HIGH SCHOOL SCIENCE TEACHER INDUCTION IN TEXAS: IMPLICATIONS FOR POLICY

A Dissertation

by

TONI ANN IVEY

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

December 2009

Major Subject: Curriculum and Instruction

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Approved by:

Chair of Committee,	Carol L. Stuessy
Committee Members,	Jane F. Schielack
	Timothy P. Scott
	Dennie L. Smith
Head of Department,	Dennie L. Smith

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ABSTRACT

High School Science Teacher Induction in Texas:
Implications for Policy. (December 2009)
Toni Ann Ivey, B.S.; M. Ed., Texas A&M University
Chair of Advisory Committee: Dr. Carol L. Stuessy

Texas public high schools induct beginning science teachers each year; yet, little is known about *how* schools induct beginning teachers. The three studies included in this dissertation use a mixed methods approach to explore data collected by the Policy Research Initiative in Science Education (PRISE) Research Group during the 2007-2008 academic year.

The first study focused on principals' perceptions of teacher induction. A content analysis of interviews collected from 50 principals examined principals' perceptions of teacher induction. Analyses indicated that high school principals had an overwhelmingly narrow focus of mentoring and provided mentor teachers with little support or training. Findings indicated that induction activities for beginning teachers were front-loaded before the school year began and were left in the hands of unprepared mentors during the school year. Further analyses indicated that the primary purpose of mentoring and induction for beginning teachers in Texas high schools revolved around orientation to campus policies and procedures. Beginning teachers' instructional needs appeared to be an afterthought.

The second study explored beginning high school science teachers' evaluations of their induction experiences. Beginning teachers identified the best school-level induction supports received and recommended improvements for school-level induction. Teachers identified mentoring as one of the best received supports, yet also made recommendations for more structure in the mentoring experience. A comparison of beginning teachers' responses with teacher turnover found that: (a) S*tayers* (i.e., teachers

retained at a campus) were most likely to report that they received induction support from other science teachers; (b) *Movers* (i.e., teachers who transferred to another campus) less frequently reported working conditions as a positive induction support; and (c) *Leavers*, (i.e., teachers not retained in the profession) most frequently did not identify induction support from the school.

The final study compared principals' perceptions of induction and beginning teacher *Movers* and *Leavers*' evaluations of their induction experiences. Findings from this study indicated that principals were aware of induction components that were considered helpful by both *Movers* and *Leavers*. However, principals did not acknowledge what *Movers and Leavers* recommended for improvements to current induction practices.

The final chapter provides a summary of all three studies. Recommendations are made for improving induction practices for high school science teachers. In particular, high school principals should discard their current "hands-off" approach to teacher induction and become more active in their induction experiences. Additionally, types of induction practices should increase to include more than mentoring. Moreover, policy makers should reform mentoring policies so that current practices, which have a narrow focus on school policies and procedures, are abandoned.

DEDICATION

I would like to dedicate this work to my husband, Dustin. He has supported me from the very beginning. Words do not exist that can properly express what his encouragement, support, and love mean to me. I would also like to dedicate this work to my mother who always told me to stay in school, but forgot to tell me when to stop. Further, I would also like to dedicate this work to my sister, Cory. Thank you for giving me a listening ear, providing me with laughter, and supplying me with a proper dose of reality when I needed it. Finally, I would like to thank all of my family for their support through this journey.

ACKNOWLEDGEMENTS

I would like to thank my committee chair, Dr. Stuessy. Thank you for being a role model. Thank you for being a mentor. Thank you for being a great teacher. Thank you for sitting with me through laughter and tears. Thank you for all of the times that I barged into your office and you still welcomed me with a smile and encouragement. Your mentorship has meant the world to me. I cannot thank you enough.

Additionally, I would like to extend my thanks to my committee members, Dr. Smith, Dr. Schielack, and Dr. Scott, for their guidance and support throughout the course of this research. I have been involved with these individuals in various ways throughout my graduate studies. These are individuals I admire and respect. Thank you for your contribution to this work.

Additionally, I am grateful to have not gone through my graduate experiences alone. I received a tremendous amount of support from my colleagues and I would like to extend my gratitude to the PRISE Research Group. Over the years, the membership of the PRISE Research Group has changed, but our spirit, focus, and perseverance has been constant. It was a wonderful journey, and I am glad to have taken it with you.

I also want to extend my gratitude to the National Science Foundation, whose funding made this research, and my graduate studies, possible. This research was supported in part by the National Science Foundation, Grant ESI-0455679, and the Department of Teaching, Learning, and Culture at Texas A&M University. Any opinions, findings, or conclusions expressed in this paper are those of the author and do not necessarily reflect the views of the funding agencies or Texas A&M University.

TABLE OF CONTENTS

CHAPTER Page

CHAPTER Page

LIST OF FIGURES

FIGURE Page

FIGURE Page

LIST OF TABLES

TABLE Page

TABLE Page

CHAPTER I

INTRODUCTION: THE IMPORTANCE OF TEACHER INDUCTION FOR TEXAS' PUBLIC HIGH SCHOOLS

Background

Education has often been referred to as the profession that "eats its young" (Halford 1998). Currently, high school science educators are some of the most sought after teachers in public schools, along with other hard to fill areas such as mathematics, bilingual, and special education (Fuller 2009). The state of Texas recently passed legislation that requires four credits of science for high school students to graduate (Texas Administrative Code 2007). This legislation is expected to cause increases in the number of (a) high school students taking science, (b) science courses offered by schools, and (c) science teachers needed by schools. With a limited supply and a high demand for high school science teachers, administrators across Texas are in a science teacher recruitment struggle.

Some researchers have indicated that a teacher shortage does not exist. These researchers report that the "teacher shortage" problem is really a "teacher retention" problem (e.g., Ingersoll 2003a, 2003b; Ingersoll & Perda 2009; Ingersoll & Smith 2003). Ingersoll and colleagues report that teachers are leaving the profession before reaching retirement because of dissatisfaction with their teaching jobs (Smith & Ingersoll 2004). To address beginning teacher retention, teacher induction programs have started emerging across the United States. However, teacher induction is important for more reasons than retaining teachers. Teacher induction programs can (a) contribute to the

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This dissertation follows the style of *Journal of Science Teacher Education.*

professional culture at a school (e.g., Kardos & Johnson 2007; Kardos, Johnson, Peske, Kauffman, & Liu 2001), (b) ease the transition from preservice to in-service (e.g., Feiman-Nemser 2001a; Gold 1996; Kahle & Kronebusch 2003), (c) provide professional development opportunities for teachers (e.g., Britton, Paine, Pimm, & Raizen 2003a; Luft, Bang, & Roehrig 2007a; Luft 2001, 2003; Luft, Lee, Fletcher, & Roehrig 2007b; Luft & Patterson 2002; Luft, Roehrig, & Patterson 2003), and (d) increase student achievement by addressing beginning teacher learning needs through mentoring and professional development (e.g., Rockoff 2008; Strong 2005, 2006, 2009).

With the passing of the *No Child Left Behind Act of 2001* ([NCLB], U.S. Congress 2002) public school administrators have paid close attention to staff their schools with *highly qualified* teachers. However, defining "highly qualified" is a contested issue (e.g., Darling-Hammond & Youngs 2002; Kaplan & Owings 2003; Nieto 2003). According to NCLB, a highly qualified teacher is defined as (a) holding a bachelor's degree from a four-year institution; (b) receiving state teacher certification; and (c) exhibiting competency in a content discipline (Berry, Hoke, & Hirsch 2004). However, state certification is unique to each of the 50 states and competency is a qualitative term open to individual interpretation. Therefore, the term highly qualified can have many meanings to many people.

Additionally, the majority of states, including Texas, hold both teachers and schools accountable for students' performance on state-mandated exams. Prior research findings indicate that the best school-based predictor of student performance is the *highly qualified* teacher in the classroom (e.g., Aaronson, Barrow, & Sander 2007; Hill, Rowan, & Ball 2005; Rivkin, Hanushek, & Kain 2005). While students are entitled to receive a quality science education regardless of their teachers' years of experience, beginning teachers are naturally inexperienced. Beginning teachers enter schools with varying levels of experience in content knowledge, pedagogy, and specific pedagogical content knowledge. Beginning teachers' inexperience and knowledge deficits affect the quality of their teaching practice and student learning. Comprehensive induction programs can

help beginning teachers gain experience and support them through their first years of teaching.

Moreover, beginning teachers leave the profession at disturbing rates. Some researchers have suggested that nearly one third of beginning teachers leave within the first three years (Feiman-Nemser, 2001), and others report that nearly half of all teachers leave by the end of five years (Ingersoll, 2003; Smith & Ingersoll, 2004). Teachers that leave are often replaced with other inexperienced teachers. This further perpetuates the chance of students being placed in classrooms headed by inexperienced teachers. As a result, beginning teacher induction programs have become the policy of choice to address new teacher attrition from schools.

In response to the emergence of induction programs, educational researchers have advanced the argument in support of teacher induction claiming that beginning teacher support programs, and in particular mentoring, help improve teacher retention (e.g., Fuller, 2003; Ingersoll & Alsalam, 1997; Ingersoll & Kralik, 2004; Odell & Ferraro, 1992; Smith & Ingersoll, 2004), teacher practices (e.g., Rockoff, 2008; A. D. Roehrig, Bohn, Turner, & Pressley, 2008; Thompson, Paek, Goe, & Ponte, 1996), teacher beliefs (e.g., Luft, 2001; Luft, Lee, Fletcher, & Roehrig, 2007; Luft & Patterson, 2002; G. H. Roehrig & Luft, 2006), and student achievement (e.g., Fletcher, Strong, & Villar, 2008). Although the research on beginning teacher induction is still emerging, there are many deficiencies in the educational research community's current knowledge base. First, some studies do not measure beginning teacher retention past one year (e.g., Gold, 1987; Henke, Chen, Geis, & Knepper, 2000). Additionally, other researchers measure beginning teachers' intentions to stay in teaching rather than actual retention data (e.g., Ingersoll & Kralik, 2004). Some research on teacher induction is case studies of a small group of teachers in a localized context (e.g., Adams & Krockover, 1997; Luft, et al., 2007; A. D. Roehrig, et al., 2008). Other studies have low return rates (e.g., Thompson, et al., 1996), poor sampling plans (e.g., Shen, 1997; Smith & Ingersoll, 2004), or any number of factors that may cause one to question conclusions that were drawn.

Moreover, policy makers at many levels have begun supporting induction programs, in various forms, as a means to support beginning teachers and reduce new teacher attrition. Some policy makers rely on research or evaluation reports of current induction programs to help guide their policy making. However, because of deficiencies in the research literature, more comprehensive and representative studies on teacher induction are needed so that policy makers can make better-informed decisions regarding the creation and implementation of induction policy.

Context of the Study

The Policy Research Initiative in Science Education (PRISE), a five-year research project designed to answer three essential policy research questions about the high school science teacher professional continuum (TPC) in Texas: *Where are we? Where should we be?* and *How do we get there?* The project uses a systems approach to link prior research findings with mixed research methods to inform the development of policies and programs for high school science teacher recruitment, induction, renewal, and retention.

To answer the policy questions above, the PRISE Research Group developed a robust sampling plan that provided a sample of public high school campuses, principals, and science teachers that is representative of the state. During the 2007-2008 school year, almost 25,400 (or 8%) Texas public school teachers were in their first year of teaching and over 121,000 (or 38%) had five or fewer years of experience (Texas Education Agency 2008). According to PRISE estimates for the 2007-2008 school year, there were approximately 10,400 high school science teachers in Texas' public schools. Of those science teachers, nearly 2,600 (or 25%) had less than four years of teaching experience. One fourth of the Texas high school science teacher workforce was composed of beginning science teachers. Consequently, beginning teachers were responsible for one fourth of high school science classrooms. These numbers indicate the importance of understanding high schools' induction practices so that more is known about how science students' teachers are supported at the school level.

The PRISE Research Group decided on using mixed methods to answer the policy research questions above. PRISE Researchers collected both qualitative and quantitative data to ensure that research findings provided rich descriptions of the science teacher professional continuum and generalizable trends. Conclusions from data collected in this study are only generalizable to the state of Texas. However, the research methods utilized by the PRISE Research Group are generalizable to all states.

Overall Purpose of the Study

The overall purpose of this body of work is to obtain an understanding of the current state of induction for beginning high school science teachers in Texas' public schools. PRISE defines *induction* as a system of policies, programs, and practices utilized by a school to support beginning teachers regarding their recruitment, orientation, professional growth, and retention. Additionally, PRISE defines *beginning high school science teachers* as those assigned as the teacher of record for at least one high school science course, as defined by the Texas Education Agency (TEA), and in their first to third year of teaching.

Significance of the Study

A study of the state-of-the-State of teacher induction is important for several reasons. First, a statewide study of public high school science teacher induction does not currently exist. This study attempts to provide policy makers at all levels with pertinent information regarding "what is" in teacher induction. Second, principals serve as the chief policy makers and policy implementers at individual campuses. Therefore, it is important to have a statewide understanding of how principals perceive current induction practices at their schools. Understanding how administrators perceive teacher induction at their respective schools will help to reveal the underlying priorities established for beginning teacher learning. Third, induction experiences happen to beginning teachers with little or none of their input or feedback. Understanding how beginning science teachers evaluate their induction experiences will give insight into how current induction policies are received by teachers.

Organization of the Manuscript

This introductory chapter presents background information on teacher induction and the context of the study. Chapter II provides a synthesis of the current literature relevant to this study. This review of the literature presents a theoretical framework for the manuscript and focuses on answering the questions:

1. How do beginning science teachers learn?
2. What do beginning science teachers need to know and be able to do to be successful in the classroom?
3. What supports, systems, and policies are needed for induction programs to be successful? and
4. What are the costs and benefits of induction programs?

Chapters III, IV, and V are independent studies that investigate the state of teacher induction from different perspectives. Additionally, each of the three chapters contains its own independent research questions, purpose, methodology, analysis, implications, and conclusions. Chapter III investigates Texas high school principals' perceptions of teacher induction practices. Chapter IV examines beginning science teachers' evaluations of their induction experiences. Chapter V examines the induction evaluations of beginning science teachers who left their schools. Chapter VI provides a summary for the entire manuscript.

CHAPTER II

LITERATURE REVIEW

"New teachers have two jobs—they have to teach and they have to learn how to teach"
(Feiman-Nemser, 2001, p. 1026)

Introduction

With the passing of the *No Child Left Behind Act of 2001* (U.S. Congress 2002), public school administrators have paid close attention to staffing their schools with *highly qualified* teachers. However, defining "highly qualified" has been a contested issue (e.g., Darling-Hammond & Youngs 2002; Kaplan & Owings 2003; Nieto 2003). According to NCLB, a highly qualified teacher is defined as (a) holding a bachelor's degree from a four-year institution; (b) receiving state teacher certification; and (c) exhibiting competency in their content discipline (Berry et al. 2004). However, state certification is unique to each of the 50 states and competency is a qualitative term open to individual interpretation. Therefore, the term highly qualified can have many meanings to many people.

Additionally, the majority of states, including Texas, hold both teachers and schools accountable for students' performance on state-mandated exams. Prior research findings indicate that the best school-based predictor of student performance is the *highly qualified* teacher in the classroom (e.g., Aaronson et al. 2007; Hill et al. 2005; Rivkin et al. 2005). While students are entitled to receive a quality science education regardless of their teachers' years of experience, teachers in their first years of teaching are by nature inexperienced. Induction-year teachers enter schools with varying levels of experience in content knowledge, pedagogy, and pedagogical content knowledge. Beginning teachers' inexperience and knowledge deficits affect the quality of their teaching practice and

student learning. Comprehensive induction programs can help beginning teachers gain experience and support them through their first years of teaching.

A Seamless Teacher Professional Continuum

A consensus exists with educational researchers about the need for a seamless professional continuum for teachers. The continuum begins with preservice education and ends with retirement. Retention in the continuum relies heavily on schools that implement policies and practices related to recruitment, induction, and renewal (e.g., for recent discussions see Feiman-Nemser 2001a; Kahle & Kronebusch 2003). Kahle and Kronebusch (2003) recommended a multifaceted support system to make the transition seamless from preservice preparation to in-service education for beginning teachers. Their suggestions included supports from entities outside of the school/district. These might include (a) internships with universities and local businesses, (b) research opportunities from local universities and businesses, and (c) guidance from university faculty to develop pedagogical content knowledge. They also suggested school/district-based supports for beginning teachers. These local supports included (a) coaching on effective instruction and assessment from master teachers, (b) reduction in teaching load to observe other teachers and collaborate with master teachers in lesson development, (c) teaching assignments that are manageable, and (d) placement in schools with positive learning environments.

While the seamless professional continuum appears attractive and easy to accomplish in the literature, in reality it is difficult, or perhaps impossible, to reach. The careers of the majority of teachers are fragmented into discontinuous sections of coursework, education, and experiences that do not build on one another. Unfortunately, the most disjointed phase in a teacher's career appears to be in the first three years of teaching.

In an ideal setting, beginning teachers would have encountered a contemporary, reform-minded teacher preparation program before entering the classroom. With this foundation in place, beginning teachers' first years of teaching would help support the implementation of reformed practices into their own classrooms. Kahle and Kronebusch

(2003) suggested that an ideal state of science teacher induction would be one that would allow the novice teacher to "adjust to a new culture as well as learn to translate his or her subject matter knowledge into pedagogical content knowledge" (p. 588). However, the complex, challenging, and contrary environments of most schools discourage many new teachers from implementing innovative pedagogies. New teachers may revert back to more safe and traditional teaching methods (Feiman-Nemser 2001a), particularly when the culture of the school supports and models them.

While induction may be the most important phase in teachers' careers, particularly as it is the foundation on which all other teaching experiences will be built, the literature paints a dismal picture of schools being able to address the needs of new teachers in a coherent, integrated way. Beginning teachers have traditionally learned how to teach by methods that could be described as "sink or swim" or "trial by fire." There is a reason that education has come to be known as the "profession that eats its young" (Halford 1998). Those of us who have been teachers know that the first years of teaching will either place a sweet or a sour taste in a beginning teacher's mouth (Gold 1996). Comprehensive induction programs can replace archaic methods of teachers' induction into the profession. Therefore, stakeholders in education (i.e., researchers, administrators, legislators, and practitioners) must understand this critical phase of a teacher's career.

Induction Programs

A Nation at Risk (National Commission on Excellence in Education 1983) publicly damned the quality of teachers in the nation's schools. "Ironically, 'blaming' teachers for failure of American education reinforced the idea that teachers could be powerful agents in the education scene, able to make a difference by virtue of the decisions they made on a day-to-day basis" (Cochran-Smith & Lytle 1999, p. 16).

After *A Nation at Risk,* induction programs began appearing in schools to support beginning teachers. The configuration of induction programs currently varies in content and quality at all levels: national, state, district, school, and mentor. Induction programs also vary in length. Some induction programs last only one day as the new teacher is

shown his/her classroom and oriented to the school, while other programs may be highly structured with frequent meetings lasting over a year. Furthermore, some induction programs offer content-specific training while others focus on general teacher needs, (i.e., school policies and procedures). In the United States:

> …much of the discourse about and practice of induction frames it as a straightforward solution to a simple problem. If, for instance, we look across the ever-increasing number of U.S. programs now requiring induction for beginning teachers (currently in more than thirty states), the universe of practice seems remarkably narrow: mentoring predominates and often there is little more. (Britton et al. 2003a, p. 1)

Induction for beginning teachers is an emerging area of research for three reasons. *First*, many countries outside of the United States developed successful programs that gradually induct novice educators into the teaching profession, as opposed to the sink or swim methods commonplace in many schools in the United States. As some of these foreign countries have higher rates of teacher retention and student achievement, researchers in the United States have begun to study the qualities of their induction programs (Britton et al. 2003a). *Second*, induction is a characteristic phase of all teachers' careers. During this phase, the novice educator makes the transition from "student of teaching" to "teacher of students" (Feiman-Nemser 2001a, p. 1027). Researchers pursue information to daunting questions about best ways to assure a successful transition, reasoning that students of teaching have yet to achieve the characteristics of "highly qualified." Multiple research studies (e.g., Aaronson et al. 2007; Hill et al. 2005; Rivkin et al. 2005) associate student performance with teacher quality. As Feiman-Nemser (2001a) remarked:

> After decades of school reform, a consensus is building that the quality of our nation's schools depends on the quality of our nation's teachers. Policy makers [*sic*] and educators are coming to see that what students learn is directly related to what and how teachers teach; and what and how teachers teach depends on the

> knowledge, skills, and commitments they bring to their teaching and the opportunities they have to continue learning in and from their practice. (p. 1013)

Beginning teachers are unfinished products when they enter the classroom and need multiple supports to make the transition into experienced, "highly qualified" teachers. Educational stakeholders in schools, districts, and states can ensure that beginning teachers receive needed supports to help them grow professionally so that the most important stakeholders in education, the students, can be ensured a quality education. *Third*, induction is a system put in place by an organization to support beginning teachers. As with any program or policy, the implementers are the ones who determine how the program or policy is put into practice. Evaluation and research on the effects of the program or policy are essential if the organization aims to assure an effective and efficient induction program.

Research on induction programs and their effects on teacher retention, practices, and effectiveness is an emerging field of research. The review of literature by Wang, Odell, and Schwile (2008) reported that:

> …teacher induction programs have historically focused on the personal comfort levels of novices" (Feiman-Nemser et al., 1998; Gold, 1996). Feeling comfortable does not necessarily lead to effective teaching and student learning (Anyon, 1981). (p. 133)

Moreover, research on the content-specific needs of beginning science teachers has emerged as a field of interest to science education scholars (e.g., Brickhouse & Bodner 1992; Britton, Raizen, & Huntley 2003b; Fong 2003; Forbes 2004; Luft et al. 2007a; Luft 2003; Luft et al. 2007b; Luft & Patterson 2002; Luft et al. 2003; Patterson & Luft 2002; Patterson, Roehrig, & Luft 2003; Roehrig & Luft 2006; Sanford 1988; Watson 2006).

Studies on teacher induction appearing in the research literature leave many questions still unanswered. Studies using small sample sizes, for instance, are not generalizable to other participants or programs. Additionally, many ideas about what happens to teachers during their beginning years are anecdotal. Although these ideas

may have substance, little to no empirical evidence exists to support them. For instance, it is widely reported that beginning teachers are assigned the most difficult students and subjects to teach. However, if one traces the citations on this report (see Fong 2003; Huling-Austin 1992; Mikkelsen 2004; Sanford 1988; Watson 2006), this notion came from a single, non-representative study (Hoffman, Edwards, O'Neal, Barnes, & Paulissen 1986) in which three of sixteen teachers reported not being satisfied with teaching because of their multiple course preparations. Although some beginning teachers face deplorable working conditions, researchers must be cautious about knowledge claims, as they may inevitably have an effect on policy.

Understanding the current conditions of support for beginning teachers is essential before one can consider the design of teacher induction policies at the school, district, state, and national levels. Policy makers run the risk of making policies blindly without an understanding of the types of supports schools are already providing to new teachers. Well-founded policies on teacher induction rely on current information about existing successful programs, on current theories of teacher learning, and on beginning teachers' perceptions of what they need to be successful in the classroom. Moreover, because teacher induction more often is highly localized at the level of school or district, an understanding of the role of school administrators in teacher induction is also very important.

The purpose of this review is to summarize the educational research community's current understanding about the induction-years of teaching. The remainder of this paper is divided into four sections: (a) *Theoretical Framework*, which is founded in the powerful, research-based, *How People Learn* model from the learning sciences (Bransford, Brown, & Cocking 2000); (b) *Knowledge and Skills for New Teachers*, which summarizes the research literature addressing the needs and concerns of beginning science teachers; (c) *Support for New Teachers*, which examines current induction programs, policies, and practices; and (d) *Cost and Benefits*, which provides information about induction program financial and instructional costs and benefits. Respectively, each section is focused around the following driving questions:

1. How do beginning science teachers learn?
2. What do beginning science teachers need to know and be able to do to be successful in the classroom?
3. What supports, systems, and policies are needed for induction programs to be successful? and
4. What are the costs and benefits of induction programs?

Answers to these questions will lead to a better understanding of the research community's perspective regarding the needs of beginning science teachers and the role induction programs play in their support.

Theoretical Framework

How do beginning science teachers learn? A design for optimal learning environments appears in the synthesis of research, *How People Learn*, (see Figure 2.1, reproduced from Bransford et al. 2000). The simple yet elegant model provided by the *How People Learn* (HPL) framework identifies four perspectives that should be adopted by learning environment designers: learner-centered, knowledge-centered, assessment-centered, and community-centered. The strength of the model resides in the identification of powerful perspectives or filters in designing learning environments. Another strength in the model is that these perspectives are presented as a system in which all perspectives overlap with all others. Particularly noteworthy is the placement of three of the perspectives on the "ground" of the community-centered perspective.

This powerful model provides insights in its application to beginning science teachers and can be used to organize the literature regarding previous theory, research, and practice. Traditionally, the HPL framework has been used to inform teachers how to design optimal learning environments to meet the needs of their students. Schools are the classrooms in which beginning teachers learn. Figure 2.2 is a modified version of the HPL framework illustrating an overlap of induction programs as the learning environment for beginning teachers. The following sections discuss literature on teacher learning: (a) learner-centered perspectives for new teachers; (b) knowledge-centered

perspectives for new teachers; (c) assessment-centered perspectives for new teachers; and (d) community-centered perspectives for new teachers.

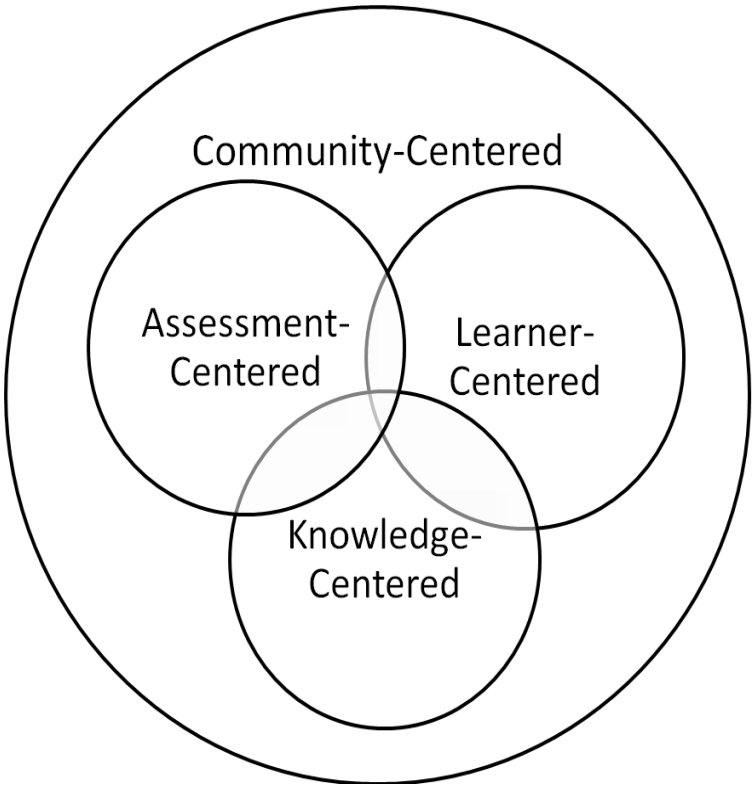

Fig. 2.1. Perspectives on learning environments as presented by the *How People Learn* framework. Source: Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.). (2000). *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academy Press.

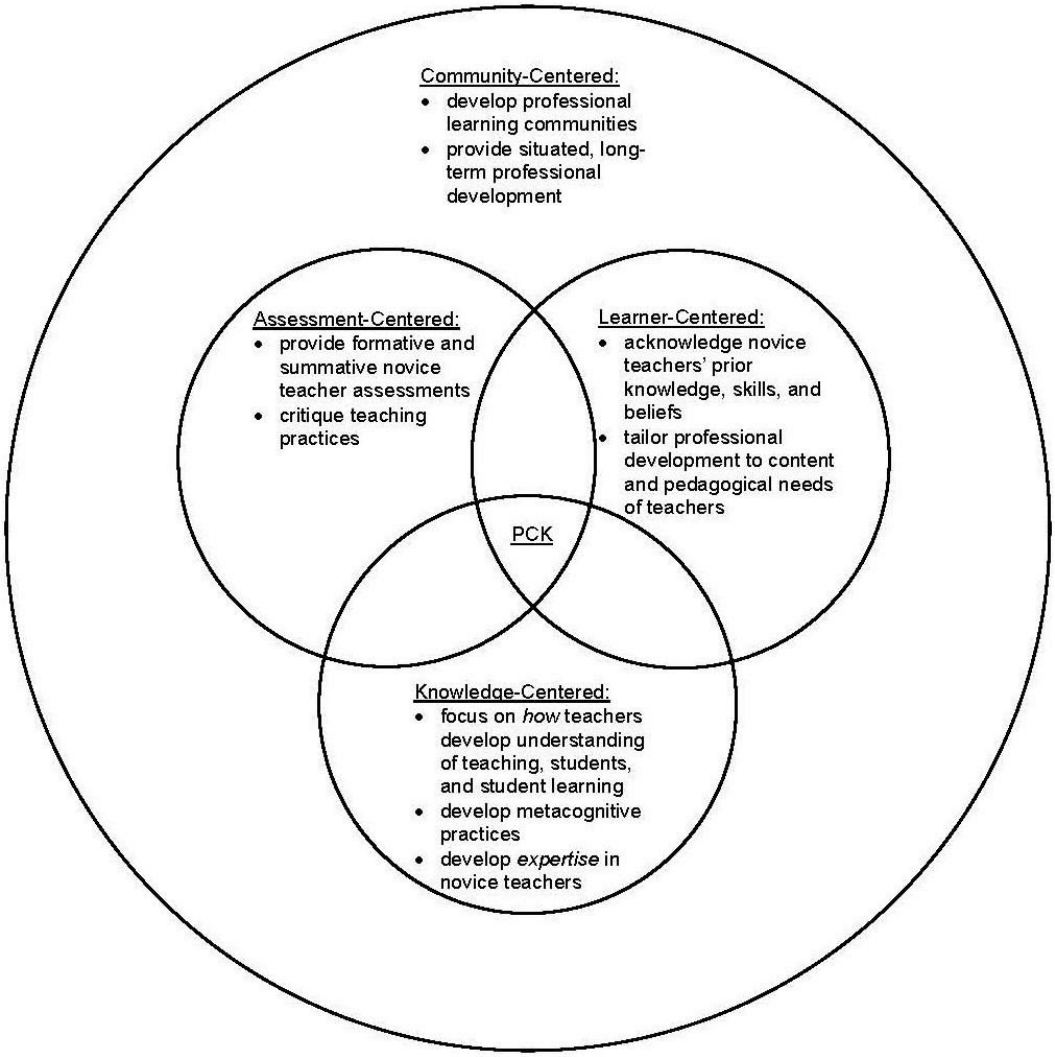

Fig. 2.2 Theoretical framework for teacher induction adapted from the *How People Learn* framework. Source: Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.). (2000). *How people learn: Brain, mind, experience, and school*. Washington, D.C.: National Academy Press.

Learner-Centered Perspectives for New Teachers

Learner-centered environments recognize that learners bring to educational settings their own "knowledge, skills, attitudes, and beliefs" (Bransford et al. 2000, p. 133). Because multiple paths to teacher certification exist, beginning teachers enter classrooms with varying degrees of teacher beliefs, teacher attitudes, content knowledge, and pedagogical

content knowledge. Schools with learner-centered environments will recognize that beginning teachers are not blank slates, nor are they finished products ready for the full responsibility of the classroom.

A common assumption is that good teachers have a natural "talent" for teaching. While there may be some truth to this assumption, even teachers with a natural inclination to the profession were probably not expert teachers on their first day in the classroom. As stated by Berliner (2001):

> Regardless of the talents, proclivities, and opportunities that motivate one to become a teacher as an adult, extensive deliberate practice is still needed to become highly accomplished in teaching, as it is needed to become accomplished in other complex activities like playing the violin, medical diagnosis, or creating pottery. (p. 465)

Prior to teaching, some beginning teachers:

> …go through an initial phase of learning. In a preservice program, they can acquire subject-matter knowledge, study the learning process and students' cultural backgrounds, and acquire a beginning repertoire of approaches to planning, instruction, and assessment. But we misrepresent the process of learning to teach when we consider new teachers as finished products, when we assume that they mostly need to refine existing skills, or when we treat their learning needs as signs of deficiency in their preparation. Beginning teachers have legitimate learning needs that cannot be grasped in advance or outside the contexts of teaching. (Feiman-Nemser 2003, p. 26)

Learner-centered induction programs allow novice teachers to develop metacognitive skills so that they are better able to self-monitor their own teaching practices. Moreover, the ability to be metacognitive is an important characteristic of becoming an expert (Bransford et al. 2000). Additionally, learner-centered induction programs will grant beginning teachers, and their mentors, time to reflect on their own practices. This is an

indication that induction programs can serve as a bridge to help teachers make the walk from novice to expert science teacher.

Knowledge-Centered Perspectives for New Teachers

Knowledge-centered learning environments are concerned with *how* teachers develop an understanding of teaching, students, and student learning (Bransford et al. 2000). Knowledge-centered schools view teacher professional development as (a) opportunities for teachers to focus "on the *what* and *why* of teaching concepts" and (b) motivation for teachers to "improve their practice" (National Commission on Teaching and America's Future 2003, p. 45). Induction programs situated in knowledge-centered learning environments concentrate on the development of individuals. As a result, induction programs can help novice teachers develop into an expert educators.

Beginning teachers enter the classroom eagerly wanting to learn answers to the "how" questions of teaching such as how to manage their classrooms; how to teach stoichiometry; how to manage students in the laboratory; and so forth (Bransford, Derry, Berlinger, Hammerness, & Beckett 2005). Beginning teachers, by definition, are novices in the profession. It takes time to develop into an expert teacher. Berliner (2001) concluded that it takes approximately five or more years for expertise to develop in teachers and three to five years before "things that happen in the classroom no longer are surprising" (Berliner 2001, p. 479). Although not experts in teaching, many beginning teachers are often given the same teaching responsibilities as their veteran counterparts. Furthermore, administrators often have the same performance expectations of beginners as they do of veterans (Feiman-Nemser 2001a; Kardos & Johnson 2007).

Mentor teachers can help guide the induction-year teacher much like an apprentice would learn from the master craftsman as expertise is developed (Brown, Collins, & Duguid, 1989). Effective mentoring results when both the mentor and novice teacher are learning reciprocally (Barnett 1995; Hargreaves & Fullan 2000) from vital and insightful examinations of the other's teaching practices (Putnam & Borko 2000; Riggs & Sandlin 2002; Scheetz, Waters, Smeaton, & Lare 2005). Several studies have recommended that experienced teachers be given opportunities to discuss their continual professional

development with novice teachers (Britton & Raizen 2003; Gratch 1998; Riggs & Sandlin 2002). This communication with beginning teachers emphasizes the "importance of self-reflection and self-assessment as tools for continued professional growth" (Riggs & Sandlin 2002, p. 5).

Assessment-Centered Perspectives for New Teachers

Assessment-centered induction programs are concerned with the role of both formative and summative assessment in teacher development (Bransford et al. 2000). Beginning teachers need frequent and formative assessments of their teaching practices (New Teacher Center at University of California 2006; Patterson 2005) and mentoring is one way to address this need. All too often, beginning teachers receive only summative assessments from a formal evaluator (i.e., the principal) towards the end of the school year (Patterson 2005). This sort of practice does not nourish the professional growth of the new teacher. Beginning teachers, like their students, can benefit from an assessment-centered environment (Bransford et al. 2000) with frequent, informal, and informative assessments to aid beginning teachers in reflecting on their teaching practices. Teachers who can use metacognitive strategies to reflect on their own teaching (Joyce, Weil, & Calhoun 2004) are more aware of their teaching strategies and how they are portraying knowledge to students. Development of metacognitive strategies progressively occurs over time and requires scaffolding by a knowledgeable mentor (Bruer 1993).

Professional growth and confidence in teachers increases when administrators make periodic classroom observations and provide productive feedback to their teachers (King 2004). Novice teachers, in particular, benefited from the customized feedback provided by supportive visits from administrators (Feiman-Nemser 2001a). One can conclude that open lines of communication between science teachers and administrators may lead to increases in teachers' classroom effectiveness, self-efficacy, autonomy, job satisfaction, and retention.

Community-Centered Perspectives for New Teachers

A community-centered environment focuses on the social nature of learning (Bransford et al. 2005). Some learning environments are established so that learners are free to ask questions instead of being ashamed of not already knowing the answers. The community-centeredness of a learning environment can affect the degree to which people feel they belong to or are isolated from the other community members. When placed in the context of teacher induction, the social aspect of learning is most important because "interactions with the people in one's environment are major determinants of both what is learned and how learning takes place" (Putnam & Borko 2000, p. 5).

Induction programs flourish when the school's culture promotes *professional learning community* development. In this type of environment, all teachers are able to form constructive relationships with other adults for the betterment of their teaching. These relationships include those other teachers, either inside or outside of the school; district personnel; university faculty; and other experts. Likewise, an induction program that allows teachers to (a) collaboratively learn and utilize innovative curriculum and instruction; (b) collegially and congenially observe each others' teaching practices; (c) selectively attend professional development to address pedagogical content knowledge; and (d) frequently receive feedback from classroom observations can help establish an integrated professional learning community (Kardos 2002) at a school and promote the professional growth of novice science teachers (Feiman-Nemser 2003).

When placed in the context of teacher induction, a professional learning community allows for Vygotsky's concept of the zone of proximal development (ZPD) to be put into practice through new teacher mentoring. Vygotsky "defined the ZPD level as the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Bransford et al. 2005, p. 65). The ZPD concept indicates that beginning teachers can become more independent teachers as they collaborate with mentors on issues of curriculum and instruction.

It is impossible for teachers to learn everything that they need to know about teaching from their preparation programs. Therefore, an imperative exists that teachers are enculturated into a "community of practice" (Wenger 1998) that promotes its members' shared vision and goals of science teaching and learning. Beginning science teachers benefit from a school and/or science department that fosters a professional community of learners that consistently supports and mentors them (Glazer & Hannafin 2006).

Within science departments, professional learning communities are formed and strengthened when science teachers collaborate on decisions of curriculum and instruction. However, an important note is that not all school cultures are appropriate for beginning teacher enculturation, for example, those that are dominated by teacher isolation, devalue beginning teachers' preservice experiences (Schempp, Sparkes, & Templin 1993), and inhibit instructional improvement (Robinson 2006). Moreover, professional learning communities are "especially difficult to maintain in high schools, where collaborative relationships are particularly hard to achieve in the face of an historical legacy of top-down administration and fragmented departmentalized subject-based communities" (Giles & Hargreaves 2006, p. 127). The majority of research studies on community and organization focus on the whole school as a level of study and do not take into account subject-based departments (Melville & Wallace 2007). Those with high school science teaching experience, especially in larger schools, know that science departments can be even more fragmented into clusters of science teachers within the same science course (e.g., biology, chemistry, physics). A beginning high school science teacher could feel very isolated without a community-centered environment.

Administrators play an important role in establishing and cultivating professional learning communities. The tone of the work environment is set by the principal in the ways in which the work day is structured. Principals can support comprehensive induction programs by providing time for induction-year teachers to observe, and be observed by, other teachers. Additionally, time can be allocated for meetings between the mentor teacher and the induction-year teacher to discuss classroom observations,

plan lessons, or discuss personal concerns. When provisions are not made for mentoring to occur during regular school-hours, mentoring is left to occur "around the edges of an already full school day" (Carver & Feiman-Nemser 2009, p. 321).

Administrators also play a pivotal role in decisions for school-based professional development for teachers. Researchers indicate that professional development programs should be ongoing and situated within practical school settings for the professional development of teachers to be effective (Borko 2004; Boyle, While, & Boyle 2004; Loucks-Horsley, Love, Stiles, Mundry, & Hewson 2003). Teacher induction is no different. A majority of teacher learning experiences takes place within the classroom. The construct of *situated learning* (Brown, Collins, & Duguid 1989) stipulates that professional development should also be situated within the teachers' learning environment.

Continual professional development embedded in the normal school day could therefore result in the professional growth of the science teacher (Knight 2002). Effective and well-structured professional development is particularly important to science teachers who often do not receive frequent, school-based, and relevant content-specific professional development. Although science teacher professional development is a relatively new area of research, several studies have provided evidence that beginning science teachers need professional development to target areas that are unique to their domain, such as laboratory planning and management, implementing inquiry, utilizing standards-based lessons, and promoting an understanding of the nature of science among students (e.g., Britton & Raizen 2003; Luft 2001, 2003; Luft et al. 2007b; Luft & Patterson 2002; Roehrig & Luft 2006; York-Barr & Duke 2004). This type of learning is so specific to science teaching that professional science teacher educators recommend that schools provide specialized science training to support the needs of beginning teachers. In this manner, beginning science teachers would be more able to provide students with quality 21st century science instruction.

Expanding on the construct of *situated learning*, Putnam and Borko (2000) recommended that learning not be isolated to a single locale and proposed the construct

of *discourse communities for teachers,* described as environments that "play central roles in shaping the way teachers view their world and go about their work" (p. 8). They expanded on this notion by stating:

> When diverse groups of teachers with different types of knowledge and expertise come together in discourse communities, community members can draw upon and incorporate each other's expertise to create rich conversation and new insights into teaching and learning. (p. 8)

Putnam and Borko primarily focused on the professional development needs of preservice and experienced teachers. However, being a part of a discourse community would also support novice teachers. Nevertheless, many public schools are still dominated by a culture of teacher isolation that hinders the growth of professional learning communities.

Summary of Theoretical Framework

Induction programs include much more than the one-on-one mentoring of an induction-year science teacher. A system of induction goes "far beyond support or assistance, using a variety of co-ordinated [*sic*] means tailored to perceptions of the novices' and the general educational systems' requirements" (Britton & Raizen 2003, p. 5). Comprehensive induction programs require that multiple people play interconnecting roles to support the professional growth of induction-year teachers.

The HPL Framework's overlapping constructs of learner-, knowledge-, assessment-, and community-centeredness provide a learning sciences lens with which to view teacher induction. As the learner in the school environment, beginning science teachers need a multifaceted system of support that will address their individual learning needs. Each teacher enters the school with variations in preservice preparation. Learner-centered schools can acknowledge novice teachers' prior knowledge, skills, and beliefs by developing induction programs that will build on teachers' preservice experiences. By helping novice teachers develop metacognitive teaching practices, school personnel and the beginning teacher can gain a better understanding of what the beginning teacher

already knows, what the beginning teacher needs help with, and how to develop areas of deficiency. This goes hand-in hand with being a knowledge-centered school which focuses on how to better develop teachers into expert teachers. Likewise, assessment-centered schools provide multiple opportunities for the beginning teacher's teaching to be formatively assessed in addition to summative assessments. However, none of this is possible if the school is not community-centered. The establishment of a professional learning community will invite open critiquing of teaching practices and provide situated, long-term professional development. All things considered, constructing the optimal learning environment for students will only be enhanced when the optimal learning environment for students' teachers has been equally established.

Knowledge and Skills for New Teachers

What do beginning science teachers need to know and be able to do to be successful in the classroom? Beginning teachers need time to learn about professional expectations for their teaching assignment and the resources that are available to them before they can be truly effective in the classroom. Beginning teachers also need to learn about the culture of the school and the surrounding community; in that regard, teachers will have to learn their role in that community as well (Schempp et al. 1993). Furthermore, teachers need time to learn about the general and specific subject requirements of their teaching assignments and how to make the curriculum relevant to the needs and interests of their students (Feiman-Nemser 2003). Additionally, teachers also need time to address their personal teaching concerns. Veenman's (1984) review of research found that beginning teachers' concerns were classroom discipline, motivating students, dealing with individual differences, assessing student's work, and relations with parents.

Beginning science teachers generally enter traditional schools and try to implement current science teaching reforms (American Association for the Advancement of Science 1993; National Research Council 1996) that emphasize teaching with authentic science inquiry so that students may develop a deep conceptual understanding of science. Standards for science teaching have been established by the Interstate New Teacher Assessment and Support Consortium (1992) and the National Science Education

Standards (1996). All science teachers are expected to teach according to these standards whether they are a beginner or a veteran. Lynch (1997) asked:

> How likely are teachers to understand and embrace science education reform? There is a great deal of anecdotal evidence and some hard data that either teachers do not understand education reform or they do not believe in it. The trend in education reform in the United States has turned the focus from input-based measures of quality (number of certified teachers, computers in the classroom, clock hours, etc.) to specified outcome-based measures (student performances, standards, or benchmarks). For students to achieve the outcomes, the understanding and commitment of teachers are vital, since teachers are the ones who must plan and create the lessons that address the new student goals or outcomes. (p. 4)

Reform methods of science instruction require training and practice, and most beginning teachers have had little of either. Moreover, most beginning teachers will enter schools that offer few models that are congruent with science reform principles (Lynch 1997). Focusing on new science teachers' challenges, the review of literature by Davis, Petish, and Smithey (2006) revealed that very little is known about "new teachers' understandings of inquiry, how they teach inquiry, or what specific challenges they face in doing so" (p. 636). While inquiry provides the specific example, the *National Science Education Standards* (National Research Council 1996) recommend many other reform practices (e.g., addressing individual students' interests, strengths, experiences, and needs; problem-based learning; curriculum adaptation; relevance in the curriculum; student understanding; students' use of scientific processes and inquiry skills) which will require beginning science teachers to have additional training and support to implement science education reform instruction in their classrooms.

