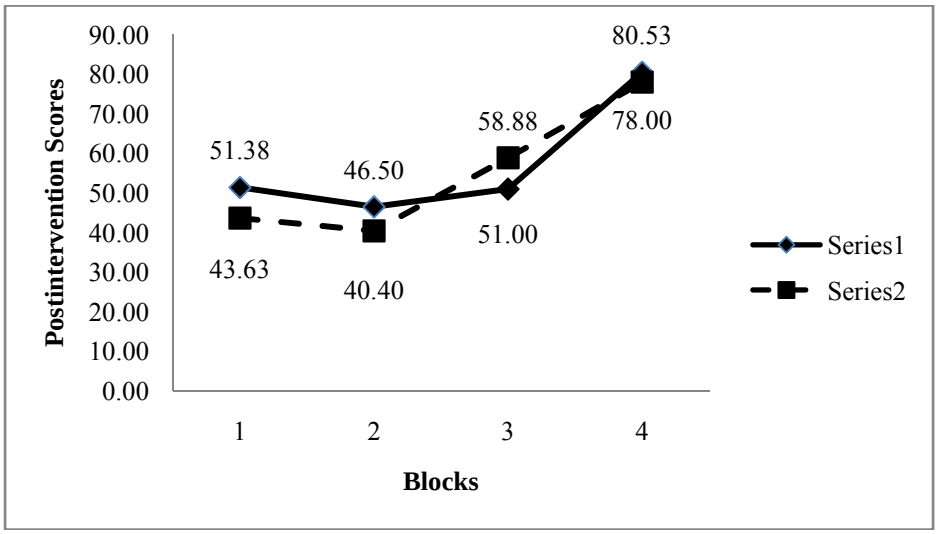
Note. Score Range is based on preintervention test scores of students in both treatment and comparison groups.

Table 3

Blocking For Data Analysis: Benchmark Test Descriptive Statistics for Treatment and Control Groups

		Treatment Group			*Control Group*		
Block	*Score Range*	*M*	*SD*	*N*	*M*	*SD*	*N*
Block I	21–46	51.39	11.057	8	43.62	20.715	8
Block II	50–61	46.50	12.161	6	40.40	9.312	10
Block III	64–79	51.00	NA	1	58.88	12.614	17
Block IV	82–97	80.53	7.110	15	78.00	10.536	3

Figure 1. *Interaction Graph for Blocking by Treatment-Control Factor with Posttest Scores as Dependent Variable on the Benchmark Test*



Note. Series 1 is the treatment group and Series 2 is the control group.

Table 4

Tests of Between-Subjects Effects for Students' Benchmark Test Scores

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*p*
Treatment	36.582	1	36.582	.248	.620
Block	8732.117	3	2910.706	19.722	<.001
Interaction	205.814	3	68.605	.465	.708
Error	8855.148	60	147.586		
Corrected Total (n – 1)	23628.279	67			

Differences between Treatment School and Comparison School

My second research question was the following: *Are there significant differences in mean student achievement test scores between elementary Theme TIP model classrooms and control classrooms using teacher made tests?* This question addressed how the Theme TIP Model affected mean test scores of students in the treatment group, in comparison to the control group, as measured by a teacher created geometry preintervention test and postintervention test. The preintervention test was given at the beginning of the 6-week unit, and a postintervention test was given at the end of the unit. The treatment classrooms consisted of one general education classroom and one intervention classroom at the PDS participant school. The control group consisted of one general education classroom and one intervention classroom from the same grade level within the same school as the treatment group. The treatment and control group data were collected from 4th grade classrooms in the same PDS participant school.

I analyzed the data to assess whether there was a statistically significant difference between the mean of TIP group posttest scores and posttest scores of the control group. A two way factorial ANOVA was used which used blocking with four levels on the pretest for the first factor. The other factor was a two level treatment factor (TIP intervention, usual instruction) (See Tables 5 & 6 & Figure 2). Winer (1962) discussed analysis of data using a factorial blocking method on a specified variable as a means of controlling experimental error. Using this method, the pretest variable was blocked into levels and analysis completed using the blocking. For the purpose of this data analysis, the preintervention test scores of all participating treatment and control students were reviewed and blocked into four groups. Postintervention test score was the dependent variable.

I conducted analysis to determine the relationship between student academic achievement and participation of classrooms using TIP approach. The dependent variable was student performance on a teacher-created geometry test. The treatment factor was statistically significant ($F(1,56)=17.967$, $p<.001$) as well as the interaction of blocks by treatment ($F(3,56)=3.034$, $p=.037$) as shown in Table 7. Results of the geometry posttest score analysis favors TIP over usual instruction.

Before interpreting the main effect for treatment versus control, the interaction of block by treatment needs to be explored. To address the interaction effect, *t* tests for simple main effects were conducted within each of the four blocks to compare the means for treatment versus control (See Appendix E). The Bonferroni procedure was employed with a family wise α level of .20 because of the small sample sizes within the blocks. For Block I, Levene's test for equality of variances was nonsignificant ($F = .028$, $p = .870$).

In Block I, low achieving students on the pretest, there was a statistically significant difference between the TIP group and the control group ($t(1,16) = 3.03$, $p = .008$) with the TIP group scoring higher. Using the control group standard deviation, the standardized effect size is 1.57.

Within Block II, Levene's test for equality of variances was statistically significant ($F = 5.05$, $p = .04$), where the control group (SD = 18.90) was more variable than the TIP group on the posttest scores. Thus, in contrast to the control group, the students' achievement scores in the TIP group were more similar after the TIP intervention. Using *t*-test for unequal variances, there was a statistically significant difference between the TIP and control groups ($t(1,6.44)= 2.58$, p=.039). Employing the control group standard deviation, the standardized effect size is 1.12. As a general benchmark, Cohen (1987) suggests that a standardized mean difference effect size of .8 is considered large. Therefore, the effect sizes from Block I (1.57) and from Block II (1.12) could be considered very large effect sizes. Thus, the simple main effects indicate that the TIP group has higher achievement than the control group for the students in approximately the lower half of the pretest score distribution.

Programmatic Internship Differences

My third research question was *What programmatic differences are there for student teacher interns between the Theme TIP model internship and the original PDS model internship?* The current Early Childhood Education (ECE) undergraduate program supports the development of students to certified teachers at elementary grade levels. The

Table 5

Blocking for Data Analysis: Geometry Postintervetion Test Scores

		Preintervention Test		*Postintervention Test*		
Block	*Score Range*	*M*	*SD*	*M*	*SD*	*N*
Block I	10–34	26.28	6.70	67.22	19.05	18
Block II	37–49	42.18	4.19	77.41	16.69	17
Block III	50–54	51.61	1.98	85.18	8.62	17
Block IV	56–73	62.50	5.45	93.00	4.57	12

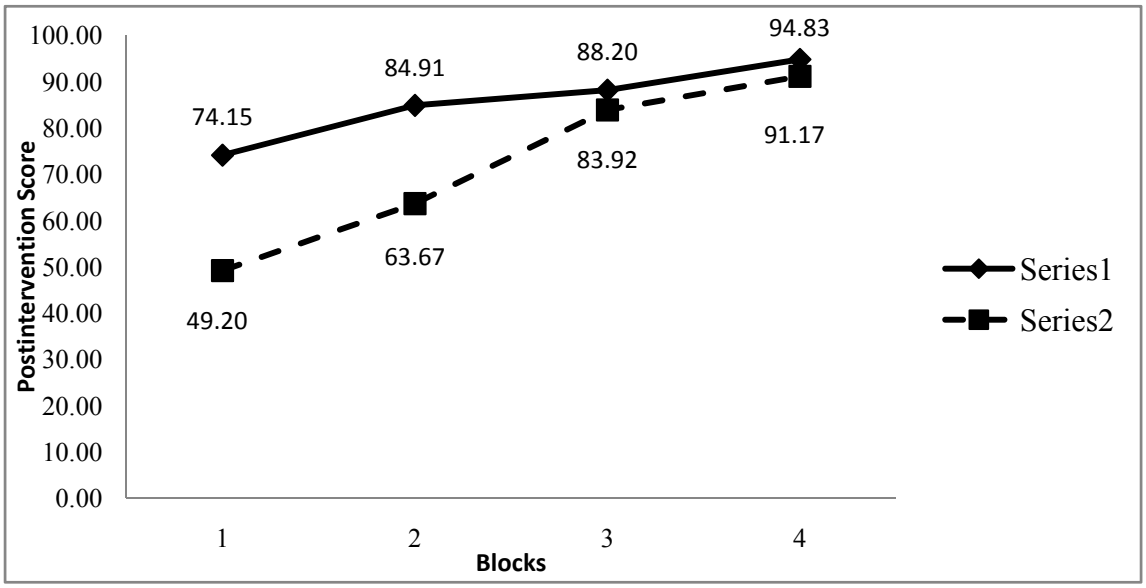
Note. Score Range is based on Pretest scores of students in both Treatment and Control Groups Table 6

Blocking for Data Analysis: Geometry Test Scores

		Treatment Group			*Control Group*		
Block	*Score Range*	*M*	*SD*	*N*	*M*	*SD*	*N*
Block I	10–34	74.15	15.593	13	49.20	15.849	5
Block II	37–49	84.91	9.576	11	63.67	18.896	6
Block III	50–54	88.20	8.758	5	83.92	8.618	12
Block IV	56–73	94.83	3.061	6	91.17	5.345	6

Note. Score range is based on pretest scores of students in both Treatment and Control Groups.

Figure 2. *Interaction Graph for Blocking by Treatment-Control Factor with Posttest Scores as Dependent Variable on Geometry Test*



Note. Series 1 is the treatment group and Series 2 is the control group.

Table 7

Tests of Between-Subjects Effects for Students' Geometry Test Scores

Source	*Type III Sum of Squares*	*df*	*Mean Square*	*F*	*p*
Treatment	2546.826	1	2546.826	17.967	<.001
Block	7679.364	3	2559.788	18.058	<.001
Interaction	1290.080	3	430.027	3.034	.037
Error	7938.118	56	141.752		
Corrected Total (n – 1)	17565.938	63			

TIP program is flexible and aligns with the goals of the existing ECE program. The TIP program was designed to support student intern during internship experiences. Reactions of the participating interns to the TIP model support its further development and replication. The TIP model was able to support het existing program with minimal interruption.

The Department of Early Childhood Education (2008), at the undergraduate level, offers certification in PreK–5. Students must first pass an admission process before beginning the program. The program is designed to be completed in four academic terms with coursework and field experience expectations for each term. Students complete their first term of course work in child development, language and literacy, classroom management, and ESOL cultural foundations. The first field experience, Block I, outlines plans for interns to observe in Pre–K and kindergarten classrooms and complete assignments related to these observations during their first term of coursework. Second-term coursework includes reading and language arts, science and inquiry, and mathematics methods. In addition, students also complete a Block II field experience, which develops content knowledge and instructional methods. The Block II field experience takes place in grades first through third and includes a seven week placement in two different classroom and grade level settings. The third academic term includes coursework on assessment of learning, a second course on reading and language arts, and social studies methods. There is also a Block III field experience. In this experience, students are assigned a mentor teacher in a school. They then work in the school two days a week (Tuesday and Thursday) and attend classes on the remaining days. Select university teaching methods courses are taught at the PDSs and information from the

courses are linked to classroom practice through observation and model lessons in PDS classrooms. In addition, students in their Block III internship must complete a Plan, Teach, Learn, Model (PTLM) project which is a social studies unit based on instruction applicable to the children in their internship classroom. During the final internship, student interns participate in the school setting five days a week for fifteen weeks. Students continue to meet with their University supervisor, as they have done throughout all internship experiences, who observes their progress and provides feedback. A two-week role-reversal is required during this time which is when the student intern teaches all subjects in the class. Students are also required to continue with their reflective teaching practices through journaling during the internship experience as required in all previous field experiences. To satisfy graduation requirements, students must complete all coursework with satisfactory grades, including completion of all internship experiences, and they must achieve a passing score on the GACE Assessment in relevant areas.

The TIP model, as outlined in Chapter 3, was designed to support the Block III and Block IV internship. This included the intern's completing a 1 year internship in the same classroom, which differs from the current internship model of have a Block III internship in an upper elementary classroom (3rd, 4th, or 5th grades) and Block IV in a lower elementary setting (K, 1st, or 2nd grades). The work within the TIP group supported objectives of the PTLM. One of those objectives is to collect information on student academic achievement from an instructional unit using a preintervention-postintervention design. Student interns were given the opportunity to participate in a minigrant-funded action research project called Anchor-Action Research (see Appendix C), which aligns

with this objective and supports work of TIP group members. The participants in this study participated in an Anchor-Action research project.

The focus for the Anchor-Action research project was a unit on geometry. Minigrant funding allowed the group to purchase manipulatives and teacher resources to help in the development of the lessons and provide hands-on mathematics experiences in the classroom. The interns worked collaboratively with the teachers and university professor to develop lessons to teach the geometry concepts covered in the unit. The Anchor-Action research project aligned with requirements of the Block IV internship to complete a PTLM. The interns chose to complete their role-reversal weeks during the time this unit was taught. They were also required, as part of their program, to give a preintervention/postintervention assessment to measure student learning gains. By using this design, the Anchor-Action research project provided the interns with data they needed to fulfill internship requirements. After the unit was completed, the interns, teachers, and professor presented the geometry unit, along with model centers, to the other fourth grade teachers in that school. The TIP members chose to present the Anchor-Action research project at a PDS conference sponsored through the PDS^2 program in May 2008. The Anchor-Action research project provided an opportunity for the interns to conduct a research project and opportunities to present the outcomes.

The two student interns were interviewed, as part of the data collection process, and asked about their experiences in a yearlong placement. Both interns responded positively about how the TIP model provided additional support throughout their internship. They both enjoyed the collaboration of the TIP group in planning for mathematics lessons. Intern 1 stated, “I feel like it is always easier when you have a

group of people working together and talking about things and sharing ideas. I got so much stuff from you guys that like it is amazing" (Interview, 3/08).

Both interns were asked in their interviews about how their perceived experiences in the TIP differed from that of their peers who were not in the TIP program and did not have an extended internship placement. Intern 1 explained that her peers were entering new classrooms and having to learn about new students. Meanwhile, she was familiar with her student and knew the teaching style and expectations of her cooperating teacher. This allowed for Intern 1 to focus more on planning lessons than acclimating to a new classroom environment (Interview, 3/08). Intern 2 said, "I think it has prepared me more (as) compared to one block or one semester (in one classroom). Whole year, continuously that was a plus" (Interview, 4/08).

The student interns were also asked if the TIP program added a significant amount of work to their internship experience. They both responded that it did not add a significant amount of work. Intern 1 said, "It (work completed in the TIP group) was the same thing I would have done anyway for any of the internships or my student teaching" (Interview, 3/08). They did find that the TIP group added to their internship experience. Intern 1 liked having another intern on her level for collaboration purposes. Intern 2 found the Anchor-Action Research project to be an area for growth "because it allowed me more control of what I was doing besides the role reversal. It brought all the materials and all the supports that really opened up and challenged me to create more or less think about creating lessons" (Interview, 4/08).

The interns were also asked what the most challenging part of the experience was for them. Intern 2 identified that not being able to collaborate with teachers outside of the

TIP group was difficult. The reason they were not able to collaborate with classroom teachers outside the TIP group was because the control classrooms for the Anchor-Action Research project were in that school and the group was trying to avoid the threat to treatment diffusion. Intern 1 indicated that she would like to have a set of resources purchased for herself by the university. Materials purchased through the Anchor-Action Research project were provided for use in the PDS school, but materials were not purchased for individual participants. The interns overwhelmingly supported the TIP research model and both agreed that they would recommend the model to their peers.

In summary, the TIP model provided a focused intervention at the classroom level. As part of the TIP model, group participants chose to participate in an Anchor-Action Research project, which focused on geometry content in their mathematics classroom. The program aligned and supported university internship requirements for the two participating student interns. The two student interns who participated in the program both supported the program.

Bayesian Approaches and Narrative Inquiry for Combining Methods

Overview

This dissertation provides a unique approach to combining narrative inquiry qualitative research with quantitative data using a Bayesian approach to mix methods. In this section, I describe the Bayesian model used in this dissertation provides an example of model application. Student intern efficacy data were analyzed using this approach and discussion of it continues in the subsequent section within my fifth question.

Bayesian statistics allow the researcher to incorporate prior knowledge into the data analysis process. A prior probability, from a subjective view of probability, is based

on the belief of the individual making the statement. The belief is influenced by the experiences of the researcher, and it allows for the incorporation of background knowledge. Qualitative data, along with quantitative historical data, were used to estimate a prior belief before the survey data collected for this research were analyzed. The data came from the observed data collected through the research study. For the purposes of my example, the data consisted or survey responses on the teacher efficacy survey as completed by two participant teachers and the historical survey data is discussed within the example. The prior distribution and the data distribution are combined to produce a posterior distribution and discussed.

Exploration on this new methodology of combining qualitative narrative inquiry with quantitative data using a Bayesian approach developed over time and through experience. This type of methodology has limited literature in the field and is an area where further methodological development should be pursued. One method explored for this dissertation used quantitative data for establishing the prior distribution and using qualitative data as the data. A challenge in this proposed model, with regards to this dissertation, was quantifying the qualitative data. Methods for potential quantification of qualitative data included tallying the frequency of key themes or using a rubric with a scale rating the qualitative data. The perceived limitation of the frequency methods was that it might not reflect the depth of the qualitative content. The challenge with the rubric was development of a scale and descriptors when the treatment was in its initial implementation. A rating rubric may be suitable for situations where there is a large body of literature or where replications of the study are present. One potential limitation of using a purely data-based prior on previous research is the minimal input, of the

researcher's personal belief, in establishing the prior distribution. These reflections led to the use of qualitative and quantitative historical data in establishing the prior distribution and observed quantitative data, as described in Bayes theorem, for the data in this dissertation.

Overview of Model

The model which was developed for this dissertation has several key features which are discussed and demonstrated. Quantitative and qualitative data needed to establish the prior distribution are identified and collected. One set of quantitative data provides a scale which is used for establishing the prior. Analysis of the qualitative data informs your belief on the mean for the prior within the previously established quantitative scale. A second set of quantitative data are used to construct the data distribution. The prior and data distributions are combined to create the posterior distribution. The following discussion provides more detail on model components and includes discussion of example data used for establishing the prior, An example of this model is provided using teacher efficacy data, collected from teachers, and includes discussion of the emergent themes and Bayesian statistical analysis.

The example below uses a dual data method prior and a quantitative data set for the data, which is then used to produce a data-based posterior distribution. The dual data method prior includes both quantitative historical data and qualitative data that are used in establishing a prior. The quantitative historical data comes from a set of 4th grade PDS participant teachers who took the same efficacy survey, separate from this study. It is my belief that the historical data accurately represents the population from which it was collected. The qualitative data, collected through interview, meeting observations, and

classroom observations, came from the participating TIP teachers. The quantitative historical data provided a mean and standard deviation for two of the four themes which emerged from this example. The qualitative data provided context and background of the teachers' sense of self-efficacy. I used the knowledge gained from both historical quantitative and qualitative data to establish a prior belief on two themes. Quantitative data from the teacher efficacy surveys were combined with the prior belief to produce a posterior distribution. One assumption for this analysis was that the data had a normal distribution. Another assumption was that the variance was known for the two themes. The variance, for the purposes of this dissertation, were derived from the historical data set which I believe is representative of the population. This information was used to calculate the posterior distribution in the following example. The information is then used to complete data analysis using Equation 1 and is followed by discussion of analysis results.