When first entering a classroom, beginning high school science teachers have multiple needs and concerns. Adams and Krockover (1997) reported that beginning science and mathematics teachers have concerns about curriculum development, classroom assignments, content presentation, classroom management, and time

management. In addition to the knowledge needed to teach courses, beginning science teachers must also learn school policies, procedures, politics, and culture. Additionally, beginning teachers may find conflict with their school's more traditional educational approach and their reform-based teacher training experiences (Schempp et al. 1993).

Beginning science teachers may also need support to learn more science content. For example, Luft and colleagues (2007b) stated that although preservice teachers can be exposed to vigorous field experiences, the content of biology can be challenging. Further, many science teachers do not receive degrees in general biology, which is the subject most generally taught in middle and high schools. Instead, most preservice teachers with biology backgrounds earn more specialized degrees in domains such as ecology, zoology, botany, and microbiology. Therefore, beginning biology teachers may not have the generalized expertise necessary to teach the more inclusive, broader "big ideas" of biology or address the range of concepts covered in a general biology class. Most likely, this same concept can be translated to other fields in science as well.

Support for New Teachers

What supports, systems, and policies are needed for induction programs to be successful? School, district, state, and national policies on teacher induction are needed for induction to be successful in practice. Linda M. Kelly (2004) comments on the support needed and the lack of support received for beginning teacher induction:

> Legislators and policy makers have failed to take a long view of what national, state, and local agencies might do to retain committed, effective teachers by providing the necessary financial resources and incentives for induction support and ongoing teacher development. In fact, historically U.S. school districts have paid insufficient attention to education's human resources, and this inattention has been and will continue to be financially and professionally costly. For example, NCTAF (1996) reported that induction programs are most likely to be eliminated during times of district budget reductions, decisions that inevitably

> produce deleterious consequences for school districts interested in retaining their novice teachers. (pp. 446-447)

Teacher induction will occur at a school whether a school has an induction program or not. Every year new teachers enter classrooms for the very first time. New teachers face many combinations of beginning teacher support at schools. Some teachers may encounter a well thought-out formal mentoring and induction program. Most will receive informal mentoring from a colleague or buddy teacher.

> [An]…informal buddy system may work for the fortunate novice who gets adopted, but it hardly represents an adequate response to the larger need. Relying on the good will of experienced teachers to reach out on their own initiative ignores the learning challenges that beginning teachers face and the need for a more sustained and systematic approach to their development. (Feiman-Nemser 2001a, p. 1030)

More recently, formal induction programs for beginning teachers have emerged across the United States. What beginning teachers learn and experience during their first years of teaching sets the tone for the rest of their career (Gold 1996). With this fact in mind, an easy argument exists: teacher induction may be the most important form of professional development for teachers (Wong 2002). If formal policies for mandating *and* funding comprehensive teacher induction and other forms of professional development do not exist at the state level, individual districts and schools are then responsible for developing and implementing policies. Therefore, it is important for researchers to examine established priorities at the state and district levels.

Education Week's (2008a) report, *Quality Counts 2008: Tapping into Teaching*, reported the frequency of induction and professional development programs and standards by state. Table 2.1 highlights some of the report's findings which indicate half or less of all states have state mandated and funded requirements for beginning teacher support. According to Education Week (2008b):

> This set of indicators reports whether states have in place the following policies aimed at beginning teachers: mandatory participation in a state-funded induction program; required participation in a state-funded mentoring-program (and whether that program has standards for selecting, training, and/or matching mentors); and a reduced workload for first-year teachers. (¶ 72)

Noteworthy is that Texas does not require nor fund any of the beginning teacher supports. As a result, individual districts and schools are responsible for the development and implementation of teacher induction programs. Additionally, the same report examined how teachers were encouraged and supported at the state level for continuing professional growth. Table 2.2 illustrates highlights of the report's findings. According to Education Week (2008b):

> This set of indicators reports whether states have in place the following policies related to professional development: formal professional-development standards; state-financed professional development for all districts; a requirement for districts/schools to set aside time for professional development; and a mandate for all districts to align professional development with local priorities and goals. (¶ 73)

Noteworthy again is that Texas does not have formal professional development standards, finance professional development for all districts, require schools to set aside time for professional development, or mandate districts to align professional development with local priorities and goals. Districts receive funds from a variety of sources. However, the state does not specifically designate district funds for teacher professional development. This leads one to conclude that individual districts and schools in Texas are responsible for establishing and implementing the professional growth of individual teachers.

Table 2.1. Requirements for beginning teachers to participate in state-funded induction and mentoring programs, existence of state standards for mentors, and state policies for first-year teachers' reduced-workload: 2007-2008[a]

Location	All new teachers are required to participate in a state-funded induction program	All new teachers are required to participate in a state-funded mentoring program	Standards for selecting, training, and/or matching mentors	Reduced workload policy for first-year teachers
United States[b]	22	25	20	2
Arizona	No	No	No	No
California	Yes	Yes	Yes	No
Connecticut	Yes	Yes	Yes	No
Michigan	Yes	Yes	No	No
Ohio	Yes	Yes	Yes	No
Texas	No	No	No	No

[a] Source: Education Week (2008). *Quality counts 2008: Tapping into teaching*. Bethesda, MD: Editorial Projects in Education Research Center. Modified with permission from the author.
[b] "United States" indicates the number of yes responses for all states.

Table 2.2 Support and incentives from the state for teacher professional development and National Board Certification: 2007-2008 [a]

Location	State has formal professional development standards	State finances professional development for all districts	State requires districts/ schools to set aside time for professional development	State requires districts to align professional development with local priorities and goals	State provides incentives to earn National Board Certification
United States[b]	41	24	16	30	38
Arizona	Yes	No	No	No	Yes
California	No	No	No	No	Yes
Connecticut	Yes	No	Yes	No	No
Michigan	Yes	No	Yes	Yes	Yes
Ohio	Yes	No	No	No	Yes
Texas	No	No	No	No	No

[a] Source: Education Week (2008). *Quality counts 2008: Tapping into teaching*. Bethesda, MD: Editorial Projects in Education Research Center. Modified with permission from the author.
[b] "United States" indicates the number of yes responses for all states.

Global Perspectives: Induction Outside of Texas

International Induction Programs

Case studies of induction programs abroad by Ted Britton and colleagues (Britton et al. 2003a) provided a new lens for policy makers in the United States to view teacher induction. The induction programs of Shanghai, Switzerland, New Zealand, France, and Japan are multiyear, funded programs with multilevels of support personnel. Additionally, the training that beginning teachers receive extends beyond school policies and procedures to advocate learning about teaching.

Shanghai. Shanghai's cultural norms promote teaching as a profession to be openly shared and examined for the improvement of teaching and learning. The case study by Paine, Fang, and Wilson (2003) indicated Shanghai beginning teachers' experiences are

guided by formal policies developed and overseen by the Shanghai Municipal Education Commission. New teachers are not considered finished products of educator preparation programs. The Shanghai Education Commission mandates that new teacher development focus on (a) education and professional ethics, (b) education and teaching theory, and (c) education and teaching practical skills. Furthermore, many people and groups support new teachers inside of their schools. An experienced, same-subject mentor meets weekly with the new teacher to discuss trials and successes of lesson plans. Mentors are not heavily compensated monetarily. However, mentor teachers report the experience rewarding and advantageous when applying for promotion to senior teacher status for their teacher career ladder. Weekly meetings with mentors occur alone or with a *lesson preparation group,* which is an opportunity for novices to learn from and plan with expert teachers in the same subject. Additionally, weekly meetings occur between teachers of the same subject in all grade levels at the school in a *teacher research group* where teachers discuss reforms in instruction and assessment.

Switzerland. Raizen, Huntley, and Britton (2003) completed a case study of teacher induction in Switzerland that focused on the German-speaking cantons of Lucerne, Bern, and Zurich. (Switzerland is composed of twenty-six member states called cantons.) In these cantons, beginning teachers are viewed as professionals who shape their own induction experiences. Beginning teachers are also believed, however, to have a lot to learn about being a teacher. Beginning teachers have multiple opportunities to observe and be observed by experienced teachers. Assortments of activities are provided for beginning teachers to perfect their craft with a particular focus on reflective practice. The cantons provide permanent, paid staff to help coordinate and provide induction programs and other professional development support.

New Zealand. New Zealand requires first-year teachers to have a paid, 20 percent release from instructional duties (Britton et al. 2003a; Britton & Raizen 2003). Second-year teachers receive a paid, 10 percent release. New teachers use release time to observe other teachers and meet with support personnel, including administrators and mentors. Although release time for first-year teachers is a national policy, how release

time is honored is determined by individual schools' practice. For example, some schools perceive beginning teachers' release time as "sacrosanct" whereas others repeatedly ask beginning teachers to cover classes of absent teachers unless it is an emergency. One beginning teacher reflected on their release time as crucial, as one novice observed:

> It's really frustrating when you are asked to cover someone's class, because you've really planned to use that time to prepare for a practical or whatever. So now, what do you do? It's a real pisser. They don't ask you. You just find out in the morning! (Britton et al. 2003b, pp. 156-157).

All New Zealand schools are responsible for developing an Advice and Guidance (AG) program for first- and second-year teachers. New Zealand perceives the AG program "as part of the overall professional development of teachers" (Britton et al. 2003b, p. 157). The AG coordinator, a school principal, (a) meets regularly with individual beginning teachers, (b) provides meetings for all beginning teachers so they have an opportunity to learn from and support each other, (c) advocates for beginning teachers, and (d) protects their release time among other things.

A subject-area department head typically acts as a primary mentor to the new teachers in each discipline. The department head serves as an official appraiser of new teachers. However, the working environment is open and welcomes constructive criticism. For example, a new teacher seeking meaningful and constructive feedback on her teaching requested her mentor to observe what the new teacher considered was her "worst" class because "if you don't let them see what your problems are, how can they suggest anything?" (Britton et al. 2003b, p. 142). In addition to campus-level mentoring duties, the department head also promotes beginning teachers' involvement in professional development opportunities away from the campus. On the campus, beginning teachers' professional growth activities include attending biweekly meetings for all beginning teachers, observing experienced teachers teaching, and being observed while teaching by multiple individuals.

Beginning science teachers' needs are also addressed in the induction program in addition to general teacher needs. Most science teachers are assigned *junior-* (grades 8 and 9) and *senior-* (grades 10-12) level science courses so that experienced science teachers are dispersed throughout the subject and grade levels. Additionally, science departments contribute to and maintain lesson folders for each subject. All science teachers benefit from these folders because they are available for all science teachers to use. Furthermore, high school schools have hired laboratory technicians who are in charge of ordering, preparing, and maintaining laboratory equipment and supplies. Laboratory technicians take laboratory orders from science teachers, deliver the laboratory items when needed, and coach teachers to set up and use equipment. These science teacher supports allow beginning science teachers to focus on *how* to teach instead of *what* to teach while simultaneously delivering "hands-on" science instruction aligned with New Zealand's national science curriculum framework.

France. First-year teachers in France, called *stagiaires,* are paid a full salary for teaching only one-third of a normal teacher's contract hours (Pimm, Chazan, & Paine 2003). *Stagiaires* are provided with a "pedagogic advisor" who is a more experienced, same-subject teacher. The advisor observes the first-year teacher, offers advice on teaching, and permits the novice to observe his teaching. First-year teachers also attend the "University Institute for the *Formation* of Teachers" (IUFM), which provides workshops and seminars for *stagiaires.* The IUFM is an opportunity for *stagiaires* to learn more about classroom management, reflect on their teaching experiences of the prior week, and develop pedagogical content knowledge, among other activities, as they are *formed* into fully credentialed teachers.

Japan. Japan provides new teachers a reduced teaching load and assigned mentors, called guiding teachers (Padilla & Riley 2003). Guiding teachers are more experienced teachers of the same discipline who also receive a reduced workload in order to perform their duties. Guiding teachers help the beginning teacher to develop professionally and personally. Schools have leaders for curriculum and instruction who also assist guiding teachers. Induction program content covers six broad categories: basic knowledge,

classroom management, subject guidance, moral education, special activities, and pupil guidance. Guiding teachers help induction-year teachers with subject matter planning and instruction. Occasionally, new teachers meet teachers in other schools if the new teacher is teaching a course no one else teaches at the school (e.g., being the only physics teacher). Three times a year, teachers teach publicly with administrators and teachers in attendance. Additionally, all first-year teachers are required to conduct an "action-research" study and submit it to the prefecture of education.

Although the details of these programs are different, many commonalities occur. For instance, all provide an opportunity for the theory learned in new teachers' preservice preparation to be transformed into practice in the classroom. Furthermore, multiple support personnel are provided to guide, assist, develop, and in some cases, evaluate the new teacher. As well, multiple opportunities are provided for individual new teachers to grow personally and professionally. Most importantly, beginning teachers are not viewed as completed products ready to take on the full responsibilities of being a classroom teacher. (For a more complete description of all programs listed, please refer to Britton and colleagues, 2003a.)

National Induction Programs

Within the United States, several induction programs are recognized as exemplary and have been replicated within states and across the nation. Appendix A illustrates the components of well-known induction programs in the United States. Carver and Feiman-Nemser (2009) indicated that induction program goals will be reflected in their established policies and practices. They elaborated by stating:

> policy can succeed in changing teaching and learning when that policy affords teachers meaningful and ongoing opportunities to learn what the reform asks of them and when there is coherence among policy instruments and within organizational structure….Applied to an induction context, where mentors are key actors in carrying the reform to new teachers, policy would thus need to be crafted specifically with mentors [*sic*] learning needs in mind. (p. 322)

When teacher retention is the primary focus, induction support rarely extends after the first year, if it even lasts that long. Carver and Feiman-Nemser (2009) remind us that induction is a "time of extended learning, often through the second and even third years of teaching" (p. 20).

The New Teacher Center (NTC) is a two-year induction program in California. Beginning teachers are required to successfully complete the induction program in order to gain clear teaching credentials (Carver & Feiman-Nemser 2009). Beginning teachers do not receive a reduced course load. Mentor teachers receive a full-time release from classroom teaching duties for three years as they work with fifteen novices. Mentors initially receive five days of training in observation, coaching, and use of the NTC Formative Assessment System (FAS) tools (Carver & Feiman-Nemser 2009; Fulton, Yoon, & Lee 2005); additionally, training is offered for principals and other school leaders responsible for developing and maintaining the program. Additionally, mentors attend half-day forums every week. Mentor teachers work individually with beginning teachers for 1-2 hours in their classrooms and also conduct monthly seminars for new teachers. Mentor teachers and beginning teachers use professional standards to set yearly goals and assess teaching practices. The FAS is used by mentors to informally assess beginning teachers throughout the year and formally twice a year. The NTC model has been adapted in more than 40 states and US territories (New Teacher Center 2009). The cost of the two-year program is more than $12,000 per teacher. However, the state contributes $3,200 a year to each school for each new teacher to help with induction costs. The NTC program in Santa Cruz, the New Teacher Project, reports estimated teacher retention of 89 percent after six years (Fulton et al. 2005).

The Cincinnati Peer Assistant and Evaluation Program (PAEP) offers all new teachers ongoing evaluation plus assistance by a consulting teacher (CT) for their first year of teaching. The program was developed jointly by the local teacher union and the district's central office. Consulting teachers must qualify for lead teacher status on the district's teacher career ladder. The teacher career ladder has six rungs: *apprentice, novice, career, advanced, accomplished*, and *lead* (Cincinnati Public Schools 2009).

Apprentice teachers have no teaching experience and are preparing to pursue a teaching career. *Novice* teachers are those that have met licensure requirements and are working to develop the skills required for a career in teaching. The Cincinnati Public School system places importance on helping teachers improve their teaching skills. The CTs play a pivotal role for beginning teachers because they recommend to the school board whether or not to renew the beginning teacher's contract. As such, CTs are trained in district standards and the teacher evaluation system. Consulting teachers are given full-time release from their classroom duties for two years (Carver & Feiman-Nemser 2009).

Connecticut's Beginning Educator and Support Training (BEST) is a 1-2 year induction program. New teachers do not receive a reduced course load but they do receive school- or district-based mentoring for one year. Mentor teachers receive twenty hours of state-sponsored and mandated training that focuses on coaching, portfolio assessment, and teaching standards (Fulton et al. 2005). The state has developed professional standards for teaching and learning which guide the development of the beginning teachers (Carver & Feiman-Nemser 2009). In addition to mentoring, the state also offers state-sponsored training for new teachers through content-specific seminars online and regionally. Schools receive a state contribution of $200 per new teacher for induction implementation. Teachers must submit a performance portfolio for state assessment and completion of their teaching license. The program reports a 94.3% retention rate of new teachers (Fulton et al. 2005).

The five-year induction program at Flowing Wells School District in Tucson, Arizona has a teacher career ladder that recognizes beginning teachers as novices in the profession. This program has received accolades for providing staff development tailored to the needs of teachers at different stages in their career and is studied by other schools within and outside of the state (Flowing Wells School District 2008).

The induction program at Port Huron Area Schools in Port Huron, Michigan was developed by the school's personnel in conjunction with the Port Huron Education Association (ASSIST Beginning Teachers 2009; Wong 2002). The cooperation of all teachers in the development of this program has helped with teacher buy-in. As a result

of the program's acceptance among the staff, the district has seen a transformation in less than ten years from staff dominated in numbers by beginning teachers to one dominated by veteran teachers.

All but one of the induction programs mentioned above are located in states that require all first-year teachers to be involved in state-funded induction and mentoring programs. (For comparison, refer back to Tables 2.1 and 2.2.) Additionally, all but one of the induction programs mentioned above are in locations that have state-standards for teacher professional development. Examination of data from Tables 2.1 and 2.2 suggests reexamination of other states' policies on teacher induction and professional development standards.

Science-specific Induction Programs

While all of the above programs predominantly address general education issues, the National Science Teachers Association (NSTA 2007) recommends that induction programs focus on the content-specific needs of beginning science teachers, in addition to the basic beginning teacher needs. The position statement of the National Science Teachers Association (2007) on science teacher induction recommends: (a) providing a science-specific focus, (b) mentoring, (c) training for mentors that is ongoing, (d) reinforcing appropriate pedagogy and classroom strategies in science classroom settings, (e) providing learning activities for new teachers that anticipate their individual grade-level needs, (f) creating a "culture of collaboration" within and outside of the school that promotes sharing and reflecting on teaching, (g) developing efficient pathways of communication, and (h) collecting data on beginning teacher development to aid in the designs of policy and better induction programs. Recently, science-specific induction programs have emerged to meet the specific needs of science teachers, such as creating a science-as-inquiry environment in the classroom (Luft et al. 2007b).

A mixed models study conducted by Luft (2001) investigated the impact of an inquiry focused demonstration classroom on fourteen high school science teachers. Findings from this study included that beginning science teachers, those with less than three years of experience, had more difficulty implementing inquiry-based science

lessons in their classrooms than more experienced teachers. Additionally, Luft concluded that beginning science teachers' classroom practices were often associated with their attitudes about teaching. Moreover, she concluded that beginning teachers should receive two to three years of science-based support to reinforce science reform-based beliefs and practices.

A qualitative study of sixteen first-year high school science teachers by Roehrig and Luft (2006) was conducted to understand the relationship between beginning teachers' experiences in a science-focused induction program and their preservice backgrounds (i.e., number of science methods courses, student teaching experiences). The science-specific induction program, Alternative Support of Induction Science Teachers (ASIST), included multiple observations of each teacher throughout the school-year and pre- and post-conferences so that teachers could receive constructive feedback of their teaching. (For a more comprehensive description of ASIST, see Luft & Patterson 2002.) Findings from this study indicated that teachers who had two science methods courses and extended student-teaching experiences executed more reform-based science lessons during the school-year and held beliefs more aligned to student-centered practices than other teachers. The ASIST program most benefited the teaching beliefs and practices of the alternatively and elementary certified teachers who had fewer science methods courses during their teacher preparation experiences. The authors concluded that science-specific induction programs should be encouraged, especially because of the increasing number of teachers who are entering the profession through non-traditional means.

Luft, Lee, Fletcher, and Roehrig (2007b) examined six beginning high school biology teachers to determine the effects of ASIST on their teaching practices. The findings of Luft and colleagues in this within- and across-case analysis indicated that teachers with student-centered beliefs were more likely to create inquiry environments in their classrooms. They also found that many new teachers began with teacher-centered practices, even though many indicated beliefs that were student-centered. In this study, beginning teachers initially lacked both content and pedagogical knowledge. Teachers

who did not have a science major lacked the conceptual understanding of biology needed to construct a productive inquiry environment in their classrooms. Also, some teachers were forced to strengthen their understandings of biology as they developed inquiry-oriented lessons. Finally, the researchers found that the science-specific induction program supported the emerging induction practices of the participants. Luft and colleagues concluded that biology teachers need to understand the overarching ideas in biology in addition to an understanding of running a classroom. The authors stated that beginning science teachers are more likely to implement inquiry-based science lessons with the support of a science-focused induction program.

Bang, Kern, Luft, and Roehrig (2007) conducted a mixed models study in which they followed 115 high school science teachers from five states over their first three years of teaching. These teachers participated in one of four induction programs: alternative certification, electronic mentoring programs, university-school district induction programs, and school district induction programs. After three years, total teacher turnover was 27 percent; 7.7 percent were *Leavers* (i.e., teachers who left the profession) and 20 percent were *Movers* (i.e., teachers who remained in the profession but moved to another school). Using a chi-square analysis, the researchers reported no significant differences between different induction programs and decisions of *Stayers* (i.e., teachers who remained at a school); *Leavers,* defined as those teachers who quit teaching; and *Movers.* However, teachers enrolled in a general induction program or the induction program of an alternative certification program left or moved involuntarily (i.e., via non-renewed contracts or school teacher personnel reduction) more than other teachers. The study's qualitative analysis gave more insight into why teachers stayed or moved. For instance, *Stayers* and *Movers* gave students more specific information about assignments, used similar amounts of lecture with discussion, and had greater and easier access to instructional resources than *Leavers.* Overall, teachers who had ready access to different instructional resources and supportive working environments stayed in teaching more than those that did not.

Induction Programs in Texas

Currently, the State of Texas recommends that teachers with less than two years of teaching experience be provided with an experienced mentor who resides on the same campus and teaches the same subject if possible (Texas Administrative Code, 2006). The Texas Beginning Educator Support System (TxBESS) was formed because of reports of high state-level beginning teacher attrition (Charles A. Dana Center 2002). School districts across the state were invited to participate. Although, the TxBESS materials were readily available to all school districts, funding for implementation of these programs was not. Currently, TxBESS materials and training are still available. However, the program is not mandated nor funded across the state.

Recently, the Beginning Teacher Induction and Mentoring (BTIM) grant was awarded to 50 schools in districts across the state (Eaton et al. 2009). Schools with high teacher turnover and high percentages of beginning teachers were given precedence for funding. This grant is a two-year initiative to help "improve teacher quality and help teachers through their first years in the classroom" (Texas Education Agency 2007a, ¶2). Eaton and colleagues (2009) claim that the evaluation of the program after the first year has implications for the retention of beginning teachers that meets or exceeds the state's current average, notable in that the schools involved were the ones that had high teacher turnover rates. However, Eaton's evaluation is limited because (a) the grant had only been in place for a year; and, furthermore, (b) districts were allowed to utilize any induction program approved by the Texas Education Agency. (In effect, one cannot specify a particular induction program as being particularly effective.) In addition, one must wonder about sustainability as grant funds will cease in 2010 and funding will fall into the hands of the districts.

Major Components of Induction Programs

Mentoring

The words *induction* and *mentoring* have become indistinguishable. However, mentoring is only one component of comprehensive induction programs (Britton et al. 2003a).

Mentoring is the most common, and sometimes the only, subcomponent of induction programs (Britton et al. 2003a; Carver & Feiman-Nemser 2009; Fulton et al. 2005). Moreover, the within- and across-case analysis by Carver and Feiman-Nemser (2009) indicated that because mentoring is the dominant policy across induction programs, mentors are placed in the "role of policy brokers. Through their interactions with beginning teachers, mentors bring induction policy to life, determining to a great extent whether and how the aims of the policy will be realized" (p. 315). The make-up of mentoring not only varies from school to school, but from mentor to mentor (Ingersoll & Kralik 2004). Additionally, the amount of time spent mentoring, and how that time is spent, are examples of variables that differ from mentor to mentor. Contact time with a mentor has also been linked to increases in achievement of the new teachers' students (Fletcher, Strong, & Villar 2008).

Mentors can take on many forms. Some mentors are formally assigned to the new teacher by the school or district and at other times, mentorships are established casually and informally by the new teacher herself. Furthermore, people from outside the school or district, such as scientists and teacher educators, can serve as mentors to the beginning teachers.

Beginning teachers paired with master science teacher mentors improve teacher retention by focusing on anxieties, feelings of efficacy, orientation into the profession, enculturation, support, career learning, and enhancing teacher quality (Darling-Hammond 2003). Likewise, Smith and Ingersoll (2004) indicated that beginning teachers with same-subject mentor teachers were more likely to be retained in the profession after their first year of teaching.

A research study by Shen (1997) used discriminant function analysis to examine data from the 1990-1991 Schools and Staffing Survey (SASS) and the 1991-1992 Teacher Follow-up Survey, both conducted by the National Center for Educational Statistics. Shen's findings indicated that teacher turnover was more frequent in schools with a higher percentage of less-experienced teachers (i.e., teachers with less than three years of teaching experience), a higher percentage of students of low-socioeconomic status (i.e.,

students receiving free or reduced lunch), a higher percentage of non-white students, and a teacher salary schedule that does not reward teachers with Master's degrees. Additionally, school characteristics (i.e., presence of a formal mentoring program, beginning teacher salary, student enrollment, school location, and class organization) were not found to be determinants of teachers belonging to either the *Stayers* (i.e., teachers retained at the same campus), *Leavers* (i.e., teachers who voluntarily left the teaching profession), or *Movers* (i.e., teachers who moved to another campus to teach) groups. The discriminant analysis did find, however, that only the presence or absence of a mentoring program variable significantly distinguished teacher groups of *Stayers* and *Movers* from *Leavers.* Shen's results provided strong support for the presence of a mentoring program as being an important variable in the retention of public school teachers.

School- and district-level administrators also play critical roles in the induction of novice science teachers. While administrators could serve as mentors to novice science teachers, administrators usually function as formal evaluators. Additionally, school administrators are often the ones responsible for selecting mentors and pairing mentors with new teachers. In that regard, administrators should exercise extreme care in assigning mentors. The selection of mentors is critical in the success of teacher mentoring (New Teacher Center at University of California [NTC] 2006). Excellent teachers do not automatically become excellent mentors. Good teachers may not understand "how to make their thinking visible, explain the principles behind their practice, or break down complex teaching moves into components understandable to a beginner" (Feiman-Nemser 2003, pp. 28-29). Mentors should receive training to address the many facets of novice teacher mentoring (Carver & Feiman-Nemser 2009). Without training, mentors will be left to "sink or swim" like their new teacher counterparts (Moir & Hanson 2008).

Ingersoll and associates (see Ingersoll 2000; Ingersoll & Kralik 2004) have found that induction programs pairing master science teacher mentors with novice science teachers are more likely to retain their novice teachers. A study of induction-year

teachers in South Texas conducted by Eberhard, Reinhardt-Mondragon, and Stottlemyer (2000) indicated that mentoring programs have the most positive influence on teachers in their first-year of teaching, a positive effect that was shown to decrease with increasing years of beginning teachers' experience. Additionally, research findings from this study indicated that teachers who had a "model teacher" tended to remain in teaching more than those that did not have a "model teacher." Furthermore, Eberhard and associates also found that the amount of time spent in mentoring had an effect on new teacher retention: teachers who had greater than one hour of contact time with their mentor per week were more likely to remain in teaching than those induction-year teachers with less contact time.

Administrative Supports

General leadership from the principal. Traditionally, administrators' jobs have focused on the political and managerial side of school with less focus on instruction (King 2004; Robinson 2006; Supovitz & Poglinco 2001). With recent school accountability policies, however, administrators are being held more accountable for student learning. As such, a call has been made for administrators to focus more on their role as instructional leaders to be better able to guide and direct the improvement of instruction on the campus (Elmore 2000). In support of this call, Blasé and Blasé's (1999) research findings indicated that teachers found principals most effective when they promoted teacher professional growth and communicated with them as they reflected on their teaching.

School administrators are charged with running a school with the goal of maximizing student achievement. One major area of administrative focus is building school capacity. Fullan (2002) elaborates by stating:

> …school capacity is the crucial variable affecting instructional quality and corresponding student achievement. And at the heart of school capacity are principals focused on the development of teachers' knowledge and skills, professional community, program coherence, and technical resources….Characterizing instructional leadership as the principal's central role has been a valuable first step in increasing student learning, but it doesn't go far

> enough….To ensure deeper learning—to encourage problem solving and thinking skills and to develop and nurture highly motivated and engaged learners, for example—requires mobilizing the energy and capacities of teachers. In turn, to mobilize teachers, we must improve teachers' working conditions and morale. Thus, we need leaders who can create a fundamental transformation in the learning cultures of schools and of the teaching profession itself. (pp. 16-17)

Fullan (2002) and others (e.g., Blasé & Blasé 1999; Elmore 2000; Hsieh & Shen 1998; King 2004; Marks & Printy 2003; Robinson 2006; Spillane 2004; Spillane, Hallet, & Diamond 2003; Stein & Nelson 2003; Sun 2004; Youngs 2007; Youngs & King 2002) reject the general business model as appropriate in running a school. Instead, many reformers adopt new models of leadership for principals that focus on the needs of today's teachers and their classrooms of students.

Educational leadership from the principal. To build "school capacity," principals must be knowledgeable of content, effective instructional strategies, adult learning theory, and teacher learning theory to be able to identify quality instruction from their teachers and provide needed professional development to improve instructional practices and student learning (Stein & Nelson 2003). Wahlstrom and Louis (2008) elaborated by stating: "As an instructional leader in the building, the principal is expected to understand the tenets of quality instruction as well as have sufficient knowledge of the curriculum to know that appropriate content is being delivered to all students" (p. 459). New models of leadership define effectiveness in principals in terms of their knowledge of teachers' instructional abilities, making every effort to develop and improve upon those abilities. This may be even more important for beginning teachers.

Robinson (2006) frames the construct of *instructional leadership* as "putting education back into educational leadership" (p. 63). Instructional leadership can be provided by more than school-based administrators. For instance, curriculum supervisors, mentors, and other teachers inside and outside a school system can provide the leadership needed to help develop individual teacher's instructional practices (Spillane et al. 2003). However, instructional leadership provided by campus

administrators remain the focus of this section because of its importance to understanding conditions that are essential in sustaining a school's teacher workforce.

A new line of research, branching off from Shulman's (1986) construct of *pedagogical content knowledge*, is the idea of *leadership content knowledge*. Leadership content knowledge is defined as "that knowledge of subjects and how students learn them that is used by administrators when they function as instructional leaders" (Stein & Nelson 2003, p. 445). Administrators serve teachers as both evaluator and supporter. An administrator needs knowledge of subject matter, student learning, and pedagogical content to effectively evaluate individual teacher's instructional practices. Additionally, administrators require knowledge of how teachers learn to help support their professional growth. Robinson (2006) asserts that:

> If principals are going to lead pedagogical change, they also need to know how to promote the learning of their teachers. This includes knowing how teachers understand the subjects they are teaching and the extent to which those understandings are consistent with the school's vision for the subject. (p. 70)

Administrators cannot be expected to be content experts in all subjects. A conclusion of the case study by Stein and Nelson (2003) was that administrators should have strong content knowledge in at least one subject in order to be aware of effective instructional practices and quality student products. Graczewski, Knudson, and Holtzman (2009) conducted a longitudinal mixed-methods study of elementary schools in San Diego, CA and concluded that:

> The extent to which the leadership team visited teachers' classrooms, provided resources and support for professional development, and understood the learning needs of teachers was related to the extent to which professional learning opportunities at the school were focused on content and curriculum. (p. 90)

The instructional leader perspective recognizes that principals play a pivotal role in the development of beginning science teachers' expertise as these novice teachers not only learn the policies and politics of the school but also learn how to design engaging

learning environments that promote increases in student achievement. Moreover, principals who are more educated in innovative, standards-based, instructional strategies, especially in science (Rhoton, 2001), can help to encourage and develop those practices in all teachers, especially novices.

As with most reform movements in education, however, the principal who embraces the role of instructional leader is met with challenges. Often, administrators are responsible for formally evaluating teachers' classroom performances. However, teachers' perception of administrators' human capital, defined as the knowledge, skills, and expertise possessed by an individual (Spillane et al. 2003), may determine how well the administrator's evaluation of teaching is received. The qualitative study of 84 teachers at eight Chicago elementary schools by Spillane and colleagues (2003) indicated that teachers regarded the principal as having human capital when the principal had previously taught the same subject and was regarded as having been a good teacher. These qualities led to an assessment of the principals as having teaching legitimacy in the eyes of the teachers. Moreover, campus principals already have a heavy workload; becoming an instructional leader may be perceived as just one more thing to add to the principal's to-do list. Therefore, policy makers and implementers must sort out the various tasks of school principals in relation to their roles as instructional leaders, business managers, disciplinarians, motivators, counselors, school safety experts, and politicians. If instructional leadership is perceived to be a role of importance in all that the principal does, that role should take precedence in school policy. The role of policy makers also becomes more complex, as they become responsible for determining the ways to incorporate this role into the administrator's workload.

Costs and Benefits

What are the costs and benefits of induction programs? Comprehensive induction programs can be costly undertakings. Likewise, however, teacher attrition can also be costly, both financially and academically. Many administrators are interested in the "bottom line" of implementing a program in their schools. Namely, administrators want

to know how much the program will cost and what benefits the school will receive in terms of overall outcomes (e.g., student achievement and teacher retention).

Studies evaluating the cost of replacing teachers (e.g., Milanowski & Odden 2007; Texas Center for Educational Research 2000) have found that the actual expenditures to replace a teacher vary from district to district. The National Commission on Teaching and America's Future (NCTAF) conducted a pilot study of five school districts to determine the costs of teacher turnover (Barnes, Crowe, & Schaefer 2007). The NCTAF study determined that the cost to replace a teacher varied from $4,366 in Jemez Valley, New Mexico to $17,872 in Chicago, Illinois. Moreover, the study estimated the yearly total cost of teacher turnover in the Chicago Public Schools to be over $86 million. The NCTAF determined the cost of teacher turnover based on costs for recruitment, hiring incentives, administrative processing, induction, and professional development. However, the NCTAF estimations do not distinguish teachers who retired from the percentage of *Leavers.* This omission of information muddles the reported costs of teacher turnover and makes it difficult for policy makers to utilize the information.

A cost analysis of teacher turnover in Texas used similar variables in calculations as did NCTAF but also included subject matter shortage area stipends, advertising costs, and background checks (Texas Center for Educational Research [TCER] 2000). The TCER analysis of district-level data for the 1998-1999 school-year estimated that teacher turnover was costing Texas between $3,400 and $5,200 per teacher. Overall, teacher turnover was estimated to be costing Texas between $329 million and $2.1 billion per year. However, when teachers walk out of a school, more than invested money walks out with them. For example, Hanushek, Kain, and Rivkin (2004b) indicated that schools with high concentrations of low achieving and disadvantaged populations have higher proportions of new teachers due to high teacher turnover and filling vacancies with inexperienced teachers; as a result, these schools' difficulties with student achievement are magnified because of continued staffing of inexperienced teachers.

Milanowski and Odden (2007) conducted a teacher turnover cost analysis in a large Midwestern district with over 90,000 students, 6,000 teachers and 160 schools. The

authors reported the main contributors to the teacher turnover costs were training and lost productivity. When they included the costs of induction and yearly teacher professional development, Milanowski and Odden estimated the district's total teacher turnover costs were between $6,829 and $8,273 per teacher.

The cost of induction programs will vary by site and the components of induction in place. The review of research conducted by Strong (2009) concluded that analyzing the costs and benefits of teacher induction is difficult to do with administrative business models. Additionally, Strong points out that per teacher turnover costs can be misleading in regards to the stability of a district's teacher workforce. For example, a district that has invested heavily in an induction program may have low teacher turnover and high per-teacher turnover costs.

Villar and Strong (2007) conducted a cost-benefit analysis of providing the New Teacher Center's comprehensive induction program in a single school district in California. (For a description of the New Teacher Center see Carver and Feiman-Nemser 2009.) The per-teacher costs of the induction program were reported as $6,605. This cost-benefit analysis also constructed monetary estimates of mentor effectiveness, teacher retention, student achievement, and principals' time saved because of fewer administrative observations to beginning teachers. The first- and second-year teachers participating in the program were found to be as effective as fourth-year teachers who were not in the induction program. The authors concluded new teachers, students, districts, and the state benefited from the induction program. Overall, Villar and Strong's cost-benefit analysis reported a five-year return of $1.66 for every dollar invested in a beginning teacher.

Conclusions

Comprehensive induction programs entail more than orienting a new teacher to basic school policies and procedures. New teachers need to learn basic school policies and procedures in order to function in the system and culture of the school. However, beginning teachers' needs extend far beyond learning to make copies, submit grades, and request substitute teachers. New teachers require multifaceted supports that will allow

them to grow as professional educators. Comprehensive induction programs require a commitment from school administrators and faculty members to the professional learning of all teachers. Part of this commitment takes place through frequent assessment and reflection on teaching and instruction.

Regardless of the route to certification, beginning science teachers enter the classroom as unfinished products. Beginning teachers have many things to learn including content, pedagogy, classroom management, school culture, and school politics. Comprehensive induction programs that are situated firmly in the learning community of the school can help the beginning science teacher to develop into a competent and confident teacher. From a science educator's perspective, it is important that induction programs address science teachers' specific learning needs. Learning to teach science as specified by the *National Science Education Standards* (National Research Council 1996) and the *Benchmarks for Science Literacy* (American Association for the Advancement of Science 1993) is a complex task for teachers. It is this science educator's opinion that principals should design their schools as learning environments to address the science learning needs of students *and* teachers.

In order for induction programs to be successful, certain supports, systems, and policies will need to be in place. The specifics of these may be different for every campus. Support personnel, from inside and outside of the school, will be needed to construct and implement the policies and practices needed to develop beginning novice science teachers into expert professionals. Mentor teachers bear the burden of implementing most induction programs. As a result, mentor teachers need training so that they are prepared to address the needs and concerns of beginning teachers.

Administrators should formulate and implement policies so that teacher learning becomes a priority of a school's induction program. Administrators and policy makers will not have to start from scratch to develop these policies. There are many existing models of international and national induction programs and only a few are highlighted in this review. More importantly, administrators need to create and act on policies that make mentor training and time for mentoring a priority of the school's induction

program. As stated by Feiman-Nemser (2001), “if we want schools to produce more powerful learning on the part of students, we have to offer more powerful learning opportunities to teachers” (pp. 1013-1014). Administrators who frequently assess the quality of novice teachers’ teaching should also evaluate the quality of the school’s induction program. Boyer and Gillespie (2004) indicated that districts “developing induction and mentoring programs with well designed assessment and support components are producing positive retention trends for all teachers” (p. 1.5). Moreover, policy makers at all levels will need to examine priorities for teachers’ learning at all stages of their career. Science teacher learning must be a priority if student achievement in science is to be of a high priority.

CHAPTER III

PRINCIPALS' PERSPECTIVES OF TEXAS PUBLIC HIGH SCHOOL SCIENCE TEACHER INDUCTION: A MIXED METHODS STUDY

Synopsis

Principals are the primary policy makers and policy implementers on their campuses. Additionally, principal leadership has been linked with establishing the professional culture of a campus. This exploratory mixed methods study reports on data collected by the Policy Research Initiative in Science Education (PRISE) research project during the 2007-2008 academic year. A content analysis of interviews collected from 50 principals revealed principals' perceptions of teacher induction. Descriptive statistics are provided to illustrate possible trends in (a) the types of supports provided to beginning (i.e., new to the profession) high school science teachers and (b) mentors across various school types (i.e., size and minority status). Analyses indicate that high school science principals (a) have an overwhelmingly narrow focus of mentoring and (b) provide mentor teachers with little to no support or training in becoming effective mentors. Findings of this study further indicate that induction activities for beginning teachers are front-loaded before the school year begins and left in the hands of unprepared mentors once school begins. Further analysis indicates that the primary purpose of mentoring and induction for beginning teachers in Texas high schools revolves around learning campus policies and procedures. Beginning teachers' instructional needs appear to be an afterthought. The author concludes this article with policy recommendations for statewide beginning teacher induction support.

Introduction

The state of Texas recommends that teachers with less than two years of professional teaching experience be provided with an experienced mentor who resides on the same

campus and teaches the same subject (Texas Administrative Code 2006). In 1999, the state of Texas piloted the Texas Beginning Educator Support System (TxBESS). The implementation of this program was limited to participating schools and ceased when funding ended (Charles A. Dana Center 2002). While TxBESS materials and training are still available, the program is neither mandated nor funded by the state. Texas recently re-ignited some interest in teacher induction by awarding Beginning Teacher Induction and Mentoring (BTIM) grants to 50 campuses across the state (Eaton et al. 2009). With money from this grant, campus principals were able to select from 22 Texas Education Agency (TEA)-approved induction providers to either create or modify a support program for beginning teachers (Texas Education Agency 2007b). When the grant expires, fiscal responsibility for the continuation of the new or modified program becomes the responsibility of the parent school district. In Texas, the plan with BTIM is that individual districts and campuses ultimately bear the responsibility for maintaining the support program.

With the passing of the *No Child Left Behind Act of 2001* (NCLB, U.S. Congress 2002), principals in public schools pay close attention to staffing their schools with "highly qualified" teachers. According to NCLB, a highly qualified teacher is defined as one who (a) holds a bachelor's degree from a four-year institution; (b) receives state teacher certification; and (c) exhibits competency in the content discipline (Berry et al. 2004). However, the term highly qualified can have different meaning for different people. State certification is unique to each of the 50 states and "competency" is a qualitative term open to individual interpretation.

In addition, the majority of states, including Texas, hold individual teachers and schools accountable for student performance on state-mandated exams. Prior research findings indicate that the best school-based predictor of student performance is the *highly qualified* teacher in the classroom (e.g., Aaronson et al. 2007; Hill et al. 2005; Rivkin et al. 2005). Students are entitled to receive a quality science education. Students normally have little choice as to who will be their teacher. Beginning teachers enter schools with varying levels of knowledge in content and pedagogy and are by nature

inexperienced. Consequently, beginning teachers' inexperience and knowledge deficits affect the quality of their teaching practice and the subsequent learning of their students. However, it is important to note that beginning teachers, even as novices, contribute to their schools as well. Kardos and Johnson (2007) noted that being a novice teacher should not have a negative connotation:

> "Novice status," as we have called it (Kardos et al., 2001) is not an official designation, nor is it negative. Instead, it suggests a set of formal practices or prevailing attitudes about new teachers that recognize and accommodate their needs as beginners. A new teacher with novice status is expected and encouraged to seek help, is provided with extra assistance, and is given roles appropriate to his or her experience and expertise. (p. 2095)

Comprehensive induction programs can help beginning teachers gain experience and support through their first years of teaching.

Research findings suggest that beginning teachers leave the profession at disturbingly high rates. Some researchers have suggested that up to half of all teachers leave by the end of the fifth year (Ingersoll 2003b; Smith & Ingersoll 2004). Beginning teachers who leave the classroom are replaced with other inexperienced beginning teachers, increasing the probability students will have teachers with little or no experience as a classroom teacher. Kardos and Johnson (2007) indicated that

> new teachers are more likely to stay in teaching and remain at their schools when they perceive their schools to be places that do three things: promote frequent and reciprocal interaction among faculty members across experience levels; recognize new teachers' needs as beginners; and develop shared responsibility among teachers for the school and its students. (p. 2084-2085)

As a result, induction programs have become the policy-of-choice for many schools and districts to alleviate the high attrition rates of beginning teachers.

School principals are the primary policy makers and implementers of policy on their campuses. The statewide conditions of beginning high school science teacher induction

in Texas are currently unknown. Policy makers run the risk of making policy blindly without an understanding of the types of supports already provided by schools to beginning teachers. Because teacher induction more often is highly localized (i.e., school or district), an understanding of what school principals do and think about teacher induction policies, programs, and practices is important to identify schools' current induction priorities.

Learning Environments for Beginning Teachers

Research on induction programs and their effects on teacher retention, practices, and effectiveness is emerging. The review of literature by Wang, Odell, and Schwile (2008) reported that:

> Teacher induction programs have historically focused on the personal comfort levels of novices (Feiman-Nemser et al., 1998; Gold, 1996). Feeling comfortable does not necessarily lead to effective teaching and student learning (Anyon, 1981). (p. 133)

Moreover, research on the content-specific needs of beginning science teachers has emerged as a field of interest to science education scholars (e.g., Britton et al. 2003b; Fong 2003; Forbes 2004; Luft et al. 2007a; Luft 2003; Luft et al. 2007b; Patterson & Luft 2002; Patterson et al. 2003; Roehrig & Luft 2006; Watson 2006). Although the available research on induction for science teachers is just emerging, most scholars agree that beginning teachers of all subjects require schools with positive school cultures that recognize beginning teachers as novices and promote all teachers' needs for professional growth (Darling-Hammond 1998; Feiman-Nemser 2001a, 2001b; Kahle & Kronebusch 2003; Kardos & Johnson 2007).

Kardos and Johnson (2007) described an "integrated professional culture" in which there was:

> ongoing, two-way interaction about teaching and learning among novices and experienced teachers. New teachers were granted special status as novices: they were given assistance, encouraged to seek help, and expected to be learning and improving their teaching practices. In addition, new teachers and their colleagues shared responsibility for the school, its students, and each other. (p. 2088)

The simple yet elegant model for optimal learning environments provided by the *How People Learn* (HPL) framework identifies four perspectives that can appropriately be adopted by learning environment designers: learner-centered, knowledge-centered, assessment-centered, and community-centered (Bransford et al. 2000). This powerful model can be used to provide insights in its application to beginning science teachers. Traditionally, the HPL framework has been used to inform teachers about the design of optimal learning environments to meet the needs of their students. However, in the case of new teachers, schools can be the classrooms in which beginning teachers learn (see Figure 3.1).