Four total themes emerged from the content analysis. Two of these themes, *personal efficacy* and *teacher efficacy* were reflected in the quantitative survey. Two additional themes, *collaboration* and *experiences in teaching*, emerged from the qualitative data analysis. Themes which emerged from the qualitative data but are not included in the quantitative data instrument inform areas for further research and development or revision of quantitative instruments which capture these themes. The steps which are recommended for development of new themes are as follows: (a) review of literature for existing instrument on that theme and possible historical data for establishing a prior and (b) review of literature for development of an instrument based on the theme and administer the instrument to targeted group which are separate from the

research study. Once data have been collected, the process flows back to the beginning where collected data and researcher knowledge on the themes can be used to establish a prior. The instrument, which came out of the review process, can be administered to the participants and a posterior on these remaining themes can occur.

Example

Data collected for this example came from two teachers at a PDS[2] participant school who were hosting a student intern in each of their classrooms for the 2007-2008 school year. Both teachers taught a fourth grade class. One teacher taught a general education classroom, and the second teacher taught an intervention class. These two teachers agreed to participate in the TIP program, which included attending bimonthly meetings, participating in interviews, and supporting the student interns during their year-long internship experience. They agreed to the collection of qualitative data and also completed a teacher efficacy survey toward the end of the TIP program. In this section, I use these data to provide an example of combining narrative inquiry qualitative research with the quantitative survey data.

An overview of the data analysis process includes a content analysis of the qualitative text, the historical data, and a statement of the researcher's prior beliefs on the themes. Qualitative text, including interview transcripts, meeting observations, and classroom observation fieldnotes, were analyzed for themes. Through a content analysis of the qualitative text, four themes emerged: personal efficacy, teacher efficacy, collaboration, and experiences in teaching. Two of these themes, personal efficacy and teacher efficacy, were reflected in the teacher efficacy survey. Collaboration and experiences in teaching were two additional themes which emerged from qualitative data

analysis. Using the two themes reflected in the survey, I estimated a mean based on my subjective judgment estimated for personal efficacy and teacher efficacy themes based on the known average of the comparison group combined with knowledge from the qualitative data. These means for personal efficacy and teacher efficacy were set as the prior and then combined with the collected survey data, as part of the research, to produce a posterior distribution. The two additional themes, collaboration and teacher experiences, are discussed and subjective beliefs about these themes are estimated by the researcher. This process incorporates qualitative text and some quantitative data into prior beliefs for the four themes.

Quantitative Data

Both the participating teachers were given the same pencil-and-paper survey on efficacy. The survey consisted of 22 statements which participants rated using a 6-point Likert scale ranging from strongly agree to strongly disagree. The survey was originally developed by Woolfolk and Hoy (1990), and the two factors which emerged were personal efficacy and teacher efficacy. Two sets of quantitative data were collected using this survey instrument. The first is the historical data set which is used as a guide for setting the prior. The second set of data come from the teachers participating in the TIP treatment. Further discussion of both data sets is to follow.

The historical data set came from 21 fourth grade teachers in participating PDS^2 schools across four Metro Atlanta school districts. These data were collected as part of the PDS^2 grant and did not include responses from the participating teachers in my study. The mean for the personal efficacy variable of the historical data was 4.50 (SD = 0.653, range = 2.25). Using the Shapiro-Wilkes test for normality, I analyzed the historical data,

and results indicated that the data were normally distributed with $W = .510$. The mean for the teacher efficacy variable was 3.89 ($SD = .532$, range = 2.50). The Shapiro-Wilk test for normality indicated that the historical data were normally distributed ($W = .200$). This information provided me with background information about typical responses on the survey and their variability when estimating the prior.

Near the end of the intervention, both of the participants completed the efficacy survey. These surveys served as the data being input into Bayes's Theorem to produce a posterior probability. I did not review or analyze these quantitative survey data until after the prior was set. Then the prior was combined with the data set to produce the posterior probability. The results of this analysis are discussed further within this question discussion.

Qualitative Data

I collected qualitative text from interview transcriptions, classroom observations, and meeting minutes. The interviews were conducted one-on-one, and I asked similar questions to each teacher. I observed math lessons and TIP group meetings. I adapted the questions asked during interviews from the pencil-and-paper survey to ensure that they addressed personal and teaching efficacy. I asked follow-up questions to gather information about experiences in the TIP program. Member checking was conducted during the interview as I presented back what I understood as the teacher's meanings to question responses. In addition, I asked clarifying questions to help my understanding at subsequent interviews. I conducted observations in the classroom as the teachers interacted with the GSU student teachers during a mathematics lesson. I typed up these observations, and clarifying questions from observation write-ups were asked during the

interviews. Finally, the teachers met with the TIP group bimonthly. I reviewed minutes from these meetings to gather additional data.

Emergent Themes

The main themes that emerged from the content analysis of the qualitative text were teacher efficacy, personal efficacy, collaboration, and experiences in teaching. Each of these themes is discussed below, and a prior probability has been set based on my beliefs as a researcher for personal efficacy and teaching efficacy.

Emergent Theme: Personal efficacy.

Personal efficacy describes the teacher's personal sense of responsibility to ensure student learning (Gibson & Dembo, 1984). Questions related to this factor address the respondent's belief that they have an effect on student learning in the classroom. Personal efficacy is the individual's belief that they possess the skills necessary to lead classroom instruction and to meet the needs of students.

Teacher A, in my belief, has a personal efficacy score which is higher than the average of the historical data group. This participant feels that she has a "tremendous impact regardless of what the home environment is" (Interview, 2/08). Teacher A feels that teacher understanding of the content, meaningful lessons, and meeting needs of individual students are steps that ensure student learning in the classroom. She feels that "teachers have the most powerful impact on student learning because their developing step-by-step the structure for students to learn" (Interview, 2/08). When asked about how she feels when a student does not retain a concept, Teacher A responded that she feels that the concept was not taught well enough and that she works with the individual student, who did not understand, to clarify their understandings. She uses scaffolding

techniques to help support the student in their understanding (Interview, 4/08). Teacher A feels very strongly about her ability to meet the needs and reach every student in her classroom.

Teacher B, in my belief, has a personal efficacy score which is slightly above average when compared to the historical data. She feels able to "motivate them (the students in her class) and get them to do things when they think they can't" (Interview, 2/08). She does this through identifying the needs of students and using teaching techniques and available resources to meet the needs of her students. She feels an advantage to her class is its small size which allows her to work with every student. Teacher B ensures student learning through reviewing information and conducting ongoing formal and informal assessments to ensure student understanding of concepts. When asked how she feels when a student does not retain a concept, Teacher B said that she feels that she may not have done something and will continue to review the concept with the student individually (Interview, 4/08). In the classroom, I saw this teacher working with an individual student on math assignments while the teaching intern led the class (Classroom Observation, 3/08).

It is my belief, based on the qualitative data and the quantitative historical data, that the estimated personal efficacy score for the treatment group would have a mean of 5.15 with a credible interval of 3.87 to 6.43 with an implied *n* of 2.

Bayesian Statistical Analysis for Personal Efficacy Theme

A Bayesian approach was used for analysis of data on the theme *personal efficacy*. The prior distribution was established, as discussed above, to have a mean of 5.15. The variance of the historical data, .426, was used as the known variance for

Equation 1. The historical data was a personal efficacy scale from the previous year for all PDS fourth grade teachers who responded to the survey with the omission of teachers who participated in this study regarding efficacy. The implicit sample size was set at 2; thus, the prior distribution was equally weighted to the data. The observed data on the personal efficacy scale for the two teachers were analyzed and had a mean of 5.64. Equation 1 was used to calculate the posterior distribution. The posterior distribution had a mean of 5.40, a variance of .107 with an *n* of 4. A credible interval, which contains 95% chance of including the parameter was calculated. The calculated 95% credible interval was 4.76 to 6.04. The prior distribution was lower than the observed distribution and the resulting posterior distribution is a combination of the two. The posterior distribution is more peaked than the prior or data as the variance narrowed. *Personal efficacy* of the observed group was higher than anticipated based on the prior distribution. It is noted that the standard deviation of observed data was .40.

Emergent Theme: Teacher efficacy.

Teacher efficacy is described as a "belief that any teacher's ability to bring about change is significantly limited by factors external to the teacher" (Gibson & Dembo, 1984, p. 574). It focuses on the teacher's beliefs of the teaching and learning relationship. Self efficacy is "the conviction that one can successfully execute the behavior required to produce outcomes" (Bandura, 1977, p. 193). Data were analyzed to see how the two teachers viewed external factors as inhibiting their ability to bring about change in the classroom.

Teacher A, in my belief, has a teacher efficacy score which is higher than the average of the comparison group. This teacher feels that she has a great impact on

students through her interactions in the classroom. She acknowledges that "growing up experiences, their home experiences, how much they've been exposed with (and) how much they read" does affect their abilities to learn. However, in the same response she goes on to say that "in the classroom you (the teacher) can bring many things to them that they might not have experienced. You can bring experiences to them," indicating that she can overcome some of these challenges through classroom experiences (Interview, 2/08). She says that ways to increase student motivation and learning in the classroom is through creating lessons that engage students and that have collaborative elements. This allows students to interact with one another as they engage in the learning process. This teacher works to meet the needs of every student and if a student is struggling with a concept then she works with that student one-on-one until they learn the concept. This is seen in classroom observation as she works with an individual student on a mathematics concept (Classroom Observation, 3/08). She believes that all students can learn regardless of their external circumstances.