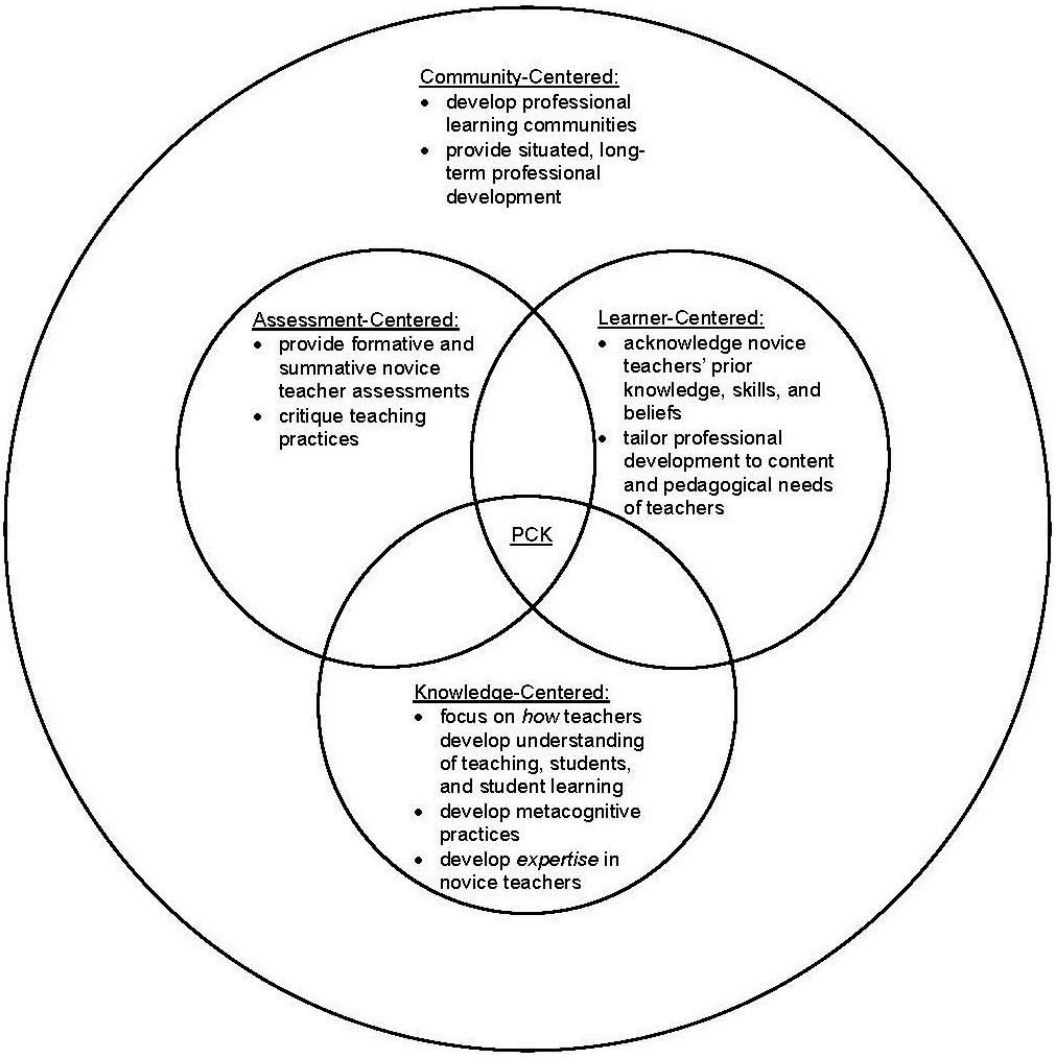

Fig. 3.1 Theoretical framework for teacher induction based on the *How People Learn* framework. Source: Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.). (2000). *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academy Press.

Comprehensive induction programs include much more than the one-on-one mentoring of a beginning science teacher. A system of induction goes "far beyond support or assistance, using a variety of co-ordinated [*sic*] means tailored to perceptions of the novices' and the general educational systems' requirements" (Britton et al., 2003a,

p. 5). Comprehensive induction programs require many individuals playing interconnecting roles to support the professional growth of induction-year teachers.

The HPL Framework's overlapping constructs of learner-, knowledge-, assessment-, and community-centeredness provide a learning sciences lens through which to view teacher induction. As the learner in the school environment, beginning science teachers need a multifaceted system of support addressing their individual learning needs. Each teacher enters the school with variations in preservice preparation. Learner-centered schools for novice teachers acknowledge their prior knowledge, skills, and beliefs. They develop induction programs that will build on teachers' preservice experiences (Feiman-Nemser 2001a, 2001b; Kahle & Kronebusch 2003). Additionally, a learner-centered school will tailor novice teachers' professional development to their individual content and pedagogical needs (Bransford et al. 2000). Knowledge-centered schools focus on how to better develop teachers into expert teachers. Focusing on metacognitive practices is one way to encourage the development of expertise (Bransford et al. 2000). By helping teachers develop metacognitive teaching practices, school personnel and beginning teachers can gain a better understanding of what the beginning teacher already knows, what assistance is required, and how to develop areas of deficiency. Likewise, assessment-centered schools for novice teachers provide multiple opportunities for both formative and summative assessment of beginning teachers' instructional abilities. However, none of these actions are possible if the school is not also community-centered. The establishment of a professional learning community will invite open critiquing of teaching practices and provide situated, long-term professional development. Additionally, community-centered schools will allow for teachers to be enculturated into a "community of practice" (Wenger 1998) where it is safe to make mistakes and learn from each other's experiences (Lave & Wenger 1991). All things considered, constructing optimal learning environments for students will only be enhanced when optimal learning environments for teachers have been equally established.

Needed Policy to Support Beginning Teachers' Needs

Beginning teachers are not finished products and need time to learn—time to learn about professional expectations, teaching resources, and school culture. Additionally, teachers need time to learn about general and specific subject requirements of their teaching assignments and how to make the curriculum relevant to the needs and interests of their students (Feiman-Nemser 2003).

When first entering a classroom, beginning high school science teachers have multiple needs and concerns. Adams and Krockover (1997) reported that beginning science and mathematics teachers have concerns about curriculum development, classroom assignments, content presentation, classroom management, and time management. In addition to the knowledge needed to teach courses, beginning science teachers must also learn school policies, procedures, politics, and culture. Additionally, beginning teachers may find conflict with their school's more traditional educational approach and any possible reform-based teacher training experiences (Schempp et al., 1993).

School, district, state, and national policies on teacher induction are needed for induction to be successful in practice. Linda Kelly (2004) comments on the support needed and the lack of support received for beginning teacher induction:

> Legislators and policy makers have failed to take a long view of what national, state, and local agencies might do to retain committed, effective teachers by providing the necessary financial resources and incentives for induction support and ongoing teacher development. In fact, historically U.S. school districts have paid insufficient attention to education's human resources, and this inattention has been and will continue to be financially and professionally costly. For example, NCTAF (1996) reported that induction programs are most likely to be eliminated during times of district budget reductions, decisions that inevitably produce deleterious consequences for school districts interested in retaining their novice teachers. (pp. 446-447)

Induction occurs at a school whether that school has an induction program or not. Every year new teachers enter classrooms for the first time. These teachers face multiple combinations of beginning teacher support which vary by school. Some teachers may encounter a well thought-out formal mentoring and induction program. Most will receive informal mentoring from a colleague or buddy teacher.

> [An]…informal buddy system may work for the fortunate novice who gets adopted, but it hardly represents an adequate response to the larger need. Relying on the good will of experienced teachers to reach out on their own initiative ignores the learning challenges that beginning teachers face and the need for a more sustained and systematic approach to their development. (Feiman-Nemser, 2001, p. 1030)

Most recently, formal induction programs for beginning teachers have emerged across the United States. What beginning teachers learn and experience during their first years of teaching sets the tone for the rest of their career (Gold, 1996). With this fact in mind, an easy argument exists: teacher induction may be the most important form of professional development for teachers (Wong, 2002). If formal policies for mandating *and* funding comprehensive teacher induction and other forms of professional development do not exist at the state level, individual districts and schools are then responsible for developing and implementing policies. Therefore, it is important for researchers to examine established priorities at state, district, and school levels.

Principal as Instructional Leader

A new line of research, branching off from Shulman's (1986) construct of *pedagogical content knowledge*, is the idea of *leadership content knowledge*. Leadership content knowledge is defined as "that knowledge of subjects and how students learn them that is used by principals when they function as instructional leaders" (Stein & Nelson, 2003, p. 445). Principals serve teachers as both evaluators and supporters. A principal needs knowledge of subject matter, student learning, and pedagogical content to effectively evaluate individual teacher's instructional practices. Additionally, principals require

knowledge of how teachers learn to help support their professional growth. Robinson (2006) asserts that:

> If principals are going to lead pedagogical change, they also need to know how to promote the learning of their teachers. This includes knowing how teachers understand the subjects they are teaching and the extent to which those understandings are consistent with the school's vision for the subject. (p. 70)

The instructional leader perspective recognizes that principals play a pivotal role in the development of beginning science teachers' expertise as these novice teachers not only learn the policies and politics of the school but also learn how to design engaging learning environments that promote increases in student achievement.

Research Purpose and Questions

The purpose of this study is to explore Texas public high school principals' perspectives on teacher induction in their schools to gain an understanding of induction trends across the state. School principals were asked to reflect on their schools' current induction practices, programs, and policies. Doing so allowed for the following research questions to be addressed:

1. How do Texas public high school principals perceive beginning science teacher induction at their schools?
2. How do principals' perceptions of their schools' induction practices rank?
3. How do induction program components differ by school size and minority student enrollment profile?

Methods

Context of Study

The Policy Research Initiative in Science Education (PRISE) is a five-year research study designed to answer three essential policy research questions about the high school science teacher professional continuum (TPC) in Texas: *Where are we? Where should we go? How do we get there?* The project uses a systems approach to link prior research

findings with mixed research methods to inform the development of policies and practices related to high school science teacher recruitment, induction, renewal, and retention.

PRISE Methodology

Mixed Methods Rationale

Mixed methods is defined as a "procedure for collecting, analyzing, and 'mixing' or integrating both quantitative and qualitative data at some stage of the research process within a single study for the purpose of gaining a better understanding of the research problem" (Ivankova, Creswell, & Stick 2006, p. 3). The decision to use mixed methods in this study draws on the need to be able to note trends and generalizations of induction practices across schools as well as to gain an in-depth knowledge of individual school principals' perspectives of current induction practices (Creswell & Plano Clark 2007).

PRISE Sampling Procedures and Principal Participants

A two-stage stratified random sampling plan was designed to select 50 schools to proportionally represent the 1,333 public high schools in Texas where high school science courses are taught (Stuessy, McNamara, & the PRISE Research Group 2008). Two explicit stratification variables were used in the sampling procedures: school size and minority student enrollment proportion (MSEP). School size was based on total student enrollment; schools were grouped into three categories: *Small* (n=15; high school student enrollment equal to or less than 189), *Medium* (n=17; high school student enrollment equal to or greater than 190 and less than or equal to 899), and *Large* (n=18; high school student enrollment greater than or equal to 900). Schools' MSEP is divided into two categories for this report: *Low* (n=29; less than 50 percent minority student enrollment) and *High* (n=21; greater than or equal to 50 percent minority student enrollment). Additionally, an implicit stratification method was used to ensure sample schools were geographically representative of the state. This method took into account schools' location within Texas' Regional Education Service Centers (ESCs) as well as the ESCs' location within Texas. (For a thorough description of the PRISE sampling

plan, see McNamara & Bozeman 2007.) These stratification variables were selected to maximize the generalizability of the PRISE survey research findings. Additionally, these stratification variables are concurrent in policy planning at state and national levels. A modified random sampling plan was used to replace non-cooperating schools. Replacement schools matched the non-cooperating schools on the sampling variables used in the original design of the sampling plan.

Once sample schools were selected, campus principals (n=50) were contacted by PRISE researchers to gain their permission to conduct the research at their schools. Of the 50 participants, 43 were principals and seven were assistant principals; two of the principals also served as the superintendent of the school district in which the high school resides. Hereafter, all particpants regardless of status will be collectively referred to as principals.

Data Collection

During the 2007-2008 school year, PRISE researchers interviewed principals to gain an understanding of current school policies and practices affecting teachers at various stages in the teacher professional continuum. All principals (n=50; 100% return rate) completed a field-based semi-structured interview. (See Appendix B.) Interviews were audio recorded, transcribed, and transposed into data charts. (Data charts are two-columned tables with the question of interest in the left column and all pertinent

responses from the interviewer placed in the right column.) When principals did not grant permission to record the interview (n=5), field notes were used as primary data sources and were transferred into data charts.

Mixed Methods Data Analysis

In the first phase of the study, a within-case analysis of principals' responses was used to determine principals' perceptions of their schools' available induction components. Simultaneously, qualitative data were reduced and coded for different components of induction support (Chi 1997). In addition to the interviews, themes of induction practices recommended by the professional literature were also used. This within-case analysis of school-level induction support resulted in the creation of a *scoring rubric* (see Appendix C). Additionally, to gain an understanding of the type and range of induction components offered across the state, a cross-case analysis (Miles & Huberman 1994) of components was conducted. Following this qualitative data analysis, a descriptive quantitative analysis was used to determine the frequency and percentages of induction components across different PRISE sample school types. See Figure 3.2 for a display of the research design for integration in the collection and analysis of quantitative and qualitative data (after Creswell & Plano Clark 2007).

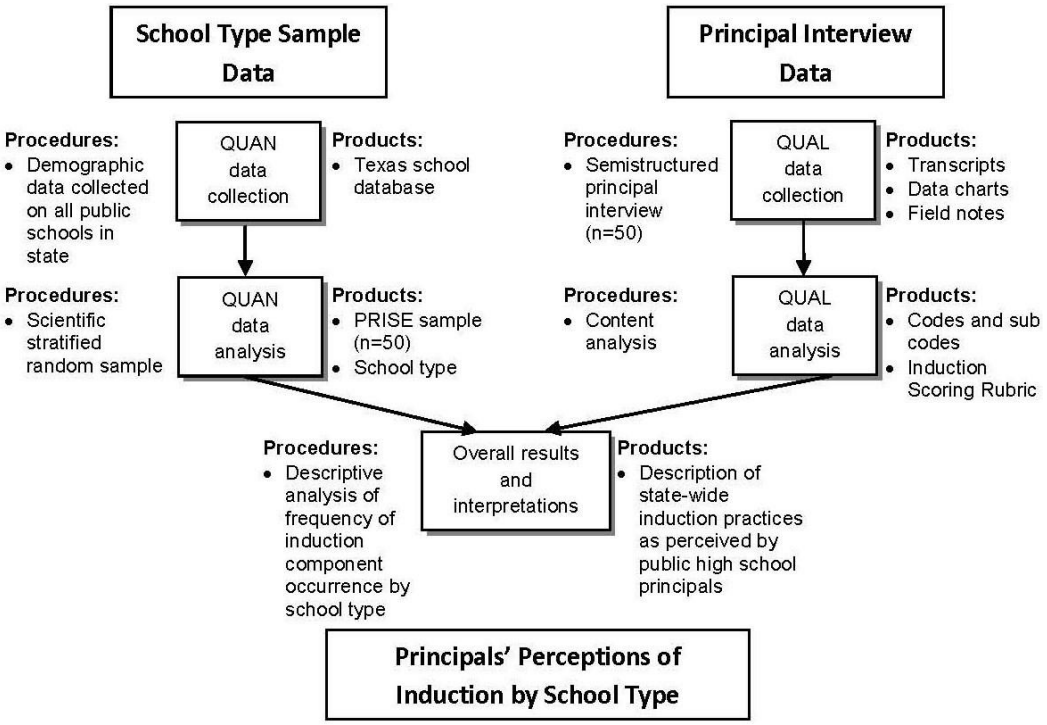

Fig. 3.2 Visual model of mixed methods analysis.

Results and Analysis

Findings from the principals' interviews regarding their individual schools' policies and practices for beginning science teacher induction are presented in three sections; each section corresponds to a research question. Principals' responses were categorized by school size and minority student enrollment profile (MSEP) to maintain confidentiality. Additionally, principals' voices supplement the findings to give a richer description of the current state of teacher induction in Texas. To preserve confidentiality, only a three-digit code identifies principals. For example, code A01 indicates a principal from school 01.

Research Question 1: How do Texas Public High School Principals Perceive Beginning Science Teacher Induction at their Schools?

The content analysis of principals' interviews resulted in eight sub-questions with which to answer the research question, *How do Texas high school principals perceive beginning science teacher induction?* To focus on different aspects of teacher induction practices, these questions include:

1. What do principals think "works best" for teacher induction?
2. What are principals' roles in induction?
3. Whom do principals identify as mentors?
4. What mentoring activities do principals report?
5. What induction supports for mentors are reported by principals?
6. What induction supports for beginning teachers are reported by principals?
7. Do principals differentiate between induction supports for beginning teachers and those for transfer teachers?
8. What concerns do principals have about teacher induction?

Sub-Question 1.1. What do principals think "works best" for teacher induction?

When asked "what works best" for teacher induction in their schools, nearly half (48%) of all principals reported that mentoring was the most effective induction practice (see Table 3.1). The second most common response (28%) from principals indicated that building relationships among school faculty and principals was the most helpful.

When comparing responses by school type, principals from Medium and Large schools gave similar rankings of importance on mentoring and new teacher orientation. Principals from Small and Medium schools placed similar importance on building relationships. Principals from Small schools placed no emphasis on team planning and new teacher orientation. Very small differences existed between schools with Low and High MSEP. Overall, all school principals ranked mentoring as the best support for teacher induction.

Table 3.1 Principals' reports[a] of "what works best" for teacher induction by school size and Minority Student Enrollment Proportion (MSEP)

		School Size (%)			MSEP (%)	
	All (%) (n=50)	Small (n=15)	Medium (n=17)	Large (n=18)	Low (n=29)	High (n=21)
Mentoring	48	40	53	50	48	48
Building relationships (e.g., relationships between teachers, mentors, and/or administration)	28	20	24	39	24	33
New teacher orientation (e.g., a program held before school starts to orient teachers to district/school policies and procedures)	10	0	12	17	7	14
School policies and procedures (e.g., how to submit grades, how to request a substitute, how to make photocopies)	6	13	0	6	10	0
Other	6	20	0	0	10	0
Team planning (e.g., working with other teachers to lesson plan)	4	0	12	0	3	5

[a]Some principals indicated more than one response.

Sub-Question 1.2. What are principals' roles in induction?

As school principals are the primary campus level policy makers and implementers of policy, it is of interest to learn of their direct role in teacher induction. Table 3.2 lists principals' reports of their involvement in teacher induction. The most common activities reported included: selecting mentors (46%), matching mentors with new teachers (38%), observing novices informally (38%), conveying school policies and procedures (32%), and communicating expectations to new teachers (30%). Principals less frequently reported meeting with novices throughout the school year (24%), keeping an open-door policy (22%), assisting novices in improving science instruction (20%),

and seeking feedback on induction experiences from novices (14%). Very few principals reported providing substitute teachers for mentors and/or mentees to observe each other's teaching (4%), communicating expectations for mentoring to mentors (4%), or formally observing beginning teachers for the purposes of induction (2%).

Table 3.2 Principals' reports of their involvement in induction by school size and Minority Student Enrollment Proportion (MSEP)

		School Size (%)			MSEP (%)	
	All (%) (n=50)	Small (n=15)	Medium (n=17)	Large (n=18)	Low (n=29)	High (n=21)
Selects mentor	46	7	59	67	38	57
Matches mentor with novice	38	20	47	44	45	29
Observes novice informally	38	40	47	28	45	29
Conveys school policies and procedures	32	20	29	44	31	33
Communicates their expectations to novice	30	7	24	39	24	24
Meets with novice throughout school year	24	13	35	17	21	24
Holds open-door policy	22	27	47	17	31	29
Assists with improving science instruction	20	20	18	22	31	5
Seeks induction feedback from novice	14	7	24	11	17	10
Provides substitute teachers for mentor/novice observations	4	0	0	11	3	5
Communicates expectations to mentors	4	0	6	6	7	0
Observes novice formally	2	0	6	0	3	0

Differences were found among principals across different school sizes. Principals from Medium and Large schools most frequently reported selecting and matching mentors and communicating expectations with novices. Principals of Small and Medium

schools had similar reports of informally observing novices and conveying policy and procedures. Principals in Medium schools more frequently reported meeting with beginning teachers throughout the school year, having an open-door policy for communicating with faculty, and seeking feedback on induction from beginning teachers. Overall, principals' induction activities appear to be differentiated by the size of the school. Taken as a whole, the majority of principals from all schools appear to have a hands-off approach to teacher induction. After mentors have been selected and matched with new teachers, few principals appear to play a role in the professional development of beginning teachers.

Sub-Question 1.3. Whom do principals identify as mentors?

Selecting and matching mentors was the primary induction activity identified by most high school principals. An understanding of the individuals selected by principals to mentor beginning science teachers would be beneficial because it is important to understand whom principals are selecting as mentors. According to Table 3.3, all principals most frequently indicated that campus science teachers (70%) served as mentors to beginning teachers. Additionally, about one-third of all principals reported that school administrators (i.e., deans of instruction, assistant principals, and principals) served as mentors.

Differences were found among different types of schools. The majority of principals from Small schools (60%) indicated that beginning teachers were mentored by informal mentors (i.e., teachers willing to take the novice "under their wing") as needed. District mentors (22%) were only reported by principals in Large schools. Principals from High MSEP schools more frequently reported science teacher mentors and district mentors than Low MSEP schools. Additionally, principals from Low MSEP schools more frequently reported school administrators, informal mentors, and non-science teachers were serving as mentors. Overall, science teachers appear to be serving as mentors to new science teachers in Medium and Large schools, whereas informal mentors appear to mentor new science teachers in Small schools.

Table 3.3 Principals' reports of individuals[a] mentoring beginning science teachers by school size and Minority Student Enrollment Proportion (MSEP)

		School Size (%)			MSEP (%)	
	All (%) (n=50)	Small (n=15)	Medium (n=17)	Large (n=18)	Low (n=29)	High (n=21)
Science teacher	70	20	82	100	59	86
School administrator	30	33	24	33	34	24
Informal mentor	26	60	12	11	38	10
Non-science teacher	12	20	0	17	14	10
District mentor	8	0	0	22	3	14

[a] Multiple individuals could be serving as a mentor at a school

Sub-Question 1.4. What mentoring activities do principals report?

Principals identified mentoring as "what works best" for teacher induction. The next step in this investigation analyzes principals' perceptions of mentors' activities (see Table 3.4). When examining schools as a whole, nearly half (48%) of all principals reported that mentors assist new teachers with non-instructional procedures (i.e., submitting grades, copying papers). Many principals' responses regarding mentors activities were echoed by the following principal's comments:

> [Mentors] cover everything from where the bathrooms are to what the office procedures are and how you pick up a drink, so to speak, from the veteran teachers. (A31)

Table 3.4 Principals' reports of mentors' activities by school size and Minority Student Enrollment Proportion (MSEP)

		School Size (%)			MSEP (%)	
	All (%) (n=50)	Small (n=15)	Medium (n=17)	Large (n=18)	Low (n=29)	High (n=21)
Non-instructional procedures (e.g., requesting substitutes, submitting grades, understanding school culture)	48	27	29	83	48	48
Informal mentoring (e.g., mentor is the "go-to" person when novice needs help)	44	73	41	22	52	33
General pedagogy (e.g., classroom management, non-science classroom assistance)	32	20	18	56	34	29
Lesson planning (e.g., helping novice with lessons)	12	7	6	22	7	14
Improving Instruction (e.g., helping novice with science instruction)	10	7	0	22	7	14
Mandatory observations of new teacher	10	0	0	28	7	14
Mandatory observations by new teacher	6	0	6	11	3	10
None mentioned (e.g., the principal did not mention any mentor activities)	18	20	24	11	10	29

Principals from all schools were least likely to report mentoring activities specifically related to instructional practice. Moreover, 18 percent (9 out of 50) of all principals did not mention any activities performed by mentors. Overall, principals' reports of mentoring activities indicated that the majority of beginning teacher mentoring focuses on general pedagogical and school procedures with little attention to improving beginning teachers' instructional practices.

Mentoring activities varied widely within and across school types. When examining principals' responses by school size, principals from Small (73%) and Medium (41%) schools were most likely to report informal mentoring activities (e.g., new teachers finding help from those willing to offer it). While principals from Large schools most frequently indicated mentors helped with non-instructional practices (83%) and general pedagogy (56%), they also reported mentoring practices aimed at improving beginning teachers' instructional practices (22%) more than principals from Small (7%) and Medium (0%) schools. For example, one principal from a Large school indicated that mentors helped:

> …with lesson planning, lesson design, working with special populations, budget issues, grading issues, and teacher-student-parent issues. (A36)

Differences were also found among schools with different MSEP. Principals from schools with Low MSEP more frequently indicated the use of informal mentoring (52%). Principals from schools with High MSEP more frequently indicated the use of non-instructional mentor activities (48%). Generally, all principals' perceptions of their schools' mentoring activities appear to be narrow and limited.

Sub-Question 1.5. What induction supports for mentors are reported by principals?

The majority of principals indicated that mentoring was the predominant induction practice. Also, principals most frequently indicated that campus science teachers most commonly served as the mentor. Consequently, it is important to understand which supports principals report are provided to mentor teachers.

Percentages of principals' reports regarding the different supports mentors receive from their schools are presented in Table 3.5. Less than 20 percent of all principals indicated any supports for mentor teachers. Only 19 percent of all principals reported that mentors received training.

Differences were found among principals from different school types. Principals' reports of mentor training increased with increasing school size. Principals from Large schools were most likely to report training (33%) and compensating (28%) mentor

teachers. Additionally, principals at schools with High MSEP were more likely to report mentor training (29%) and mentor compensation (19%). Few principals from any school type reported meetings, reduced course load, and guidelines for mentors. Overall, the majority of mentors receive little training and support to assist beginning teachers.

Table 3.5 Principals' reports of support components for mentors by school size and Minority Student Enrollment Proportion (MSEP)

		School Size (%)			MSEP (%)	
	All (%) (n=50)	Small (n=15)	Medium (n=17)	Large (n=18)	Low (n=29)	High (n=21)
Mentor training	18	7	12	33	10	29
Monetary compensation	10	0	0	28	3	19
Mentor meetings	6	0	12	6	0	5
Reduced course load	4	0	6	6	7	0
Mentoring guidelines	2	0	0	6	0	5

Sub-Question 1.6. What induction supports for beginning teachers are reported by principals?

This section examines the induction activities principals report are available to help beginning teachers acclimate to their new schools and new profession. The section is divided into two parts in order to examine what principals report is offered to beginning teachers before school starts and after school begins.

Beginning teacher activities before the school year starts. Principals' reports of induction activities for beginning teachers before the school year starts are reported in Table 3.6. The majority of all school principals indicated that beginning teachers attend a *new teacher orientation* (60%) and *learn about district/school policies* (56%). Principals less frequently reported that beginning teachers learned about district/school

technologies (18%), met other science faculty (16%), learned about the school community (10%), or learned about the science curriculum (10%).

Table 3.6 Principals' reports of induction activities for new teachers before school starts by school size and Minority Student Enrollment Proportion (MSEP)

		School Size (%)			MSEP (%)	
	All (%) (n=50)	Small (n=15)	Medium (n=17)	Large (n=18)	Low (n=29)	High (n=21)
Attend new teacher orientation	60	7	88	78	52	71
Learn about district/school policies	56	27	76	61	48	67
Learn about district/school technologies	18	0	24	28	21	14
Meet science faculty	16	7	18	22	17	14
Learn about school community	10	0	12	17	7	14
Learn about science curriculum	10	0	6	22	3	19

Examination of principals' responses across school size and MSEP indicates potential differences in the beliefs and actions of principals. When examining principals' responses by school size, it is clear that a greater number of principals in Medium and Large schools reported activities for new teacher induction before school starts than principals in Small schools. Principals from Small schools reported that new teachers in their schools more frequently learned of district/school policies and procedures (27%). Principals at schools with High MSEP more frequently reported a new teacher orientation for beginning teachers (71%) than principals from schools with Low MSEP (52%). Generally, new teacher orientation and conveying district and school policies were the dominant form of before-school teacher induction activities.

Beginning teacher activities after the school year starts. Principals' reports of induction activities for beginning teachers after school starts are located in Table 3.7. Less than 20 percent of all principals reported induction activities for new teachers after the start of school. The most commonly reported induction supports were a common

planning period for science teachers (16%), meetings with other new teachers (12%), and training specific for new teachers (12%).

Table 3.7 Principals' reports of induction activities for new teachers after school starts by school size and Minority Student Enrollment Proportion (MSEP)

		School Size (%)			MSEP (%)	
	All (%) (n=50)	Small (n=15)	Medium (n=17)	Large (n=18)	Low (n=29)	High (n=21)
Common planning period for science teachers	16	0	12	33	10	24
Meetings with other new teachers	12	0	12	22	14	10
Training specifically for new teachers (i.e., classroom management, teacher evaluation procedures)	12	7	6	22	0	29
Lesson planning in subject teams	8	0	12	11	7	10
Scheduled mentoring during school day	6	7	0	11	7	10
Science training for novices(s) (i.e., training through ESC or district)	4	7	0	6	3	5
Induction support beyond one year	4	0	0	11	3	5
Mandatory observations by non-science teachers	4	0	0	6	3	0
Mandatory observations of non-science teachers	4	0	0	11	3	5
Mandatory observations of science teachers	2	0	0	6	0	5
Reduced course load	0	0	0	0	0	0

Differences are found among schools of different types. Principals from Large schools reported more induction support components for new teachers than principals in

Small and Medium schools. Principals in schools with High MSEP were more likely to report providing a common planning period for science teachers and were the only ones to report training specifically designed for new teachers that also took place during the school year. However, regardless of school size and MSEP, reports of induction supports for new teachers during the school year were few.

Summary of supports provided to beginning teachers. Overall, principals' reports of supports for beginning teachers are few. The majority of new teacher supports occur before school in the form of a new teacher orientation. Few supports were mentioned for beginning teachers during the school year.

Sub-Question 1.7. Do principals differentiate between induction practices for beginning teachers and those for transfer teachers?

Principals were asked what procedures were in place for inducting transfer teachers (i.e., those teachers currently in their fourth or more year of teaching but in their first year on the campus). If principals indicated that no differentiation was made, principals indicated that all teachers new to the campus, regardless of the teachers' years of experience, were provided with the same induction experiences (see Table 3.8).

Less than one-fourth of all principals reported differentiating induction practices between beginning and transfer teachers. Of those principals who indicated differentiating between the induction of beginning and transfer teachers, 14 percent indicated that more time was spent on mentoring beginning teachers.

Differences in principals' reports of concern for induction were found among schools of different sizes. Principals from Medium schools (82%) more frequently did not differentiate between the two. Principals from Large schools (17%) indicated that transfer teachers were differentiated from beginning teachers by being assigned a "buddy teacher" as opposed to a mentor. (The role of a "buddy teacher" was to orient new teachers to school policies and procedures.) For example, a principal from a Large school commented that the buddy was:

> …someone to show them where this or that is, or how do you do attendance…when it is okay to wear jeans and when it is not. (A36)

Few differences were found between schools of Low and High MSEP. Generally, principals did not report differentiating between the induction of beginning and transfer teachers in Texas public high schools.

Table 3.8 Percentage of principals' reports of induction program differentiation for beginning[a] and transfer[b] teachers

		School Size (%)			MSEP (%)	
	All (%) (n=50)	Small (n=15)	Medium (n=17)	Large (n=18)	Low (n=29)	High (n=21)
No	76	73	82	72	76	76
Yes	24	27	18	28	24	24
More time spent on mentoring beginning teachers	14	20	12	11	17	19
Transfer teachers do not receive a mentor nor a "buddy" teacher	6	7	6	0	7	0
Transfer teachers receive a "buddy" teacher instead of a mentor teacher	4	0	0	17	0	5

[a] Beginning teachers are those within their first three years of teaching.

[b] Transfer teachers are those who are in their fourth or more year of teaching but are new to the campus.

Sub-Question 1.8. What concerns do principals have about teacher induction?

Principals were asked if they had any concerns for their current teacher induction program. Responses to this question are summarized in Table 3.9. Nearly half (44%) of all principals expressed no concerns regarding their current teacher induction practices. Of the principals who did express concern for their current teacher induction practices, the majority of responses revolved around mentoring. In particular, 20 percent of all principals reported their current induction system was "poor." Some principals described their schools' induction practices as "shaky" (P23) and "one of the poorest things that

we do" (P19). Other principals remarked that teachers were inducted "horribly" (P27) into the school. One principal elaborated and stated:

> That's kind of the big weakness of this school district…we never had a set policy or even regular practices. That's probably why some teachers have left the profession through the year. We just kind of throw you in and let you do it. (P24)

Additionally, 18 percent of principals reported concerns with the lack of guidelines for mentors. Other concerns expressed by principals included poor mentoring follow-through (12%), an insufficient number/quality of mentors (10%), training needs of new teachers (10%), and school scheduling difficulties (10%).

Table 3.9 Principals' concerns[a] for teacher induction by school size and Minority Student Enrollment Proportion (MSEP)

		School Size (%)			MSEP (%)	
	All (%) (n=50)	Small (n=15)	Medium (n=17)	Large (n=18)	Low (n=29)	High (n=21)
No concerns	44	80	41	17	59	24
Current induction system is "poor"	20	20	29	11	21	19
Lack of guidelines for mentors	18	0	18	33	10	29
Lack of follow-through with mentoring (i.e., checking to see if mentoring is actually taking place)	12	0	6	28	10	14
Insufficient number/quality of mentors	10	7	0	22	7	14
Meeting training needs of new teachers	10	0	0	28	3	19
School scheduling difficulties	10	0	24	6	3	19
Other	10	0	24	6	3	19

[a] Principals could indicate more than one concern.

Differences were found among principals from different school types. Generally, principals' concerns for their current school induction practices increased with increasing school size. Nearly all principals from Small schools (80%) indicated that they had no concerns with teacher induction, followed by principals from Medium (41%) and Large (17%) schools. Principals from Large schools were most concerned with the lack of guidelines for mentors (33%). Other concerns of principals from Large schools were the lack of mentoring follow-through (28%), training needs of new teachers (28%), and the insufficient number/quality of mentors (22%). A Large school principal expressed a lot of these new teacher mentoring concerns:

> I would venture a guess that after that first day or two when they are with their mentor and the mentor person kind of goes over the ins and outs of our school and helps them out with procedural type things that that's it….Everyday, teachers have a 30 minute lunch and 5 minutes between classes and that's it. Everything else is non-stop classroom stuff so our schedule doesn't afford a lot of time for those kinds of activities. So I would say our induction process is lacking. (P41)

Principals from Medium schools were most concerned with the current state of their induction system (29%), scheduling difficulties for mentoring (24%), and lack of guidelines for mentors (18%). One principal from a Medium school remarked:

> We probably need a little more work as far as guidelines and expectations of what we have for those mentor teachers. (A23)

Principals from Small schools most frequently indicated that their induction program was "poor" (20%). One principal from a Small school indicated:

> [I] would like to see a better induction program. Our school does not offer any monetary incentive to be a mentor. (A08)

Principals in schools with Low MSEP more commonly did not express concerns for their current induction practices than principals in schools with High MSEP. The most common induction concern for principals in schools with Low MSEP was having a "poor" induction system (21%). The most common induction concern for principals in

schools with High MSEP was the lack of guidelines for mentors (29%). Overall, principals' concerns for their schools' current induction practices revolved around mentoring.

Principals were also asked if they had any plans to change their current teacher induction practices. Only 24 percent of all principals indicated that they had plans to change their current induction policy and practices (see Table 3.10).

Differences were found among principals from different types of schools. All principals from Small schools indicated that they had no plans to change their current induction practices. Some principals from Medium (29.4%) and Large (38.9%) schools indicated that they had plans to change their current induction practices. Additionally, principals from schools with High MSEP (38.1%) more frequently reported plans to change induction practices than principals form schools with Low MSEP (13.8%). Generally, the overwhelming majority of all school principals indicated that they had no plans to change current school-level induction practices.

Table 3.10 Proportion of principals reporting plans to change current induction policies and practices by school size and Minority Student Enrollment Proportion (MSEP)

		School Size (%)			MSEP (%)	
	All (%) (n=50)	Small (n=15)	Medium (n=17)	Large (n=18)	Low (n=29)	High (n=21)
No	76.0	100.0	70.6	61.1	86.2	61.9
Yes	24.0	0.0	29.4	38.9	13.8	38.1

Research Question 2. How do principals' perceptions of their schools' induction practices rank?

The Induction Scoring Rubric (see Appendix C) was used to score all principals' responses. Responses were weighted to calculate a total induction score for each sample

school (see Appendix D); a total score of 119 points was possible on the Induction Scoring Rubric. Figures 3.3 and 3.4 illustrate the distribution of schools' Induction Scores by school size and by student minority enrollment proportion, respectively. Descriptive statistics pertaining to the distribution of school induction scores are located in Table 3.11.

Figure 3.3 displays the range of induction scores by school size. Out of a possible 119 points, schools typically scored very low. The induction score for all schools ranged from 1 to 59 points on the weighted Induction Scoring Rubric.

Figure 3.3 is a box and whiskers plot of school induction scores by school size. The induction scores of Small schools ranged from 1.00 to 32.00 with a median value of 6.00 and an interquartile range (IQR) of 6.00. The induction score of one Small school, indicated with an open circle (o), was more than 1.5 IQRs away from the box. The induction scores of Median schools ranged from 7.00 to 37.00 with a median value of 13.00 and an interquartile range (IQR) of 14.50. The induction scores of Large schools ranged from 7.00 to 59.00 with a median value of 26.00 and an interquartile range (IQR) of 22.25.

Visual inspection of Figure 3.3 indicates that the mean, median, range, and variability of induction scores increased with school size. Post hoc comparisons using the nonparametric Mann-Whitney *U*-test revealed that statistically significant differences exist between the induction scores of Small and Medium schools (U =49.00, p=.002) and Small and Large schools (U=32.50, p=.000) but not between Medium and Large schools (U=100.50, p=.083).

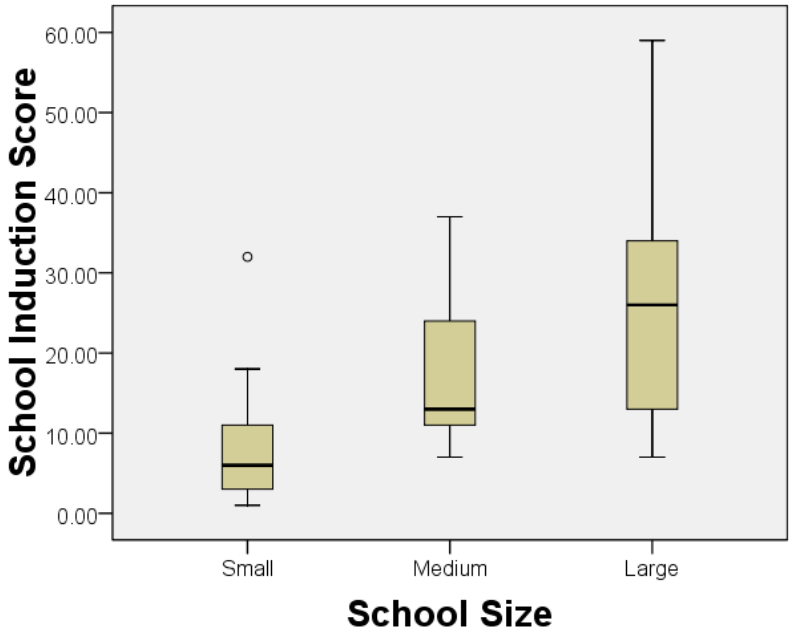

Fig. 3.3 Distribution of school induction scores by school size.

Figure 3.4 displays the range of induction scores by minority student enrollment proportion. Visual inspection of the distribution of scores indicates no difference between the induction scores of schools with Low and High MSEP. A post hoc comparison using the nonparametric Mann-Whitney *U*-test confirmed that there was no statistically significant difference between these two groups (U=265.500, p=.443).

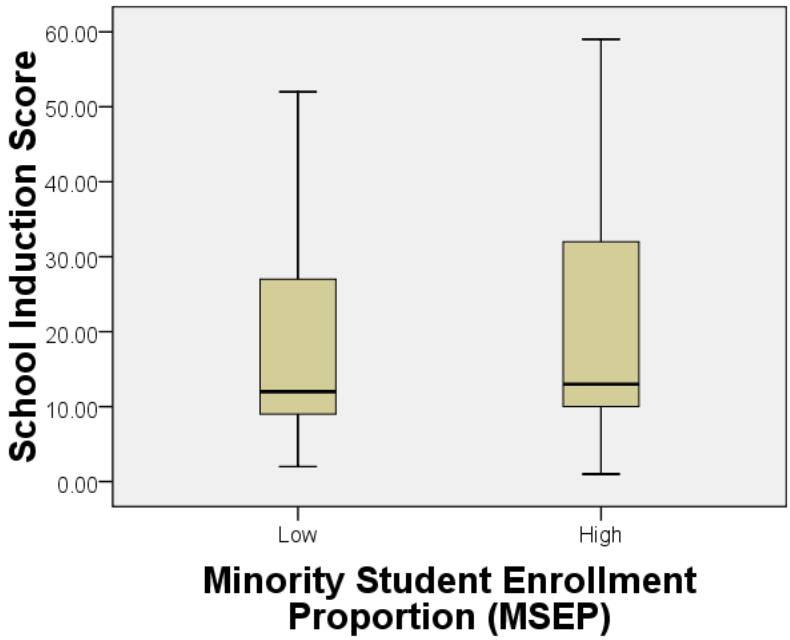

Fig. 3.4 Distribution of school induction scores by Minority Student Enrollment Proportion (MSEP).

Table 3.11 Distribution of school induction scores[a] by school size and Minority Student Enrollment Proportion (MSEP)

		School Size			MSEP	
	All (n=50)	Small (n=15)	Medium (n=17)	Large (n=18)	Low (n=29)	High (n=21)
Mean	17.94	8.73	17.53	26.00	16.86	19.43
Standard deviation	13.18	8.10	8.97	15.08	12.68	14.02
Standard error	1.86	2.09	2.17	3.56	2.36	3.06
Minimum	1.00	1.00	7.00	7.00	2.00	1.00
25^{th} percentile	9.00	3.00	11.00	12.50	8.50	10.00
Median	13.00	6.00	13.00	26.00	12.00	13.00
75^{th} percentile	27.25	12.00	25.50	34.75	27.00	32.00
Maximum	59.00	32.00	37.00	59.00	52.00	59.00

[a] Total possible points on rubric was 119.

Research Questions 3. How do induction program components differ by minority student enrollment proportion and school size?

Generally, school type appears to play a role in the induction practices a school employs.

Minority Student Enrollment Proportion (MSEP). An analysis of schools' induction scores indicates that MSEP appears to play no role in the types of induction practices available at a school as indicated by the induction score. Because of the minimum involvement of MSEP in school induction activities, the remainder of this section concentrates on the role of school size in the availability of induction components at schools.

School size. School size may have a strong influence in differentiating the types of induction practices in place at a school. One reason for this may be the availability of staff, faculty, and administrators employed at a school or district. Small schools have a limited number of administrators and other support personnel. Large schools may have access to numerous people in administrative positions (e.g., multiple assistant principals, subject-specific curriculum specialists, mentor coordinators). By their nature, Medium schools tend to fall in between Small and Large schools. The number of individuals employed in a district may determine the amount of services that a school can provide to beginning teachers.

Differences in schools' sizes may have played a role in what school principals reported as "what worked best" in teacher induction. Principals from Small schools reported mentoring less frequently than principals from Medium and Large schools. Principals at small schools may not have mentors. Therefore, a principal would not be able to report mentoring as a best induction practice. Additionally, principals from Small schools did not mention new teacher orientation. Some small schools may have twenty teachers in grades K-12. Does a Small school need a large-scale new teacher orientation? Perhaps not.

School size appears to play a role in the type of mentoring at a school. Often, Small schools have only one or two science teachers who typically will not teach the same science subjects. In a Small school, it may be difficult to pair a beginning teacher with a

mentor that also teaches science. Conversely, Large schools typically have a science department composed of many teachers who may teach some of the same subjects. In Large schools, pairing a beginning teacher with a mentor that teaches the same science subject may not be as difficult. Depending on the number of employed science teachers, Medium schools may or may not have science teachers who teach subjects in common. As a result, beginning teachers in larger schools have a greater potential of being paired with a mentor with whom they can share lesson plans. Generally, it appears school size plays a role in determining who is a mentor to beginning high school science teachers.

School size also appears to play a role in the types of mentoring that takes place. Principals in Small schools overwhelming indicated that beginning teacher mentoring was informal. Some principals from Small schools indicated they were ill equipped to mentor beginning teachers because of the limited number of faculty. As a result, filling vacancies with novice teachers was not the first desirable option for some principals from Small schools. Some small school principals indicated a preference to hire experienced teachers who were more familiar with turning in lesson plans, grading, and classroom management. One principal stated:

> We have a loose mentoring type network, but it's not near probably what they need if they're a beginner…we try to hire a teacher that has some kind of experience so that a whole bunch of that stuff has kind of been taken care of. (A01)

Less than one-fourth of principals from Large schools indicated that mentors helped beginning teachers with lesson planning to improve science instruction. However, the findings indicated that this is an even rarer occurrence in Small and Medium Schools.