Teacher B, in my belief, has an average teacher efficacy score as compared to that of the comparison group. The teacher feels that peer pressure and family views toward education affect a student's ability to learn. She discusses how pressure from peers and gang members affects students. According to Teacher B, students are affected by these factors and choose not to complete their work in school. However, in the same response she goes on to say how she has worked with counselors to provide added support in showing other ways to act (Interview, 4/08). While Teacher B's perception is that factors of peer pressure and gang pressure do affect student learning, she has support in counteracting those factors as well within her classroom. She also discusses how home

barriers such as limited support with school work affect students' ability to learn. Specifically, she discusses that the language barrier of family members limits the student's ability to read at home. This is because the majority of her students speak English as a second language and the English fluency of the parents varies by family. Teacher B sends home a tape recorder for the student to read to. Then she sits with the student, at school the next day, and they listen to the recording together as they read the book. She felt that, in addition to completing their homework, the students enjoyed the attention of having someone listen to their tape. She both acknowledges that there are environmental barriers that keep students from being able to learn in school but she also provides examples of how she works to break-down the barriers (Interview, 2/08).

Both Teacher A and Teacher B had similar personal beliefs about their motivation for working as a teacher and expectations of students. Teacher A said that her motivation for working as a teachers was "to touch lives" and viewing the students in her class as being "open to developing so much of themselves." She goes on to say that the students are excited about reading, math, and learning (Interview, 2/08). Teacher B also indicated that her motivation for teaching was "seeing the students learn" and that they are excited about this (Interview, 2/08). The teachers have a shared motivation of watching students learn as a reason for teaching. Both teachers were also asked about their expectations for students. They had a similar answer, that their goal was for students to be prepared to learn and that they have their homework completed. These teachers share beliefs toward teaching motivations and expectations for students in their classroom.

It is my belief, based on the qualitative data and the quantitative data from the control group, that the estimated teacher efficacy score for the treatment group would have a mean of 4.22 with a credible interval of 3.18 to 5.26 with an implied *n* of 2.

Bayesian Statistical Analysis for Teacher Efficacy Theme

Data on the theme *teacher efficacy* were analyzed using Bayesian techniques. The mean of the prior distribution was set, as discussed above, to have a mean of 4.22. The known variance, .283, was taken from the historical data on efficacy from fourth grade teachers who had previously completed the survey. The weight of the prior was equal to that of the observed data with an *n* of 2. The observed data were had a mean of 4.44 and an *n* of 2. The posterior distribution was calculated using Equation 1. The mean of the posterior distribution was 4.33 and a variance of .071 with an *n* of 4. The calculated credible interval has a 95% chance of including the parameter and was 3.81 to 4.87. The prior distribution was slightly lower than the observed distribution. The calculated posterior distribution has a mean between the two distributions and has a more peaked distribution. It is noted that the standard deviation of the observed data was 1.14.

Emergent Theme: Collaboration.

Collaboration among the teachers and student interns was an additional theme which emerged from the qualitative data. The teachers valued the collaboration between themselves, the interns, and the professor as they worked toward a common goal to increase student knowledge of geometry concepts through sharing of ideas and the creation of group lesson plans that were used in both classrooms. Teacher A shared in both her interviews and in meetings that she valued the sharing of ideas so that she would not have to do this work alone. Teacher B felt that sharing lesson and sharing ideas

enhanced classroom instruction (Interviews, 2/08 & 4/08; Meeting Observation, 1/08). Both teachers indicated that when they are struggling with a student or concept in the classroom, they can share their challenges with the group members who brainstorm ideas for supporting that teacher. Both teachers indicated that there were benefits to working collaboratively in the TIP group (Interviews, 2/08 & 4/08). Teacher A discussed how this work has supported her understanding of geometry content knowledge for teaching the unit. Teacher B discussed how she learned new teaching strategies and ideas from working with her student intern that she will incorporate into her classroom in the future. Both indicate that collaboration has supported them as teachers.

It is my belief, based on my personal experiences in education, that the estimated mean for these teachers would be higher than average for the theme collaboration. This theme would need to be further researched using both a quantitative instrument and additional qualitative interviews with questions investigating this theme. A follow-up study could be conducted for further exploration on the collaboration theme in the TIP model.

Emergent Theme: Experiences in Teaching.

Experiences in teaching encompass building knowledge and understanding that the teacher can draw from to help students. Experiences in teaching can come from time in the classroom, professional development, or through modeling experiences with peers. Time in the classroom provides the teachers with real life experiences that they can draw from when developing lessons or strategies to help students. Teacher A says that it takes "experience and actually working with the children" to develop as a teacher (Interview, 4/08). Professional development is another way to gain experiences that can be applied in

the classroom setting. Teacher B feels that "good workshops help (to) give ideas" which teacher can apply in the classroom (Interview, 4/08). Through peer interaction and modeling, the teachers have gained experiences which have helped them in the classroom. Teacher A discusses that one of the challenges in her classroom is that many students are second language learners. She does not have the English as a Second Language (ESOL) endorsement which would indicate that she was certified to work with second language learning students in her classroom. However, she has worked with the ESOL certified teacher, who has served those ESOL students in her class. The ESOL teacher modeled teaching strategies that were effective for teaching second language learners. Teacher A was able to observe these strategies and use them to help students in the classroom (Interview, 4/08). These experiences are primarily gained by working in the classroom and continuing to engage in learning new techniques that they can apply in the classroom setting.

It is my belief, based on my personal experiences in education, that the estimated mean for these teachers would be average when compared to a comparison group. This theme would need to be further researched in a follow-up study using both a quantitative instrument and additional qualitative interviews with questions investigating this theme. I would also like to consider expanding the definition of "experiences in teaching" to include "informal information" gained from peer interaction. However, research would need to be collected to determine if informal information should be included within the teaching experiences theme. Next steps in a follow-up study would be to review the literature for research related to this topic.

Discussion

The four themes, personal efficacy, teaching efficacy, collaboration, and experiences in teaching, emerged from analysis of qualitative data. I set a prior mean for the themes personal efficacy ($\overline{\chi} = 5.15$) and teaching efficacy ($\overline{\chi} = 4.22$). The credible intervals for each were calculated with an implied *n* of 2. The two additional themes, collaboration and experiences in teaching, were not reflected in the original survey, and quantitative data are not available for analysis on these two themes. However, a belief about these two themes was established by the researcher. The next steps are to review the literature for instruments and historical data sets or the development of instruments on the themes. This information would be used to establish a prior. The instrument would then be given to the participants as a follow-up to the study. From this information, a posterior distribution could be calculated. The advantages of a dual data method prior model is that it uses historical quantitative data to provide information on the instrument in addition to the qualitative data which provides context. The content review of qualitative data revealed themes that were not included in the original survey. This review allows for further development of instrument items that will reflect these two themes. This is a reflexive model in which the quantitative and qualitative data inform the researcher's understandings of what is happening in this research setting.

Participant Efficacy

In this final section of Chapter 4, I address my fifth research question, *How does the implementation of the Theme TIP model affect student teacher intern efficacy when compared to student teacher intern efficacy score data from the original PDS model using a Bayesian mixed-methods approach?* Four themes emerged from this qualitative-

quantitative analysis: personal efficacy, teacher efficacy, relevance of learning, and resilience of the interns. Two of these themes, personal efficacy and teacher efficacy, emerged from both the quantitative and the qualitative analysis methods, and thus I used them to inform the Bayesian model I used in my study. These two different types of data were combined to produce a posterior distribution.

I collected the primary data for my study from two student interns who participated in the TIP model and spent their student teacher internships in the same 4th grade classrooms (see Programmatic Internship Differences above). One intern was placed in a general education 4th grade classroom while the other served in an intervention classroom. The TIP program included attending bimonthly meetings, participating in an Anchor-Action Research project, and working collaboratively with other TIP members. In addition they also agreed to participate in interviews, share lesson plans, have the researcher observe several mathematics lessons and complete an efficacy survey. The data collection methods for the quantitative analysis and the qualitative analysis were described in Chapter 3 and in the previous section of this chapter. In the remainder of this section, I discuss the two themes that emerged regarding participant efficacy.

Emergent Theme: Personal Efficacy

The definition of personal efficacy can be described as the teacher's personal sense of responsibility for ensuring student learning (Gibson & Dembo, 1984). Interview questions included under this theme related to the respondent's belief of her impact on student learning in the classroom. Items on the quantitative survey also addressed this

theme. This factor also includes the participant's belief that she possesses the skills necessary to meet the needs of students in the classroom.

Intern 1, in my belief, has a personal efficacy score which is lower than the average of the historical group data. She felt unsure of the impact she had on students. She also belies her age made it "easier for them (the students) to relate to me or I can use terms that they understand because it's a little more current" (Interview, 2/08). She felt able to understand and relate to students because of her age. Intern 1 gave an example of a geometry lesson she taught where students understood the concept afterwards. This experience had a positive impact on her. Later in an interview, Intern 1 stated that she reflects on lessons that work well and takes the teaching strategies from those lessons and implements them in other lessons. Intern 1 was also asked how comfortable she was with meeting the diverse needs of the students in her classroom. She replied, "Not very. Sometimes, [I] am more sure [of what] to do with what my ESOL student need . . . It is easier for me to help them than . . . the [higher achieving] students [who] tend to finish their work a little faster" (Interview, 2/08). Intern 1 has taken classes to receive her ESOL endorsement and has more classroom experience and strategies for working with these students in the classroom. Intern 1 feels that she is developing skills and strategies for meeting the needs of the students in her classroom.

Intern 2, in my belief, has a personal efficacy score which is slightly lower than the average of the historical data. She was asked about her perceived impact on student. In the response, Intern 2 indicated that she has seen improvement in behavior and academic progress of students since she has been in the classroom. An improvement she noted was in the note-taking ability of the students: "First time, I was trying to have them

write a note, take notes from my lecture. Things like that [they had difficulty with]. Now they know what I expect and they know better what they are supposed to do" (Interview, 2/08). In a classroom observation, Intern 2 gave instructions on completing a task multiple times and clearly stating expectations of the task (Classroom Observation, 3/08). She has also seen the increase in scores of her students on the geometry assessment and evaluation tests. This showed her that the lesson in the classroom have increased student knowledge. In her interview (2/08), Intern 2 said "I looked at their pretest and compared with [the] posttest, everybody made at least, doubled their scores. But beside the score. I know [they have learned the content] because I throw questions and I listen to what they say." She circulates through the room during times in which observations occurred, working with students, questioning, and helping them complete tasks (Classroom Observation 1 & 2). Intern 2 provided multiple direct experiences where she felt students had increased their knowledge in the classroom as a result of instruction.

It is my belief, based on the results of qualitative data content analysis, my personal experiences as the researcher conducting this study, and the statistics provided by the historical data that the estimated personal efficacy score for the treatment group would have a mean of 3.75 with a credible interval of 2.47 to 5.03 and an implied *n* of 2.

Bayesian Statistical Analysis for Personal Efficacy Theme

Data relating to the theme *personal efficacy* were analyzed using a Bayesian approach. The prior distribution mean was set at 3.75 as discussed in the previous session. The weight of the prior distribution was set equal to the observed data, the implicit sample size was set at 2. The observed data mean, from the completed surveys, was 4.08. The known variance used for this analysis, .426, was derived from the

historical data set collected previously from PDS fourth grade participant teachers. The posterior distribution was calculated using Equation 1. The posterior distribution had a mean of 3.92, a variance of .11, and an *n* of 4. A 95% credible interval was calculated and ranges from 3.28 to 4.56. The prior distribution mean was lower than the observed data mean with a posterior mean between the two. The variance for the posterior distribution was narrower than that of the prior data and the observed data creating a more peaked distribution for the posterior. *Personal efficacy* of the observed group was higher than anticipated in the prior distribution. The standard deviation of the observed data set was .40.

Emergent Theme: Teacher Efficacy

Gibson and Dembo (1984) describe teacher efficacy as the teacher's belief that external factors limit the teacher's ability to bring about change in a student. It is the belief that home life and experiences and beliefs reflected in one's community limit the extent to which a student is capable of being affected by the teacher at school.

Intern 1, in my belief, has a teacher efficacy score which is slightly lower than the average of the historical data. The intern acknowledges that experiences outside the classroom affect student behavior and their ability to learn in the classroom. When asked what had the greatest effect on student learning, her response indicates that both parental factors and school environment factors had an impact. She sounds very sensitive to the backgrounds of her students: "In discipline cases . . . you can't be too harsh. . . . You can't automatically assume you have to look into their [the student's] background. I know why two of my students act out. So I can't get upset with them" (Interview, 2/08). She understands that experiences in the home can affect how a student acts in the classroom.

She also believes that teachers can reach students through lessons and experiences in the classroom that are relevant to them. It is also important, according to Intern 1, for teachers to know their students and understand their individual needs in order to tailor lessons in the classroom. Ultimately, she believes that teachers have a great impact on students, that impact is dependent on the level of engagement by the teacher, and that home experiences affect a student's ability to learn.

Intern 2, in my belief, has a teacher efficacy score which is approximately the same as the historical data. She believes that a teacher's teaching style and engagement in the classroom with students greatly affects a student's ability to learn (Interview, 2/08). Intern 2 (Interview, 2/08) lists "school teachers, school environment, home environment and society" as factors that affect a student's ability to learn. She acknowledges that personal experiences of students can be a barrier to learning in the classroom. When asked what it takes to reach students, she indicates that it takes time and that she must build relationships with the students through small group interaction. Intern 2 works in an intervention classroom which features a reduced class size, so there are only 14 students in this classroom. She frequently works with small groups to develop skills and reteach concepts, providing her the opportunity to build relationships with students (Classroom Observation 1 & 2). She feels that both home and school experiences affect learning in the classroom.

It is my belief, based on the content analysis of the qualitative data and the statics from the historical data that the estimated teacher efficacy score for the student interns would have a mean of 3.50 with a credible interval of 2.46 to 4.54 and an implied *n* of 2.

Bayesian Statistical Analysis for Teacher Efficacy Theme

A Bayesian approach was used for analysis of data on the theme *Teacher Efficacy*. As discussed above, the prior distribution was constructed using a mean of 3.50. The implicit sample size was set at 2 and was equally weighted to the mean. The observed data had a mean of 4.50 and an *n* of 2. The known variance used in the calculation, .283, was derived from the previously discussed historical data set. The prior $\bar{x}$ distribution, implicit *n* was combined with the observed data and observed *n* using Equation 1. The posterior resulted in a mean of 4.00 and a variance of .071 with an *n* of 4. The calculated 95% credible interval ranged from 3.48 to 4.52. The posterior mean was higher than the prior mean and the variance was also reduced. The *teacher efficacy* mean of the observed group was higher than expected based on the prior distribution. The standard deviation of the observed data set was 1.14.

Additional Emergent Themes

Two themes emerged from the content analysis of the qualitative data collected in my study, and they are discussed in this section. These themes are relevance of learning and resilience of student teachers.

Relevance of Learning

The interns believe that the relevance of the learning or lesson to students' increased the impact of learning in the classroom. Intern 1 said that she feels students were motivated by the relevance of their work to their lives (Interview, 2/08). This theme reemerged throughout the interview when student motivation for completing homework was addressed. She gives an example of making a lesson relevant: "I have such a high Hispanic population in my classroom. If I relate [the lesson] to Mexico or El Salvador

[they are more motivated]. If I just recognize that I know that they have a second culture, then that's a big impact right there" (Interview, 2/08). She sees value in making lessons in the classroom relevant to the students. Intern 2 echoed this theme, saying, "I hope they [the students] find what they are leaning more meaningful" and that learning should be related to real life experiences (Interview, 2/08). She wants her students to "see [that] learning doesn't have to be like that [memorizing facts for tests] all the time" (Interview, 2/08). In an observation, students engaged in an activity where they had to align temperatures with activities. Intern 1 was leading this activity and tries to relate the temperatures to student experiences with weather. Students had to think about what the weather had been the previous day and how it felt. During a TIP meeting (Meeting Observation, 1/08), the professor modeled this theme as she helped the interns relate what they had learned in their methods class to teaching in the internship. The interns are striving to bridge learning experiences in the classroom to life experiences so that the information if relevant to students.

It is my belief, based on my limited personal experiences with these interns, that the estimated mean would be average for the relevance of learning theme. A literature review should be conducted to investigate and develop this theme for inclusion in future research.

Resilience of Student Teachers

Resilience of student teachers reflects that idea that the student interns have positive outlooks about teaching while remaining realistic about their inexperience. Both interns indicated in interviews that they became teachers to provide students with experiences that will shape and guide their lives. Intern 2 indicated that she is "providing

a way to find what they are supposed to find in their lives . . . provide them a way to find the right tool" to be successful in life (Interview, 2/08). Intern 1 hopes to "spark their interest in some subject or something they can go on and do well in and get a job" (Interview, 2/08). Both teachers have very positive attitudes and outlooks about teaching. This positive outlook supports them when they encounter challenges in the classroom making them resilient. Intern 1 discussed her frustration when students did not retain concepts from previous lessons. However, she "realized that they're [the students] not just going to get it [the concept being taught] after the first lesson. So, reteaching is just something you have to do" (Interview, 2/08). Even though the concept may not have been retained, the intern explained that this does mean she is a less effective teacher. In a TIP meeting, Intern 1 discussed having trouble with students' understanding the concept "diagonals bisect." The group collaborated to brainstorm ways of teaching this concept. The professor provided several ideas on this topic and verified that Intern 1 had enough support teaching this concept (Meeting Observation, 1/08). A geoboard activity teaching the concept diagonal bisect is reflected in a geometry lesson plan. Intern 1 identified an area where she needed support and the TIP group was able to provide instructional strategies. Intern 1, through meeting minutes and interviews, demonstrated that she is aware of ways to find support when needed for classroom instruction. Intern 2 demonstrated this same resilience, and she said she was not disappointed when she revisited concepts in the classroom. When students have difficulty understanding a concept from class, Intern 2 indicated that she "brings different approaches to teach the same objectives" (Interview, 3/08). She does this through games, alternate activities, small group work, or one-on-one work with the students. Intern 2 said that she reflects on

her lesson, notes elements of lessons which were not successful, and collaborates with her supervising teacher on additional strategies to teach the concept. The student interns are resilient to negative teaching experiences during their internship, and they use resources available to them to help overcome obstacles.

Summary of Themes

The four themes, personal efficacy, teacher efficacy, relevance of learning, and resilience of student teachers, emerged from a content analysis of the qualitative data. A prior mean was set for the themes personal efficacy ($\bar{x} = 3.75$) and teaching efficacy ($\bar{x} = 3.50$). The credible intervals for each were calculated with an implied *n* of 2. The two additional themes, relevance of learning and resilience of student teachers, were not reflected in the original survey and quantitative data was not available for analysis on these two themes. A belief about these two themes was established by the researcher. The next step is to review the literature for instruments and historical data sets on these two themes. If the literature results show there is no research in this area, then an instrument could be developed.

Discussion

Research Question1

In summary, for research question 1, results of the Benchmark Data analysis produced no statistical significance favoring the TIP group over the matched comparison school classrooms.

Research Question 2

In summary, for research question 2, results of the analysis produced statistical significance in favor of the TIP group treatment. This research question compared data

from a teacher created geometry posttest from two TIP classrooms with two control classrooms from within the same professional development school.

Research Question 3

The TIP model was compared with the existing PDS internship model currently used to prepare student interns to teach in classroom. The TIP model provided additional focused content support for the student interns as compared to the existing model.