Some principals from Large schools viewed beginning teachers as a burden on their school system. One principal from a Large school indicated that:

> [New teachers] need to hit the floor running [and the school doesn't have] enough time to train them… [Training new teachers] slows us down. (A46)

Other principals in Large schools indicated having more dynamic mentoring programs with clearly defined roles for mentor teachers. One principal from a Large school indicated that the science department head serves as a:

> …teacher facilitator who teaches a limited number of courses during the school day only to have the remaining school day to work with teachers in their classroom, help them design lessons, model lessons for them, plan review resources, that sort of thing… (A36).

School size also played a role in the types of supports mentors received. Principals in Large schools were more likely to indicate that mentors received training and compensation. However, supports for mentors were sparse across all school types.

Additionally, supports for beginning teachers were also influenced by school size. Before school, the majority of principals in Medium and Large schools indicated that beginning teachers attended a new teacher orientation; this was not an induction practice mentioned by principals in Small schools. Overwhelmingly, principals in Medium and Large schools reported practices for beginning teachers before school starts with more frequency than principals from Small schools. Moreover, although supports for beginning teachers during the school year were meager from all school types, principals in Large schools were more likely to mention them than principals in Small and Medium schools.

Discussion and Implications

The findings from this study confirm the dismal reports found in the literature regarding the "sink or swim" and "trial by fire" experiences of beginning teachers. Findings from this study suggest that (a) principals' perceptions of teacher induction in Texas have an overwhelmingly narrow focus on school procedures; (b) mentor teachers receive little or no support to be effective mentors; (c) induction activities for beginning teachers are front-loaded before the school year begins; (d) once the school year starts, beginning teachers are left in the hands of untrained mentors who have few structural supports for mentoring; (e) induction and mentoring in Texas revolve around learning school policies

and procedures; and (f) beginning teachers' instructional and learning needs are an afterthought. The following sections summarize highlights from the study's findings and make recommendations for induction policy alternatives.

Data from this study support previous claims from other researchers that beginning teachers are often isolated and prematurely presumed experts. Additionally, findings from this study support some researchers' claims that mentors often take on mentoring as just another duty in their already busy school schedules. Moreover, this study's findings support other researchers' claims that mentoring is the most common component of teacher induction programs and that little else is offered to beginning teachers.

Teacher Learning Environments

This study indicates that the professional continuum of teacher education is not only fractured, but that a crevasse exists for teachers during their induction years. If schools are a learning environment in which beginning teachers learn, principals provide little evidence that teachers' learning environments are learner-, knowledge-, assessment-, or community-centered.

Learner-centered environments. Very few principals recognized beginning teachers' individual needs or incoming skills. Some principals expected their beginning teachers to "hit the ground running" and perform as expert teachers. However, other principals recognized teachers as novices in their profession. These principals made concessions for teachers to have time to lesson plan and for instructional mentoring to take place on a regular basis.

Knowledge-centered environments. The majority of principals' responses indicated that mentoring had a narrow focus on school policies and procedures. Very few principals mentioned mentoring that focused on improving beginning science teacher instructional skills. Although it may be important for beginning teachers to learn school policies and procedures, it may be even more important that they learn also how to be an effective science teacher. Principals provided little evidence that developing expertise in

reflective practices and metacognitive skills in beginning teachers was a priority for teacher induction in Texas.

Assessment-centered environments. Overall, the majority of principals provided little evidence to indicate that frequent formative assessments of beginning teachers took place. Formal assessments and reviewing of teaching are beneficial to both novices and veterans. Many principals indicated that beginning teachers were paired with mentors. However, many principals described mentors' roles as being more like "school tour guides" or "information desk clerks" rather than knowledgeable veterans with advanced levels of pedagogical content knowledge in science who can help novices develop expertise.

Beginning teachers need many opportunities to reflect on, review, and revise their teaching. Frequently, beginning teachers receive only summative assessments from a formal evaluator. Beginning teachers, like their students, can benefit from an assessment-centered environment with frequent, informal, and informative assessment to aid beginning teachers in reflecting on their teaching practices. When teachers are able to reflect on their own teaching, they become more aware of their teaching strategies. However, these findings indicate that opportunities for beginning and mentor teachers to reflect on teaching practices are rare.

Community-centered environments. Beginning teacher attrition rates are alarming. As many researchers have suggested, preparing new teachers and injecting them into schools will not resolve the teacher shortage problem if teachers continue to leave schools before retirement. Principals' interview responses provided little evidence of developed professional learning communities at their schools. Very few principals indicated providing beginning teachers with opportunities to collaborate with their teaching colleagues. Perhaps beginning teachers are like *canaries in the coalmine*. The beginning teachers may be detecting the quality of the school atmosphere. If school environments are not conducive to promoting teacher learning, the canaries will die.

Implications

Principals and Principal Training

This statewide study indicates that many Texas principals have a hands-off approach to teacher induction. Most principals indicate that they assign mentor pairs and "turn them loose" (A15). Although principals may select and match mentors, the findings of this study imply that little follow-through occurs to make sure that mentoring is actually taking place. Moreover, it appears that principals may have a very superficial definition of mentor since many report mentors' duties are primarily to convey school policies and procedures to beginning teachers. Additionally, many principals did not mention observing and evaluating beginning teachers as a part of their induction. This could be an indication that principals may not associate teacher observations with teacher induction. The author recommends the education administration community needs to assess what training is required for principals to better understand the needs of both beginning and mentor teachers.

Mentors

Most principals report that mentoring is "what works best" for teacher induction. However, mentor teachers are given minimal, if any, support to properly assist beginning teachers. Mentors need an understanding of how to help an adult learner grow as a professional. Moreover, very few principals indicated that mentors were provided with a reduced course load or scheduled time for mentoring during the school day. When mentor teachers are not given time to perform their duties, mentoring is forced to occur "around the edges of an already full school day" (Carver & Feiman-Nemser 2009, p. 321). Although science teachers were most commonly identified as mentors for beginning science teachers, this study implies that many mentors most often play the role of "buddies" who answer beginning teachers' questions.

> [An]…informal buddy system may work for the fortunate novice who gets adopted, but it hardly represents an adequate response to the larger need. Relying on the good will of experienced teachers to reach out on their own initiative

> ignores the learning challenges that beginning teachers face and the need for a more sustained and systematic approach to their development. (Feiman-Nemser, 2001, p. 1030)

Policy makers at school, district, and state levels need to determine their goals for teacher mentoring. If the goal of mentoring is only to answer beginning teachers' questions as they arise, then policy may not need to be adopted. However, if policy makers in Texas would like mentors to help beginning teachers to develop their teaching expertise, then policy makers will need to reexamine their priorities and develop policies for mentor training that can be put into practice.

Teacher Education and Teacher Educators

Teacher education does not end with certification. Many would argue that teachers truly begin to learn their craft once they are in their own classrooms. Current teacher induction practices are "front-loaded" with activities before the start of the school year. After school begins, there appears to be little structured support to assist beginning teachers to improve their instructional practices. The author would like to recommend that the TEA, the Texas Legislature, the State Board for Educator Certification (SBEC), teacher preparation institutions, and individual districts reexamine their priorities for teacher education. This study indicates that beginning teachers need more support as they make the transition from teacher preparation to practice. Moreover, the lack of principals' reports of instructional supports for beginning teachers may be an indication that more content-specific support is needed.

Promising Starts for Induction in Texas

Although this paper presents a dismal image overall of beginning science teacher induction for Texas' public high schools, there are some schools that show promising beginnings to more comprehensive induction programs. These practices are found in schools where principals acknowledge beginning science teachers as novices, provide mentors with training, and provide opportunities for mentoring to take place. However, the schools exhibiting promising practices for teacher induction are few. Only 18 percent

of schools provide mentors with training, 12 percent of schools provide a common planning period for science teachers, 6 percent of schools schedule time for mentoring, and less than 5 percent of schools schedule opportunities for beginning teachers to observe other teachers.

Limitations

A major strength of this study is that the PRISE sampling plan allows the empirical data to be generalized to all public high schools in Texas. As with any study, there are limitations to the findings. First, principals may have omitted information about their induction policies and practices. However, the field-based interviews were conducted on the principals' terms and most principals were candid and eager with their responses. Second, principals' perspectives provide only one voice of schools' induction practices. The PRISE principal interview covered the entire spectrum of a teachers' in-service professional continuum; that is, from recruitment to retirement. In the future, it would be helpful to have interviews with principals that are more focused on principals' beliefs about beginning teachers' induction needs. The perspectives of beginning and mentor teachers will be explored in future studies.

Conclusions

Data from this study indicate that a "one size fits all" induction policy will not meet the needs of all Texas schools, beginning teachers, and mentor teachers. The author recommends further investigation of policy alternatives for teacher induction. One recommendation would be to better utilize ESCs. These centers already provide TxBESS training, a model of teacher induction the TEA has found to be effective in teacher retention (Fuller 2003); mentor training; and subject-specific training. How hard would it be to coordinate training for all beginning teachers in Texas so that they may develop both their content and pedagogical skills? How hard would it be to coordinate training so that mentor teachers receive the training they need to better support beginning teachers?

Small schools do not have the same support personnel resources (i.e., district mentors, science curriculum directors, mentor directors) found in larger schools and

districts. As a result, Small schools may not be able to individually operate comprehensive induction programs such as those prescribed by the New Teacher Center at Santa Cruz (Moir & Hanson 2008; New Teacher Center 2009). In addition to ESCs, cooperatives could be formed among Small schools to develop induction programs that will meet the content and pedagogical needs of beginning teachers. The Texas Regional Collaborative for Excellence in Science and Mathematics Teaching is an award-winning statewide network that has been in existence for over 17 years (Texas Regional Collaboratives n.d.). How hard would it be to coordinate a collaborative addressing the needs of beginning science teachers and their mentors?

In terms of teacher induction, there are things that take money and there are things that do not. Providing a reduced course load to mentors and beginning teachers can be a costly undertaking for most schools. However, manipulating a school's master schedule to reduce the number of course preparations or arrange common planning time for teachers are low- or no-cost alternatives. Policies need to be put in place that will promote school-, district-, and state-level induction practices concentrating on improving teachers' instruction so that students have a better opportunity of having a truly highly qualified science teacher in the classroom. Until state-level policies are developed and implemented, schools in Texas bear the burden of inducting beginning teachers into the profession. However, there are questions all stakeholders in Texas education can begin to address, including:

1. How can the current system be changed so that beginning science teachers, or all beginning teachers for that matter, enter schools in which their instructional, pedagogical, and emotional needs are met?
2. If state standards for teacher induction were to be developed, what would they look like?
3. If state standards for teacher professional development were to be developed, what would they look like?
4. What do Small schools need to do to support beginning science teachers?
5. What do Medium schools need to do to support beginning science teachers?

6. What do Large schools need to do to support beginning science teachers?
7. What role can ESCs play in addressing the needs of beginning science teachers and mentors?
8. What role can state collaboratives play in addressing the needs of beginning science teachers? and
9. How can state education policy support schools in addressing the needs of beginning science teachers and mentors?

Although answers to these questions will not be easy, it is imperative that the conversation begins so that teacher mentoring in Texas will no longer "occur around the edges." Policy makers must address these questions to ensure that positive learning environments exist in all Texas public high schools. Currently, the teacher professional continuum is a deeply fractured. Teachers' professional careers will become more seamless when schools become more learner-, knowledge-, assessment-, and community-centered.

CHAPTER IV

A MIXED METHODS STUDY OF BEGINNING SCIENCE TEACHERS' EVALUATIONS OF THEIR INDUCTION EXPERIENCES IN TEXAS PUBLIC HIGH SCHOOLS

Synopsis

Whether or not schools have an official induction program in place, beginning high school science teachers are inducted into schools each year. This study utilizes a mixed methods approach to explore beginning science teachers' perceptions of their induction experiences and recommendations for improvement. Beginning high school science teachers (n=95), defined as those in their first three years of teaching, were identified from a sample of science teachers (n=385) from a stratified random sample of Texas public high schools (n=50). Beginning science teachers (n=71) were asked to evaluate their induction experiences. A content analysis of teachers' responses revealed themes of (a) best school-level induction supports received and (b) recommended improvements for school-level induction. Among other themes, teachers identified mentoring as one of the best supports they received and made recommendations for more structure in the mentoring experience. Beginning teachers' responses then were compared with teacher turnover. *Stayers*, teachers retained at a campus, were most likely to report that they received induction support from other science teachers. *Movers*, teachers retained in the profession but who transferred to another campus, less frequently reported working conditions as a positive induction support and most frequently recommended improvements to mentoring and administrative support. *Leavers*, teachers not retained in the profession, less frequently reported receiving supportive working conditions and support from administrators and most frequently reported no induction support from the school. Implications for teacher education policy are discussed.

Introduction

A variety of reports condemning the state of the teaching workforce (e.g., National Commission on Excellence in Education 1983) indicated a strong link between student achievement and teacher quality (e.g., Aaronson et al. 2007; Hill et al. 2005; Rivkin et al. 2005) and reported alarming rates of beginning teacher attrition (e.g., Smith & Ingersoll 2004). Results of reports such as these have encouraged policy makers to refocus their efforts on ways to best support and retain beginning teachers in the classroom. Since the mid-1990s, many induction programs have appeared across the United States that vary in their goals, structure, and components.

Beginning Teachers

A quality teacher in the classroom has been identified as the primary predictor of student performance in schools (e.g., Aaronson et al. 2007; Hill et al. 2005; Rivkin et al. 2005). Although beginning science teachers may meet federal *highly qualified* teacher requirements established by the *No Child Left Behind Act of 2001* for being hired and placed in a classroom (U.S. Congress 2002), beginning teachers are by nature inexperienced. Defining a highly qualified teacher has been a contested issue (e.g., Darling-Hammond & Youngs 2002) and different definitions are given by different experts and organizations. In regards to science teachers, guidelines for science teaching standards have been established in the National Science Education Standards (National Committee on Science Education Standards and Assessment 1996) and the National Science Teachers Association (NSTA, 2004). Beginning teachers, by definition, are at the beginning of their professional teaching careers.

Currently, teachers' professional career paths are composed of jumbled, discontinuous, and fragmented segments of teaching experiences (Feiman-Nemser 2001a; Kahle & Kronebusch 2003). Teachers' preparation for the classroom, regardless of preparation method, typically reaches an abrupt end with certification. Once hired by a school, many beginning teachers are expected to perform with the efficiency and

expertise of a master teacher (Kardos & Johnson 2007). However, beginning teachers are not finished products from their preservice training, nor are they blank slates.

The needs of beginning teachers will vary by individual. Beginning teachers need time to learn about professional expectations for their teaching assignment and the resources that are available to them before they can be truly effective in the classroom. Beginning teachers also need time to learn about the culture of the school and the surrounding community; in that regard, teachers will have to learn their role in that community as well (Schempp et al. 1993). Furthermore, teachers need time to learn about the general and specific requirements of their teaching assignments and how to make the curriculum relevant to the needs and interests of their students (Feiman-Nemser 2003). Additionally, teachers also need time to address their personal teaching concerns. Veenman's (1984) review of research found that beginning teachers' concerns were classroom discipline, motivating students, dealing with individual differences, assessing students' work, and relations with parents.

When first entering a classroom, beginning high school science teachers have multiple needs and concerns. Adams and Krockover (1997) reported that beginning science and mathematics teachers have concerns about curriculum development, classroom assignments, content presentation, classroom management, and time management. In addition to the knowledge needed to teach courses, beginning science teachers must also learn school policies, procedures, politics, and culture. Additionally, a beginning teacher may find conflict with the school's more traditional educational approach and standards-based teacher training experiences (Schempp et al. 1993).

Because beginning teachers are novices in the profession, the vast majority will need help translating their content knowledge into pedagogical content knowledge. Depending on the teachers' personal backgrounds, some teachers may require help acquiring the content knowledge needed to teach their assigned courses. While preservice teachers can be exposed to vigorous field experiences, for example, Luft and colleagues (Luft et al. 2007b) found that the content of biology can be challenging. Many science teachers do not receive degrees in general biology, which is the subject

most generally taught in middle and high schools. Instead, most preservice teachers with biology backgrounds earn more specialized degrees in domains such as ecology, zoology, botany, and microbiology. Therefore, beginning biology teachers may not have the generalized expertise necessary to teach the more inclusive, broader "big ideas" of biology or address the range of concepts covered in a general biology class. Teachers in other science disciplines are likely to confront a similar situation.

Teacher Retention

Beginning teachers leave the profession at disturbing rates. Some researchers have suggested that nearly one third of beginning teachers leave within the first three years (e.g., Feiman-Nemser 2001a) and others report that nearly half of all teachers leave by the end of five years (Ingersoll 2003b; Smith & Ingersoll 2004). These rates are compounded with the consideration of other reports projecting more than one third of experienced teachers will leave the classroom in the next four years with the retirement of baby boomers (Carroll & Foster 2009). Attrition rates out of control beg the questions: As science teachers make their exit from the classroom, who will be left to teach students?

Research on teacher turnover has received increasing attention in recent years. Research reports on teacher retention have commonly lumped teachers into one of three categories: *Stayers*, teachers retained at a campus; *Movers*, teachers who are retained in the profession but transfer to another campus; and *Leavers*, teachers who leave the profession (e.g., Shen 1997; Smith & Ingersoll 2004). How teacher turnover is defined determines its implications and impacts on education. Retaining quality teachers in the profession as a whole is a global concern for teacher educators and education policy makers. For example, on a larger scale, *Stayers* and *Leavers* may be lumped into a single category of teachers that are retained in the profession. However, at a local level, retaining quality teachers on a campus is a large concern for principals and other school administrators. *Movers* and *Leavers* have an equal impact on individual campuses because principals are left with teacher vacancies to fill. The problem is exacerbated

when principals are challenged to fill vacancies in hard-to-fill areas, such as science, (Ingersoll 2003b; Ingersoll & Perda 2009).

Other inexperienced teachers often replace those who leave, thus increasing the probability that students will be taught by inexperienced teachers. Considering that it takes approximately five years to gain expertise in the classroom (Berliner 1988, 2001), the attrition of beginning teachers is an important policy concern. Furthermore, teacher turnover causes schools to lose both money (Barnes et al. 2007; Hanushek, Kain, & Rivkin 2004a; Rivkin et al. 2005) and instructional productivity (Milanowski & Odden 2007).

Retaining 100 percent of teachers is neither feasible nor desirable. Some teachers will leave a school in the best of working conditions due to reasons outside of a school's control (i.e., spousal job transfer, parenting, retirement). Additionally, most principals would not want to retain individuals who are not a good match for teaching (Ingersoll 2003a). Some research studies have indicated that internal school factors (e.g., poor working conditions) have resulted in a "revolving door" of teachers leaving the profession prior to retirement (e.g., Hanushek et al. 2004a; Ingersoll 2001). However, policy makers addressing teacher attrition typically respond by trying to recruit more teachers into the profession. Ingersoll and Perda (2009) assert that preparing and recruiting more teachers will not address the science teacher "shortage" because nearly three-fourths of science teachers leave the profession because of job dissatisfaction.

Teacher Induction

The ways in which schools support their beginning teachers is reflective of schools' professional cultures and schools' views towards teacher education. Likewise, the induction experiences that beginning teachers encounter at schools may be highly dependent on their schools' professional cultures. School policy makers help to determine what those experiences may be. The National Science Teachers Association's (National Science Teachers Association 2007) position statement on science teacher induction promotes science-specific training in both content and pedagogy in addition to general beginning teacher needs (i.e., classroom management, school policies).

Teacher induction will occur at a school whether a school has an induction program or not. Every year new teachers enter classrooms for the first time. New teachers face many combinations of beginning teacher support at schools. Some teachers may encounter a well thought-out formal mentoring and induction program. Most will receive informal mentoring from a colleague or buddy teacher. The research literature indicates that many beginning science teachers are left to their own accord to find help from others that are willing to give it (e.g., Kardos & Johnson 2007; Kardos et al. 2001; Odell & Ferraro 1992). This study is an attempt to give beginning high school science teachers an opportunity to evaluate their induction experiences.

Purpose and Research Questions

The intent of this exploratory mixed methods study is to examine beginning high school science teachers' perspectives of their induction experiences. Additionally, the study will identify trends in teachers' perceptions across different school types. This study addresses the following research questions:

- Research Question 1: What do beginning high school science teachers report as the best school-level induction supports?
    - Research Sub-Question 1a: How do positive induction supports differ by school type?
    - Research Sub-Question 1b: How do positive induction supports differ by *Stayers*, *Movers*, and *Leavers*?
- Research Question 2: What do beginning high school science teachers consider to be deficiencies in school-level induction support?
    - Research Sub-Question 2a: How do deficiencies reported by teachers differ by school type?
    - Research Sub-Question 2b: How do deficiencies reported by teachers differ by *Stayers*, *Movers*, and *Leavers*?

Methods

Context of Study

The Policy Research Initiative in Science Education (PRISE) is a five-year research study to answer three essential policy research questions about the high school science teacher professional continuum (TPC) in Texas: *Where are we? Where do we want to go? How do we get there?* The project uses a systems approach to link prior research findings with mixed research methods to inform the development of high school science teacher recruitment, induction, renewal, and retention.

PRISE Methodology

Mixed Methods Rationale

Mixed methods is defined as a "procedure for collecting, analyzing, and 'mixing' or integrating both quantitative and qualitative data at some stage of the research process within a single study for the purpose of gaining a better understanding of the research problem" (Ivankova et al. 2006, p. 3). The decision to utilize mixed methods in this study draws on the need to be able to note trends and generalizations of induction practices across the sample schools as well as to gain in-depth knowledge of Texas public high school science teachers' perspectives of current induction practices (Creswell & Plano Clark 2007).

PRISE Sampling Procedures

A two-stage stratified random sampling plan was designed to select 50 schools to proportionally represent the 1,333 public high schools in Texas where high school science courses are taught (Stuessy et al. 2008). Two explicit stratification variables were used in the sampling procedures: school size and minority student enrollment proportion (MSEP). School size was based on total student enrollment and schools were grouped into three categories: *Small* (n=15; student enrollment less than or equal to 189), *Medium* (n=17; student enrollment equal to or greater than 190 and less than or equal to 899), and *Large* (n=18; student enrollment greater than or equal to 900). Schools' MSEP

is divided into two categories for this report: *Low* (n=29; less than 50 percent minority student enrollment) and *High* (n=21; greater than or equal to 50 percent minority student enrollment). Additionally, an implicit stratification method was used to ensure sample schools were geographically representative of the state. This method took into account locations of schools within geographic regions of the state defined by boundaries established by the Texas Education Agency (TEA) in their provisions of Regional Education Service Centers (ESCs). (For a thorough description of the PRISE sampling plan, see McNamara & Bozeman 2007.) These stratification variables were selected to maximize the generalizability of the PRISE survey research findings. Additionally, these stratification variables are currently used in state and national level policy planning.

PRISE Participants

Table 4.1 describes the proportion of beginning teachers across school types. Once sample schools were selected, PRISE researchers contacted campus principals (n=50) to inform them of the study and to gain their permission to conduct the study at their schools. All science teachers (n=385) from sample schools were informed about the study and gave their written consent. Science teachers identified as being in their first three years of teaching were identified by PRISE as beginning teachers (n=95).

Table 4.1 Distribution of sampled beginning Texas public high school science teachers by school size and Minority Student Enrollment Proportion (MSEP)

	Sample Schools					
		Size			MSEP	
	All (n=50)	Small (n=15)	Medium (n=17)	Large (n=18)	Low (n=29)	High (n=21)
All science teachers						
Count	385	26	87	272	180	205
Beginning science teachers[a]						
Count	95	6	34	55	37	58
Proportion of beginning science teachers in schools (%)	24.7	23.1	39.1	20.2	20.6	28.3

[a] Beginning science teachers are those in their first three years of teaching

Tables 4.2 and 4.3 provide demographic information about the beginning science teachers.

Highest degree earned. Overall, Table 4.2 indicates that 80 percent of beginning science teachers have a Bachelor's degree, less than 14 percent have a Master's, and less than 5 percent have a Doctoral degree. Beginning teachers in Medium schools are more likely to have obtained a graduate level degree. Beginning teachers in Small schools only had obtained Bachelor's degrees. The distribution of earned degrees is similar across schools with Low and High MSEP.

Gender. Generally, there are more male (52.0%) than female (43.0%) beginning science teachers across all schools. Beginning teachers in Small schools are predominantly male (63.7%). Beginning teachers in Medium and Large schools have a higher percentage of female teachers. Schools with Low MSEP have a higher percentage of male teachers whereas schools with High MSEP have a higher percentage of female teachers.

Ethnicity. Overall, across all schools, the majority of beginning science teachers was classified as White (60.0%), followed by Hispanic (24.0%). The diversity of ethnicity of beginning science teachers increased with school size. However, the majority of teachers at school sizes can either be classified as White or Hispanic. Nearly all beginning teachers at schools with Low MSEP can be classified as White (91.9%). Schools with High MSEP have a more diverse array of beginning science teachers.

Table 4.2 Characteristics of all beginning Texas public high school science teachers (n=95) identified in sample and their distribution by school size and minority student enrollment proportion (MSEP)[1]

		School Size (%)			MSEP (%)	
	All[2] (%) (n=95)	Small (n=6)	Medium[3] (n=34)	Large[3] (n=55)	Low (n=37)	High[2] (n=58)
Highest Degree Earned						
Bachelor's	80.0	100.0	67.6	85.5	81.1	79.3
Master's	13.7	0.0	23.5	9.1	13.5	13.8
Doctorate	4.2	0.0	5.9	3.6	5.4	3.4
Gender						
Female	43.0	33.3	52.9	58.2	43.2	62.1
Male	52.0	63.7	47.1	41.8	56.8	37.9
Ethnicity						
American Indian	1.0	0.0	2.9	0.0	2.7	0.0
Asian/Pacific Islander	4.0	0.0	0.0	7.3	2.7	5.2
African American	4.0	0.0	2.9	5.5	0.0	6.9
Hispanic	24.0	16.7	14.7	32.7	2.7	39.7
White	60.0	83.3	76.5	52.7	91.9	44.8

[1] These data were identified by the Texas Education Agency's Public Education Information Management System (PEIMS)
[2] PEIMS system missing 2 individuals
[3] PEIMS system missing 1 individual

Age. Table 4.3 describes the distribution of beginning science teachers' ages by school size. (Figures 4.1 and 4.2 also display the ages of beginning science teachers by school size and MSEP, respectively.) Some individuals may think of beginning teachers as individuals in their early twenties who are fresh out of college or some other teacher preparation program. These figures indicate a large range of ages for beginning science teachers in Texas' public high schools. The median age of all beginning science teachers is 29 years of age and the mean age is nearly 33 years of age. Additionally, beginning science teachers are as young as 23 and as old as 62 years of age. The median age of beginning teachers in Small schools is higher (32.50 years of age) than for those in

Medium and Large schools. Schools with Low and High MSEP have similar age distributions. Post hoc comparisons using the Mann-Whitney *U*-test indicated no statistically significant difference between schools of differing size or MSEP. Age is important to acknowledge here because many researchers, policy makers, and teacher educators may not think of a beginning teacher as someone in her thirties, forties, fifties, or sixties.

Table 4.3 Distribution of all beginning Texas public high school science teachers' ages and their distribution by school size and minority student enrollment proportion (MSEP)[1]

		School Size (%)			MSEP (%)	
	All[2] (%) (n=95)	Small (n=6)	Medium[3] (n=34)	Large[3] (n=55)	Low (n=37)	High[2] (n=58)
Mean	32.96	36.17	32.36	32.96	33.81	32.39
25th percentile	26.00	26.50	26.00	26.00	26.00	27.00
Median	29.00	32.50	28.00	29.00	29.00	29.00
75th percentile	37.00	45.00	37.00	36.25	39.50	34.75
Minimum	23.00	25.00	23.00	23.00	23.00	23.00
Maximum	62.00	60.00	57.00	62.00	62.00	60.00

[1] These data were identified by the Texas Education Agency's Public Education Information Management System (PEIMS)
[2] PEIMS system missing 2 individuals
[3] PEIMS system missing 1 individual

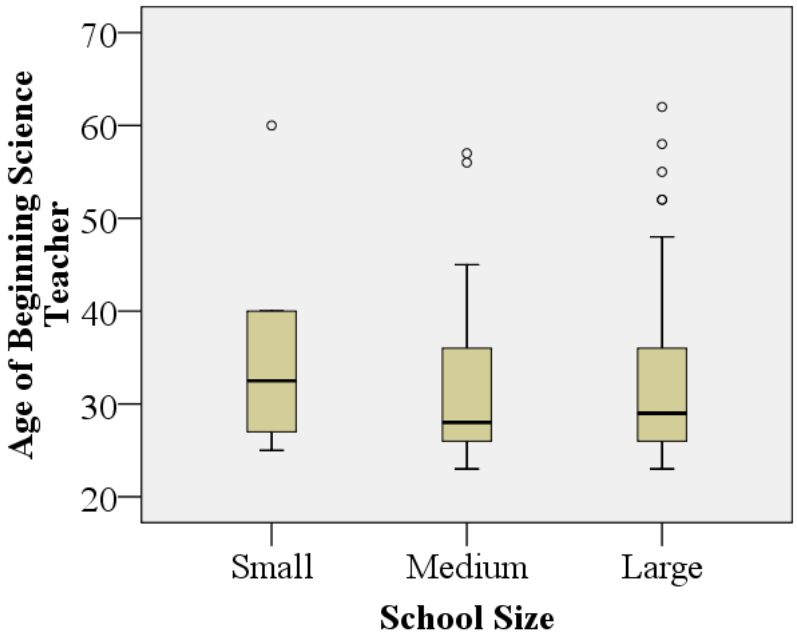

Fig. 4.1 Distribution of beginning Texas public high school science teachers' ages by school size.

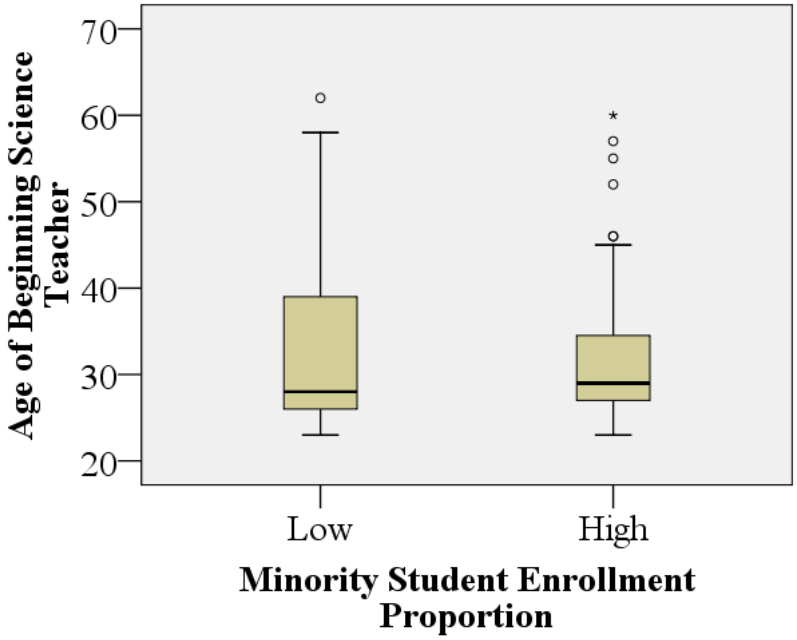

Fig. 4.2 Distribution of beginning Texas high school science teachers' ages by minority student enrollment proportion.

Data Collection

This mixed methods study collected both qualitative and quantitative data from the sample schools and the beginning science teachers. Mixed data collection methods enables the researcher to identify trends and generalizations across all sample schools as well as identify beginning teachers' evaluations of their induction experiences in rich detail. The remainder of this section describes the qualitative data (i.e., interviews) and quantitative data (i.e., archival data) collected for this study.

Interviews. During the 2007-2008 school year, 71 of the 95 (76.3%) beginning teachers consented to an interview regarding their induction experiences. (Table 4.4 provides detailed information about return rates by school size and MSEP on beginning teacher interviews). Interviews were conducted by PRISE Researchers either over the telephone or face-to-face. (The PRISE Beginning Teacher Interview Protocol is located in Appendix E.)

Table 4.4 Distribution of all beginning Texas public high school science teachers, number of beginning science teacher interviews conducted, and return rates by school size and minority student enrollment proportion (MSEP)

		School Size			MSEP	
	All (n=50)	Small (n=15)	Medium (n=17)	Large (n=18)	Low (n=29)	High (n=21)
Beginning science teachers identified	95.0	6.0	34.0	55.0	37.0	59.0
Beginning science teacher interviews conducted	71.0	5.0	26.0	40.0	26.0	45.0
Return rate (%)	74.7	83.3	76.5	72.7	70.3	76.3

School- and state-level archival data. Sample schools' master schedules, which include information about individual teachers' course assignments, were collected for

the 2007-2008 and 2008-2009 school years. Additionally, the PEIMS database was queried to acquire teacher-level information (e.g., age, gender, highest degree obtained, assigned campus) for all teachers in the sample.

Mixed Methods Data Analysis

The interviewer recorded data from interviews of new teachers (n=71) by audio-recording (n=22) or field notes (n=49). Audio-records were transcribed, and transcripts were transformed into data charts, which allowed the researcher to rearrange and connect information from the interview directly to the interview questions. Field notes were also rearranged and transferred directly into data charts. Figure 4.3 provides a visual model of this study's data analysis. Only two questions from the PRISE beginning teacher interview are analyzed in this study: (a) *If the administration of this school were to ask you what three things were the best supports for you as a beginning teacher, what three things would you tell them?* and (b) *If the administration were to ask you how to improve the induction program at this school for a beginning teacher, what three things would you recommend?* These questions were selected for analysis to gain an understanding of beginning science teachers' program evaluation of their induction experiences.

During this sequential, exploratory mixed methods analysis of beginning teacher interviews, teachers' responses to each question above were reduced and coded (Chi 1997). The teachers' responses were grouped together to develop topics of induction support. Individual topics were then clustered to form larger themes.

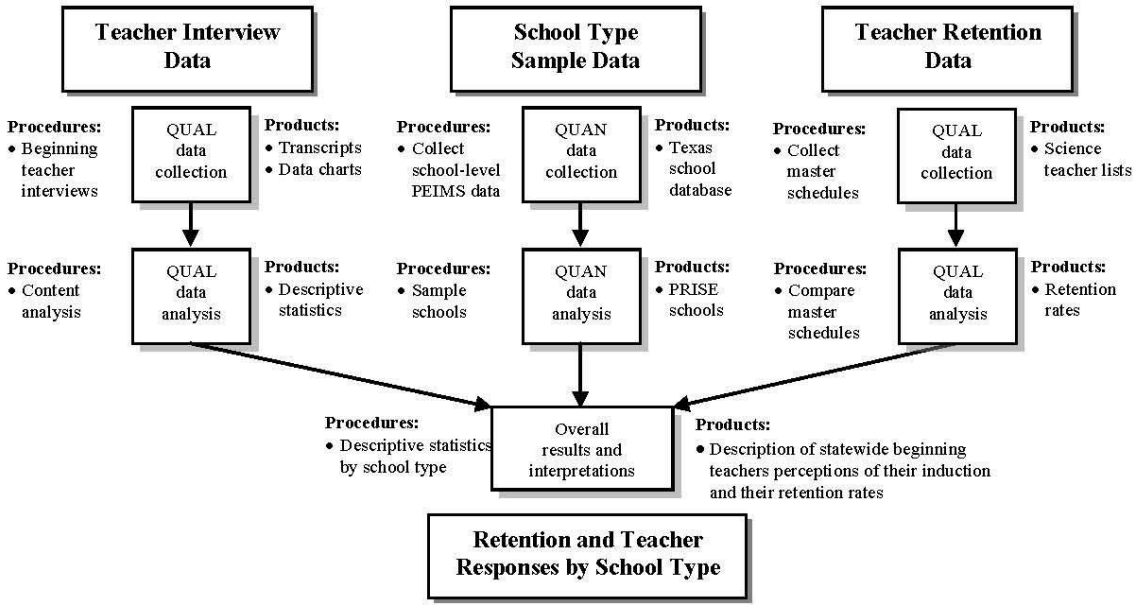

Fig. 4.3 Schematic of mixed methods analysis.

Sample schools' master schedules were collected for the 2007-2008 and 2008-2009 school years. Lists of science teacher names were created for each school and compared to determine which teachers were *Stayers*, *Movers*, and *Leavers* (see Appendix F). In this study, *Stayers* were defined as those science teachers who are retained as a science teacher by a campus; *Movers* were defined as science teachers who are retained in the profession but transfer to a different campus; and *Leavers* were defined as science teachers who are no longer in the teacher workforce as defined by the Texas Education Agency's (TEA) Public Education Information Management System (PEIMS). The distribution of *Stayers*, *Movers*, and *Leavers* are displayed in Table 4.5.

Table 4.5 Distribution and return rates of beginning Texas public high schools science teacher interviews by retention type and school size

	Beginning Texas public high school science teachers				
	Identified (n=95)		Contacted (n=71)		Return rate (n=95)
	Count	%	Count	%	%
All Schools					
Stayers	62	65.3	48	67.6	73.8
Movers	14	14.7	10	14.1	71.4
Leavers	19	20.0	13	18.3	68.4
Total	95	100.0	71	100.0	74.7
Small Schools					
Stayers	4	66.6	4	80.0	100.0
Movers	1	16.7	1	20.0	100.0
Leavers	1	16.7	0	0.0	0.0
Total	6	100.0	5	100.0	83.3
Medium Schools					
Stayers	22	64.8	16	61.6	72.7
Movers	6	17.6	5	19.2	83.3
Leavers	6	17.6	5	19.2	83.3
Total	34	100.0	26	100.0	76.5
Large Schools					
Stayers	36	65.5	28	70.0	77.8
Movers	7	12.7	4	10.0	57.1
Leavers	12	21.8	8	20.0	66.7
Total	55	100.0	40	100.0	72.7

Note that return rates for all sized schools are similar, ranging from 72.7% (Large schools, n=55) to 83.3% (Small schools, n=6). In Small schools, *Stayers* and *Movers* have a 100 percent return rate. However, the single *leaver* from Small schools did not complete the interview. In Medium schools, *Stayers* (72.7%) had a lower return rate than *Movers* (83.3%) and *Leavers* (83.3%). In Large schools, *Movers* (57.1%) had a lower

return rate than *Leavers* (66.7%) and *Stayers* (77.8%). As a whole, the return rates indicate that the collected data is representative of all beginning science teachers in Texas public high schools.

Results and Analysis

The results will be presented in two sections: (1) beginning science teachers' reports of the best induction supports provided by the school, and (2) beginning science teachers' recommendations to improve induction at their schools. Each of these sections will present (a) an overview of teachers' responses by theme, (b) an overview of teachers' responses by topic, and (c) a comparison of teachers' responses by *Stayers*, *Movers*, and *Leavers*. Because the number of beginning teachers increases with increasing school size (see Table 4.1), heteroskedasticity is present in the data. Proportionally, this sample is representative of the Texas public high school science teacher population by school types. However, small numbers of teachers in different types of schools hinder robust statistical analysis. As a result, this study strongly focuses on descriptive statistics in an attempt to describe the state-of-the-State of science teacher induction in Texas. Therefore, it is important to note commonalities and differences across beginning science teachers' responses from different school types.

Research Question 1. What do beginning high school science teachers report as the best school-level induction supports?

A content analysis of teachers' responses to what were the best school-level induction supports resulted in the themes and topics found in Figure 4.4. Teachers' responses were coded and clustered to form topics. Topics were then clustered to form themes, which included *Professional Colleagues, Administrative Supports, Mentoring,* and *Working Conditions.*

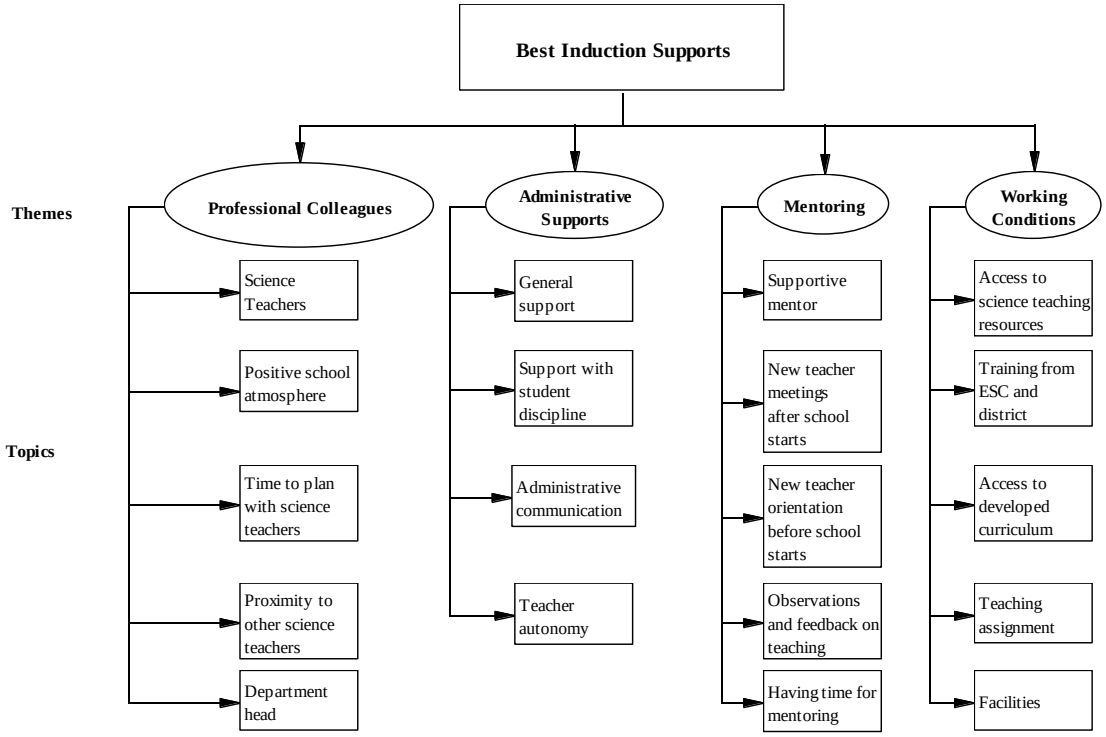

Fig. 4.4 Themes and topics from Texas public high school beginning science teachers' reports of best induction supports.

Teachers were asked to report on the top three school-level induction supports. As a result, each teacher had three responses. Percentages of teachers' evaluations of the best induction supports they experienced at their respective schools are displayed in Figure 4.5 by all schools and by school size. Overall, beginning teachers indicated that the most helpful induction support was *Professional Colleagues* (28%), defined as support received from other teachers who were not identified as a mentor. It is important to note *Professional Colleagues* implies voluntary support received by the beginning teacher from other teachers who may not necessarily be another science teacher. Another induction support identified by all teachers was *Administrative Supports* (18%), which

included feeling supported and respected by the administration, receiving good communication from the administration, and being supported on student disciplinarian issues. Beginning teachers also identified *Mentoring* (17%) as a good induction support from the school. Finally, the beginning teachers identified their *Working Conditions* (15%) as a good induction support, which included being provided with science teaching resources, professional development, training, science teaching facilities, developed curriculum, and a manageable teaching assignment.

One unexpected phenomenon was that nearly one fourth of all teachers were not able to identify a school induction support (22%). For example, when asked what school-level induction supports were the best, the following teacher commented:

> It wasn't anything *they* [the school] set up. I would say it was just more my contacts—the informal mentors that I had—that's pretty much what I relied on. I can't give you three things that helped, honestly. (T2304)

Although surprising, this finding of *No Support Identified* echoes reports in the research literature of beginning teachers being "left on their own and presumed expert" (Kardos & Johnson 2007) in school cultures of teacher isolation. Additionally, this finding may address why so many beginning teachers identified *Professional Colleagues* as the best induction support they received.

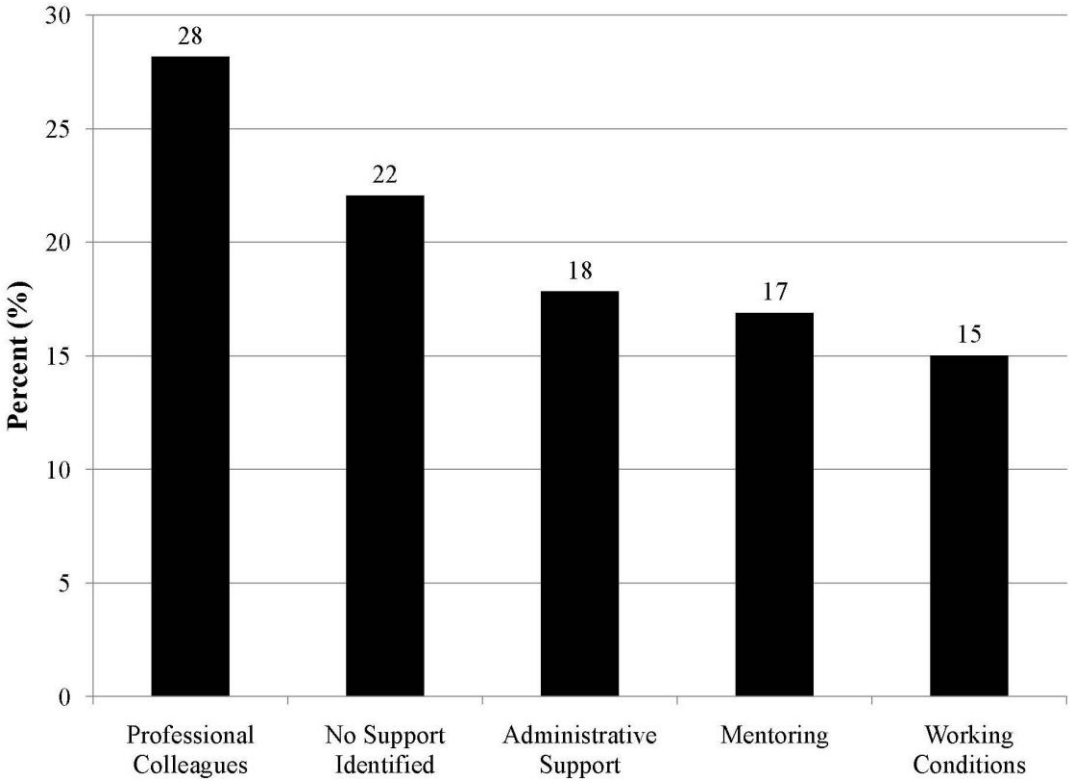

Fig. 4.5 Beginning science teachers' responses (n=213) regarding the best school-level induction supports.