Research Question 4

The model for combining qualitative data and quantitative data, discussed in this question, feature a dual data method prior, of which on data source is qualitative, and a quantitative data set. This model is used to address question 5.

Research Question 5

Four themes emerged from the qualitative data content analysis. The first two themes, personal efficacy and teacher efficacy, are factors on the quantitative survey. A Bayesian analysis was conducted on both themes, which combined the prior belief with the survey data to produce a posterior distribution. Two additional themes emerged from the data: relevance of learning and resilience of student teachers.

CHAPTER 5

CONCLUSIONS

Research Questions

Five research questions served as guides to my investigation of the TIP model during initial implementation and a mixed-methods approach employing Bayesian statistics.

1. How does the Theme TIP model affect elementary grade mean student achievement as measured by the County Benchmark Test?

2. Are there significant differences in mean student achievement test scores between elementary Theme TIP model classrooms and control classrooms using teacher made tests?

3. What programmatic differences are there for student teacher interns between the Theme TIP model internship and the original PDS model internship?

4. How can Bayesian approaches be combined with narrative inquiry qualitative research for a mixed-methods approach?

5. How does the implementation of the Theme TIP model affect student teacher intern efficacy when compared to student teacher intern efficacy score data from the original PDS model using a Bayesian mixed-methods approach?

Discussion

The first two research questions examine the effects of the TIP model on student academic achievement in mathematics between the treatment and comparison group. Student achievement test scores on a county mandated benchmark test and teacher created postinstruction test were used as achievement measures. A quasi-experimental research model was used in comparing treatment to comparison groups. Student

academic achievement on mathematics assessment measure, used as the dependent variable, was on research method used to evaluate the TIP model.

Measures of student academic achievement have also been used throughout the PDS^2 grant to evaluate effectiveness of the treatment. Results were presented at a school level, and it has been difficult to determine the impact of the treatment at that large level (Ogletree, 2007). The TIP model allows for a more focused approach to measuring treatment impact at the classroom level. This has been made possible through Anchor-Action Research projects, which allowed for support of the TIP group by providing materials and manipulatives to support classroom instruction. The TIP Anchor-Action Research project is similar to an action research project which reflects and focuses on classroom needs (Shulha & Wilson, 2003). The Anchor-Action Research projects differ because they have an anchor, student achievement, which unites each project with others. The professor's time was provided to work with the team throughout the Anchor-Action Research project. The professor served as the PDS liaison to the school and had served in that school prior to the implementation of the TIP program. The TIP program is a new model that was not seen in review of previous literature as far as can be determined. The program is unique in that it focuses classroom support for teachers while providing a unique internship for the student interns. Alkins et al. (2006) investigated the QUEST model, which bridged higher education with urban classroom teachers who worked collaboratively to increase experiences of success in urban schools. Similar to the QUEST model, the TIP model bridges the university with urban classrooms but is expanded to include student teachers and focuses on supporting them while also emphasizing classroom student achievement.

The third research question addresses the TIP program components as part of the developing the new model. The TIP program was designed to enhance PDS work in the schools by providing additional support to student interns. This is achieved through the extended internship experience which incorporates TIP group meetings and support. This model was designed to enhance current internship models and for work within the model to align to the expectations already in place for completion of a teacher preparation program.

There are many different coaching and mentoring models to support beginning teachers in the classroom. The cognitive coaching model (Costa & Garmston, 1994) is one such model that supports new teachers through development of reflective teaching practice. There are collaborative models, such as the model developed by Allen and LeBlanc (2005). The collaborative peer coaching approach devotes time to teachers observing each other in practice and then reflecting on their observations. Goals of teacher mentoring generally include fostering a supportive culture in which new teachers can develop (Portner, 2002; Zachary, 2005). New teachers may engage in a mentoring relationship in which they develop a relationship with an experienced teacher who supports them throughout their first several years of teaching.

Over the years, work within a PDS has been evaluated using standards developed by the National Council for Accreditation of Teacher Education. These standards help guide and develop PDS relationships in a way that ensures the integrity of the relationship. The five standards are discussed in Chapter 2 of this dissertation. Two of the five standards that can be linked to the TIP model are standards I and III. Standard I supports a learning community which used inquiry based practices and development of

students, teacher candidates and PDS partners. The TIP model reflects this standard, establishing a learning community that supports inquiry based practices through the Anchor-Action Research project. The student teacher receives support in planning and instruction through the TIP group and student achievement is monitored and discussed during meetings and data are analyzed through the inquiry-based research project. Standard III emphasizes collaboration and shared work among the partners. The collaborative nature of the TIP group requires that the school and university partners work together to support the student intern. The work in the group was shared at a grade-level meeting. The TIP group members shared lesson plans, ideas, and experiences with others on their grade level to support mathematics understanding of students as it relates to the geometry standards. Work in the TIP group can be directly linked to these two standards. In addition, work supports larger PDS standards by using the partnership to discuss roles and resources.

The members of the National Association for Professional Development Schools developed the Essential Nine to identify work within a PDS partnership. (Full discussion of the Essential Nine is provided in Chapter 2.) Standards within the Essential Nine applicable to this study include essential 2, essential 3, essential 4, essential 8, and essential 9.

Essential 2 encourages development of a school-university culture that emphasizes the preparation and development of future teachers. The TIP model supports this through the collaboration between the university and school to support them during their student teaching experiences.

Essential 3 focuses on professional development with the goal of developing or refining classroom practice. Through work in the TIP group, members were able to develop as teachers and share experiences from the classroom. The university professor provided research and professional development support to the interns along with shared ideas of the teachers.

Essential 4 promotes a shared commitment to innovative and reflective practice. The collaborative nature of the TIP group supported this standard. The university professor was able to connect lesson and research from math methods courses to practical application in the classroom. This practice provided the interns with support in implementing ideas from the university into the classroom setting.

Essential 8 is reflected in how the roles and responsibilities of the university professor are outlined in the TIP manual. The role of the professor is to support team members by providing research and bridging university experiences to the classroom setting. The role of the cooperating teacher is to support the intern for an extended teacher internship experience and provide support in the classroom setting. The student intern fully participates in the model by bringing experiences or concerns to the group for discussion, planning and teaching lessons in the classroom, and working collaboratively with team members. The clarification of roles allows for all members to participate fully in the TIP group and learn from one another.

Essential 9 emphasizes shared resources provided by both the university and school. In the case of the TIP model, resources are shared by the university professor in the form of ideas, suggested readings, and suggested resources to enhance instruction. The school provides the teaching setting and teachers who are willing to host and support

the interns throughout their student teaching. Resources were purchased to support lessons in the classroom. In addition, the TIP members created lessons which used the resources and research. The end product was a collaborative geometry unit. This unit and the manipulatives were shared with other teachers on the grade level in a professional development setting. The grade level will share the manipulatives and copies of the geometry unit were provided to all teachers.

In this dissertation, I delineate myself from other coaching models by using a quasiexperimental design to observe student academic achievement in conjunction with the implementation of the TIP model. Student academic achievement provides information on the students within the treatment classrooms and the impact of the TIP model in conjunction with the support model for student interns. I have also linked my work to NCATE standards and the newly developed NAPDS Essential Nine. This allows for work within the TIP to connect to goals of a PDS at a national level. The TIP model provides an enhanced internship experience by through the provisions outlined within the program and the impact on student academic achievement within the classroom has also been observed.

The fourth and fifth research questions contribute to methodology by exploring a new way of combining quantitative survey data with qualitative data. In addressing these two questions, data were analyzed and combined using a Bayesian approach. The model discussed in this dissertation builds on the concepts presented by Curlette (2006) and others (e.g., Buckley, 2004). Curlette discussed the combination of quantitative and qualitative techniques as applied to the context of psychology. In this dissertation that concept is developed and develops methodology on integrating narrative inquiry

(qualitative) data with survey (quantitative) data. Student intern efficacy served as the dependent variable in addressing these two questions. I used narrative inquiry because it provided a unique approach to understanding experiences of participants through elements of storytelling (Kramp, 2004). Through narrative inquiry, the experience is relayed through stories to provide a detailed account from the perspective of the participant. An added advantage of this model is that it may limit the threat of reactive self-reporting as stories provided added detail of participants' responses to interview questions. Qualitative and quantitative research has been informed by this dissertation through the combination of data coming from the two different methods. Qualitative research is made more generalizable with through incorporation with larger quantitative data sets. Quantitative research data has been informed though the detailed information provided by a qualitative approach which can be used to refine and develop instruments. The exploration of combining quantitative and qualitative data lead to a unique design in which the allowed for the incorporation of qualitative data in establishing the prior and then using the quantitative data as the data which, when combined, produces a posterior distribution which takes into account both sets of data.

Limitations

Several limitations were identified throughout the course of this research. The first limitation is the coordination of the TIP program at both the university and school level. The professor must be given time and be willing to go out into the school and lead a TIP group. Time constraints and expectations by the university may inhibit the professors ability to spend time in the school setting. Next, the interns must be willing to remain in a year-long internship placement. Finally, the teachers at the school must be

willing to take an intern for an extended year placement. In addition, the school must be willing to allow for the teachers to participate fully in a TIP group throughout the year. I would suggest that planning and implementation of a TIP group begin in the spring prior to the school year when it will be implemented. This will provide the university professor and intern with the time they need to plan for the model. The interns may also be contacted for potential placement in a TIP group setting and have ample time, over the summer, to make that decision.

A second limitation is the school system's ability to provide student level benchmark test data. The benchmark test must be in place by the school system and data collected at the system level as not to interrupt daily classroom proceedings. While a teacher created test can be used to measure student academic achievement within the classroom, the benchmark data provides comparison data from across the district on a standardized assessment.

Another limitation is measuring the effectiveness of the TIP model when there are other activities and interventions taking place in the school and classroom setting. Qualitative and quantitative data were collected so that effect the TIP group in the classroom setting could be assessed. I think that this is one way in which the multiple forms of data collection benefited the evaluation of the model. The multiple forms of data provided a more detailed view of mathematics in the classroom than just provided by measures of student achievement.

The final limitation is the link between the content being taught and the unit of assessment. The teacher-created geometry test used for assessment and evaluation provided a direct link between classroom activities and assessment questions. The

assessments focused on only those standards being taught in the classroom, as related to geometry. The benchmark assessments cover standards taught throughout the course of the school year. The benchmark assessments are given three times a year and the ones closest to the beginning of the unit and at the end of the unit were used to measure achievement. However, items on the assessment reflected standards taught over the course of the school year and not just for the period in which the geometry unit was taught.

Implications

The findings of the research questions have implications on policy and how teacher preparation can be viewed. The results of the student achievement assessments indicate that the TIP group had a positive effect on student understanding of the mathematics content when compared to comparison groups both within the school and in the matched comparison school groups. They also indicate that a more focused approach at the classroom level may be more effective at measuring change than analysis at the school level. Outcomes from questions regarding the TIP model were in favor of the model. The student interns indicated that the extended internship was a positive experience and that there were many advantages to this model. The classroom teachers enjoyed having the same intern for the school year instead of just half a year. It gave them a chance to form a relationship with the interns and help them throughout their internships. The professor indicated that work in the TIP model aligned to her goal of bridging university to school settings for the interns. The Anchor-Action Research project gave all participants the opportunity to engage in research related to teaching in the classroom that can be shared with the teaching community at large. The results of my

research suggest that a more focused approach to measuring student academic achievement would better indicate changes in student achievement than school-level measures. In addition, results of my study support extended internships where the student intern is paired with a practicing teacher for more than one academic term. This provides the intern with the opportunity to become immersed in the classroom setting and experience working with the students at a deeper level.

Future Research

As this was the initial implementation of the TIP model, replication and further development of the model are needed. The TIP model needs to be implemented in other school settings for replication purposes so that data can be collected and analyzed regarding student achievement data. In addition, further models of combining quantitative and qualitative data should also be developed and explored. Finally, to advance the work of this dissertation, inclusion of Bayesian decision theory models may be incorporated to evaluate the utility of the TIP model. Considering the replication of TIP, the exploration of new models in combining quantitative and qualitative data, and the inclusion of decision theory would give additional importance information about the TIP model and continue contributing to research methodology.

After conducting the research, I found that replication of the model is needed to investigate the model. In its original implementation, the TIP model focused on mathematics content at the 4th grade level. There were two student interns who chose to participate in the model. Replication in the same school with a mathematics focus would allow for additional data to be collected to inform the effectiveness of the model. New teachers, those within the first 5 years of teaching, could also be included in the

replication of the TIP model for additional support. The TIP model, while implemented with a content focus on mathematics, is designed to be flexible and responsive to needs within the PDS. Implementation of the TIP model in other PDS settings with a content focus other than mathematics is desired. The goal would be to collect TIP model data from multiple sites over a period of time to be combined into a meta-analysis.

The contribution to research methodology, for this dissertation, was the exploration of combining quantitative and qualitative data using a Bayesian approach. The model featured a treatment group, student interns, from which qualitative data were used to determine a prior distribution, which was then combined with the quantitative data to produce a posterior distribution. Information yielded from TIP group replications could be input into the prior distribution as an updating mechanism during data analysis of subsequent replications of the program. Further model development of this type would continue to build research methodology of this sort. This could include using this type of model with both a treatment group and a comparison group. Another development would be to use the quantitative data to establish a prior probability and then to use qualitative data as the data. Impediments to this type of model include converting the qualitative data to a numeric rating scale that is compatible to the quantitative data. There are many areas of exploration for combining quantitative and qualitative data using Bayesian techniques.

Decision theory is based on the premise that decisions made throughout a study are backed by utility. Utility is a value or consequence of acting on each decision based on a degree of known outcome, risk (Press, 2004). Risk is the "occurrence of an outcome other than the one specified" (Chacko, 1991). Decision theory uses utility function, which measures the relative desired outcome to the risk it imposes. It reflects the expected

outcome at the time the decision was made without the actual outcome being known. Utility functions can be used to determine the expected outcome of the TIP model in contrast to the money and resources that are required to support the model. The utility function would represent what the expected outcome of the TIP model would be incorporating the cost of the program. This would produce an expected outcome relative to what is known about the TIP program from which the desirability to implement the program could be assessed. This type of decision making may be useful in determining if the results of the program out way the cost of the resources, making it desirable to implement in a school setting.

The outcomes of this study favor the TIP program in its initial implementation and indicate that replication of the program is needed. In addition, I encourage further research on methodologies combining quantitative and qualitative data in new ways. Contributions to research are applicable in this area of research. Finally, I encourage the investigation of decision theory and utility functions in evaluating the TIP model. This type of information would be unique to informing PDS partners about impact of the TIP model relative to the resources requirements. Future research should be able to build upon the knowledge base of the TIP model and combining quantitative and qualitative research as presented in this dissertation.

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APPENDIXES

APPENDIX A

General Interview Questions

Interview One

- Can you tell me a little about yourself?
- Please tell me about your educational background
    - How did your program support you as a teacher?
    - What were your internship experiences like?
- Why did you choose to become a teacher?
    - How long have you been teaching? (if applicable)
- What is it like to have an intern in your classroom versus teaching by yourself?
- What do you think it means to work in a TIP Group?

Interview Two

Teaching Efficacy

- Can teachers have a direct impact on student motivation and learning? Why/How?
- What factors impact students' ability to learn?
- What type of impact do you feel teachers have on student learning
- What barriers do you feel impact students ability to learn.

Personal Teaching Efficacy

- What impact do you feel you have on your students?
- Can you tell me about a time you felt that something you did in class made a difference in a students learning.
- How confident are you with meeting the needs of your students? What has helped you to feel this way?
- What steps do you have in place to ensure student learning in the classroom?
- What is your motivation for working as a teacher?
- What kind of outcomes do you hope to see for your students?
- What are your expectations from students?
- What do you feel has the greatest affect on student learning?

Interview Three

- When you find a student who is struggling with a task/assignment, what do you do to help that student?
- How do you feel your teaching methods affect student learning?
    - What do you do if you try a new lesson that positively impacts Student Academic Achievement?
    - What do you do if you try a new lesson that negatively impacts student academic achievement?
    - Can you tell me about a time which illustrates one of these (or both) points

- What has this experience meant to you?
    - How do you perceive this experience has differed from your peers who are in the same internship but not participating in this program?
- What has been the most challenging part of this experience?
- What has been the most rewarding part of this experience?
- Would you recommend this program to other Interns or Teachers?
    - Why/Why Not
    - If you could go back and give yourself a piece of advice, what would it be?
    - Did this program add a significant amount of work to your intern experiences, in addition to work already required by the University?
- What are the strengths of working in a TIP group
- What are the limitations of working in a TIP group

Intern Specific Questions

- What, in the classroom, has gone well for you over the past week?
- How has the transition within the classroom from teacher to intern been going?
    - Are you comfortable with the shift?
- How did your PTLM go?
    - Tell me about it
    - Take me through the experience
    - What further assistance could the TIP group have provided to help with this?
- What do you plan to do for the near future?
- How have you changed as an intern due to your experiences over the two semesters?
    - How has this experience shaped your views toward teaching?
- How could we improve intern experiences with this

Teacher Specific Questions

- Can you think of any ways in which your participation in the TIP group has affected the strategies you use to teach math in the classroom?
    - Has this experienced broadened your teaching of math?
    - Can you give me an example?
- What has been your reaction to having an intern for a year instead of just a semester?
    - Was there any additional paperwork required to host an intern as a classroom teacher?
    - What are you required to do as a mentoring teacher?
- What has this experience, in the TIP Group and serving as a year mentor teacher, meant to you?
- How could we improve TIP model experiences for the teacher/ for the intern?
- Would you be interested in participating in this type of work next year?
- Have you thought of any math topics you would like additional support with next the fall?

Appendix B

Quantitative & Qualitative Data Source Timeline and Research Methods

Date	Data Source	Research Methods
11/10/07	TIP Meeting	Observed Meeting & Coded Field Notes
11/29/07	TIP Meeting	Observed Meeting & Coded Field Notes
12/2007	County Mathematics Benchmark Test Administered	Factorial Analysis with 4 Levels of Blocking
1/2008	Geometry Pretest Administered	Factorial Analysis with 4 Levels of Blocking
1/16/08	TIP Meeting	Observed Meeting & Coded Field Notes
1/29/08	Interview 1 (Teacher A, Teacher B, Intern 1, & Intern 2)	Conducted Interview & Theme Coding of Interview Transcripts
2/1/08	Classroom Observation 1 – Teacher B & Intern 2	Coded Filed Notes of Observation
2/6/08	TIP Meeting	Observed Meeting & Coded Field Notes
2/20/08	TIP Meeting	Observed Meeting & Coded Field Notes
2/2008	Geometry Posttest Administered	Factorial Analysis with 4 Levels of Blocking
2/2008	County Mathematics Benchmark Test Administered	Factorial Analysis with 4 Levels of Blocking
2/27/08	Classroom Observation 1 – Teacher A & Intern 1	Coded Filed Notes of Observation
2/27/08	Interview 2 (Teacher A, Teacher B, Intern 1, & Intern 2)	Conducted Interview & Theme Coding of Interview Transcripts
3/12/08	TIP Meeting	Observed Meeting & Coded Field Notes
3/12/08	Classroom Observation 2 – Teacher B & Intern 2	Coded Filed Notes of Observation
3/19/08	Interview 3 Intern 1	Conducted Interview & Theme Coding of Interview Transcripts
3/19/08	Classroom Observation 2 – Teacher A & Intern 1	Coded Filed Notes of Observation

4/2/08	Interviews 3 (Teacher A, Teacher B, & Intern 2)	Conducted Interview & Theme Coding of Interview Transcripts

APPENDIX C

ANCHOR ACTION RESEARCH PROGRAM ANNOUNCEMENT

PDS^2 Mini-Grant Program: Anchor Action Research in Classrooms and Schools

ANNOUNCEMENT

William Curlette
September 8, 2008

The PDS^2 Anchor Action Research (AAR) is a program that aims to improve student achievement within selected classes and subject areas in the schools served by PDS^2 Grant. An Anchor Action Research Team consists of PDS partners, university faculty, and interns who conduct site-based research focused on increasing the academic achievement of K-12 students at either the classroom or school level. This is accomplished by working with highly qualified, diverse, well-trained teachers in the classrooms and schools being served. The PDS^2 Grant will support a number of mini-grants for teaching in schools and classrooms in Atlanta Public Schools, DeKalb County School System, Gwinnett County Public Schools, and the Fulton County School System. Grant proposals will be accepted from eligible applicants who are interested in conducting Anchor Action Research.