Research Sub-Questions 1a. Do positive induction supports differ by school type?

Figure 4.6 indicates that beginning teachers' modal responses differed with school size. Beginning teachers from Small schools predominately reported that *Working Conditions* (27%) was their best induction support. Beginning teachers from Large schools most frequently reported that *Professional Colleagues* (35%) was their best source of induction support. However, 29 percent of responses from beginning teachers in Medium schools indicated *No Support Identified* for induction was provided. To gain a better understanding of what beginning teachers reported as the best induction supports, the themes will be described by their topics.

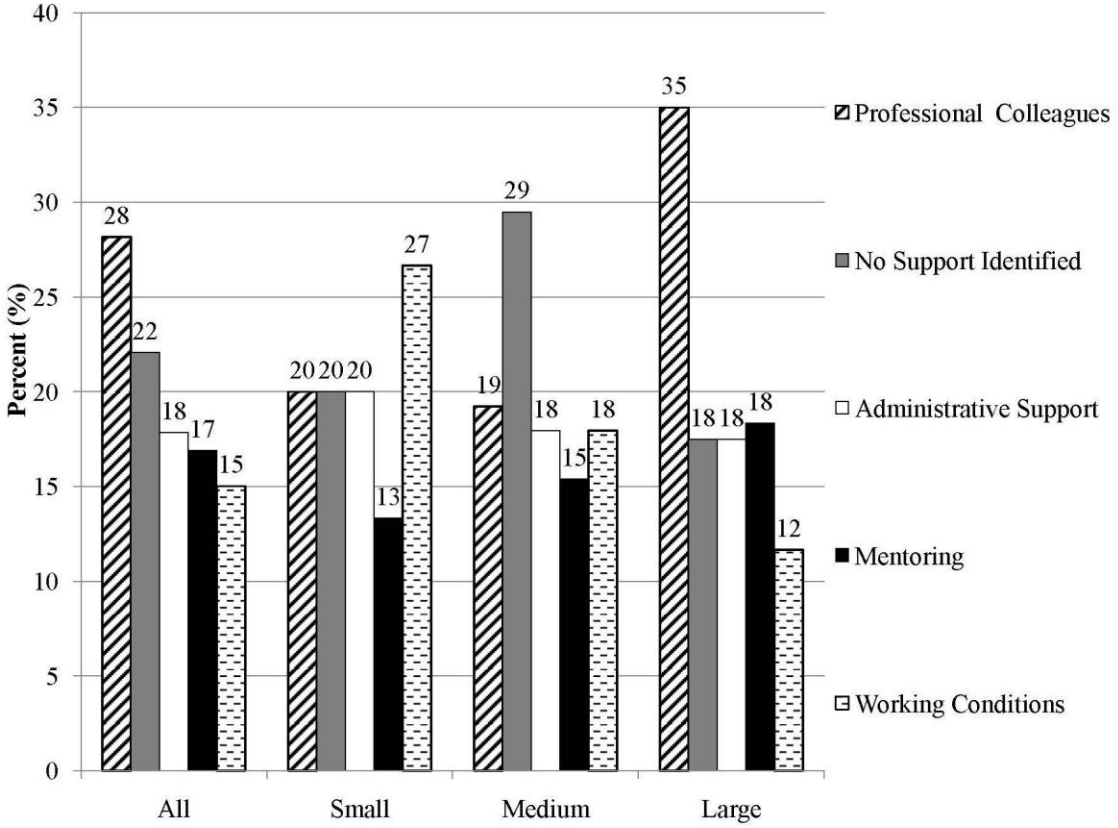

Fig. 4.6 Beginning science teachers' responses (n=213) regarding the best school-level induction supports by school size.

Administrative Support. Figure 4.7 displays beginning teachers' responses among topics of *Administrative Support*. Beginning teachers in Small, Medium, and Large schools reported that administrators were helpful in general (teachers offered no elaboration on administrators' helpfulness) and that communications received from the administration (i.e., learning school procedures) were the best induction supports. As one teacher reported, "The number one thing was access to administration. They were more than eager to help me do anything I needed to do—discipline, curriculum, what have you" (T4106). Beginning teachers from Medium and Large schools reported that principals' assistance with enforcing student discipline was one of the best induction

supports received. Beginning teachers from Large schools also reported that administrators allowing for teacher autonomy was a positive induction support.

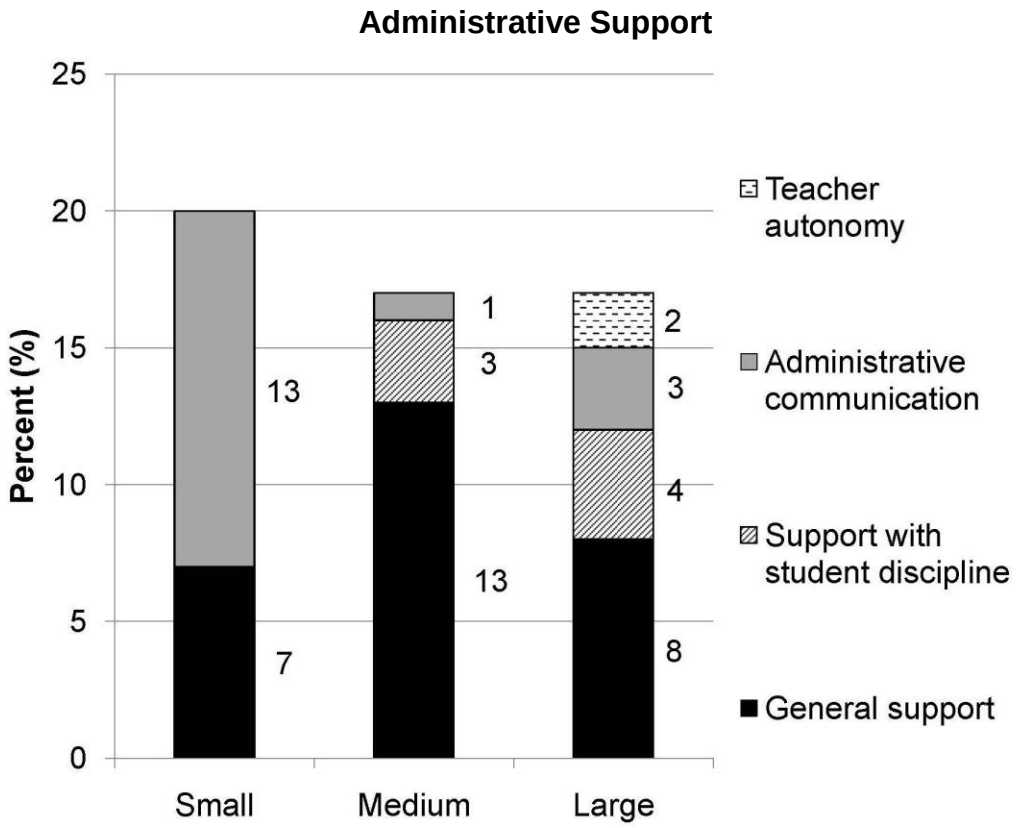

Fig. 4.7 Distribution of beginning teachers' responses (n=213) among topics of *Administrative Support.*

Mentoring. Figure 4.8 displays percentages of beginning teachers' responses among topics of *Mentoring.* Beginning teachers from all schools reported that their mentors were generally supportive. (Teachers offered no elaboration on mentors' helpfulness.) Beginning teachers at Medium and Large schools reported that new teacher orientation before school, new teacher meetings during the school year, and scheduled time for

mentoring were the most helpful parts of their induction experience. Beginning teachers from Large schools also reported that receiving observations and feedback on their teaching was helpful.

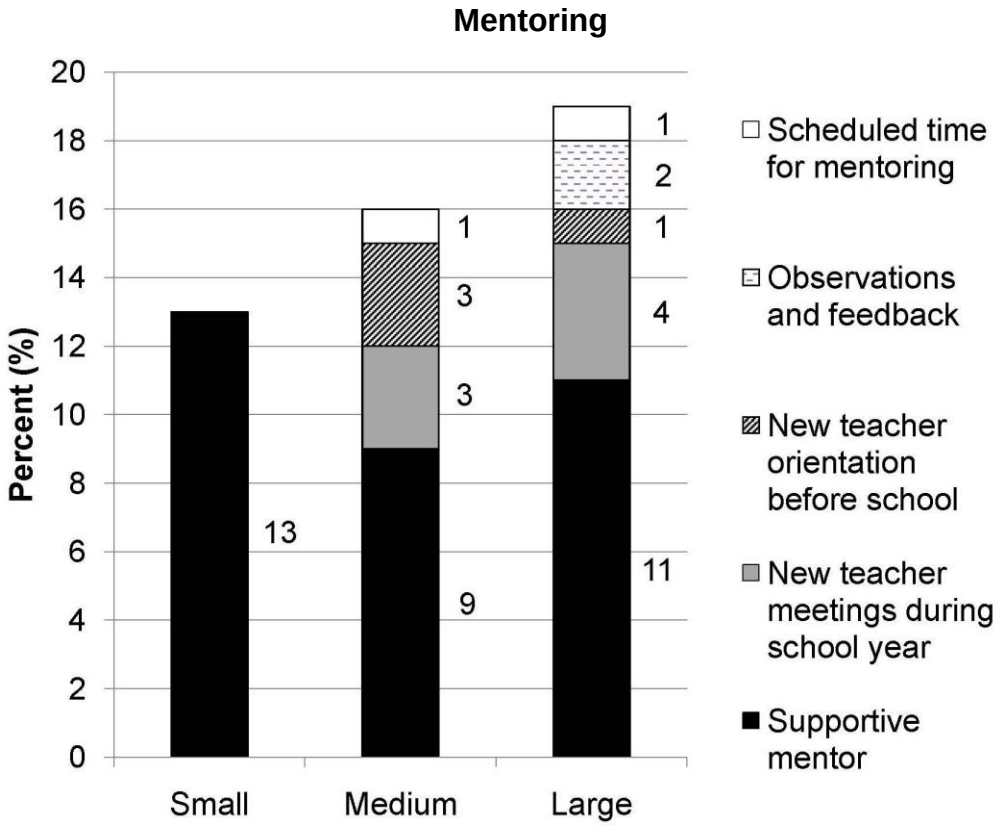

Fig. 4.8 Distribution of beginning science teachers' responses (n=213) among topics of *Mentoring.*

Professional Colleagues. Figure 4.9 displays the percentages of beginning teachers' responses among the topics of *Professional Colleagues.* Beginning teachers from all schools reported that other science teachers and a positive school atmosphere were helpful induction supports. Medium and Large school beginning teachers reported that a

helpful induction support was having time to plan with other science teachers. Large school beginning teachers reported that the science department head was generally helpful as well as having classrooms in close proximity to other science teachers. One teacher responded that, "having a good department head that I can say, 'I need this, this and this.' and she gets it" (T4922) was a positive support as a beginning teacher.

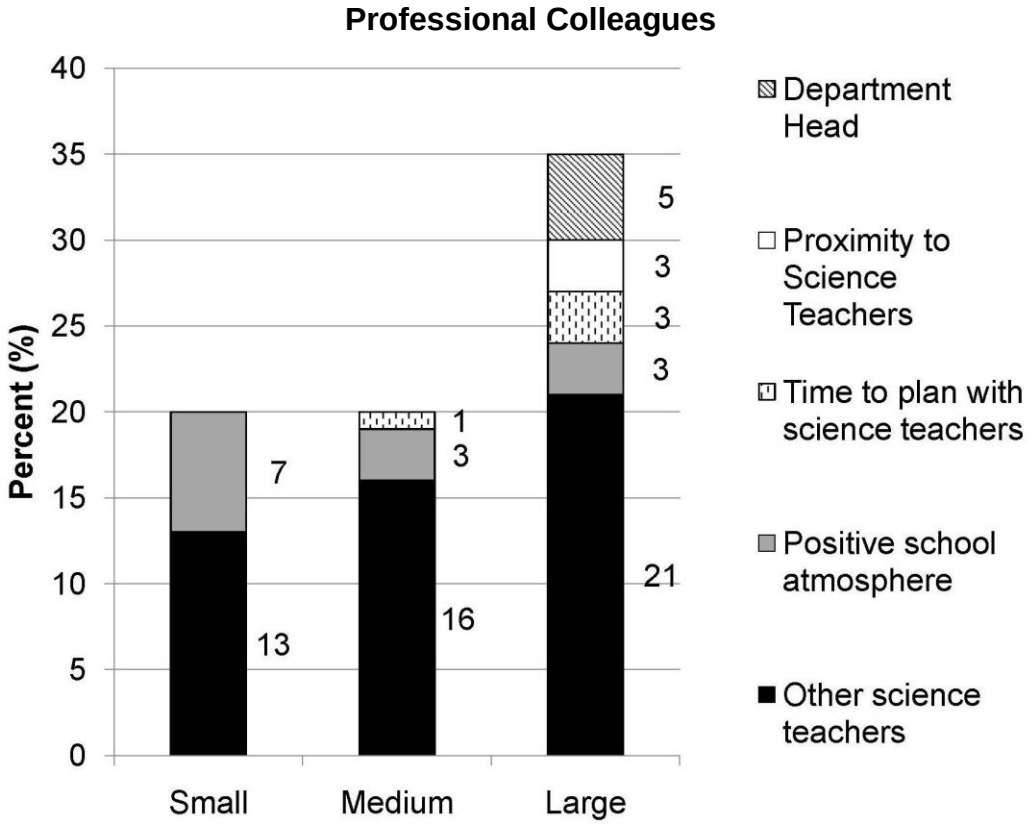

Fig. 4.9 Distribution of beginning science teachers' responses (n=213) among topics of *Professional Colleagues.*

Working Conditions. Figure 4.10 displays the distribution of beginning teachers' responses among the topics of *Working Conditions.* Beginning teachers from all schools

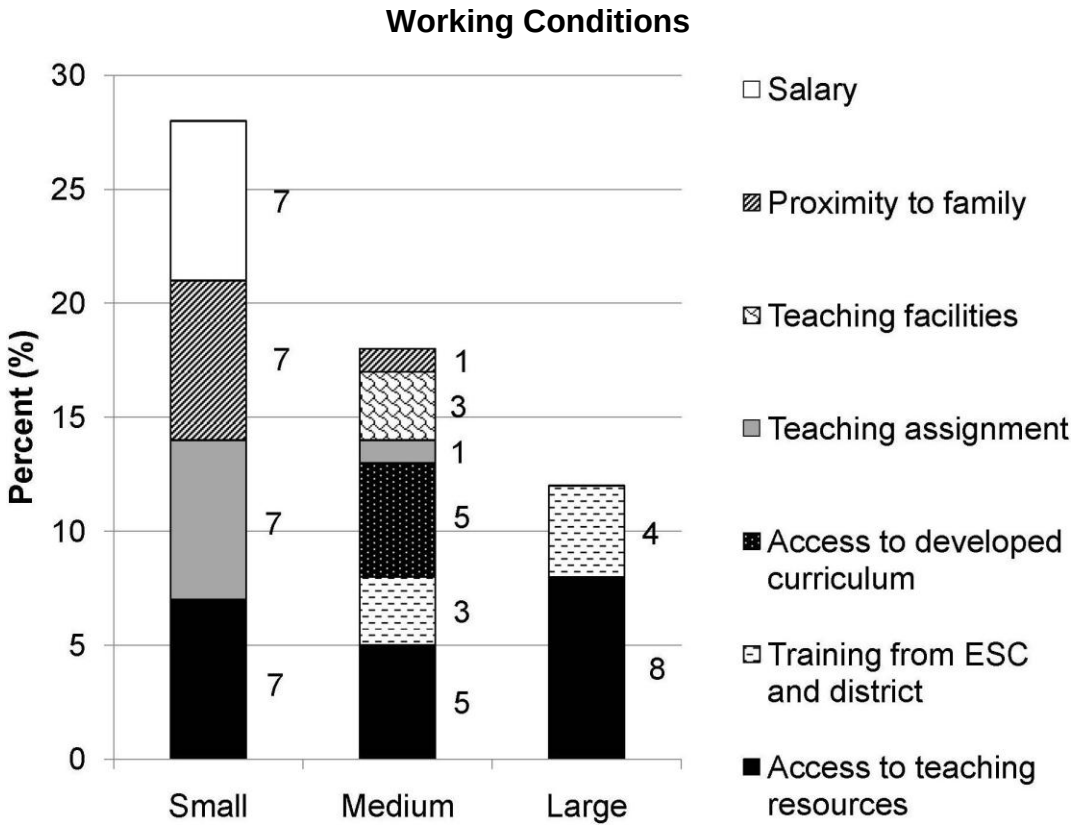

Fig. 4.10 Distribution of beginning science teachers' responses (n=213) among topics of *Working Conditions*.

reported that having access to science teaching resources was a helpful induction support. Teachers from Small and Medium schools reported that their teaching assignment (i.e., having few classroom preparations) and being located near family (i.e., family in same community, spouse working in building) were good induction supports. Only beginning teachers from Medium schools reported that having access to developed science curriculum and classrooms with science laboratory facilities were good induction supports.

Generally, beginning science teachers recognized support from their administrators, especially in the forms of clear communication and support with student discipline. Additionally, beginning teachers also indicated that mentors were generally helpful. Furthermore, beginning teachers identified other science teachers and a positive school atmosphere as being helpful to their induction experiences. Finally, beginning science teachers indicated aspects of their working conditions as good supports, especially having access to developed curriculum for their teaching assignments.

Research Sub-Question 1b. How do reports of best school-level induction supports differ between beginning teachers classified as Stayers, Movers, and Leavers?

Figure 4.11 displays the percentages of reports from *Stayers*' best school-level induction supports. *Stayers* (31%) most frequently reported that support from *Professional Colleagues* was a positive induction support. *Stayers* least frequently reported that *Mentors* (14%) was one of the best induction supports received.

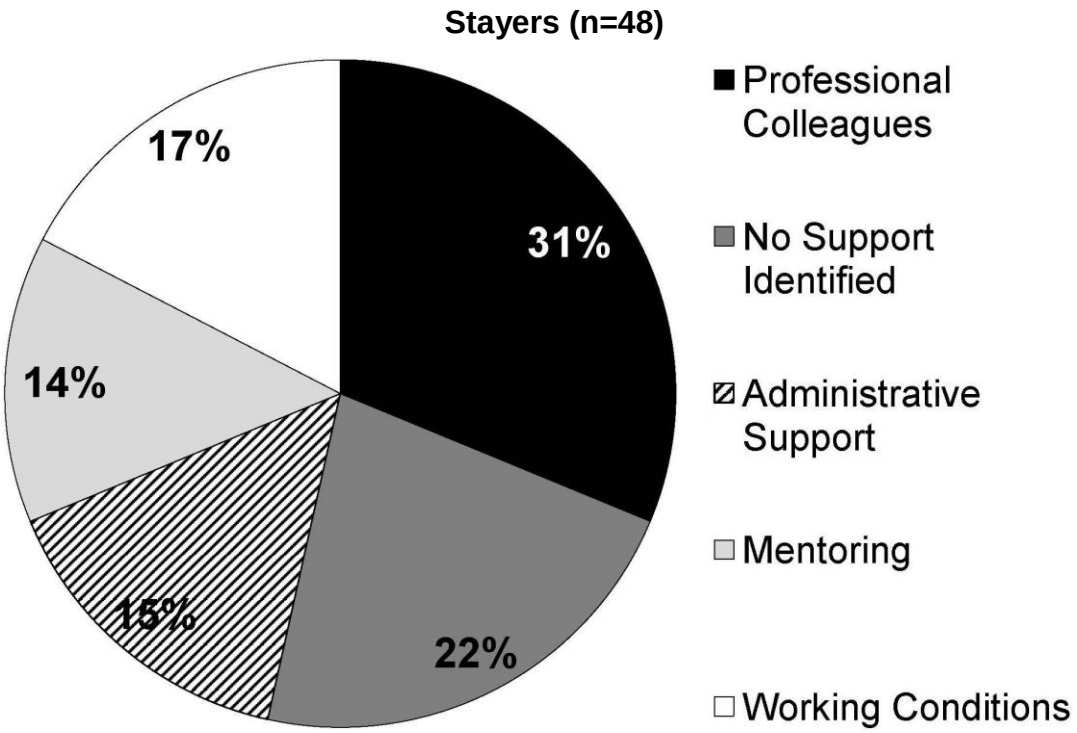

Fig. 4.11 Proportion of beginning science teacher *Stayers'* responses (n=144) regarding the best school-level induction supports.

Figure 4.12 displays the percentage of reports made by *Movers* of the best school-level induction supports. *Movers* were most likely to report *Mentoring* (30%) as a positive induction support. (It is important to note that the quality of mentoring is not being measured here, only the frequency with which beginning science teachers mentioned that the mentor was helpful.) *Movers* less frequently reported receiving support from *Professional Colleagues* (13%) and *No Support Identified* (13%) from their schools.

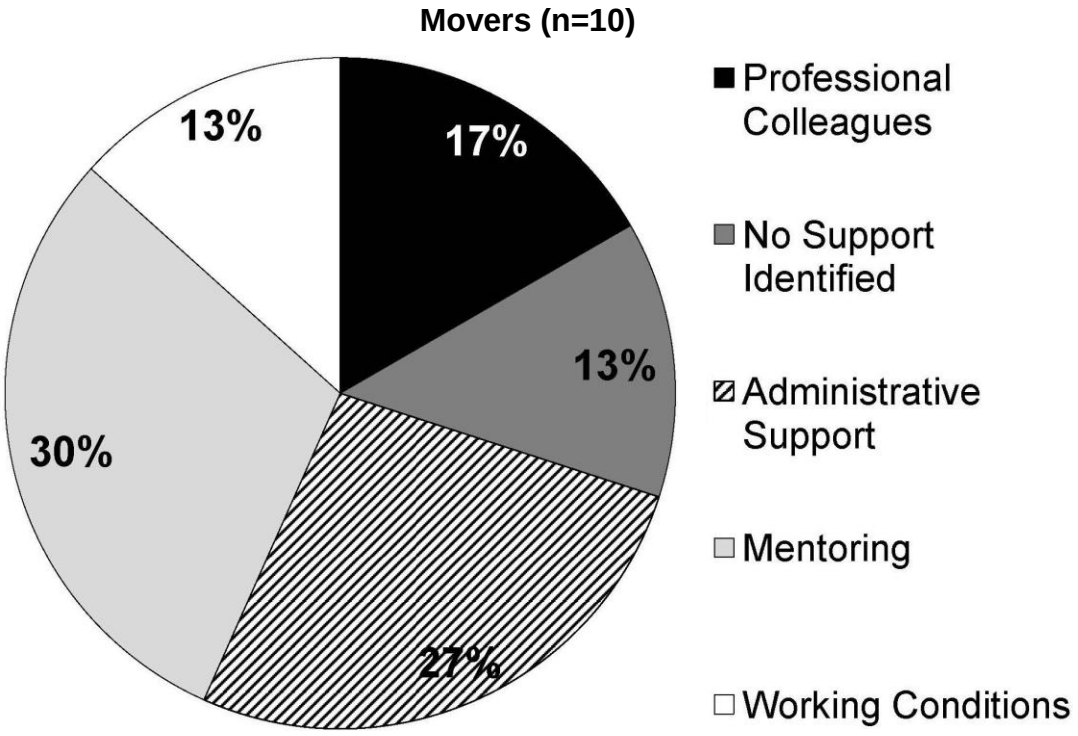

Fig. 4.12 Proportion of beginning science teacher *Movers'* responses (n=30) regarding the best school-level induction supports.

Figure 4.13 displays the percentage of responses from *Leavers*' indications of best school-level induction supports. *Leavers* most frequently reported *No Support Identified* (28%) from their schools. *Leavers* less frequently reported *Working Conditions* (15%) as a positive induction support. It is important to note that individuals in all retention types, (i.e., *Stayers*, *Movers*, and *Leavers*) reported *No Support Identified*.

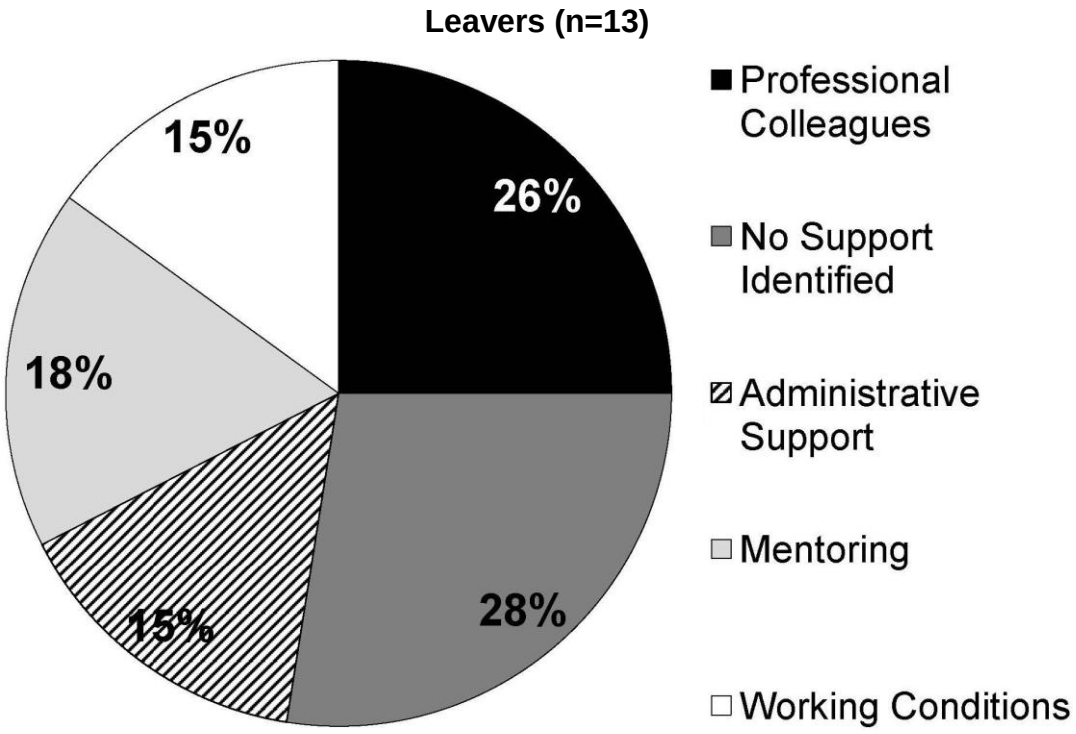

Fig. 4.13 Proportion of beginning science teacher *Leavers'* responses (n=39) regarding the best school-level induction supports.

Summary of Best Induction Supports as Reported by Beginning Teachers

Overall, beginning teachers report that support from their professional colleagues, in particular other science teachers, are the best supports from their induction. Although teachers were asked to list three supports, it is alarming that 22 percent of all teacher responses were of a lack of school induction support. As a whole, beginning science teachers most frequently reported professional support from their colleagues as a positive induction support, followed by administrative support, mentoring, and working conditions.

Research Question 2. What do beginning high school science teachers consider as deficiencies in school-level induction support?

A content analysis of teachers' recommendations for improving current school-level induction practices resulted in the themes and topics in Figure 4.14. Recommendations were clustered to produce six themes: *Administrative Support, Instructional Support, Working Conditions, Orientation, Mentoring,* and *Professional Development*.

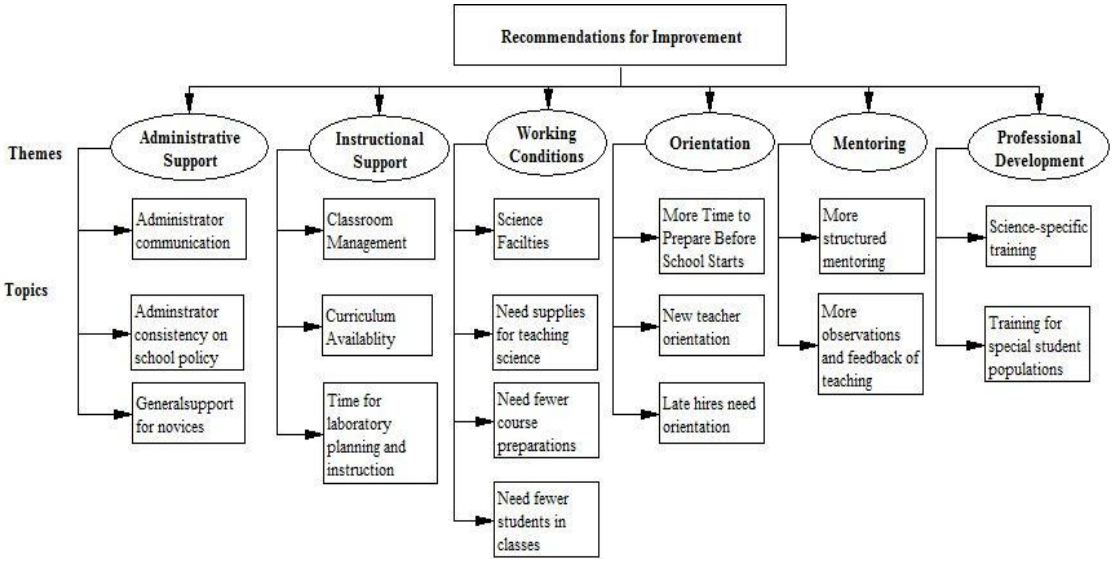

Fig. 4.14 Themes and topics of recommendations from high school science teachers regarding ways to improve school-level induction.

Teachers were asked to report on the top three improvements that they would recommend making to beginning teacher induction. Percentages of teachers' recommendations are displayed in Figure 4.15. Of all 213 recommendations, 57 responses were excluded because the teacher could not think of an improvement to make. Therefore, the following are a reflection of the remaining 156 recommendations from the 71 beginning teacher interviews conducted.

The majority of beginning teachers from all schools (25%) recommended improvements to *Mentoring*, which included recommendations for more structured mentoring and more observations and feedback of teaching. Beginning teachers also recommended making improvements to *Administrative Supports* (16%), which included improving administrative communication, administrators' consistency with school policies, and other general support for novices. Beginning teachers placed equal emphasis on improving *Orientation* (12%) and *Working Conditions* (12%). *Orientation* included teachers' recommendations for more time to prepare before school begins, improvements to new teacher orientation, and an orientation for teachers hired late in the school year. *Working Conditions* included teachers' recommendations to improve science-teaching facilities, access to science teaching supplies, number of teaching preparations, and number of students in classes. Beginning teachers also made recommendations to improve *Instructional Supports* (10%) which included help with classroom management, improved access to curriculum, and more time for laboratory planning and instruction. Finally, beginning teachers recommended improvements to *Professional Development,* which included requests for professional development that addresses science-specific and special student population needs.

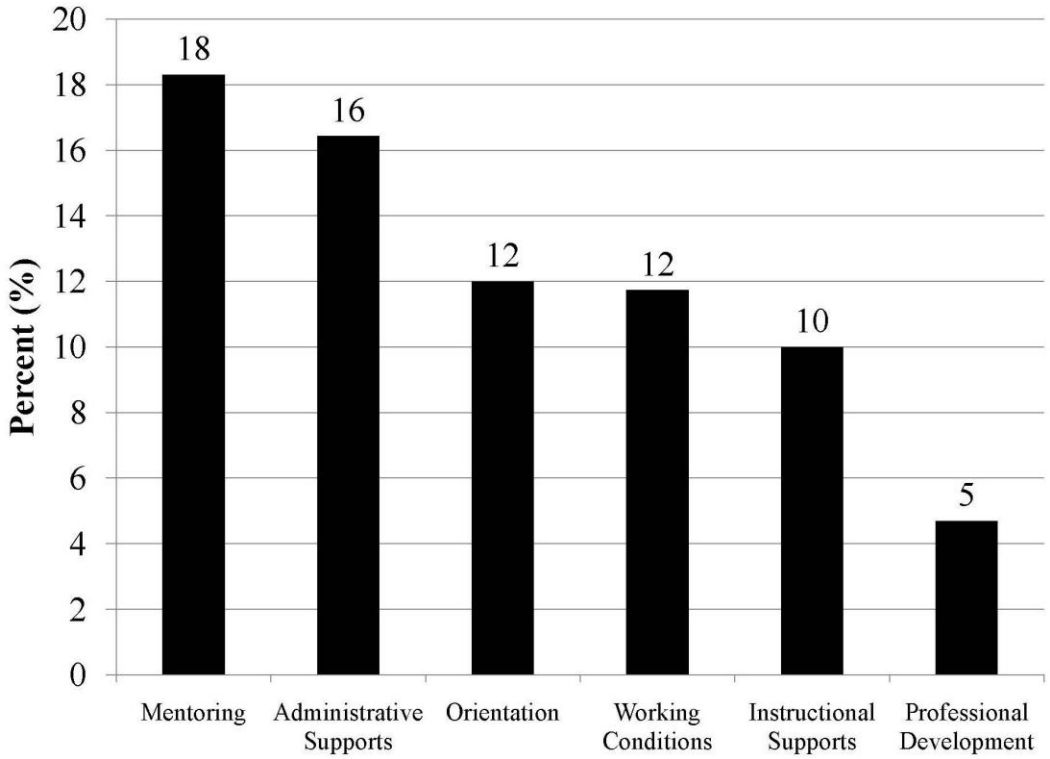

Fig. 4.15 Beginning science teachers' recommendations (n=156) to improve school-level induction supports.

Research Questions 2a. Do deficiencies in induction support differ by school type?

Figure 4.16 indicates that beginning teachers' modal responses differed with school size. Beginning teachers from Small (43%) and Medium (24%) schools most frequently recommended improving *Mentoring*. Beginning teachers from Large schools most frequently recommended improving *Administrative Supports* (29%), followed by improving *Mentoring* (24%). Other general areas recommended for improvement included instructional supports, working conditions, orientation, and professional development. To gain a better understanding of what beginning teachers reported as the best induction supports, the following sections more thoroughly describe the themes and topics previously reported in Figure 4.14.

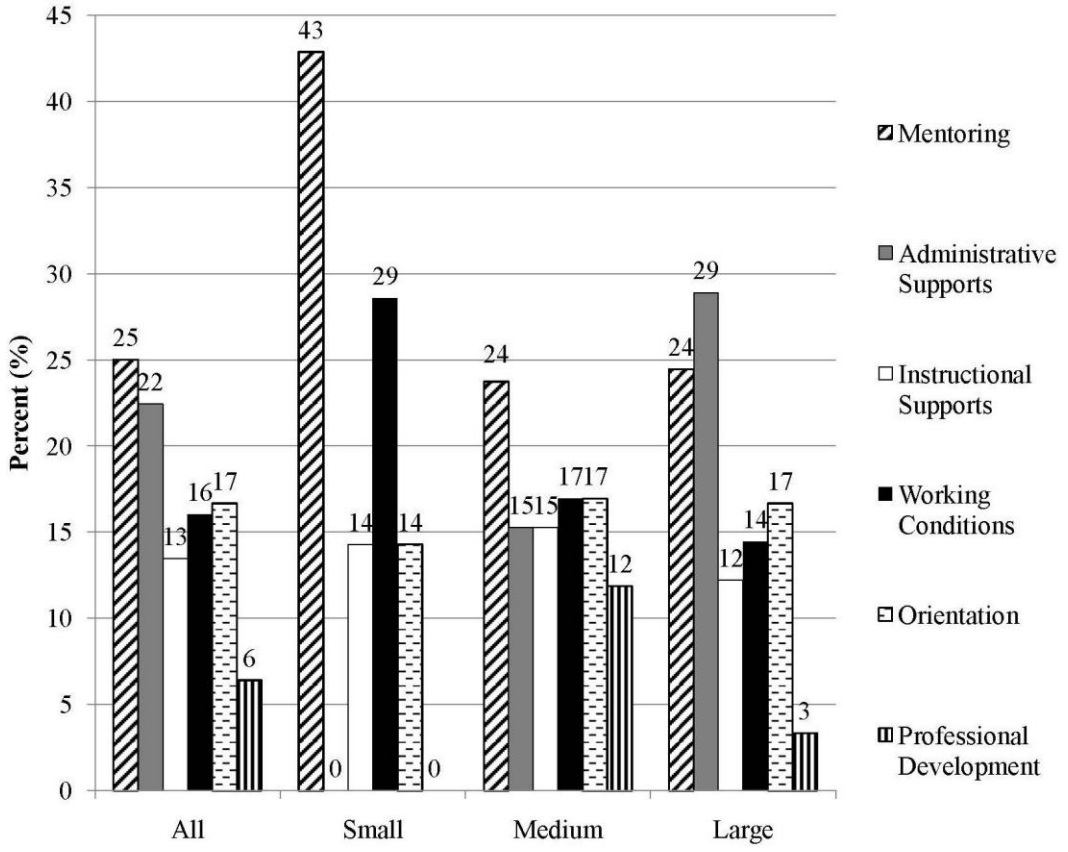

Fig. 4.16 Beginning science teachers' recommendations (n=156) to improve schools' current induction practices by school size.

Administrative Supports. Figure 4.17 displays beginning teachers' recommendations for *Administrative Supports* by topics and school size. Beginning teachers in Small schools did not recommend improving administrative supports. Teachers in Medium (15%) and Large (29%) schools both recommended improvements in administrative support. First, beginning science teachers recommended improving administrators'

communication of expectations with teachers (i.e., school policies, grading, student discipline). Another recommendation from Medium and Large school beginning science teachers included improving administrators' consistency in campus policy. In particular, teachers remarked about the need for administrators to be consistent with the student discipline policies. One teacher, frustrated with principals questioning why she sent a student to the office, remarked that being supported by administrators with student discipline was important:

> especially when it comes to classroom management and behavior, and just that if I really send someone to the office I really need something done with that student. And that's a big thing to know that if it's gotten to the point where I can't handle them in the classroom, then I really need someone to help me in the office with that. (T4917)

Medium and Large school beginning science teachers also recommended that administrators should provide more general support for novices. For example, one teacher remarked that principals should make other teachers, especially the "negative veterans that hang out in the teachers' lounge" (T4807), more aware of the needs of beginning teachers.

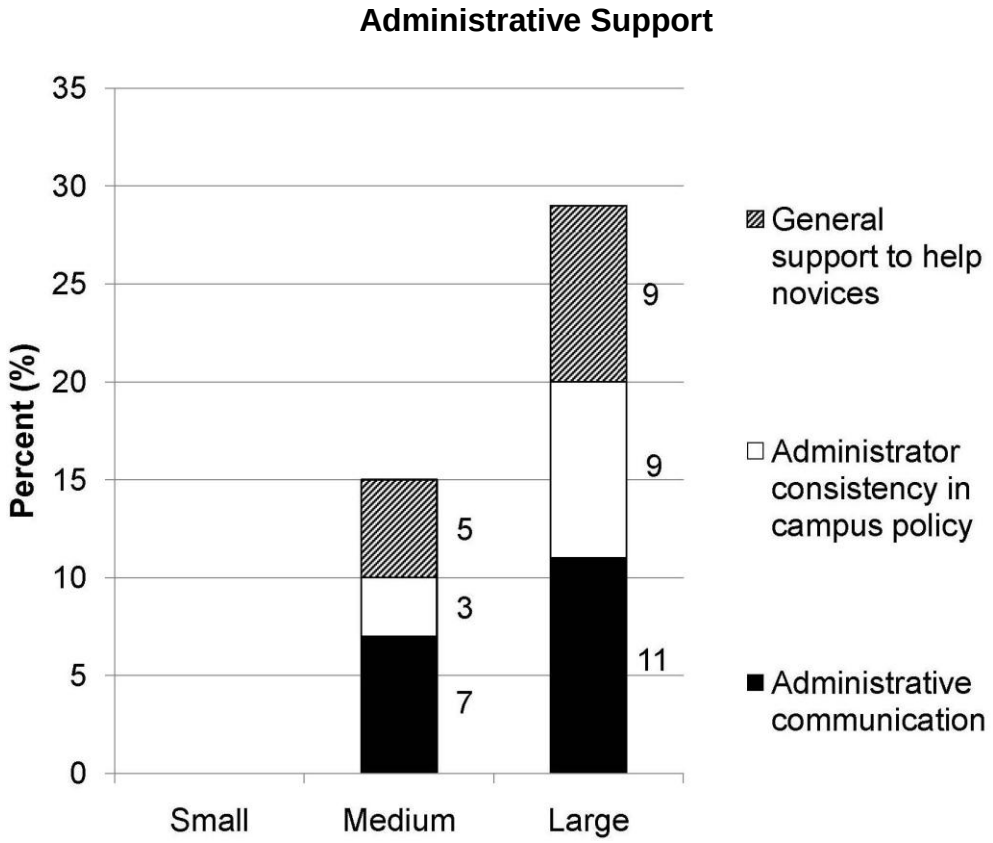

Fig. 4.17 Distribution of beginning science teachers' recommendations (n=156) among topics of *Administrative Support.*

Instructional Supports. Figure 4.18 displays beginning science teachers' recommendations for *Instructional Supports* by topic and school size. Teachers of all school sizes recommended more time for science laboratory planning and instruction. Medium and Large school teachers also recommended that the beginning teachers have access to developed curriculum (including laboratories) for their classrooms as illustrated by the following teacher's comments:

> There's not a formal curriculum, or scope and sequence in our school district—so, I think for new teachers, and that each one having some sort of formal curriculum guide would help. (T3204)

Medium and Large school beginning teachers also recommended more training in classroom management.

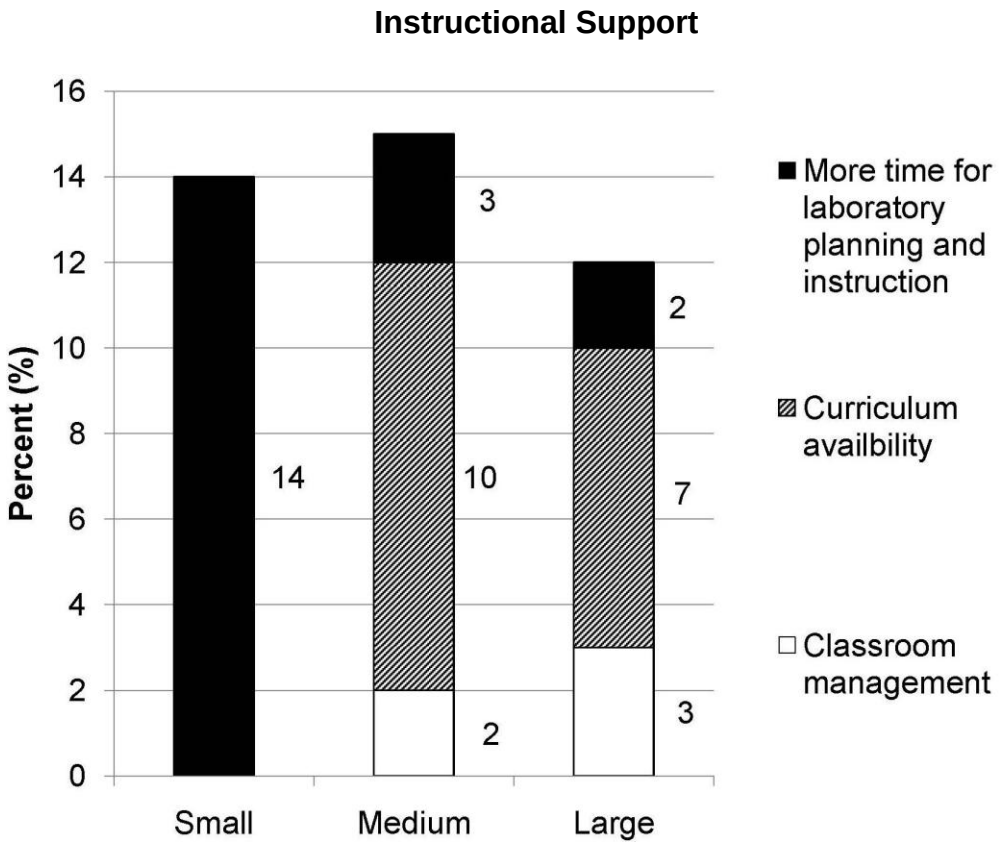

Fig. 4.18 Distribution of beginning science teachers' recommendations (n=156) among topics of *Instructional Support.*

Mentoring. Figure 4.19 displays beginning science teachers' recommendations for *Mentoring* by topic and school size. Beginning teachers from all school sizes recommended that mentoring become more structured. In particular, teachers from Medium and Large schools recommended that they receive more observations and feedback from their teaching. One teacher made what he feels is an impossible wish for more regular mentoring:

> Maybe—I mean I know it is not necessarily possible, but—maybe someone who can—you know—be here—you know—more than, maybe once a week to—to give advice and to critique a little more often. (T1701)

Beginning science teachers also recommended an induction program in their schools that would allow for them to be able to observe and be observed by other teachers. The following comment from a third-year beginning teacher, who is also serving as a mentor, made the following comment:

> Well, we really have a very weak mentoring program—and I mean mentoring in terms of having formal time to assess others and giving formal time with our new people. So like this year, I have teachers that I am mentoring, but I don't really have *formal time*—to meet with them. It's going to be after school, but maybe if they changed our lunch or some sort of time would be helpful. (T3204)

Other teachers, such as in the following comments, recommended a mentoring system with more structure:

> A better mentor system, someone that's—or just—at least something that is more rigorous. Where you can actually have a—where you have a scheduled meeting time, observations—more observations would be helpful. (T2304)

> Another [recommendation] would probably be more one-on-one time with an actual mentor, instead occasionally just popping in or anything—you know—an actual time and that you know that's mentor time. (T3007)

Other recommendations for improving mentoring focused on the mentor selection process:

> I think the teachers who are picked as mentors need to be individuals that are going with the system, they're doing what's best for the students, and they are going to be there for the teachers. And they're there to help the teachers and there to be a mentor and they need to be there for that teacher regardless of what's going on. Because if they can't, it's their job or personal life that's holding them back from being a mentor, they don't need to be a mentor. So they need to be more strict, I think, in finding out who's going to be a mentor. (T4906)

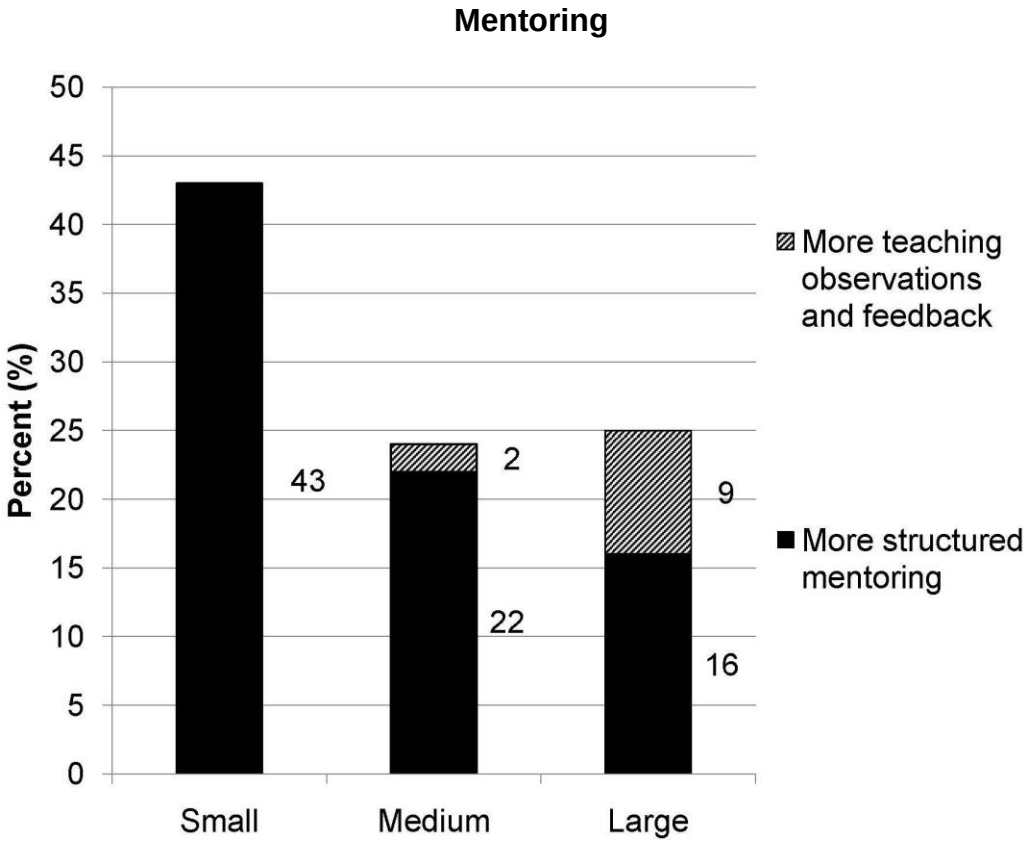

Fig. 4.19 Distribution of beginning science teachers' recommendations (n=156) among topics of *Mentoring.*

New Teacher Orientation. Figure 4.20 displays beginning science teachers' recommendations for *New Teacher Orientation* by topic and school size. Beginning teachers from all school sizes recommended that more time was needed to prepare for the start of school, including having time to set up their classrooms as illustrated by the following teacher's comments:

> I would say some assistance in setting up the classroom itself…some time and some resources for setting up a classroom because for a lot of the teachers the few resources that they have around them are their own. And, when you start in a

> brand new field, a brand new school—you don't have any resources, so you are kind of trying to have to scavenge for even getting posters on the wall or whatever. (T2309)

Additionally, beginning science teachers commented that they would like to be given more notice on what courses they would be teaching. Medium and Large school beginning teachers also recommended that new teacher orientation was more streamlined. For instance, one teacher commented that teachers are “bombarded” with an “overwhelming” amount of information at the beginning of the school year (T3103). Another teacher commented that the information received at new teacher orientation was redundant (T5005). An interesting point was made by a small group of beginning teachers. Some beginning teachers who were hired after the start of school, some as late as March 2008, commented that they were not “inducted into the school.” As a result, their recommendation was that “late-hires” need an orientation into the school as well as those teachers hired before school started. This may be an indication that teacher induction at these schools is a single, front-loaded event prior to the start of the school year. Finally, beginning teachers from Medium and Large schools recommended reducing the amount of administrative paper work that is discussed during new teacher orientation because it was overwhelming. Teachers indicated that they needed more clarity on proper paperwork procedures.

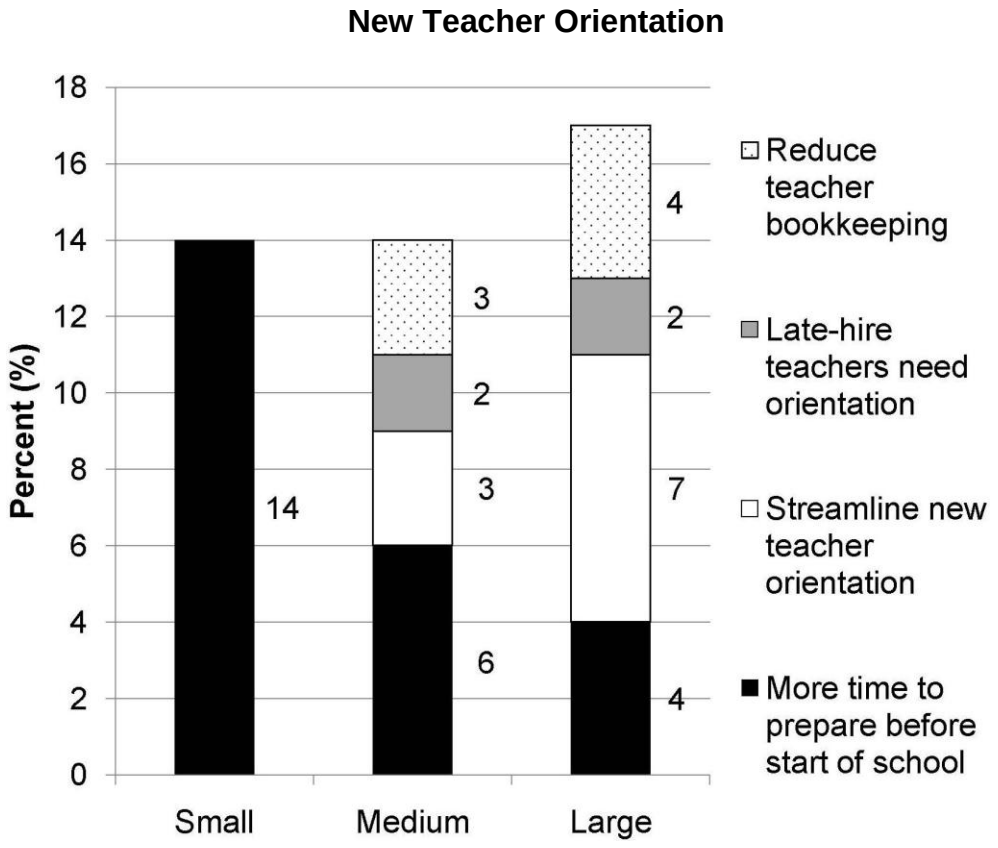

Fig. 4.20 Distribution of beginning science teachers' recommendations (n=156) among topics of *New Teacher Orientation.*

Professional Development. Figure 4.21 displays beginning science teachers' recommendations for *Professional Development* by topic and school size. Beginning teachers in Small schools did not make any recommendations for improvement in professional development. Beginning teachers in Medium and Large schools recommended that they receive more subject-specific professional development as well as training for teaching different student populations (i.e., English Language Learners, Special Education).

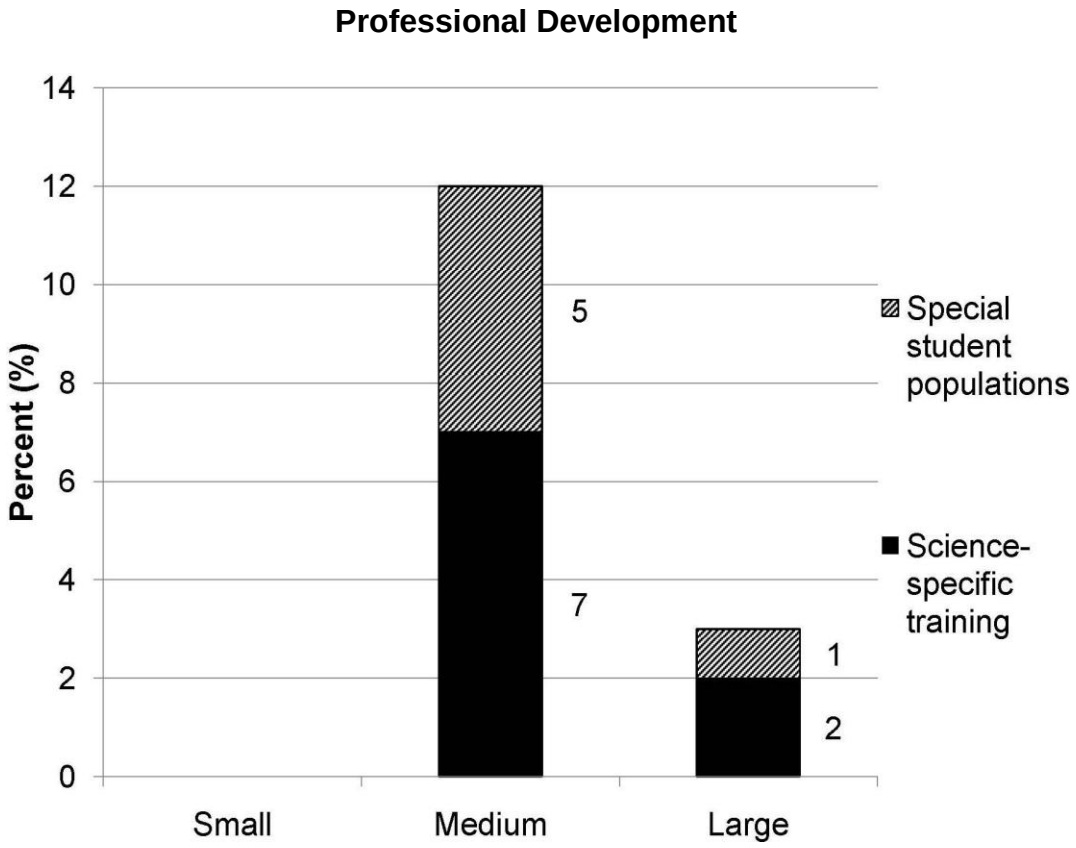

Fig. 4.21 Distribution of beginning science teachers' recommendations (n=156) among topics of *Professional Development.*

Working Conditions. Figure 4.22 displays beginning science teachers' recommendations for *Working Conditions* by topic and school size. Beginning teachers from all school sizes recommended improvements in beginning teachers' science teaching supplies. For instance, one beginning teacher reported how he started his first days of being a teacher without enough places for students to sit. He recommended that his school should make a better effort for beginning teachers to have:

> …everything in the classroom that you need to start the first day of school. Because, it was into the second week before I had most of these stools and desks that I needed to ask [for]. Students were sitting on top of desks. I wouldn't let them sit on the floor—but I had them sitting on top of desk tops and stuff like that. (T1705)

Beginning teachers from Medium and Large schools recommended that they have fewer course preparations and fewer students in their classes. Another variant on the latter was a request for students to be carefully placed in beginning teachers' classes (i.e., filter students with known behavioral problems). Beginning teachers from Large schools recommended improvements in their available science teaching facilities (i.e., would like to be assigned to a classroom with science laboratory teaching facilities and not be a "floater").

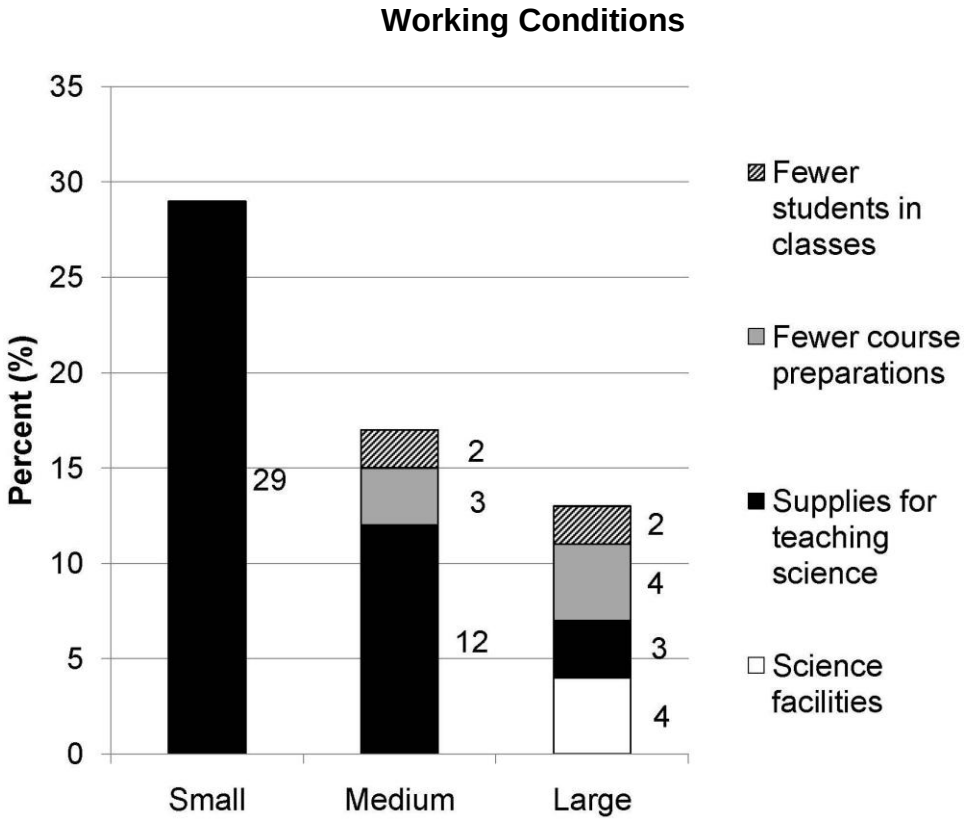

Fig. 4.22 Distribution of beginning science teachers' recommendations (n=156) among topics of *Working Conditions.*

Beginning teachers also recognized that they need more time to prepare their classroom and lessons before school begins and to plan for science laboratory and instruction during the school day.

Summary of Beginning Teachers' Recommendations for Induction. One must remember that just because a recommendation was not mentioned at a particular school size, it does not mean that the recommendation may not apply to that school type. In this study, increasing school size also resulted in an increasing number of beginning science teachers. Therefore, more variability in answers naturally occurs as the school size

increases. However, the recommendations made in individual schools can be viewed as the most immediate concerns for the beginning science teachers in those types of schools.

Generally, beginning science teachers recommended that mentoring could be improved by making it more structured. Beginning science teachers also recommended making more time available for science laboratory planning and instruction. Additionally, beginning science teachers would like to see an increase in the amount of time for preparing their classrooms and their lessons before the school year begins. Furthermore, beginning science teachers recommended more availability to science teaching supplies.

Research Questions 2b. How do recommendations for improving school-level induction supports differ between beginning teachers classified as Stayers, Movers, and Leavers?

Figures 4.23-4.25 display the proportion of all participating beginning science teachers' recommendations by their classification as *Stayers*, *Movers*, and *Leavers*, respectively. Figure 4.23 indicates that *Stayers* most frequently recommended making improvements to *Mentoring* (27%), *Administrative Supports* (22%), and *Orientation* (18%). *Stayers* were least likely to make recommendations to improve *Professional Development (7%).*

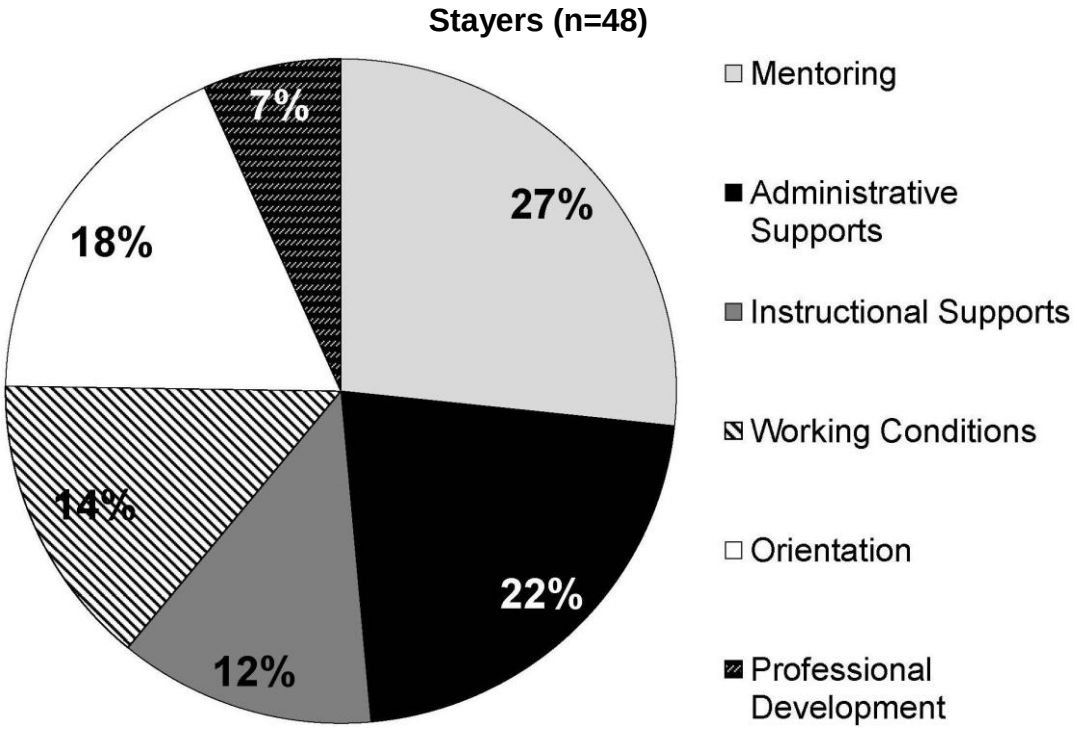

Fig. 4.23 Proportion of participating beginning science teacher *Stayers*' recommendations (n=105) to improve school-level induction.

Figure 4.24 indicates that *Movers* most frequently recommended making improvements to *Mentoring* (32%), *Administrative Supports* (27%), and *Instructional Supports* (18%). *Movers* were least likely to make recommendations to improve *Professional Development* (5%) and *Orientation* (5%).

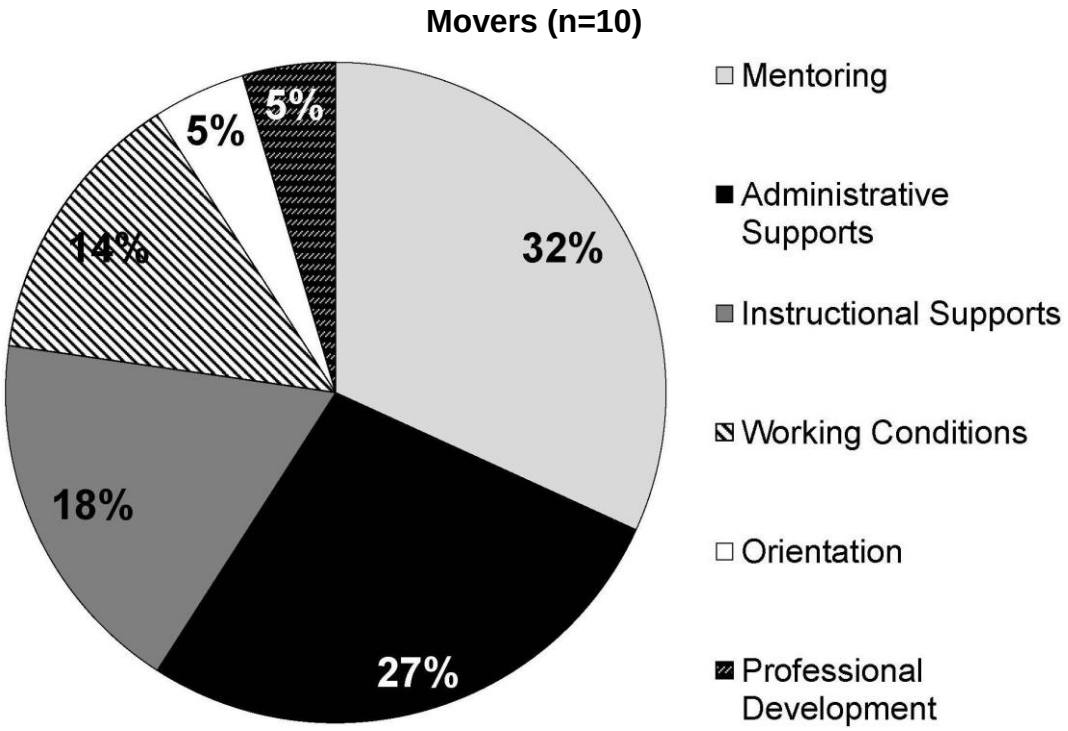

Fig. 4.24 Proportion of participating beginning science teacher *Movers*' recommendations (n=22) to improve school-level induction.

Figure 4.25 indicates that *Leavers* most frequently recommended making improvements to *Working Conditions* (24%), *Orientation* (21%), and *Administrative Supports* (21%). *Leavers* were least likely to make recommendations to improve *Professional Development* (7%).

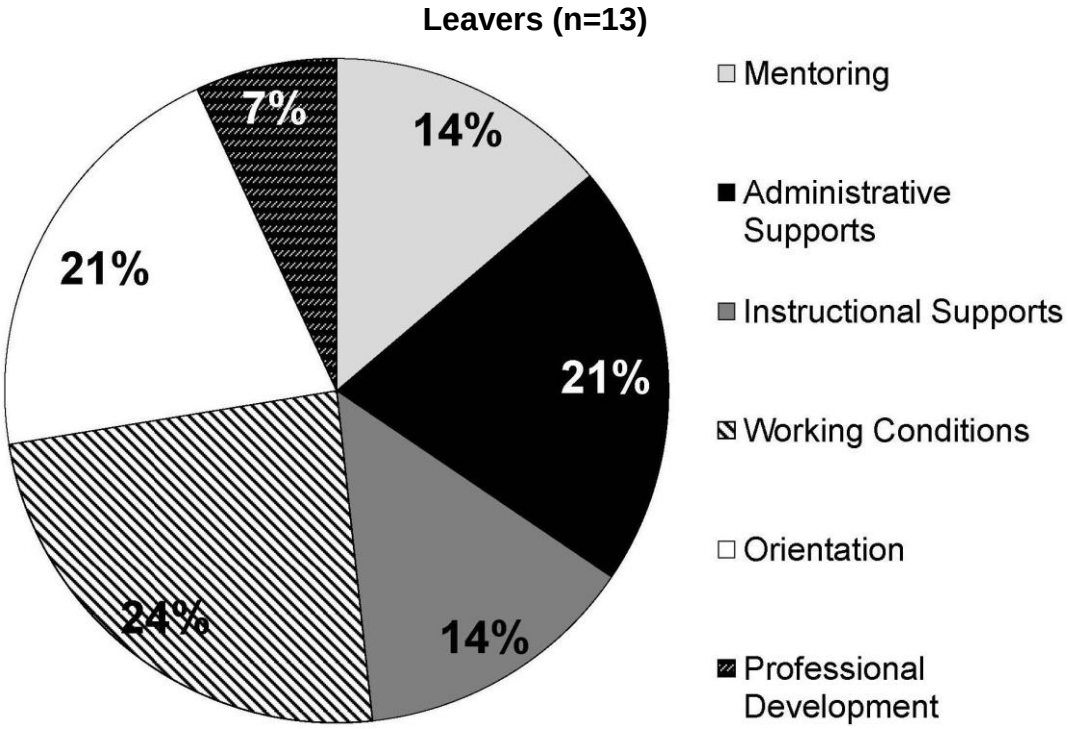

Fig. 4.25 Proportion of participating beginning science teacher *Movers*' recommendations (n=29) to improve school-level induction.

Discussion

Beginning teachers recognized that supportive administrators, mentors, working conditions, and colleagues were helpful during their first years of teaching. However, beginning teachers recognized that they needed more help than what they presently received.

This research concludes that beginning science teachers are seeking out help from other teachers. A large proportion of all teacher responses indicated that the best induction support was a colleague with whom they could go to for help, which was an induction support not necessarily established by the school. Schools currently leave it to chance if they use unassigned help from other teachers as a support for beginning teachers. Overall, nearly one-fourth of all beginning teachers indicated that they did not

receive any induction supports from their schools. This important finding indicates that schools, districts, and the state need to reevaluate their priorities for beginning teacher support and mentoring.

Additionally, the principal plays an important role for beginning science teachers. Teachers either reported being supported by their administrator or they did not. Teachers felt supported when lines of communication with the administration were clear and their decisions about student discipline were supported by the administration. However, the opposite was also found to be true. Some teachers felt unsupported and recommended that principals should be consistent with student discipline policies.

Teachers also recognized mentoring as a good support that needed improvement. Teachers who remarked that mentoring was a good support often did not elaborate. This leaves little understanding about the ways in which mentors were a good support to the beginning science teachers. However, teachers were much more specific when making suggestions on how to improve mentoring. In particular, beginning science teachers would like to have a more structured mentoring program that provides more opportunities for their teaching to be observed *and* for them to observe others teaching. Additionally, teachers would like to receive more meaningful feedback from their teaching observations. School administrators, and other policy makers, may wonder if mentoring is worth the investment of time and money since beginning teachers reported mentors as helpful whether or not the teacher remained at the school. It is important to note that most of what is called mentoring in Texas' high schools would not be recognized as such by experts in the field. As a result, current mentoring goals and practices need to be assessed and reevaluated.

Teachers also identified their working conditions as an important area of support and concern for beginning science teachers. Those teachers that had access to teaching resources, access to developed science curriculum, and were happy with their teaching assignment reported that these were positive induction supports. However, recommendations to improve working conditions for beginning science teachers included providing access to science teaching facilities, providing resources for science

teaching equipment, lessening the number of course preparations, and placing fewer students in their classrooms (especially students with known behavior problems).

In regards to professional development, beginning science teachers also recommended providing more science-specific training and training for special populations of students (i.e., English Language Learners, Special Education). Additionally, teachers wanted to make improvements to their orientation to the schools. In particular, teachers wanted more time to prepare their classrooms and lessons prior to the beginning of the school year.

Implications for Future Research

The findings from this study warrant further research. Exploration into the types of mentoring received by the beginning teachers can help to give deeper understanding as to why some teachers stayed at their schools and others left. The types of mentoring support received by each most likely varied by each location.

Gaining an understanding of how school administrators perceive beginning induction support at their schools would allow for a better understanding of how the administrators were supportive. Many teachers' responses indicated that the administrators were supportive, but the teachers did not elaborate on how the administrators were supportive. Additionally, comparing the beginning teachers' responses in this study with the administrators' perceptions of induction support could determine whether there is a disconnect between what beginning teachers and administrators view as helpful for beginning teachers. In particular, how do beginning science teacher *Movers*' and *Leavers*' views correspond with their principals' views on current induction practices.

Strengths and Weaknesses of the Study

A major strength of this study is that the PRISE sampling plan allows the empirical data to be generalized to all public high schools in Texas. Furthermore, the sampling plan provides a multiplier so that each beginning teacher in this study represents approximately 27 science teachers in Texas public high schools. Additionally, the large return rate on the interviews of beginning teachers provides a level of confidence that the

findings are statistically representative of all beginning high school science teachers in Texas public schools. As with any study, there are limitations to the findings. First, beginning teachers may have omitted information about their induction policies and practices. However, the field-based interviews were conducted on the teachers' terms and most were candid and eager with their responses. Second, the questions analyzed in this study are only a small fraction of the entire interview. Future research is needed to understand the intricacies of beginning science teachers' induction experiences. Third, the beginning science teachers only represent one voice of schools' induction practices; future research is needed to understand the voices of principals and mentors.

CHAPTER V

A MIXED METHODS STUDY OF *MOVERS* AND *LEAVERS*: BEGINNING SCIENCE TEACHERS' EVALUATIONS AND PRINCIPALS' PERCEPTIONS OF TEACHER INDUCTION

Synopsis

It is important to retain beginning science teachers so that they can develop expertise. However, beginning teachers leave the classroom at disturbing rates and well before reaching retirement. Induction programs have become the policy-of-choice to address new teacher attrition from schools. This exploratory mixed methods study reports on data collected by the Policy Research Initiative in Science Education (PRISE) collected from 50 principals and 385 science teachers representing all Texas public high school campus principals and science teachers. Beginning teachers' interviews from those teachers that left their schools were studied to determine how *Movers* (n=10) and *Leavers* (n=13) evaluated their induction experiences. The interviews of corresponding principals were then examined to discern if principals' perceptions of their schools' induction practices where in tune with *Movers*' and *Leavers*' evaluations. Findings from this study indicated that principals and were aware of induction components that were considered helpful by both *Movers* and *Leavers*. However, principals did not acknowledge what *Movers and Leavers* recommended for improvements to current induction practices.

Introduction

With the passing of the *No Child Left Behind Act of 2001* (U.S. Congress, 2002), public school administrators have paid close attention to staffing their schools with *highly qualified* teachers. Additionally, the majority of states, including Texas, hold both teachers and administrators accountable for students' performance on state-mandated exams. Prior research findings indicate that the best school-based predictor of student

performance is the *highly qualified* teacher in the classroom (e.g., Aaronson, Barrow, & Sander, 2007; Hill, Rowan, & Ball, 2005; Rivkin, Hanushek, & Kain, 2005). While students are entitled to receive a quality science education regardless of their teachers' years of experience, teachers in their first years of teaching are by nature inexperienced. Beginning teachers enter schools with varying levels of experience in content knowledge, pedagogical knowledge, and pedagogical content knowledge. Beginning teachers' inexperience and knowledge deficits affect the quality of their teaching practice and student learning. Comprehensive induction programs can help beginning teachers gain experience and support them through their first years of teaching.

Beginning Teacher Retention

Beginning teachers leave the profession at disturbing rates. Current estimates are that more than one-third (Feiman-Nemser 2001a) to one-half of all novice teachers leave the profession during their first five years (Ingersoll 2003b; Smith & Ingersoll 2004). Teachers that leave are often replaced with other inexperienced teachers. This further perpetuates the chance of students being placed in classrooms headed by inexperienced teachers. The attrition rates of novice teachers are even more alarming when one considers that more than one third of experienced teachers are projected to leave the classroom within the next four years due to the retirement of Baby Boomers (Carroll & Foster 2009). An analysis of the 1999-2000 Schools and Staffing Survey by Ingersoll and Perda (2009) indicated that teacher retirement accounted for less than 14 percent of all attrition. However, retirement is not the reason that novice teachers leave the profession.

Ingersoll and Perda (2009) reported that nearly 42 percent of science teachers leave the profession because of family reasons, which are outside of a school's control. However, they also found that 28.8 percent of science teachers left the classroom to pursue another career and 47.2 percent of science teachers left the classroom because of dissatisfaction with their jobs. Namely, science teachers reported dissatisfaction with "inadequate preparation time, lack of teacher influence over decision-making, class sizes, and inadequate computers and technology" (Ingersoll & Perda 2009, p. 33). These

last two reasons for teacher turnover are "directly related to the occupational and organizational conditions of teaching" (Ingersoll & Perda 2009, p. 32), which can be inside a school's control.

As a result of large numbers of teachers leaving their teaching jobs well before retirement, induction programs have become the policy-of-choice to address beginning teacher attrition from schools (Smith & Ingersoll 2004). Consequently, research on teacher turnover has received increasing attention in recent years. Research reports on teacher retention have commonly lumped teachers into one of three categories: *Stayers*, teachers retained at a campus; *Movers*, teachers who are retained in the profession but transfer to another campus; and *Leavers*, teachers who leave the profession (e.g., Shen 1997; Smith & Ingersoll 2004). How teacher turnover is defined determines its implications and impacts on education. Retaining quality teachers in the profession as a whole is a global concern for teacher educators and education policy makers. For example, on a larger scale, *Stayers* and *Leavers* may be lumped into a single category of teachers that are retained in the profession. However, at a local level, retaining quality teachers on a campus is a large concern for principals and other school administrators. *Movers* and *Leavers* have an equal impact on individual campuses because principals are left with a teacher vacancy that needs to be filled. Moreover, retaining teachers in hard to fill areas, such as science, is of special concern because of the scarcity of their numbers in comparison to other fields (Ingersoll 2003b; Ingersoll & Perda 2009).

The Importance of Retaining Beginning Teachers

It is important to retain beginning teachers for many reasons. First, a large wave of Baby Boomer teachers are about to leave the teacher workforce due to their retirement. As these experienced teachers exit the teacher workforce, they take with them a wealth of knowledge of teaching and institutional knowledge that took years for them to develop. The current teacher workforce currently makes a U-shaped curve in regards to years of teaching experience (Johnson & The Project on the Next Generation of Teachers 2004, p. 5). As beginning teachers leave before retirement, and veteran teachers begin to retire,

concerns arise regarding the level of teaching expertise that will remain in the teacher workforce.

Second, it is important to retain beginning teachers because it takes time for novices to develop expertise. Berliner (2001) concluded that it takes approximately five or more years for expertise to develop in teachers and 3-5 years before "things that happen in the classroom no longer are surprising" (Berliner, 2001, p. 479). Although not experts in teaching, many beginning teachers often have the same teaching responsibilities as their veteran counterparts. Furthermore, administrators often have the same performance expectations of beginners as they do of veterans (Feiman-Nemser, 2001; Kardos & Johnson, 2007). However, because beginning teachers are novices, these expectations may not be reasonable.

Local Induction Programs

Across the nation, less than half of all states require new teachers to participate in a state-funded induction program and only half require new teachers to participate in a state-funded mentoring program. Furthermore, only one in five states has standards for selecting, training, and/or matching mentors (Education Week 2008a). Texas does not mandate or fund any of the above. However, the Texas Administrative Code (TAC) mandates (without funding) that all first year teachers should be provided with a mentor (Texas Administrative Code 2006). It is also suggested by the TAC that the mentor should teach the same subject and be on the same campus *if possible.* With limited guidelines and a lack of funding from the state, it is left to the discretion of individual high schools in Texas to determine how beginning teachers are inducted into the profession.

Induction Programs

Induction programs vary greatly in goals, structure, and longevity. A primary goal of most induction programs is to retain teachers. Many schools induct new teachers with a brief orientation to district and campus policies and procedures before the school-year begins (see Ivey 2009, this dissertation). Additionally, many principals select mentor

teachers and assign them to work with beginning teachers (see Ivey 2009, this dissertation). Although mentoring is the primary approach taken by many schools to address the needs of new teachers, once the mentoring match has been made by the principal, many mentor teachers are left to conduct their mentoring duties with little support and few guidelines. As a result, mentoring is left to "occur around the edges of an already full school day" (Carver & Feiman-Nemser 2009).

Teacher induction is a time of tremendous growth for beginning teachers. Beginning teachers are learning the politics (Curry, Jaxon, Russell, Callahan, & Bicais 2008) and the procedures of a school (i.e., attendance policy, grading procedures, making copies, ordering supplies). Additionally, they are also learning how to teach. Many induction programs are general to all teachers that are new to the schools that focus on familiarizing new faculty to district and campus policies and practices. Recently, induction programs have emerged that focus on beginning science teachers' specific instructional needs, such as teaching through inquiry (Luft et al. 2007a). The first years of teaching can be a very stressful time for teachers. As such, induction programs should address the gamut of beginning teacher concerns, including procedural, political, instructional, and emotional concerns.

Induction programs vary in structure because schools of different sizes and circumstances will have different personnel needs. Some schools may have many beginning teachers whereas others may have very few (or none). Some schools may have a more formal induction program that has many support personnel and mentors at the campus and district levels to help induct beginning teachers. Smaller schools may not have the personnel resources to develop their own induction programs. Some programs may last one day, whereas others may last multiple years. Schools develop programs to address their perceived needs and by utilizing the resources they have at hand.

The Principal's Role in Induction

Principals are the primary policy makers and implementers on their campuses. In order for principals to develop induction programs that are beneficial and relevant to their

novice teachers, it is important that they have an understanding of beginning teacher needs and concerns. Stufflebeam (as cited in Fowler 2004) stated, "We cannot make our programs better unless we know where they are weak and strong" (p. 303). As such, it is important that principals assess the efficiencies and deficiencies of their current teacher induction practices. One method of assessing program effectiveness is for principals to elicit feedback from beginning teachers. This can be a particularly useful practice since Markow and Cooper (2008) indicated that principals and teachers may not perceive schools' working conditions in the same way.

New models of administrative leadership define effectiveness in principals in terms of their knowledge of teachers' instructional abilities and their efforts to develop and improve upon those abilities (Bredeson 2000; Robinson 2006; Stein & Nelson 2003). As instructional leaders, principals should become aware of their beginning teachers' instructional abilities and help to develop them. Even with managerial models of the principalship, it is important for the principal to be cognizant of beginning teachers' areas of concern (Halverson, Prichett, & Watson 2007). Principals cannot address beginning teachers' concerns if they do not elicit feedback from them. As stated before, some teachers leave schools for reasons outside of a school's control. However, if a teacher is unhappy with the job for a reason that can be alleviated by the principal, then these concerns are worth becoming aware of if it could help retain a teacher. It is important to note here that a principal may not want to retain all teachers since some individuals may not be suited to the teaching profession.

Research Purpose and Questions

A void exists in the research literature in regards to how beginning high school science teachers evaluate their induction experiences. This information is needed to gain an understanding of how current school induction practices are meeting, or not meeting, the needs of beginning science teachers. Beginning high school science teachers were asked to evaluate their induction experiences and school principals were asked to reflect on their schools' current induction practices, programs, and policies. The purpose of this study is to compare Texas public high school science teacher *Movers*' and *Leavers*'

evaluations of their induction experiences with their principals' perspectives on teacher induction. The research questions addressed in this study include:

1. Do high school principals recognize components of their schools' induction programs that beginning science teacher *Movers* and *Leavers* consider the best induction supports?
2. Do high school principals recognize components of their schools' induction programs that beginning science teacher *Movers* and *Leavers* recommend as areas needing improvement?

Methods

Context of Study

The Policy Research Initiative in Science Education (PRISE) is a five-year research study designed to answer three essential policy research questions about the high school science teacher professional continuum (TPC) in Texas: *Where are we? Where should we go? How do we get there?* The project uses a systems approach to link prior research findings with mixed research methods to inform the development of policies and practices related to high school science teacher recruitment, induction, renewal, and retention.

PRISE Methodology

Mixed Methods Rationale

Mixed methods is defined as a "procedure for collecting, analyzing, and 'mixing' or integrating both quantitative and qualitative data at some stage of the research process within a single study for the purpose of gaining a better understanding of the research problem" (Ivankova et al. 2006, p. 3). The decision to utilize mixed methods in this study draws on the need to be able to note trends and generalizations of induction practices across the sample schools as well as to gain an in-depth knowledge of

individual school principals' and beginning science teachers' perspectives of current induction practices (Creswell & Plano Clark 2007).

PRISE Sampling Procedures and Participants

A two-stage stratified random sampling plan was designed to select 50 schools to proportionally represent the 1,333 public high schools in Texas where high school science courses are taught (Stuessy et al. 2008). Two explicit stratification variables were used in the sampling procedures: school size and minority student enrollment proportion. Additionally, an implicit stratification method was used to ensure sample schools were geographically representative of the state. This method took into account schools' locations within Texas' Regional Education Service Centers (ESCs) as well as the ESCs' locations within Texas. (For a thorough description of the PRISE sampling plan, please see McNamara & Bozeman 2007.) These stratification variables were selected to maximize the generalizability of the PRISE survey research findings. Additionally, these stratification variables are currently used in state and national level policy planning.

Once sample schools were selected, campus principals (n=50) of the identified sample schools were contacted by PRISE researchers to be informed of and gain their permission to conduct the research at their schools. Of the participants, 43 were principals and seven were assistant principals; two of the principals also served as the district superintendent. Hereafter, all participants will be collectively referred to as principals.

Additionally, all teachers at sample schools who taught at least one section of a high school science course (grades 9 through 12), as identified by the Texas Education Agency (TEA), were included in the sample of science teachers (n=385). Individual teachers were informed of the study and gave their written consent. Science teachers identified as being in their first three years of teaching were identified by PRISE as beginning teachers (n=95).

Data Collection

During the 2007-2008 school year, PRISE researchers interviewed principals to gain an understanding of current school policies and practices affecting teachers at various stages in the teacher professional continuum. All principals (n=50; 100% return rate) completed a field-based semistructured interview. (The PRISE Administrator Induction Interview Protocol is located in Appendix B.) Interviews were audio recorded, transcribed, and transposed into data charts. (Data charts are two-columned tables with the question of interest in the left column and all pertinent responses from the interviewer placed in the right column.) When principals did not grant permission to record the interview (n=5), field notes were taken which were then transposed into data charts.

Seventy-one of the 95 beginning teachers consented to an interview regarding their induction experiences (see Table 5.1 for detailed return rates on beginning teacher interviews). Interviews were conducted by PRISE Researchers either over the telephone or face-to-face. (The PRISE Beginning Teacher Interview Protocol is located in Appendix E.) Beginning teachers' interviews were audio recorded (n=22), transcribed, and transposed into data charts. When audio was not recorded (n=49), field notes were taken which were then transposed into data charts.

Table 5.1 Distribution of all beginning Texas public high school science teachers, number of beginning science teacher interviews conducted, and return rates by school size and Minority Student Enrollment Proportion (MSEP)

		School Size			MSEP	
	All (n=50)	Small (n=15)	Medium (n=17)	Large (n=18)	Low (n=29)	High (n=21)
Beginning science teachers identified	95.0	6.0	34.0	55.0	37.0	59.0
Beginning science teacher interviews conducted	71.0	5.0	26.0	40.0	26.0	45.0
Return rate (%)	74.7	83.3	76.5	72.7	70.3	76.3

Sample schools' master schedules were collected for the 2007-2008 and 2008-2009 school years. Additionally, the PEIMS database was queried to acquire teacher-level information (e.g., age, gender, highest degree obtained, assigned campus).

Mixed Methods Data Analysis

Figure 5.1 provides a visual model of this mixed methods study. Teacher retention data was calculated using the sample schools' master schedules for the 2007-08 and 2008-09 school years and data collected from PEIMS. From these data sources, lists of science teachers were created for each school-year and compared to determine which teachers were *Stayers*, *Movers*, and *Leavers* (see Appendix F). In this study, *Stayers* are defined as those science teachers who were retained as a science teacher by a campus; *Movers* are defined as science teachers who were retained in the profession but transfered to a different campus; and *Leavers* are defined as science teachers who were no longer in the teacher workforce according to the PEIMS.

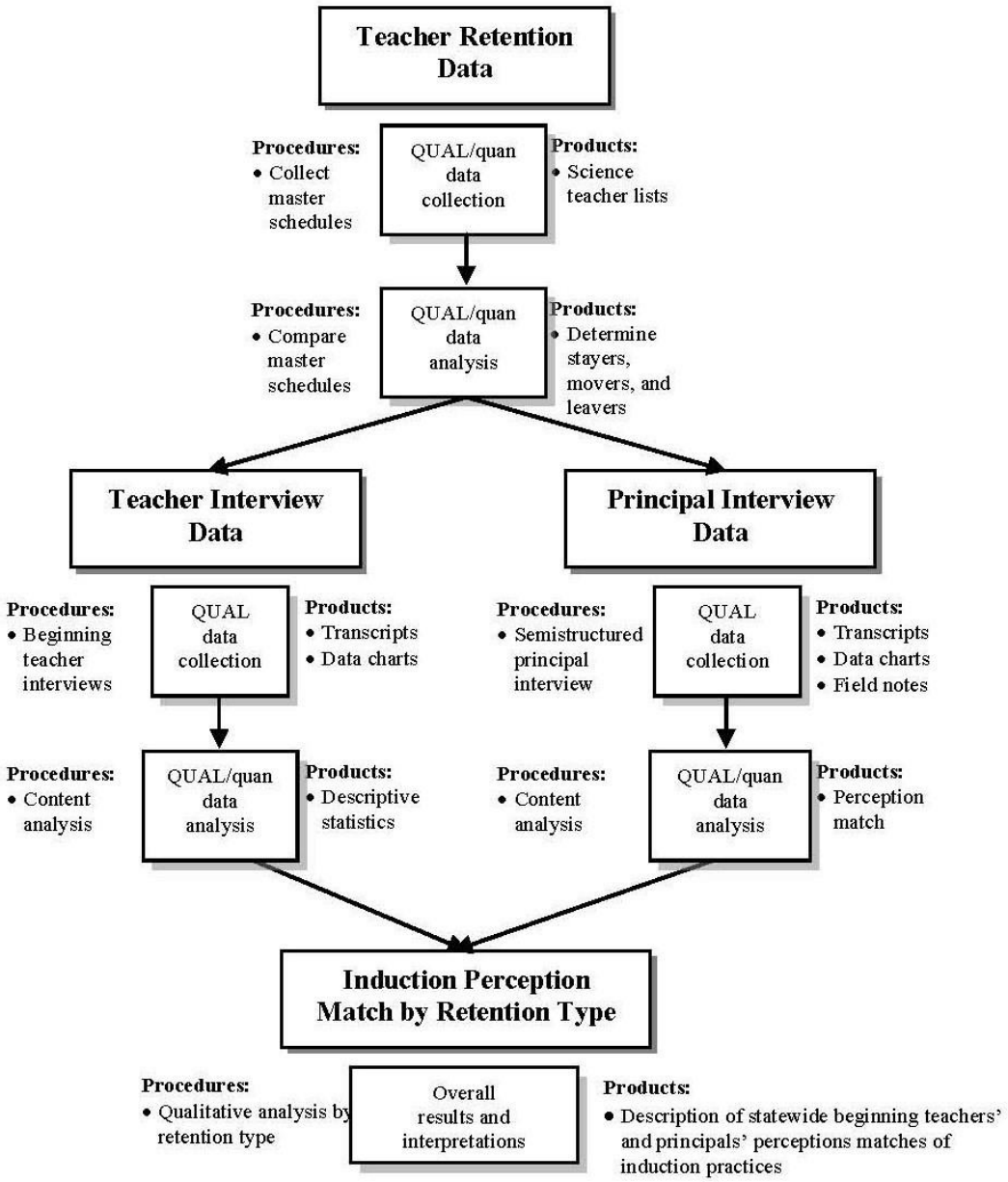

Fig. 5.1 Schematic of mixed methodology.