Anchor Action Research means that the research is concerned with changes in current policies and practices and is anchored through commonalities among the studies in methodology (primarily quasi-experimental designs) and student academic achievement outcome variables. These studies originate with the teacher and/or professor where the topics for studies focus on the following:

1. change in instructional practice, and/or
2. change in delivery of the curriculum

The specifications for research funded through these mini-grants create a commonality, or anchor, across the research projects. In particular, these funded studies are required to have a quantitative component focusing on student achievement in a pretest-posttest design in at least one of the following areas: reading, English/language arts, science, social studies, or mathematics. This year there is a third anchor which is attending to teacher inquiry skills / interpreting data and documenting with a pretest and posttest any changes in inquiry skills / interpreting data. This requires an instrument to assess teacher inquiry skills / interpreting data be included in the submission to the IRB. In addition, it is desirable that the research have a qualitative component to describe the contextual experiences. Quantitative data other than student academic achievement data may also be collected.

Eligible Applicants: Partner GSU faculty and PDS^2 cooperating teachers (supervising the GSU interns) planning to conduct classroom level or school level research can be principal investigators. GSU Interns are encouraged to participate in the project. It is expected that the Anchor Action Team will consist of the following: GSU Faculty Member(s), School-based Cooperating Teacher(s), Intern(s) (could be a counselor intern if involved in the program), Pathway II GRA(s), District Research Assistant.

Funding: Budgets for the proposed programs should be between $750 and $1000 and should provide appropriate justification (budget period to be specified). Money should be used to support the Anchor Action Research conducted within the classroom or school (materials/supplies, equipment, GRA support, transcriber, presentation of research, etc.). It is anticipated that funds will be available for approximately 10 awards. If fewer than 8 awards are made, the amount of each award may be increased. Stipends for K-12 teachers are allowed in the budget. **The funding is for Spring 2009 and Summer 2009.**

Requirements: Mini-Grant program recipients must secure and provide proof of Human Subjects approval (if applicable) before funds are released. **In particular, recipients must have a Georgia State University IRB approval and a letter of support from the school system.**

Informational Sessions for Proposal Writers: An Informational session was conducted on Monday,September 8 at 10 o'clock and 4 o'clock in the ERB. Another informational session will be

http://pds2.gsu.edu/doc/Announcement&20PDS2&20MINI&20GRANTS&202008.doc 1

conducted at the PDS Joint University & Site Coordinators / PEF Advisory Meeting on September 14. Those who wish to participate should send an email to Shaila Philpot in the PDS Grant Office at sphilpot@gsu.edu indicating interest in submitting to the mini-grant program. The final project reports are due September 15, 2009. A detailed description of the a funded project's requirements for the final report will be provided.

Suggested Research Design: A mixed-method design including both (a) a quasi-experimental design (e.g., a pretest - post-test design with a control condition) and (b) a qualitative analysis of the classroom context of the action research and the changes in instruction/curriculum is preferred. Assistance on study design will be provided in informational sessions prior to the admission deadline. There are various ways to obtain a control condition. For example, a pretest posttest methodology could be used for both the experimental and control groups. The experimental group receives the instructional method you are using in your class for the proposed research. The control group could be either another class in the same grade level taking the same pretest and posttest or scores from the same pretest and posttest if given the year before.

Proposal Narrative: Proposals should include the following:

1. A letter of support from the classroom teacher and any school administrator according to your school's policy.

2. If you had an Anchor Action Research Project funded last year and this year's project builds on last year's project, then a brief statement of the relationship of the two projects is needed.

3. A brief literature review indicating the status of the area or state-of-the-art.

4. A description of the instructional method to be investigated. You may investigate existing strategies/activities for teaching or create a new or unusual instructional method.

5 . An evaluation of the instructional intervention using pretest/posttest quantitative data. It is preferred that you have a comparison group and/or a mixed method design.

6. Assessment of teacher inquiry skills using a pretest and posttest. An instrument for accomplishing this will be suggested.

7. A brief discussion of transferability is needed. Discuss how the strategy/activity may be replicated in other teachers' classrooms, schools, or subject areas. You should indicated resources needed to implement the instructional intervention in other situations.

8. A detailed budget and budget narrative should be included. The awards can be used for the purchase of materials to support the action research project.

9. A brief vita of the P.I.

Dissemination of Research: A scholarly formal presentation of research (i.e., poster-session or symposium, etc.) will be a culminating experience. The Anchor Action Research Team will also submit a written final report to the PDS Director of Research. It is hoped that findings can be disseminated at local, state, regional, and/or national levels including annual PDS Conferences or Partnership Retreats. The researchers agree that summary data from their Anchor Action Research Studies can be summarized in a meta-analysis. Researchers are encouraged to publish the results.

Deadline: Proposals are due 5:00 pm on October 7, 2008.

Proposal Submission: Proposals should be submitted in electronic form to Dr. Susan L. Ogletree (sogletree1@gsu.edu) and Dr. Dee Taylor (cuedmt@langate.gsu.edu) or hand delivered to Dr. Ogletree, (room 330, GSU College of Education Bldg).

Review Process: A review committee composed of school system and university personnel will recommend proposals to be funded to the PDS^2 Director of Evaluation and Research, and the PDS^2 Principal Investigator.

Awards: Notification of awards will occur by December 1, 2008. Funds will be paid in two installments: 1.) typically 2/3's at the beginning of the project, and 2.) 1/3 upon the approval of the final report if feasible depending on timing of budget expenditures.

Appendix D

T-TEST ANALYSIS FOR BENCHMARK DATA

T-Test: Block I

Group Statistics

	T/C	N	Mean	Std. Deviation	Std. Error Mean
Post Test	1	8	51.38	11.057	3.909
	2	8	43.62	20.715	7.324

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Post Test	Equal variances assumed	7.943	.014	.934	14	.366	7.750	8.302	-10.056	25.556
	Equal variances not assumed			.934	10.689	.371	7.750	8.302	-10.588	26.088

T-Test: Block II

Group Statistics

	T/C	N	Mean	Std. Deviation	Std. Error Mean
Post Test	1	6	46.50	12.161	4.965
	2	10	40.40	9.312	2.945

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Post Test	Equal variances assumed	.967	.342	1.134	14	.276	6.100	5.381	-5.440	17.640
	Equal variances not assumed			1.057	8.549	.320	6.100	5.772	-7.064	19.264

T-Test: Block III

Group Statistics

	T/C	N	Mean	Std. Deviation	Std. Error Mean
Post Test	1	1	51.00		
	2	17	58.88	12.614	3.059

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Post Test	Equal variances assumed			-.607	16	.552	-7.882	12.980	-35.398	19.633
	Equal variances not assumed						-7.882			

T-Test: Block IV

Group Statistics

	T/C	N	Mean	Std. Deviation	Std. Error Mean
Post Test	1	15	80.53	7.110	1.826
	2	3	78.00	10.536	6.083

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Post Test	Equal variances assumed	.412	.530	.525	16	.606	2.533	4.821	-7.687	12.754
	Equal variances not assumed			.399	2.378	.723	2.533	6.354	-21.034	26.101

Appendix E

FOLLOW-UP ANALYSIS FOR GEOMETRY TEST DATA

T-Test: Block I

Group Statistics

	T/C	N	Mean	Std. Deviation	Std. Error Mean
Post Test	1	13	74.15	15.593	4.325
	2	5	49.20	15.849	7.088

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Post Test	Equal variances assumed	.028	.870	3.029	16	.008	24.954	8.239	7.487	42.421
	Equal variances not assumed			3.005	7.200	.019	24.954	8.303	5.430	44.478

T-Test: Block II

Group Statistics

	T/C	N	Mean	Std. Deviation	Std. Error Mean
Post Test	1	11	84.91	9.576	2.887
	2	6	63.67	18.896	7.714

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Post Test	Equal variances assumed	5.052	.040	3.118	15	.007	21.242	6.812	6.723	35.762
	Equal variances not assumed			2.579	6.436	.039	21.242	8.237	1.414	41.071

T-Test: Block III

Group Statistics

	T/C	N	Mean	Std. Deviation	Std. Error Mean
Post Test	1	5	88.20	8.578	3.917
	2	12	83.92	8.618	2.488

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Post Test	Equal variances assumed	.156	.698	.930	15	.367	4.283	4.607	-5.537	14.103
	Equal variances not assumed			.923	7.438	.385	4.283	4.640	-6.559	15.125

T-Test: Block IV

Group Statistics

	T/C	N	Mean	Std. Deviation	Std. Error Mean
Post Test	1	6	94.83	3.061	1.249
	2	6	91.17	5.345	2.182

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Post Test	Equal variances assumed	2.030	.185	1.458	10	.175	3.667	2.514	-1.936	9.269
	Equal variances not assumed			1.458	7.961	.183	3.667	2.514	-2.137	9.470