Table 5.2 describes (a) the distribution and (b) the return rate of interviews from beginning high school science teacher *Stayers*, *Movers*, and *Leavers*. Note that return rates for all schools are similar, ranging from 72.7% (Large schools, n=55) to 83.3%

(Small schools, n=6). In Small schools, *Stayers* and *Movers* have a 100 percent return rate. However, the single *leaver* from Small schools did not complete the interview. In Medium schools, *Stayers* (72.7%) had a lower return rate than *Movers* (83.3%) and *Leavers* (83.3%). In Large schools, *Movers* (57.1%) had a lower return rate than *Leavers* (66.7%) and *Stayers* (77.8%). Generally, the return rates indicate that the collected data is representative of all beginning science teachers in Texas public high schools.

Table 5.2 Texas public high school beginning science teacher distribution and interview return rates by retention type and school size

	Beginning Texas public high school science teachers				
	Identified (n=95)		Contacted (n=71)		Return rate (n=95)
	Count	%	Count	%	%
All Schools					
Stayers	62	65.3	48	67.6	73.8
Movers	14	14.7	10	14.1	71.4
Leavers	19	20.0	13	18.3	68.4
Total	95	100.0	71	100.0	74.7
Small Schools					
Stayers	4	66.6	4	80.0	100.0
Movers	1	16.7	1	20.0	100.0
Leavers	1	16.7	0	0.0	0.0
Total	6	100.0	5	100.0	83.3
Medium Schools					
Stayers	22	64.8	16	61.6	72.7
Movers	6	17.6	5	19.2	83.3
Leavers	6	17.6	5	19.2	83.3
Total	34	100.0	26	100.0	76.5
Large Schools					
Stayers	36	65.5	28	70.0	77.8
Movers	7	12.7	4	10.0	57.1
Leavers	12	21.8	8	20.0	66.7
Total	55	100.0	40	100.0	72.7

Only two questions from the PRISE beginning teacher interview are analyzed in this study: (a) *If the administration of this school were to ask you what three things were the best supports for you as a beginning teacher, what three things would you tell them?* and (b) *If the administration were to ask you how to improve the induction program at this school for a beginning teacher, what three things would you recommend?* These questions were selected for analysis to gain an understanding of beginning science teachers' program evaluation of their induction experiences. During this sequential, exploratory mixed methods analysis of beginning teacher interviews, teachers' responses to each question above were reduced and coded (Chi 1997). The teachers' responses were grouped together to develop topics of induction support. Then, individual topics were clustered to form larger themes. This study will focus on *Movers*' (n=10) and *Leavers*' (n=13) evaluations of their induction experiences.

To maintain confidentiality of participants, teachers and principals have been assigned a code. Principals have been assigned a two-digit code to identify them by their campus. For example, in this study, A30 is the administrator from school number 30. Science teachers have been assigned a four-digit code. The first two digits identify their school, and the last two digits are their teacher identification number. For example, T3001 is the science teacher from school 30 with teacher identification number 01. Both of these examples would be individuals from the same school.

In the second phase of this study, the interviews of principals from schools with beginning science teacher *Movers* and *Leavers* were analyzed to determine whether principals acknowledged the beginning science teachers' evaluations of their induction experiences. Results from this analysis will provide evidence of principals' awareness of what beginning high school science teachers consider the best induction supports and what they would improve. By focusing only on *Movers* and *Leavers*, we can gain a better understanding of whether or not principals were attuned to beginning science teachers' perceptions.

An Overview of *Stayers, Movers,* and *Leavers*

In a previous study of beginning teachers' evaluations of their induction experiences Ivey (2009, this dissertation) concluded that beginning science teacher *Stayers*, *Movers*, and *Leavers* differed in their reports of best school induction supports and their recommendations to improve induction. The following is a brief summary of that analysis.

Overview of *Stayers*', *Movers*', and *Leavers*' Evaluations of School Level Induction Practices

Best Induction Supports

In a previous analysis of beginning teachers' reports of best induction supports, differences were noted among *Stayers*, *Movers*, and *Leavers* (see Figure 5.2-5.4). Teachers were asked to list the top three induction supports provided to them by the school. As a result, each teacher could have three responses.

Figure 5.2 illustrates the distribution of *Stayers*' reports of the best school-level induction supports. *Stayers* most frequently reported receiving *Professional Colleagues* (31%) as the best induction support, which included receiving help from teachers other than those identified as an assigned mentor.

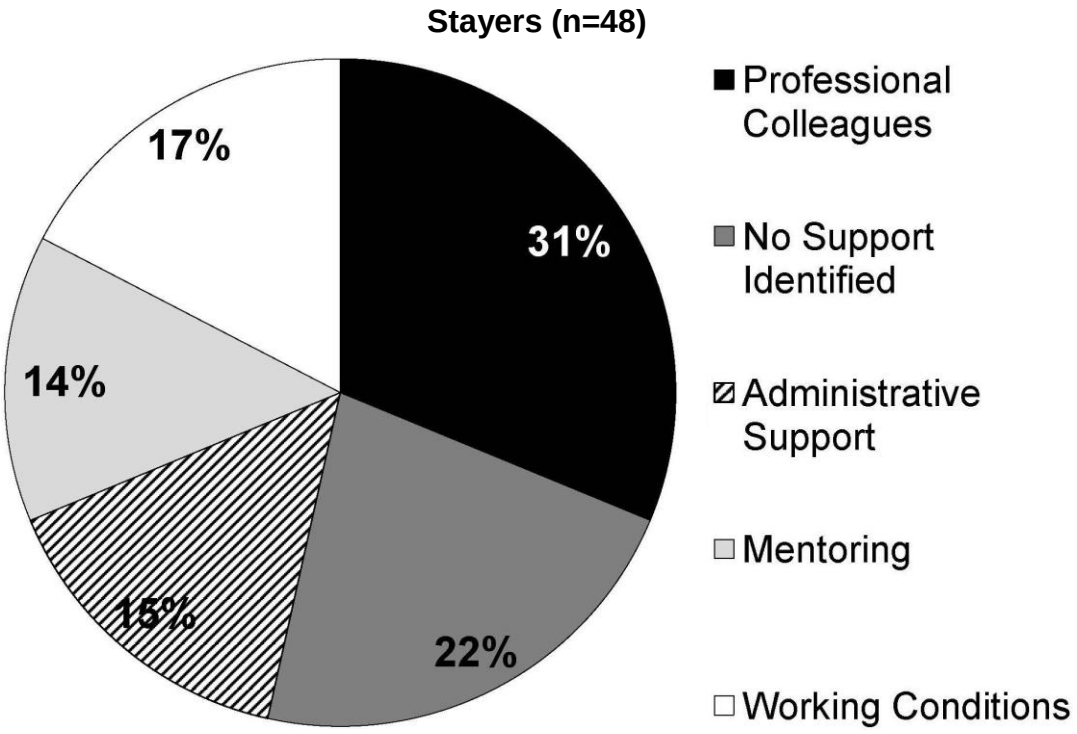

Fig. 5.2 Percentage of beginning science teacher *Stayers'* responses (n=144) regarding the best school-level induction supports.

Figure 5.3 illustrates the distribution of *Movers*' reports of the best school-level supports received. *Movers* most frequently reported *Mentoring* (30%) as the best induction support, followed by *Administrative Supports* (27%). (It is important to note that teachers did not elaborate on *how* the mentoring was helpful.)

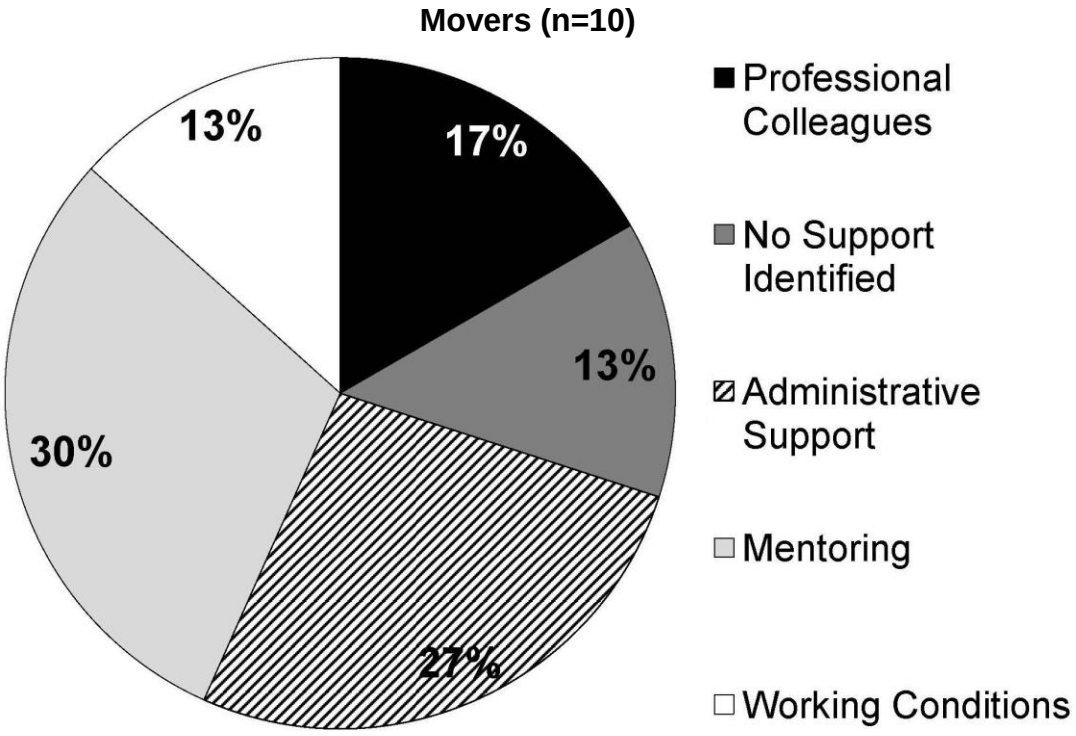

Fig. 5.3 Percentage of beginning science teacher *Movers'* responses (n=30) regarding best school-level induction supports.

Figure 5.4 displays the distribution of *Leavers*' reports of the best school-level induction supports received. *Leavers* most frequently reported receiving *No Support Identified* (28%) during their induction, followed by *Professional Colleagues* (26%). An unexpected outcome of this analysis was that nearly one-fourth of all teacher responses indicated that no school support for induction was received (see Ivey, this dissertation).

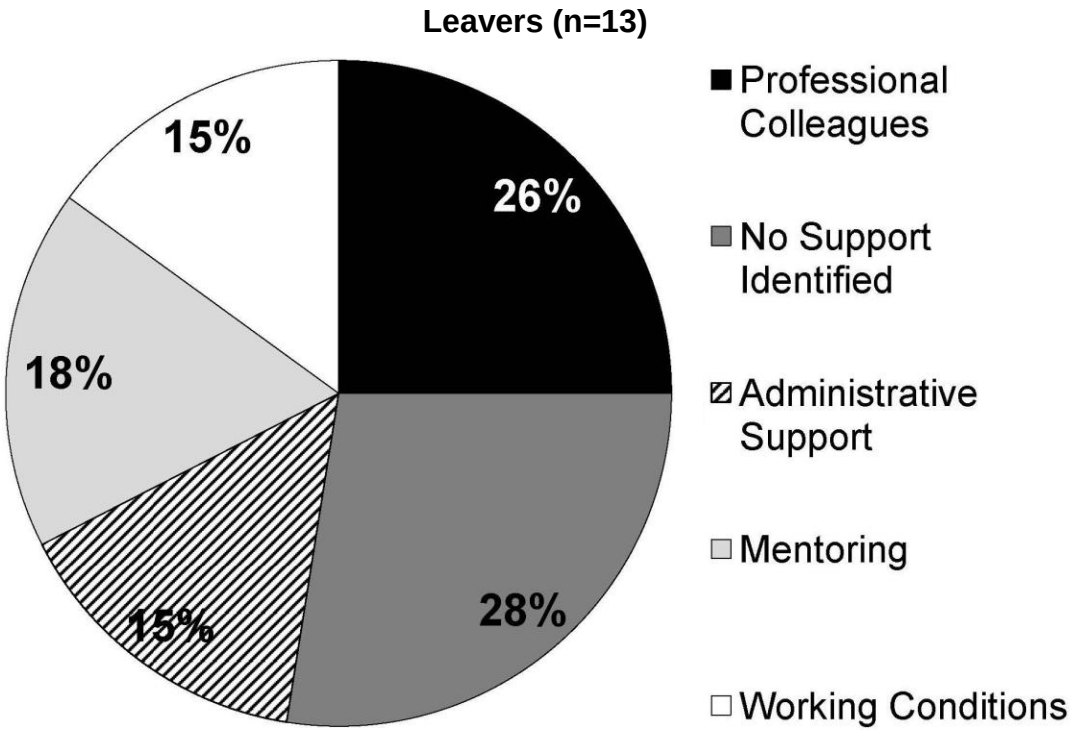

Fig. 5.4 Percentage of beginning science teacher *Leavers'* responses (n=39) regarding best school-level induction supports.

Recommendations to Improve Induction

Ivey (2009, this dissertation) also indicated that differences were found among *Stayers*', *Movers*', and *Leavers*' recommendations to improve induction (see Figures 5.5-5.7). As before, teachers were ask to list the top three recommendations to improve the induction programs at their schools; therefore, each teacher could have up to three responses.

Figure 5.5 displays the distribution of *Stayers*' recommendations to improve induction. *Stayers* most frequently recommended improving *Mentoring* (27%) and *Administrative Supports* (22%).

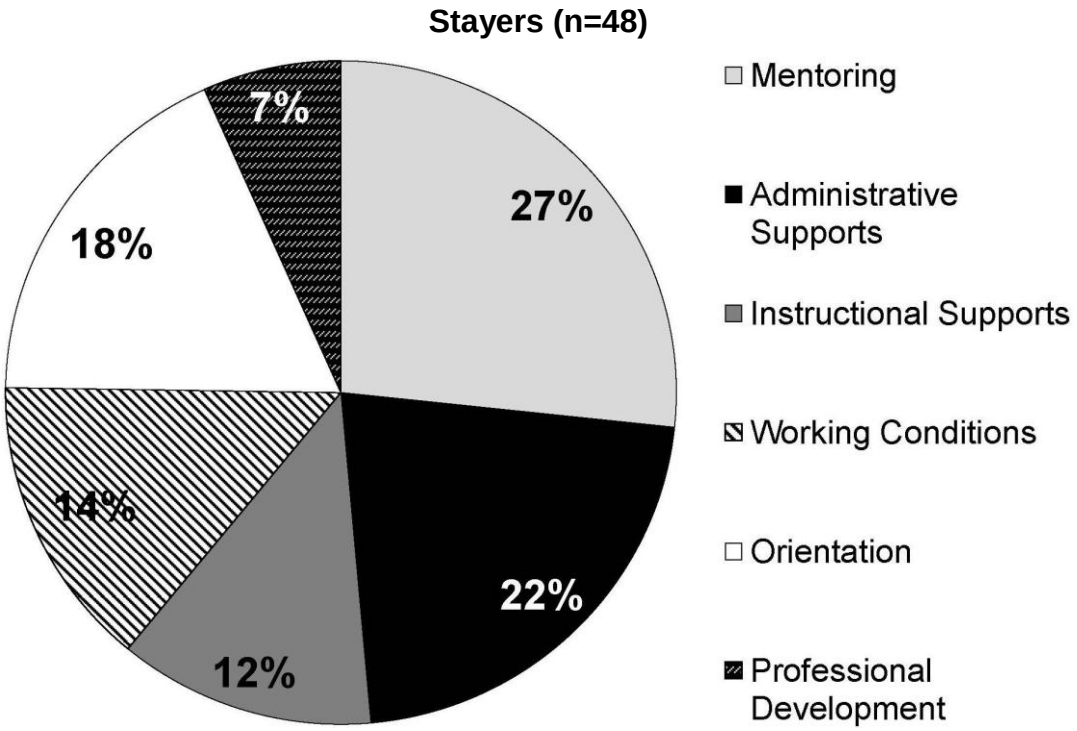

Fig. 5.5 Percentage of all participating beginning science teacher *Stayers*' recommendations (n=105) to improve school-level induction.

Figure 5.6 illustrates the distribution of *Movers*' recommendations to improve induction practices at their schools. *Movers* most frequently recommended improving *Instructional Supports* (32%), including access to science curriculum, and *Administrative Supports* (27%).

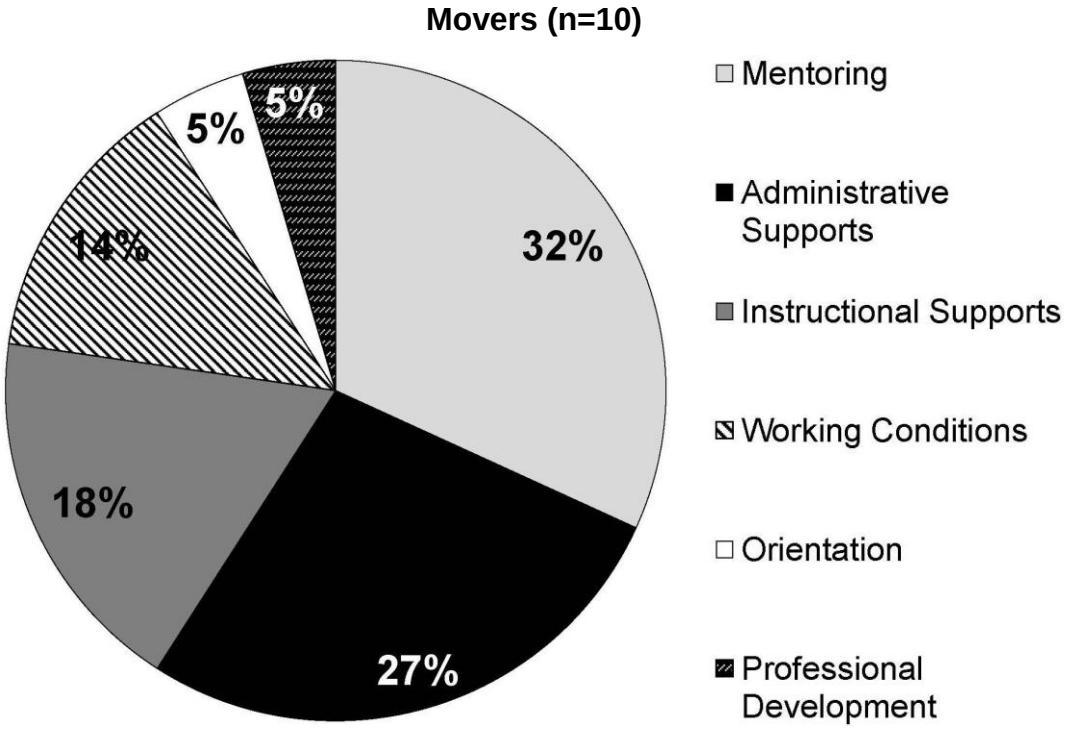

Fig. 5.6 Percentage of all participating beginning science teacher *Movers*' recommendations (n=22) to improve school-level induction.

Figure 5.7 displays the distribution of *Leavers*' recommendations to improve induction at their schools. *Leavers* most frequently recommended improving *Working Conditions* (24%), *Administrative Supports* (21%), and *Orientation* (21%).

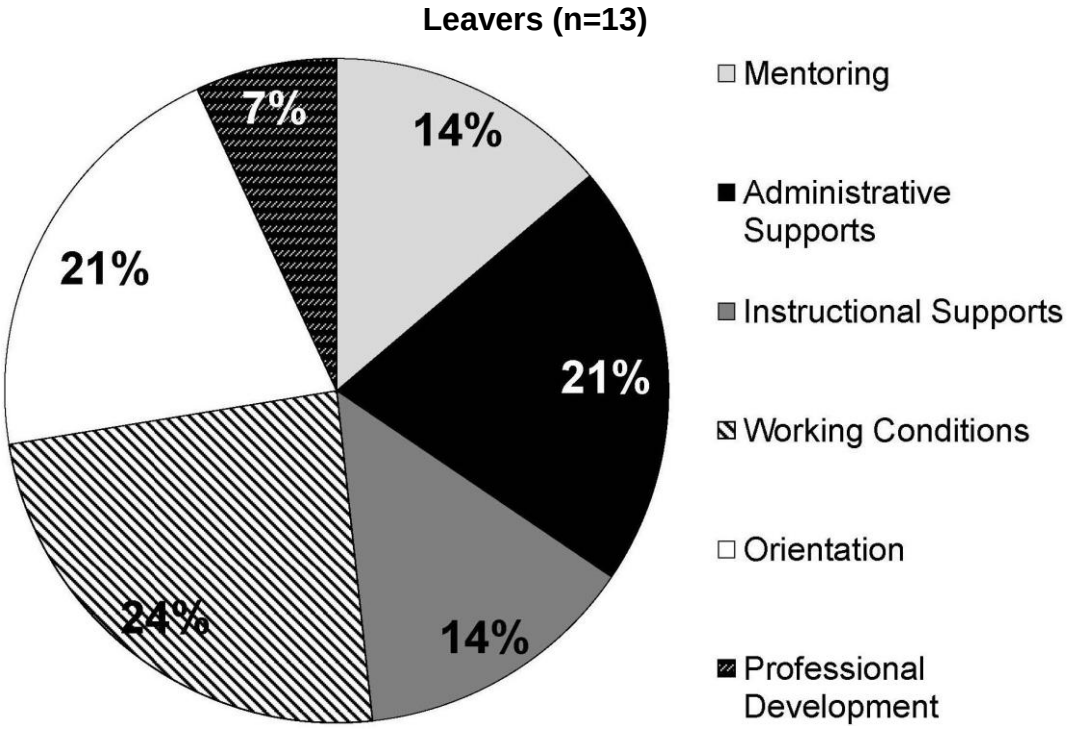

Fig. 5.7 Percentage of all participating beginning science teacher *Movers*' recommendations (n=29) to improve school-level induction.

The Present Study

Differences found among *Stayers*, *Movers*, and *Leavers* led the author to question how *Movers*' and *Leavers*' evaluations matched with principals' perceptions of school induction practices. The focus of the remainder of this study is to compare the beginning science teacher *Movers*' and *Leavers*' responses with their respective principal's interview regarding school-level induction practices. This evaluation will allow for the development of an understanding as to whether or not principals acknowledge those items which science teachers find helpful. Additionally, it will also allow for the development of an understanding as to whether or not principals acknowledge areas of their schools' induction practices that teachers indicate are in need of improvement.

This study of beginning science teacher *Movers* and *Leavers* is divided into three parts. First, a comparison of beginning science teachers' and principals' reports of the best induction supports is presented. Second, a comparison of beginning science teachers' and principals' recommendations and concerns for teacher induction is presented. Finally, *Movers'* and *Leavers'* best supports and recommendations for improvement are compared.

Part I: A Comparison of Beginning Science Teachers' and Principals' Reports of Best Induction Supports

This section provides an analysis of what beginning science teacher *Movers* and *Leavers* reported as the best induction supports they received. Teachers' reports were then compared to their respective principals' responses of their schools' current induction practices. A content analysis of teachers' responses resulted in five categories: (a) *Working Conditions*, (b) *Administrative Supports*, (c) *Professional Colleagues*, (d) *Mentoring*, and (e) *No Support Identified*.

No Support Identified

Some beginning teachers indicated that they did not receive induction support from their schools. These teacher responses were classified as *No Support Identified.* For this category, analysis focused on whether or not the beginning teacher's principal expressed any concerns for or plans to make changes to the current induction practices at that school.

Movers

Some *Movers*' were unable to identify school-level induction supports. One principal acknowledged that she had concerns for the school's induction program because it was difficult to schedule science team meetings (A22). The school had recently switched to be a school composed of multiple school communities, and the science teachers were dispersed among the individual communities. As a result, scheduling science team meetings and mentoring among science teachers had become very difficult. Another

principal expressed concern about not being able to monitor whether or not teacher mentoring was actually occurring (A47). This principal also pleaded, "help me develop an induction program. Right now it is just about a mentor, but maybe there is something else we can do in addition to providing a mentor" (A47).

Leavers

Some *Leavers*' responses indicated that they did not receive any induction from the school. Of these *Leavers*, two were from the same schools in the section above whose principals also expressed concern for their schools' induction practices. However, two other *Leavers*' principal indicated that she had no concerns about or plans to make changes to the schools' induction practices.

Summary of No Support Identified

It is interesting to note that all beginning teachers who indicated that they received no school support were from schools that had both beginning teacher *Leavers and Movers*. All other schools had only one or the other. This may be an indication that beginning teachers' needs are not being met at these schools.

Professional Colleagues

Beginning teachers' responses of best induction supports that indicated science teachers, positive school atmosphere, time to plan with science teachers, proximity to other science teachers, and the department head were classified as *Professional Colleagues.* The teachers' responses, first *Movers* and then *Leavers*, will be identified and compared with their respective principal's reports of the schools' induction practices.

Movers

Some *Movers* indicated other science teachers were one of the best supports during their induction experiences. Of these teachers' principals, all but one mentioned that other science teachers played an important role in beginning science teacher induction. At one school, science teachers have two daily conference periods; one of these periods is used to meet with all science teachers. The principal indicated that he would prefer for all

teacher mentoring to take place during that common planning time (A46). Additionally, the principal stated that "what worked best" for teacher induction was the "bonding" between the science teachers (A46).

Leavers

Several *Leavers* indicated receiving support from other teachers was beneficial to their induction experiences. Principals varied on their acknowledgement of the importance of beginning teachers receiving support from their professional colleagues. One principal simply acknowledged that teachers received support through an informal teacher "buddy system" (A19). Another principal had made formal arrangements for teachers to have official time built into the schedule so that teachers could learn from each other (A36). An additional principal commented that it was important for beginning teachers to plan lesson in teams so that beginning teachers can focus on *how* to teach as opposed to *what* to teach (A49). *Leavers* also indicated that being in close proximity to other science teachers was beneficial to their induction; principals did not reciprocate these comments.

Summary of Professional Colleagues

Generally, principals of both *Movers* and *Leavers* recognized the importance of receiving support from their teacher colleagues. The specificities of this induction support are not clear because teachers did not indicate *why* and *how* other teachers were helpful.

Mentoring

Beginning teachers' responses of best induction supports that indicated a supportive mentor, new teacher meetings after school starts, new teacher orientation before school starts, observations and feedback on teaching, and time for mentoring were classified as *Mentoring.* The teachers' responses, first *Movers* and then *Leavers*, will be identified and compared with their respective principals' reports of the schools' induction practices.

Movers

Some *Movers* indicated that their mentor was generally helpful. One mover indicated that the assistant superintendent had monthly meetings for first year teachers; the principal of this school also acknowledged these monthly meetings (A17). Other areas of mentoring support mentioned by *Movers* included monthly observations by their ESC mentor (this teacher was in an alternative certification program) and being able to observe other teachers. Neither of these supports was mentioned by their respective principals.

Leavers

Leavers also recognized mentors as one of the best induction supports. One school has district science mentors called "helping teacher" which the leaver at that school referred to as being "a life saver" (T3910). Although the principal indicated that campus level mentors were present, the principal made no mention of district level mentors; likewise, the leaver at this same school did not mention campus level mentors as being helpful.

For the most part, principals of *Leavers* did recognize mentors as a support for beginning teachers. Some principals indicated that mentors received training (A42, A49), were compensated (A47, A48), and served as intermediaries between the beginning teacher and the administration (A48). However, one principal did not mention mentor support for beginning teachers and only indicated that the new teachers were provided with a substitute so that they could observe master teachers in subject areas other than science (A50).

Summary of Mentoring

Generally, *Movers* and *Leavers* found their mentors helpful. However, neither *Movers* nor *Leavers* emphasized how the mentors were helpful, which limits this analysis. Although principals and teachers reported that mentors play an important role in induction, some principals overlooked mentoring that new teachers found supportive, such as mentor support from the alternative education programs and beginning teachers observing other teachers in their classrooms. These types of mentoring activities may be more teacher-directed and less determined by the principal. This may explain why principals were less apt to mention them when discussing school induction practices. However, as an instructional leader, principals should be aware of beginning teachers' needs. If a beginning teacher is in an alternative certification program, one would hope that they are receiving support more often than once a month.

Administrative Supports

Beginning teachers' responses of best induction supports that indicated general administrator support, administrator support with student discipline, administrative communication, and teacher autonomy were classified as *Administrative Supports.* The teachers' responses, first *Movers* and then *Leavers,* will be identified and compared with their respective principal's reports of the schools' induction practices.

Movers

Some *Movers* indicated that campus principals were generally supportive of them during their induction experiences. One principal's remarks indicated that taking care of teachers' concerns was a priority:

> My philosophy is people come first, papers second. And so I stop everything that I'm doing if a teacher comes to the door. If I'm working on something, I stop what I'm doing to address what their needs are….I can remember being in schools and I probable hadn't ever sat down and had three conversations with somebody, and I'd been at their school for seven years. That's not who I am, and

> that's not how I operate. So I really promote, and try to demonstrate to people that who your building principal is is a big part of whether or not you're going to be happy where you are. And I try to demonstrate that through the conversations that we have during the times that they come out and visit. (A32)

Other teachers reported principals respecting teachers' planning time and providing teachers the freedom to innovate their curriculum as good induction supports. Additionally, a mover indicated that clear communication from principals regarding teacher expectations was beneficial to their induction experience; this teacher's principal did mention informing teachers of expectations. Overall, principals of these *Movers* acknowledged that they played a role in beginning teacher support.

Leavers

Some *Leavers* indicated that the principal was generally supportive during their induction experiences; teachers offered no explanation on *how* the principal was supportive. One principal reflected on his experiences as a beginning teacher and commented that he supported beginning teachers by spending:

> more time with younger teachers at first, to make sure that I'm here for support. If you need me don't feel like you can't come in here and talk to me. Those doors are open anytime…I try to be more visible and do a lot more walkthroughs for those teachers that are new to my campus…whether they've been doing it for a long time or not. And then the older ones, you seek their advice on things but I do treat the young ones differently. I want somebody to do better for them than what was done to me. (A19)

Another administrator reported that what worked best for teacher induction was for new teachers to meet with assistant principals to "discuss problems and get advice" (A50).

Other *Leavers* indicated that open lines of communication between the principal and the beginning teachers were helpful for teacher induction. The principal of these *Leavers* indicated that principals met regularly with new teachers and that principals review campus policies and procedures with the new teachers.

Summary of Administrative Supports

Overall, *Movers*, *Leavers*, and principals agreed that the administration was a form of positive induction support. *Movers* and *Leavers* recognized principals' efforts to open lines of communication and provide opportunities for professional activities among teachers to occur. However, because most teachers only mentioned that the principal was supportive, it is still unknown as to why the beginning teachers found them supportive.

Working Conditions

Beginning teachers' responses of induction supports that indicated access to science teaching resources, training from ESC and district, access to developed curriculum, teaching assignment, and teaching facilities were classified as *Working Conditions.* The teachers' responses, first *Movers* and then *Leavers*, will be identified and compared with their respective principal's reports of the schools' induction practices.

Movers

Beginning science teacher *Movers* indicated that (a) pedagogical training, (b) instructional resources, and (c) school environment were the best working conditions supports.

Participation in pedagogical training. Movers indicated that participation in pedagogical training, such as classroom management training from the ESC was beneficial to their induction experiences. One principal acknowledged the importance of sending teachers to professional development opportunities when he stated that "we send them lots of places…anywhere they want to go" (A17).

Access to instructional supports. Movers also indicated that having access to developed course curriculum was helpful. In particular, one teacher indicated that the CSCOPE Curriculum (Texas Education Service Center Collaborative 2009) was helpful. The principal at this school recognized that the CSCOPE curriculum was implemented in the district to help the teachers incorporate more "hands-on" science learning in the classroom. Additionally, the principal remarked the science teachers:

> would meet in professional learning communities each week to make sure that everybody is on the same page, and that they were consistent with their curriculum—consistent with the starting point and stopping points of units to make sure they were all pretty much on the same page, within subject area classes. (A23)

Another instructional support that a mover found helpful was being given a copy of Harry Wong's teaching survival guide, "The First Days of School: How to be an Effective Teacher". However, the principal did not mention this book as a support given to new teachers. Additionally, a mover found that having access to science laboratory equipment was beneficial to her induction experience. Again, the principal at this school did not mention access to laboratory equipment as an induction support.

Participation in new teacher meetings. Movers indicated that being in an environment that promoted meetings for new teachers, both prior to the start of school and monthly meetings during the school year, were beneficial to teacher induction. The principals of these *Movers* recognized the benefits of these meetings; however, these meetings differed by campus. For instance, at one school the principal was directly involved in the monthly new teacher meetings called "rookie camps" (A32) whereas at another school, district level personnel were in charge of new teachers' monthly meetings. Principals' levels of involvement in teacher induction activities may play a role in how they understand beginning teachers' concerns.

Leavers

Beginning science teacher *Leavers* indicated that having access to teaching resources and instructional supports were the best *Working Conditions* supports.

Access to teaching resources. Teachers that were *Leavers* indicated that having access to teaching resources was among the best induction supports at their schools. First, one leaver indicated that having access to teaching resources was a good induction support. This leaver's principal indicated that teachers have the ability to order their own supplies.

> They do their purchase orders online. I see it. I put a number on it, put a code on it. It goes through. I don't go through central office or anything. So, I do my own purchase orders, and when the money's gone, it's gone. (A19)

Additionally, this same principal remarked that the teachers' "budget is unlimited; you get what you want. I have not told anybody 'no' all year on anything. And so, supply budget is there, whenever they want. The travel is there, I send [the teachers] everything I get" (A19). A leaver from another school also reported that being "given funds to purchase science equipment for the classroom" (T48) was a great support during teacher induction. However, this principal did not make any comment about supporting beginning teachers by providing them with teaching supplies.

Access to instructional supports. Leavers also commented that the best induction aid that they received centered on instructional supports. In particular, one teacher commented that receiving help with the curriculum from her mentor teacher, who was also the science department head, was beneficial. The principal also agreed that giving curriculum support to beginning teachers was important. Because of this belief, the principal made arrangements to have science:

> team conferences periods…which enabled us to have inexperienced teachers with experienced teachers when they're sitting down and doing their lessons and coming up with their labs, and coming up with their evaluation instruments and stuff. So it helps to support the inexperienced with the experienced. (A32)

Additionally, other *Leavers* reported having scheduled science department meetings were helpful because they discussed "student-directed instruction with other science teachers" (T36). Moreover, *Leavers* at this school were provided training for student-directed instruction. The principal of these *Leavers* acknowledged that science teachers were provided with two conference periods: a personal conference and a personal learning time (PLT) that is used to meet and plan lessons with other science teachers.

Summary of Working Conditions

Generally, both *Movers* and *Leavers* indicated induction supports that were directly related to their everyday teaching experiences. It is not surprising that beginning teachers' recognize some of the best supports as those that address some of their basic needs, such as *what to teach* (i.e., lesson plans), *with what to teach* (i.e. teaching resources), and *how to teach* (i.e., training). When speaking of supporting beginning teachers, principals did not mention supporting them through access to those things that are crucial to beginning science teachers, namely laboratory equipment, funds for resources, and teaching "survival guides." Teachers mentioning these items as some of the best received induction supports indicated that they received them. However, it is possible that the principal does not consider these supports as a part of teacher induction.

Comparing *Movers* and *Leavers*

Table 5.3 displays a comparison of *Movers*' and *Leavers*' responses with their respective principal's perceptions of current school induction practices. Of the *Movers*, principals agreed with the teachers' perceived best supports 25 out of 30 times (or 83.33%). A study of *Leavers*' responses indicates that principals agreed with the teachers' perceptions of induction 28 out of 39 times (or 71.79%).

Table 5.3 Comparison of beginning science teachers *Movers'* and *Leavers'* responses[a] of the best received school-level induction supports with their respective principals' interview on teacher induction

Theme	Mover	Principal match [b]	Leaver	Principal match
No Support Identified	T2203* [c]	+	T2201*	+
	T2203*	+	T2201*	+
	T4704*	+	T2201*	+
	T4704*	+	T3202*	-
			T3202*	-
			T3205*	-
			T3205*	-
			T3205*	-
			T3910	-
			T4713*	+
			T4713*	+
Professional Colleagues	T0401	+	T1901	-
	T2302	+	T3007	+
	T4604	+	T3007	+
	T4604	+	T3626	+
	T4704	-	T3910	+
			T4216	-
			T4906	+
			T4922	+
			T5015	-
Mentoring	T0401	+	T3910	-
	T1703	-	T4216	+
	T1703	+	T4216	+
	T2001	+	T4713	+
	T2203*	+	T4807	+
	T4312	-	T4906	+
			T4922	+
			T5015	+
Administrative Supports	T0401	+	T1901	+
	T2001	+	T3007	+
	T2302	+	T4906	+
	T3201*	+	T4807	+
	T4503	+	T4922	+
	T4503	+	T5015	+
	T4503	+		
	T4604	+		
Working Conditions	T1703	+	T1901	+
	T2001	-	T3202*	+
	T2302	+	T3626	+
	T3201*	+	T3626	+
	T3201*	+	T4807	-
	T4312	+		
	T4312	-		

Note:

[a] Teachers have a maximum of three responses

[b] A (+) indicates the principal and the teacher both recognized the support. A (-) indicates that the principal did not recognize the induction support mentioned by the teacher.

[c] Teachers marked with an (*) worked in schools that had both beginning science teacher *Leavers* and *Movers* after the 2007-2008 school year.

Table 5.4 reports the percent agreement between beginning science teacher *Movers* and *Leavers* and their principals regarding the best induction supports at their schools. One category, *No Support Identified*, is different from the other categories because it is representative of the teachers' responses indicating they received no induction support from their schools. The principals of *Movers* all indicated that they had concerns about their schools' induction program and were incomplete. Less than half of the principals of *Leavers* (45.4%) reported concerns for their schools' induction programs. *Leavers* had higher levels of agreement with their principals than *Movers* on supports *Mentoring* and *Working Conditions.* Higher levels of principal agreement occurred with *Movers* for *Professional Colleagues.* Generally, high levels of agreement occurred between principals and *Movers* than between principals and *Leavers* in regards to the best school-level induction supports.

Table 5.4 Percent agreement between principals and beginning science teacher *Movers* and *Leavers* on best induction supports

	Movers (Frequency of responses)	Leavers (Frequency of responses)
No Support Identified	100.0% (4)	45.4% (11)
Professional Colleagues	80.0% (5)	66.7% (9)
Mentoring	66.7% (6)	87.5% (8)
Administrative Supports	100.0% (8)	100.0% (6)
Working Conditions	71.4% (5)	80.0% (5)
Total	**89.3% (28)**	**71.8% (39)**

Part II: Comparison of Beginning Science Teachers' and Principals' Recommendations and Concerns to Improve Induction

Mentoring

Beginning teachers' recommendations to improve induction that included having more structured mentoring, receiving more observations of teaching, and receiving more

feedback from observations were classified as *Mentoring.* The teachers' responses, first *Movers* and then *Leavers,* will be identified and compared with their respective principal's reports of the schools' induction practices.

Movers

One *Mover* recommended improving induction by having science-specific mentors (T0401). The principal of this mover indicated that mentoring at the school was "informal." Moreover, when asked about the mentoring of science teachers, the principal was unsure of who was mentoring the beginning science teachers. Of the two science teachers at his school, one teacher was in his second year of teaching and the principal remarked:

> I would say that he doesn't even probably use a mentor because he taught in [another school] and so he has lesson plans in on time, he has his grades in on time. So he's pretty much on his own; he's doing well. (A04)

Another teacher recommended that principals select individuals who would be "a truly qualified science mentor that is interested in improving your teaching abilities" (T1703). The principal at this school indicated that the district was beginning to utilize the Texas Beginning Educator Support System (TxBESS) but that "the program was not in full force but being brought online with the new superintendent of curriculum" (A17). This same beginning teacher also indicated that he would like to improve the level of teacher "collegiality" because there is presently a "lack of structure" among the science teachers at the school (T1703). The principal confirmed that none of the science teachers had a common planning period nor taught any subjects in common (A17); this makes informal mentoring among science teachers difficult.

More structured mentoring. Another *Mover* also recommended for schools to have "more formal expectations for beginning teachers" (T2302). The principal at this school indicated that mentoring was an informal process with no documentation and stated "we probably need a little more work as far as guidelines and expectations of what we have for those mentor teachers" (A23).

Leavers

Some *Leavers* recommended that mentoring, including observations of their teaching, should occur with more regular frequency. One leaver commented how she felt isolated and on her own when she stated, "I felt like my own mentor" (T3202). One principal indicated that the district's assistant superintendent had "an entire induction program" which included meeting with mentors and novices every three weeks in the afternoons (A22). Additionally, this same principal indicated that she met with new teachers after the first three weeks of school had passed to address new teachers' questions. Another principal acknowledged beginning teachers' recommendations for more mentoring and commented that the school's schedule hinders mentor meetings. In particular, this principal's high school student body and teachers are divided into smaller school communities, or academies. The science teachers are distributed among the communities "so they don't get to meet and that's been very difficult [for mentoring to work]…and working with the lead [science] teacher to talk about what's going on with science and what are the lesson plans?" (A30). However, when this principal expressed how she would like for mentoring to improve, she indicated "I wish [the beginning science teacher] could work with a mentor for like a whole week, you know, before [school starts], but that is not a practice we have here" (A30). A third principal reported that the districts' mentoring program required that mentors observe all beginning teachers seven times throughout the school year (A49). The mentors at School 49 receive training and use forms to document teacher observations.

Summary of Mentoring

Principals of these *Leavers* and *Movers* report that mentors are assigned to the beginning teacher. However, the types of mentoring differ from site to site. The schedule of one school makes mentoring difficult. Another principal has a formalized induction program with multiple required observations. However, the *Leavers* and *Movers* at these schools indicated that more mentoring was needed. Beginning teachers' recommendations for improvement indicate that frequent and structured mentoring is needed throughout the school year.

Administrative Supports

Beginning teachers' recommendations to improve induction that included receiving better communication from administration, more consistency from administration on school policies, and more general administrative support were classified as *administrative supports.* The teachers' responses, first *Movers* and then *Leavers,* will be identified and compared with their respective principal's reports of the schools' induction practices.

Movers

Some *Movers*' concerns about improving teacher induction centered on receiving more support from school administrators. Various *Movers* indicated that induction experiences could be improved if principals were more consistent with implementing school policies (T4503), especially in regards to student discipline (T2302). Other *Movers* indicated that they felt as if their principal did not listen to them (T4704) nor give "clear expectations" of beginning teachers (T4503). An interesting recommendation made by a mover expressed that principals should "talk to other teachers so that they are aware I need more support as a beginner" (T4312). None of the principals of these teachers addressed supporting beginning teachers by improving these matters.

Leavers

Leavers recommended that the school principals should help improve communication regarding (a) parents (b) other teachers, and (c) school protocols. First, one leaver expressed that the parents at the schools were "very involved" and that help was needed to learn how to manage parent-teacher-student relations (T3626). In this instance, the principal reported that the department head, who also served as a teacher facilitator, was to help with "teacher-student-parent" issues (A36).

Additionally, *Leavers* expressed a need for better communication between principals and other teachers in the school in regards to beginning teacher support. One leaver commented on the "negativity" of veteran faculty in the teachers' lounge (T4807). This teacher's principal made no comment in regards to the faculty atmosphere at the school

and the role of veteran teachers and their support of beginning teachers. Furthermore, *Leavers* recommended that principals needed to communicate school protocols more effectively. One leaver requested having better information about which school personnel to contact about different needs and clearer documentation about student disciplinary issues (T421). The principal at this school reports that the mentor is "that person that can help you with technology, about showing you where paper is, about the culture of the school, about those kinds of things" (A42). Although the principal indicated that the mentor is in charge of relaying school procedures, the beginning teacher indicated that more help was needed from the administration on this issue. Additionally, one leaver indicated better student discipline was needed at the school (T5015). This leaver's principal indicated that classroom management was the "biggest problem" of beginning teachers and provides Boys Town training to teachers (A50). Another concern from a leaver indicated that the teachers need "a chance to regroup every six weeks" (T3910). This teacher's principal did not refer to breaks for teachers during the interview. However, it is understandable that a beginning teacher would feel overwhelmed.

Summary of Administrative Supports

Generally, *Movers* and *Leavers* concerns about administrative support revolve around consistency and communications. The beginning teachers recommend that administrators are more consistent with their own school policies so that their jobs will be easier to learn. This goes hand in hand with teachers' recommendations to improve communication. These *Movers* and *Leavers* would have liked to have had a better understanding of administrators' expectations of them. Moreover, beginning teachers would like to feel that their principals are listening to them.

Instructional Supports

Beginning teachers' recommendations to improve induction that included classroom management, curriculum availability, and time for laboratory planning and instruction were classified as *instructional supports.* The teachers' responses, first *Movers* and then

Leavers, will be identified and compared with their respective principal's reports of the schools' induction practices.

Movers

Movers recommendations to improve the instructional support aspects of induction included being provided with a developed curriculum and time.

Developed curriculum. Some *Movers* recommended that beginning teachers would benefit from having access to developed science curriculum. One principal agreed with this and indicated that "vertical alignment" of the school's curriculum was "desperately needed" (A17). Although one teacher indicated her school lacked a "written curriculum" (T2001), the principal indicated that the school had both vertical and horizontal planning teams to ensure curriculum alignment:

> We have a vertical and horizontal lines between us to…yeah, junior high, you know our teachers can make sure that, here on our campus that the junior high is heading in what they need to here and so forth. And, it, more that the TEKS [Texas Essential Knowledge and Skills] helped us a whole lot there too. (A20)

This principal perceives that the TEKS and the planning teams are sufficient; however, this principal's perception is not a reality for the beginning teacher.

Time. Another area of beginning science teacher concern centered on time: One mover indicated that more time was needed to plan for science laboratories (T2203); the principal of this school made no remark concerning science teachers' need for time to prepare for laboratory. Additionally, another mover indicated she needed help with time management (T4503). The principal of this mover indicated that mentors were to help with "survival 101 on the campus." It is unclear as to whether or not "survival 101" included time management; however, time management is an area that the beginning teacher perceives needs improvement.

Leavers

Leavers' recommendations for improving instruction focused on needing help with general and science-specific pedagogy. One leaver indicated that she needed more help

with student discipline (T2201). The principal from this teacher's school made no remark about helping beginning teachers with student discipline. Some *Leavers* indicated that they needed more help with content-specific lesson planning. In particular, *Leavers* indicated that they were assigned to teach science courses that did not have a preexisting curriculum scope and sequence (T2201, T3201, T4713). However, the principals of these teachers recognized that beginning teachers needed support and that they should not be lesson planning in isolation. These principals indicated that mentors, or other teachers, should be helping beginning teachers with lesson plans. Specifically, one principal commented that many of her science teachers were products of alternative teacher certification programs and had little to no student teaching experience. She expressed that "it takes them a little while to get their feet on the ground, which makes it even more important for what we do with them, as far as training and support" (A32).

Summary for Teachers' Recommendations to Improve Instructional Supports

Generally, both *Movers* and *Leavers* indicated that they needed help with the curriculum for their assigned classes. Although principals expressed that teachers should be receiving help with lesson planning help from mentors, and other teachers, these beginning teachers appear to be left in isolation. Additionally, beginning teachers recognized that they needed more time to prepare for science laboratories and needed help with time management. This recommendation is highly understandable if beginning teachers are developing curriculum for their courses as well.

Working Conditions

Beginning teachers' recommendations to improve induction that included science facilities, science teaching supplies, fewer course preparations, and fewer students in classroom were classified as *instructional supports.* The teachers' responses, first *Movers* and then *Leavers*, will be identified and compared with their respective principal's reports of the schools' induction practices.

Movers

Various *Movers* had concerns regarding their daily working conditions. Some *Movers* indicated that they needed more teaching resources in their classrooms (T4704), such as more textbooks (T2203). Other *Movers* had concerns about their teaching assignment, including too many students in their classrooms (T4312). The principals of these teachers made no remarks regarding daily working conditions to support beginning teachers.

Leavers

Leavers recommendations to improve their working conditions revolved around their (a) instructional resources, (b) teaching assignment, and (c) classroom assignment. One leaver recommended that more teaching resources, especially text books (T3202), were needed. Another leaver at this same school recommended that school procedures for organizing and ordering science teaching supplies be improved (T3205). The principal of this school made no mention of teaching resources during the interview.

A leaver at another school commented that beginning teachers should have fewer courses preparations and fewer students in their classes (T5015). The principal made no mention of consideration of teaching assignment for these teachers.

Another leaver suggested that science teachers should be placed in classrooms with laboratory facilities and that beginning science teachers should not be allowed to "float" from classroom-to-classroom (T4807). The principal at this school made no comments about beginning teachers' classroom assignment.

Summary of Working Conditions

It appears that when speaking about teacher induction, principals failed to speak of teachers' daily working conditions. All teachers need instructional resources, manageable teaching assignments, and appropriate classroom assignments. However, this may be even truer for beginning teachers. Principals' considerations of teachers' daily needs may be most important when considering support components for beginning science teachers. Beginning science teachers have a steep learning curve to climb and

every effort that can be made to help ease their daily stressors can only be a positive influence on their induction experiences.

Orientation

Beginning teachers' recommendations to improve induction that included more time to prepare before school starts, new teacher orientation, and late hire orientation needs were classified as *orientation.* The teachers' responses, first *Movers* and then *Leavers,* will be identified and compared with their respective principal's reports of the schools' induction practices.

Movers

One mover recommended reducing the number of "unnecessary and repetitive" meetings (T3201). Although the teacher did not indicate which meetings were unnecessary and/or repetitive, the principal of this school held a "rookie camp" for beginning teachers. This camp consisted of monthly meetings with new teachers to check on their needs and concerns.

Leavers

Leavers who made recommendations to improve teacher orientation recommended more training for beginning teachers, more assistance for teachers hired after the start of school, and more familiarization with the campus.

More training for beginning teachers. One teacher recommended that more training was available for beginning teachers (T1901). The principal acknowledged that beginning teachers receive training from the district before school starts which includes introductions to district-level technologies such as electronic grade book, student attendance, lesson plans, and making purchase orders (A19). However, this principal mentioned no additional help or training for beginning teachers after this initial orientation session. Once school begins, beginning teachers are left to seek help from informal "buddy teachers" (A19). Although the school used to have a mentoring program, it is no longer in existence because the principal:

> …thought the mentor was doing a little bit too much…maybe telling the teacher how to teach and I didn't care for that. I want the teacher to learn what works for them and what doesn't work for them. And you can ask some questions, so we started calling it the buddy system. (A19)

Although the principal reported no plans to change the teacher induction system, he did express concerns of how district policies were relayed to the beginning teachers "because we just throw it all at them at once, and we know that's kind of bad. So sometimes we'll have a two day thing before school starts…sometimes we can't get it all covered in one day so we have to go over some of the stuff again in our staff development days probably before schools starts" (A19). Nevertheless, an orientation before school begins is the only training and orientation by the district that teachers at School 19 receive.

Another leaver recommended that beginning teachers needed a better understanding of teachers' administrative duties (T4906). The principal at this school reported that beginning teachers receive district-level training during before school orientation. However, this leaver requested that more training and resources regarding campus-level policies and procedures be provided to beginning teachers.

In general, principals' remarks regarding new teacher orientation indicate that principals view the isolated district/campus orientation as the time when all teachers new to the campus should acquire knowledge of district/campus policies and procedures. However, these teachers indicated that more help is needed throughout the school year. Beginning teachers are overwhelmed with a mountain of information at the beginning of school. During this stressful time, teachers are concerned about completing human resources information (i.e., payroll, benefits) in addition to preparing classrooms and lessons in anticipation of the students' return.

Training for teachers hired after school begins. Some of the beginning science teachers were hired after the school year had begun; one teacher was hired as late as March. Two of these teachers (T4216, T4922) made recommendations to include a district/campus orientation for teachers that were hired during the school year. Although

the principals at both of these schools remarked about orientation for all teachers before school began, neither made any mention of (a) orientation for late-hired teachers or (b) help given for them to take over classrooms that had been without a steady teacher of record. This is another indication that teacher induction is a front-loaded, isolated event that concentrates on introducing teachers to district policies and procedures.

Tour of the school. One teacher recommended that beginning teachers should receive a tour of the school (T4713). However, this teacher's principal remarked that beginning teachers attended a district orientation so they "get to know about the school district. They go to the neighborhoods to learn where the students come from and then they're given information about the …layout of where all the schools are. So once they become familiar with [the district] then they come [to the campus]…and within the next two weeks they have a campus orientation. During that campus orientation we provide them with a layout of the school" (A47). Although the principal reported that teachers are provided with a "layout of the school," the beginning teacher in the case reported that a tour of the school was still needed. Perhaps the presentation at this school was very superficial and the beginning teacher needed a more in depth description of the campus, including where personnel and material resources were located.

Summary of Teachers' Recommendations for Orientation

Generally, *Movers* and *Leavers* recommendations to improve orientation focus on the need for more continuous support throughout the school year. A tremendous amount of information inundates beginning teachers when they attend schools' orientations. Principals may need to reconsider the amount of information presented to teachers and make periodic training sessions available to beginning teachers in regards to school policies; it could be helpful to prepare a reference manual of school policy and procedures.

Professional Development

Beginning teachers' recommendations to improve induction that included science-specific training and teacher training for special student populations were classified as

professional development. The teachers' responses, first *Movers* and then *Leavers*, will be identified and compared with their respective principal's reports of the schools' induction practices.

Movers

One mover expressed needing assistance and training for special student populations. In particular, the teacher commented that "special education students need to be taught by special education teachers" (T2203). The principal of this teacher made no comment about special education support or training for beginning or experienced teachers.

Leavers

Leavers' recommendations to improve the professional development of induction year teachers were centered on needing time for professional development opportunities. First, one leaver commented that she did not have time to take advantage of professional development opportunities (T3205). The teacher's principal remarked that professional opportunities for teachers were important, and especially for science teachers, "because science is one of the areas I don't want to lose my teachers" (A32). However, this leaver perceived she had no time to attend professional development opportunities. A leaver from a different school commented that she did not have enough time to integrate into the classroom what was learned at professional development (T3910). The principal at this school made no remarks concerning integrating what was learned in professional development opportunities into the classroom.

Summary of Professional Development

Beginning teachers' indications of lack of training and insufficient time for professional development opportunities indicate that improvements can be made for beginning teacher induction. First, because learning to teach is such a difficult task, it is only understandable that a beginning teacher would express frustration with having students with special needs placed in their classroom without any support-staff. Second, beginning teachers' complaints of not having time to attend professional development opportunities or that they did not have time to integrate what they had learned from those opportunities into the classroom could indicate that some principals need to recognize that beginning teachers are eager to become better educators by attending professional learning activities. However, beginning teachers need administrative support to be able to attend such functions and to be able to incorporate the newfound knowledge into their practice.

Comparing *Movers* and *Leavers*

Table 5.5 displays a comparison of *Movers*' and *Leavers*' responses with their principals' perceptions of current school induction practices. Of the *Movers*, principals agreed with the teachers' recommendations 3 out of 22 times (or 13.63%). A study of *Leavers*' responses indicates that principals agreed with the teachers' recommendations to improve induction 3 out of 26 times (or 11.54%).

Table 5.5 Comparison of beginning high school science teacher *Movers*' and *Leavers*' recommendations[a] to improve induction with their principals' interview on teacher induction

Theme	Mover	Principal's perception match	Leaver	Principal's perception match
Mentoring	T0401	-	T2201*	-
	T1703	-	T3007	+
	T1703	+	T3202*	-
	T2302	+	T4906	-
	T4604	-		
	T4604	-		
	T4604	-		
Administrative supports	T2302	-	T3007	+
	T4312	-	T3626	-
	T4503	-	T3910	-
	T4503	-	T4216	-
	T4704*	-	T4807	-
	T4704*	-	T5015	+
Instructional supports	T1703	+	T2201*	-
	T2001	-	T2201*	-
	T2203*	-	T3202*	-
	T4503	-	T3205*	-
			T4713	-
Working conditions	T2203*	-	T3202*	-
	T4312	-	T3205*	-
	T4704*	-	T4807	-
			T5015	-
Orientation	T3201	-	T1901	-
			T4216	-
			T4713	-
			T4906	-
			T4922	-
Professional development	T2203*	-	T3205*	-
			T3910	-

Note:

[a] Teachers have multiple recommendations since the interview asked for the best three induction supports.

[b] A (+) indicates the principal and the teacher both recognized the need for improvement. A (−) indicates that the principal did not mention a need for improving induction as mentioned by the teacher.

[c] Teachers marked with an (*) worked in schools that had both beginning science teacher *Leavers* and *Movers* after the 2007-2008 school year.

Table 5.6 describes the percent agreement between *Movers* and *Leavers* and their principals on recommendations to improve induction. Overall, *Leavers* and principals had lower levels of agreement than principals and *Movers*. Both *Movers* and *Leavers* recommended making improvements to mentoring. Some principals (33%) recognized that they could provide better administrative supports; however, most did not. Overall, very little agreement exists between what principals, *Movers*, and *Leavers* reported as areas of induction that were in need of improvement.

Table 5.6 Percent agreement between principals and beginning science teacher *Movers* and *Leavers* on recommendations to improve induction

	Movers (Frequency of responses)	*Leavers* (Frequency of responses)
Mentoring	29% (7)	25% (4)
Administrative Supports	0% (6)	33% (6)
Instructional Supports	25% (4)	0% (5)
Working Conditions	0% (3)	0% (4)
Orientation	0% (1)	0% (5)
Professional Development	0% (1)	0% (2)
Total	13.6% (22)	11.54% (26)

Part III: Comparing Best Supports with Recommendations for Improvements

When reviewing Tables 5.3 and 5.5, it is immediately apparent that they are nearly the opposites. There were high levels of agreement between principals and teachers in regards to what beginning teachers perceived as the best induction supports. This is good news because it means beginning teachers and principals recognize positive induction supports.

However, principals and teachers do not seem to be on the same page when it comes to beginning teachers' recommendations. Very few principals were in agreement with the recommendations that beginning science teachers would like to make to their schools' induction practices. Either principals are unaware of these teachers' concerns or they do not associate these types of concerns with teacher induction. Either way, principals may need to consider collecting evaluative feedback from their beginning teachers so that they may improve their induction practices.

Discussion

It appears that archaic teacher induction methods of "trial by fire" and "sink or swim" are alive and well in Texas according to the data examined in this study. When beginning science teachers are asking for science facilities, equipment, and lesson plans, they have been placed in an environment that promotes more sinking and less swimming. One question that was not asked of principals in their interview was *How do you perceive beginning teachers?* An answer to this question may have helped to bare light on current induction practices found in Texas' public high schools. Do principals consider beginning science teachers as finished products from their teacher preparation institutes? Do they envision beginning teachers as blank slates upon which to write? Do they identify beginning teachers as novice professionals who will need time to develop expertise? Although these questions cannot be fully answered here, the principals in this study allow us a glimpse into their thoughts.

It is important that principals and teachers be on the same page. As an instructional leader, or as the boss in any workplace, it is important to address the concerns of employees. Teachers leave schools for many different reasons. However, research indicates that science teachers leave the classroom well before reaching retirement (Ingersoll & Perda 2009). Some teachers leave schools for reasons that are outside of a schools' control, such as spousal relocation and other family needs. However, previous studies of science teacher retention have indicated that many science teachers most often leave because of job dissatisfaction or a better job opportunity. For the most part, these latter reasons are inside schools' control. Schools can work to improve conditions for

beginning teachers, but their efforts will be futile unless principals seek evaluative feedback from beginning teachers. Local conditions, such as s supportive administration, comprehensive mentoring, and a positive school culture could be well worth the investment if it could help retain teachers. One could speculate that if working conditions were made better for beginning teachers, they may not seek employment elsewhere because they may be less dissatisfied with their jobs.

However, before schools' climates can be adjusted to meet the needs and concerns of beginning science teachers, principals must first become cognizant of those needs and concerns. In a previous analysis of principals' interviews from the entire PRISE sample of 50 schools, Ivey (2009, this dissertation) reported that (a) less than 15 percent of principals solicited feedback about induction from their beginning teachers; (b) less than half (44%) of principals expressed any concerns for their current induction practices; and (c) less than one-fourth (24%) of principals indicated any plans to change their current induction practices. This study indicates that the majority of principals were not aware of the needs and concerns of those who left their schools.

Many principals appear to view induction as a time when teachers learn school policies and procedures, and not much more. This is illustrated with one principal's remarks that a second year teacher did not need a mentor anymore because he knew how to turn in lesson plans and grades on time. Although beginning teachers need to have an understanding of school policies and procedures to be functional employees, they also have needs and concerns that are directly related to classroom instruction. Principals' conceptions of teacher induction may be shortsighted and narrow.

Principals are doing some things right. Even the *Movers* and *Leavers* from this study recognized induction practices such as mentoring as helpful to their induction. However, teachers also recommended that mentoring become more formalized so that teachers could more frequently meet with, plan with, and learn from their mentors. This study also indicated that some principals agreed that mentoring needed improvement.

It is important to retain beginning science teachers so that our schools have an opportunity to staff classrooms with highly qualified, professional, experienced teachers.

Students deserve a quality science teacher in the classroom, especially since research indicates that the number one in-school predictor of student success is the highly qualified teacher in the classroom.

Principals and teachers may be on different pages when it comes to perceiving teacher induction conditions because they exist in two different worlds. The administrator has the overwhelming job of overseeing the day-to-day functions of the school. The beginning teacher also has an overwhelming job and is primarily in survival mode. However, principals, as instructional leaders must make efforts to solicit feedback from all teachers regarding their daily working conditions. With the alarming rates that teachers are leaving schools, principals no longer have excuses to ignore teachers' needs and concerns that can be addressed at the campus level.

Implications for Science Education

The findings of this study provide further support for providing more structured induction support to beginning teachers. Further, these findings suggest that principals could use a more hands-on approach to teacher induction. Additionally, principals may need to be more proactive in soliciting feedback from beginning teachers so that concerns can be addressed and program improvements can be made.

Beginning teachers arrive at schools with varying professional backgrounds and levels of teaching experience. However, teacher learning does not end with teacher licensure. Teacher and principal educators should help to make principals more aware of the general and science-specific needs of beginning science teachers. Science teacher educators may need to become more active in the field and advocate for the proper induction and professional development of science teachers for the betterment of K-12 science education.

CHAPTER VI

SUMMARY

My research on the induction of beginning high school science teachers is part of a much broader research agenda initiated four years ago by the PRISE Research Group at Texas A&M University. The Research Group proposed to answer three policy research questions about the high school science teacher professional continuum (TPC) in Texas: *Where are we? Where should we be? How do we get there?* While several experts have idealized the high school science TPC as a seamless continuum of professional growth that begins with recruitment and continues with induction, renewal, and retention, these same experts imply many of the same things that the PRISE Research Group has found to be true, namely that the system is "broken," that the continuum is not seamless, and that Texas loses teachers at particular points along the continuum. To better describe teachers at these points, the Research Group differentiated new teachers with three or less years of teaching experience as *beginning teachers* from more experienced teachers (i.e., mid-career teachers with 4-7 years of experience, and veteran teachers with 8 or more years of experience).While my dissertation focuses on beginning teachers, the idealized notions of "continuous" and "seamless" will appear in this chapter in reference to my discussion of "where we should be," one of the two purposes of this chapter. The other purpose is to summarize "where we are" with new information from my research, merged with the findings of others (see Chapter II).

My research contributed to the PRISE Research Agenda by examining the experiences and challenges of induction-year teachers in Texas from the perspectives of principals and induction-year teachers. The studies reported in Chapters III, IV, and V examined data from a statewide representative sample of Texas public high school science teachers and principals to investigate practices and policies related to the induction of beginning high school science teachers. For the first time, a description of induction practices is now available for the state of Texas. This description helps to

accomplish one goal of the Policy Research Initiative in Science Education (PRISE) Research Group, which was to answer the question of, "*Where are we?"* in regard to teacher induction in Texas. In this chapter, I summarize findings from these three studies and combine them with empirical research from previous investigations (see Chapter II), to suggest considerations to school, district, and state policy makers to move the research on high school science teacher induction forward to the next stage of this policy research: to answer the question, "*Where we should be?" regarding induction practices to alleviate current shortages and increase the effectiveness of high school science teachers in Texas.*

Research Summary

Principals' Perspectives on Induction Research

This research was the first to describe public high school principals' perspectives on science teacher induction from a statewide representative sample. The findings from this study confirm the dismal reports found in the literature regarding the "sink or swim" and "trial by fire" experiences of beginning teachers.

Principals appear to have a very hands-off approach in teacher induction. The majority of principals indicate that they select mentors and match them with novices. Principals report that mentoring is the best practice for teacher induction. Consequently, after novices are paired with mentors, induction is typically left in the hands of mentor teachers.

Additionally, principals' reports indicate mentors bear the burden for inducting new teachers with little or no support to be effective mentors. Because mentors receive few guidelines or supports, mentoring becomes an extra duty that most mentors add on to an already full day. Principals' perceptions of mentors indicate that mentors roles are more of school "tour guides" or "information desk clerks" as opposed to knowledgeable veterans with advanced levels of pedagogical content knowledge in science who can help novices develop expertise. Moreover, mentoring, as it is currently practiced in

Texas' public high schools, would not be recognized as such by experts in mentoring and teacher induction.

Induction activities for beginning science teachers are front-loaded before the school year begins. Many teachers receive an orientation to the school and little more. Once the school year begins, beginning teachers are left in the hands of untrained mentors who have few structural supports for mentoring. Principals' reports of teacher induction activities provide little evidence that beginning teachers enter schools with positive learning environments or professional learning communities. Data from this study supports previous claims from other researchers that beginning teachers are often isolated and prematurely presumed experts.

Beginning Science Teachers' Evaluations of Induction Research

This research is the first to describe how beginning high school science teachers in Texas public high schools evaluate their induction experiences. Findings from this study indicate that beginning science teachers recognize supportive administrators, mentors, working conditions, and colleagues as helpful induction supports. However, beginning teachers also recognized that they needed more help than what they presently received in the above categories.

Beginning teachers recognized that the principal plays an important role in their induction experiences. Either teachers reported being supported by their administrator or they did not. Teachers felt supported when their decisions about student discipline were supported by the administrations and when lines of communication with the administration were clear. Some teachers who felt unsupported by the principal recommended that principals should be consistent with student discipline policies.

Findings from this study strongly suggest that beginning science teachers are seeking out help from other teachers. A large proportion of all teacher responses indicated that the best induction support was a colleague they could go to for help. This is an induction support not necessarily established by the school. Generally, schools currently leave beginning teachers' induction experiences to chance as many beginning teachers are receiving support from unassigned, informal mentors. Overall, nearly one-fourth of all

beginning teachers indicated that they did not receive any induction supports from their schools. This is an important finding that indicates schools, districts, and the state need to reevaluate their priorities for beginning teacher supports and mentoring.

Additionally, teachers recognized mentoring as a good support that also needed improvement. Teachers who remarked that mentoring was a good support often did not elaborate and we are left with little understanding of the ways in which mentors were a good support to the beginning science teachers. However, teachers were much more specific when making suggestions on how to improve mentoring. In particular, beginning science teachers would like to have a more structured mentoring program that provides more opportunities for their teaching to be observed *and* for them to observe others teaching.

Beginning teachers also identified their working conditions as an important area of support and concern. Teachers either reported having access to teaching resources, access to developed curriculum, and manageable teaching assignments or they did not. Many beginning teachers, especially those that left the profession, recommended making improvements to working conditions.

Overall, beginning teachers are very cognizant of their own needs as novices in the profession. The findings indicate that beginning teachers are seeking induction supports that will help them become better professional science educators.

Beginning Science Teacher *Movers* and *Leavers* Research

This research has indicated that beginning science teachers who left their schools after one year had recommendations for improving the induction practices at their schools that were not reciprocated by their principals. The findings from this research indicate that principals may not be aware of beginning teachers' concerns about their induction experiences. If principals are not aware of beginning teachers' concerns, it is difficult for principals to adapt induction practices at their schools to alleviate these concerns. Overall, it appears that principals are not aware of what beginning teachers would improve with their induction experiences.

It is important the principals and beginning teachers are on the same page. As an instructional leader, or as the boss in any workplace, it is important to address the concerns of employees. Teachers leave schools for many reasons. Some of these reasons are not within the control of the schools (i.e., personal family concerns, spousal job transfer). However, when researchers have indicated that many science teachers leave the profession because of job dissatisfaction, it is paramount that principals make every effort to address to teachers concerns that are within their power to rectify.

Positive Learning Environments for Teachers

This study indicates that the professional continuum of teacher education is not only fractured, but that a crevasse exists for teachers during their induction years. If schools are a learning environment in which beginning teachers learn, principals provide little evidence that teachers' learning environments are learner-, knowledge-, assessment-, or community-centered. Additionally, beginning teachers' evaluations of their induction experiences provide further evidence that optimal learning environments for beginning teacher learning have not been realized in Texas' public high schools.

Learner-Centered Environments

Learner-centered environments recognize that learners bring their own "knowledge, skills, attitudes, and beliefs" (Bransford et al. 2000, p. 133) to their schools. Very few principals recognized beginning teachers' individual needs or incoming skills. Some principals expected their beginning teachers to "hit the ground running" and perform as expert teachers. However, other principals recognized teachers as novices in their profession. These principals made concessions for teachers to have time to lesson plan and for instructional mentoring to take place on a regular basis. Beginning teachers' evaluations of their induction experiences indicate that induction activities consist of "one-size-fits-all" activities. To become more learner-centered, schools should develop ways to address beginning teachers' content-specific needs in addition to addressing general school policies and procedures.

Knowledge-Centered Environments

Knowledge-centered learning environments are concerned with how teachers develop an understanding of teaching, students, and student learning. Moreover, schools with knowledge-centered environments view teacher professional development as opportunities for teachers to focus "on the *what* and *why* of teaching concepts" and motivation for teachers to "improve their practice" (National Commission on Teaching and America's Future 2003, p. 45). As such, induction programs situated in knowledge-centered schools provide mentoring to beginning teachers that focuses on developing the novice teacher into an expert educator.

The majority of principals' responses indicated that mentoring had a narrow focus on school policies and procedures. Very few principals mentioned mentoring that focused on improving beginning science teacher instructional skills. Although it may be important for beginning teachers to learn school policies and procedures, it may be even more important that they learn also how to be an effective science teacher. Principals provided little evidence that developing expertise in reflective practices and metacognitive skills in beginning teachers was a priority for teacher induction in Texas.

Beginning teachers also indicated that they would like for more structured mentoring to take place during their induction experiences. Beginning teachers recognized the importance of working with more experienced teachers to develop an understanding of teaching, students, and student learning. Moreover, beginning teachers recognize themselves as novices who need to reflect and revise their practices as they develop expertise. To become more knowledge-centered, schools should develop ways to develop metacognitive practices for teachers and their mentors to help develop expertise in novice teachers.

Assessment-Centered Environments

Assessment –centered learning environments are concerned with the role of both formative and summative assessment in teacher development. Overall, the majority of principals provided little evidence to indicate that frequent formative assessments of

beginning teachers took place. Formal assessments and reviewing of teaching are beneficial to both novices and veterans. Many principals indicated that beginning teachers were paired with mentors. However, many principals described mentors' roles as being more like "school tour guides" or "information desk clerks" rather than knowledgeable veterans with advanced levels of pedagogical content knowledge in science who can help novices develop expertise.

Beginning teachers need many opportunities to reflect on, review, and revise their teaching. Frequently, beginning teachers receive only summative assessments from a formal evaluator. Beginning teachers, like their students, can benefit from an assessment-centered environment with frequent, informal, and informative assessment to aid beginning teachers in reflecting on their teaching practices. When teachers are able to reflect on their own teaching, they become more aware of their teaching strategies. However, this study indicates that opportunities for beginning and mentor teachers to reflect on teaching practices are rare.

Beginning teachers' evaluation of their induction experience indicate that they value being observed by others and receiving constructive and informative feedback on their teaching. Moreover, beginning teachers indicate that they would like more opportunities to observe other teachers. To become more assessment-centered, schools should provide more opportunities for teachers, both novices and mentors, to observe the teaching of others. Additionally, schools should develop school environments that encourage reviewing teaching practices for the betterment of student learning.

Community-Centered Environments

Community-centered schools focus on the social nature of learning. Beginning teacher attrition rates are alarming. As many researchers have suggested, preparing new teachers and injecting them into schools will not resolve the teacher shortage problem if teachers continue to leave schools before retirement. Principals' interview responses provided little evidence of developed professional learning communities at their schools. Very few principals indicated providing beginning teachers with opportunities to collaborate with their teaching colleagues. Perhaps beginning teachers are like *canaries in the*

coalmine. The beginning teachers may be detecting the quality of the school atmosphere. If school environments are not conducive to promoting teacher learning, the canaries will die.

Beginning teachers' evaluations of their induction experienced provided evidence that their schools provided very little induction support. Consequently, beginning teachers informally seek support from their colleagues. Furthermore, the support that beginning teachers solicit from these colleagues will be varied in quality and quantity. Currently beginning teachers are isolated and presumed expert. To become more community-centered, schools should develop professional learning communities that encourage collaboration and collegiality among science teachers.

Policy Recommendations

Findings from this study suggest that Texas needs to reevaluate its priorities for beginning science teacher support and mentoring. Many policy makers are concerned with an impending science teacher shortage, but perhaps focusing more energy on developing and retaining those beginning science teachers would be a wise use of state, district, and school resources. The following sections present policy recommendations for improving high school science teacher induction in Texas.

Mentors and Mentoring

Mentoring is just a single component of teacher induction. However, it appears that many Texas high schools are only providing mentoring, and superficial mentoring at best. Policy makers need to reevaluate the goals of mentoring and make policy that will support those goals. The mentoring currently taking place in many Texas high schools would not be recognized as quality mentoring by many experts in mentoring and beginning teacher support.

1. *Define mentor's role*. Providing mentors with a clearly defined role will help them perform their jobs. Currently, many mentors are a "go-to" person that passively reacts to beginning teachers' requests. Policy makers should define mentor's roles as a trained individual who helps a beginning teacher grow

professionally through the first years of teaching. As a result, mentors should be strong in teaching content in addition to being knowledgeable of school policies and procedures.

2. *Train mentors to learn their role.* Mentors require training to be effective at helping beginning teachers gain expertise in the classroom. Texas' Regional Education Service Centers (ESC) often provide mentor training as do other teacher induction institutions such as the New Teacher Center in Santa Cruz, CA. This training should focus on adult learning theory and pedagogical content knowledge. A good classroom teacher does not always equate with a good mentor. Teaching high school students and adults may require a different skill set. Consequently, mentors need training to learn how to assist beginning teachers. Many types of mentoring can take place, including *emotional* (i.e., helping beginning teachers with daily stressors), *procedural (*i.e., helping beginning teachers with non-instructional school policies and procedures), and *instructional* (i.e., helping beginning teachers gain expertise in the classroom). With the current lack of instructional mentoring, mentors will need training so that they can better assist beginning teachers gain expertise in the classroom and translate content knowledge into pedagogical content knowledge.
3. *Provide mentors support to perform their role.* Mentors need support from the school administration to perform their role. Policy makers should strongly consider reducing mentors' course load to ensure time for mentoring during the school day. During this time, mentors can meet with beginning teachers to reflect on past lessons, focus on current concerns, and prepare for future instructional goals. Additionally, mentors need a reduced course load so that they can make thorough observations of beginning teachers in their classroom or team-teach with the beginning teacher. When mentors do not have a reduced course load, their personal planning period becomes the default time for mentoring duties. As a result, mentors must decide how to use that planning period, to perform mentoring duties or to prepare for their own classes. Often, mentoring duties will

take second place to a mentors' class preparation. If a school's schedule cannot afford to reduce a mentor's course load, then schools' should provide some sort of accommodation so that mentors can observe the beginning teacher.

4. *Allow flexibility within a format of expectations for mentoring.* Beginning teachers have been prepared to teach science in a number of different ways, which range from traditional two-year programs at universities to in-district alternative certifications. Beginning teachers' field experiences with high school learners and within high school learning environments vary. Effective mentoring occurs when mentors consider the prior experience and knowledge of beginning teachers and can flexibly adjust their support to assure meaningful mentoring experiences.

    Current mentoring programs are as varied as teachers' incoming backgrounds. Some mentoring programs, such as the Texas Beginning Educator Support System (TxBESS), are rigid with prescribed mentoring scripts and a fixed number of teacher observations. Although the TxBESS program provides a good model for mentoring in some ways, more flexibility should exist in mentoring so that the prior experiences of beginning teachers are account for as well as increasing the frequency of classroom observations.

Working Conditions for Beginning Teachers

Beginning teachers need time to transition into their role as professional educator. The working conditions a beginning teacher faces each day will have an impact on the level of stress in his or her workday. The following policy recommendations are made to help improve the working conditions of beginning science teachers.

1. *Reduce course load.* Beginning teachers' course loads should be reduced in two ways: (1) the types of courses being taught and (2) the number of courses being taught. First, careful consideration should be given to the types of courses beginning teachers are assigned to teach. Beginning teachers' course assignments should closely match their own science backgrounds. Additionally, beginning teachers should teach only one subject preparation. (This is not feasible in Small

schools; a discussion on Small schools is below.) Having only one course preparation allows a beginning teacher to continually reflect and refine their teaching throughout the school day. Additionally, a reduction in course preparations allows the beginning teacher to focus on *how to teach* instead of *what to teach*. Second, beginning science teachers should have a reduction in the number of courses that they teach. An extra planning would give beginning science teachers time to plan science laboratory activities, meet with their mentor, plan lessons with other science teachers, assess students' science needs, attend to administrative duties, meet with administrators, and observe other science teachers while teaching.

2. *Provide access to curriculum*. Providing beginning teachers with ample curriculum resources will better enable them to transition their own content knowledge into their classroom. Veteran teachers can create binders of science lessons to ensure that the beginning teacher has some material to start the school year with. Additionally, schools should inform beginning teachers of their teaching assignment well in advance so that beginning teachers can prepare prior to the start of the school year. Moreover, once notified of their teaching assignments, schools should notify beginning teachers of any existing district curriculum.
3. *Provide access to science teaching materials*. No teacher should start school without the proper number of desks, chairs, lab stools, textbooks needed for her students. This is especially true for beginning science teachers. The very nature of standards-based science teachers requires that teachers have access to a multitude of science teaching materials. Sometimes, science equipment is stored in a centralized storage area so that all teachers have access to the equipment. Other times, individual teachers keep science supplies in their classrooms. This may because of a lack of storage space or the teacher has a "claim" to some specific equipment. Regardless, all science students benefit if all science teachers have access to all science-teaching supplies. Consequently, beginning teachers

are often unaware of what science equipment exists and where the equipment is located. Schools should maintain inventories of science equipment and provide them to beginning science teachers to help orient them to available science teaching resources.

4. *Provide access to science teaching facilities.* Schools should assign beginning science teachers to their own classrooms with access to science laboratory facilities. Preparing for science laboratories is a time consuming task, especially for beginning science teachers. Beginning teachers who have to "float" to different classrooms during the day are unable to provide quality laboratory opportunities for students; this is especially true if the classrooms do not have laboratory facilities.
5. *Provide access to science teachers.* Schools should provide beginning teachers to access to other science teachers during the school day. Common planning periods for same subject teachers allow beginning teachers to become a part of a science teaching team as they collaborate and plan lessons with other science teachers.

Principals

Findings from this research indicate that principals need to take a more active role in the induction of beginning science teachers. In particular, principals can:

1. *Obtain training on teacher induction and mentoring.* Teacher induction encompasses much more than superficial mentoring and learning school procedures. Principal certification should require training on the needs of beginning teachers and their mentors. Some induction programs, such as TxBESS, require that administrators receive training to understand the supports needed for beginning teachers and their mentors.
2. *Monitor mentoring*. Often principal will pair a beginning teacher with a mentor and then do little else. Principals should have a system in place to monitor the quality and the frequency of mentoring.
3. *Elicit feedback from mentors.* Principals should elicit feedback from mentors so that adjustments to the induction program can be made. First, principals should

communicate regularly with mentors to garner information regarding the progress of beginning teachers. Second, principals should elicit feed from mentors to determine how to make their roles more efficient.

4. *Elicit feedback from beginning science teachers.* Principals should meet regularly with beginning teachers to assess their progress, needs, and concerns. Feedback form beginning teachers will also provide valuable information about how to adjust the induction program to meet beginning teachers' needs.
5. *Involve teachers in the development of induction programs.* Principals should collaborate with campus teachers to collaboratively design, implement, test, reflect, and revise models for mentoring that best fit beginning teachers' needs. By involving both experienced mentors and newly mentored teachers to develop mentoring frameworks, multiple perspectives will be present in the design. Moreover, teacher involvement can encourage teacher ownership and involvement in the induction of new colleagues.
6. *Seek assistance from outside resources.* Principals cannot do it all on their own. Many resources, such as ESCs, Texas Beginning Educator Support System (TxBESS), and the Texas Regional Collaboratives (TRC), are already inexistence. These institutions, and many others, can help principals provide mentoring, content, and pedagogical support to their beginning teachers.

Small Schools

Small high schools have a special set of circumstance. They often employ only a couple of science teachers. As a result, these teachers often do not teach any subject in common nor do they have a common planning period.

1. *Form cooperatives.* Small schools can form cooperatives with other school districts so that science teachers can collaborate on science curriculum issues.
2. *Join collaboratives.* The TRCs offer content-specific training and are located across the state. Principals of Small schools should encourage their teachers to attend such activities.

3. *Find content specific mentoring.* It is impossible for beginning science teachers in Small schools to have a mentor who also teaches science, much less the same science subject. However, Small schools may be able to work with ESCs, the TRCs, or another entity, to provide a traveling master science teacher to help beginning science teachers with content-specific issues.
4. *Provide curriculum assistance.* Teaching in a Small school implies a teaching assignment consisting of multiple science courses. Principals can help beginning science teachers by providing curriculum resources to help them with their multiple course preparations. Also, principals can help reduce the workload on science teachers by rotating high school science course offerings. For example, biology and physics may be offered one year and chemistry and environmental science may be offered the next. A rotating schedule will reduce the number of science course preparations for the teacher and increase the number of science options for high school students.

Medium and Large Schools

Science departments within Medium and Large Schools have a greater potential than Small schools to develop an "integrated professional culture" because multiple teachers with multiple levels of teaching experience are present. In an integrated professional culture, teachers collaborate with one another, shape the school's practices, reflect on teaching practices, and attend to novice teachers' needs (Kardos et al. 2001). Although the following are recommendations for Medium and Large schools, Small schools are highly encouraged to adapt the following practices as well.

1. *Promote a professional culture*. Principals play an important role in establishing, directing, and maintaining the professional culture at a school. Principals should foster professional learning communities in their schools that promote student learning through teacher learning.
2. *Promote collegiality*. Principals should arrange schedules so that common time is available for mentoring as well as for science teachers to collaborate during the day.

3. *Recognize the skills of all teachers*. Integrated professional communities recognize the strengths of all teachers in building science programs that support both teachers and students. Beginning teachers have the potential to bring their unique contributions to the community: new ideas about curriculum, instruction, and assessment; up-to-date knowledge about science; skills in new learning technologies; and enthusiasm. Likewise, more experienced teachers contribute to the professional community with their strengths in classroom management; school procedures, policies, and politics; institutional knowledge; pedagogical content knowledge; and multitasking. Principals should assess the numbers of teachers by experience to help manage the professional community so that the school takes advantage of resources to achieve balance in novice-rich and veteran-rich professional cultures.

Higher Education

Traditionally, teacher preparation institutions discontinue support of their graduates at licensure. However, teacher educators have made a call to expand Higher Education faculty's role in the teacher professional continuum. The following are some policy recommendations for teacher preparation institutes to consider:

1. *Become responsible for graduates.* A program is only as good as the product is produces. Beginning teachers are the product of teacher preparation institutions. Consequently, teacher preparation institutions should become responsible for their teachers and track their progress over the first years of teaching. Additionally, is more teacher preparation institutions were to track their teachers progress, a wealth of information would exist for teacher educators to understand how to better prepare future teachers.
2. *Form partnerships.* University education faculty can form partnerships with schools and districts to study the current supports provided to beginning science teachers and what supports beginning science teachers need. Course offerings towards advanced degrees could be developed to address the need of beginning science teachers.

3. *Take part in teacher induction.* A great crevasse currently exists in the teacher professional continuum between the preservice and in-service stages. Expanding university faculty's involvement in teacher induction can help to bridge the gaps and fractures that exist in the current system. Additionally, university faculty's involvement in induction can help to reinforce standards-based science teaching in typically traditional school settings.

The State of Texas

Overall, the state sets the tone for teacher education. Following are some policy points for the state's consideration.

3. *Establish a career ladder.* Currently, teachers in Texas have little incentive to further their education. As such, beginning teachers are normally expected to "pull their own weight" upon entering schools. Beginning teachers are not recognized as novices and instead are viewed as burdens on a school. Establishing a career ladder that recognizes professional growth and achievement would promote professionalism and continued education from the teacher workforce, recognize beginning teachers as novices, and reward teachers for perfecting their craft.

4. *Establish priorities for teacher induction.* Texas has already made progress in promoting teacher mentoring. However, mentoring is only a small portion of comprehensive teacher induction. The state should examine large-scale teacher induction programs such as the California's Beginning Teacher Support and Assessment Program (BTSA), Connecticut's Beginning Educator Support and Training Program (BEST), and Cincinnati's Peer Assistance and Evaluation Program (PAEP). Priorities for teacher induction must be reexamined to promote continued teacher learning through positive learning environments.

Future Study Recommendations

This research has provided a snapshot into Texas high school science teacher induction through the eyes of both principals and beginning science teachers. However, further

investigation is required to better describe and evaluate the current induction practices across the state.

Principals' Perspectives on Induction Research

The findings of this research indicate that a "one size fits all" induction policy will not meet the needs of all Texas schools, beginning teachers, and mentor teachers. Schools of different sizes have different capacities and means to support beginning teachers.

Principals' semistructured interviews covered topics ranging from science teacher recruitment to retention. As a result, only a general overview of the school's induction practices was documented. In order to gain a more in depth understanding, the author proposes collecting data from principals concerning more specific induction practices. Additionally, some principals identified other administrative personnel (i.e., assistant superintendents, mentoring directors, curriculum supervisors) who played a role in teacher induction. Collecting data from individuals such as these would allow for a more holistic understanding of induction practices at some school sites. Overall, more research is needed to understand principals' (a) roles in induction, (b) understandings of new teacher needs, (c) understandings of mentor needs, and (d) beliefs about teacher learning.

Beginning Science Teachers' Evaluation of Induction Research

Findings from this study warrant further explorations into how beginning science teachers evaluate their induction experiences. Exploring feedback from beginning science teachers on their induction experiences is one method to evaluate how schools' induction programs are meeting the needs of beginning science teachers. It is also a way to determine where these induction programs are falling short of meeting their needs.

In this study the responses from beginning teachers were often short and offered no elaboration. As a result, the analyses in this study have determined that many beginning teachers find their administrators, mentors, and colleagues helpful. However, the briefness of available responses does not allow for an understanding of *how* these individuals were helpful to the beginning teachers. Further study is needed to determine the relationships among beginning teachers and these helpful individuals. Further, more

study is needed to gain a better understanding of why some beginning teachers chose to stay at their schools and others chose to leave their schools, or leave the professional all together.

Beginning Science Teachers' *Movers* and *Leavers* Research

The findings from this research indicate that further research is needed to gain an understanding of how high school principals perceive beginning teachers. How principals perceive beginning teachers and beginning teachers' needs may help to explain the current goals and structures of schools' current beginning teacher induction practices.

Additionally, teachers' responses were brief and often offered little elaboration. Further studies are needed to gain a better understanding of what *Movers* and *Leavers* consider the best induction supports. Additionally, further studies are needed to gain a more thorough understanding of their recommendations to improve current induction practices.

Furthermore, further studies are needed to gain an understanding of *Stayers* responses. Additionally, a comparison of *Stayers*' responses with their principals' understanding of induction practices is needed. This sort of comparison would provide a better understanding of the relationship between principals' perceptions of induction and the perceptions of *Stayers*, *Movers*, and *Leavers*.

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APPENDIX A

COMPONENTS OF WELL-KNOWN INDUCTION PROGRAMS

Program	Length of Program (years)	Program features	
		Before school starts	After school starts
California's Beginning Teacher Support and Assessment Program (BTSA) /Santa Cruz New Teacher Project (SCNTP)[a]	2	• Mentors, who qualify as lead teachers, are on full release from classroom duties for two-years • Mentors trained in district standards and teacher evaluation • Mentors recommend rehiring of new teachers	• Two years of mentoring with formative assessment • Participation in induction program linked to teaching credentials • Mentoring is content focused
Cincinnati's Peer Assistance and Evaluation Program (PAEP) [a]	1	• Three days of state-approved mentor training • State standards for teaching	• Continuous evaluation of new teachers for first year • Successful teacher evaluation linked to district contract continuation
Connecticut's Beginning Educator Support and Training Program (BEST) [a]	1	• Two-day training for mentors • State standards for teaching	• Performance portfolio linked to professional licensure in second year. • State-sponsored seminars • District sponsored mentoring for one year • Content specific meetings for teachers
Flowing Wells School District Tucson, AZ[b]	5	• Eight-day new teacher orientation • Bus tour with superintendent through the school district • Master teachers set up classrooms and model first day of school activities with new teachers (Demonstration Classroom) • Induction graduation luncheon	• Teacher career ladder with advancements tied to being observed by and observing other teachers • Monthly new teacher support seminars • Mentor in same grade/subject • New teachers and mentors observe each other teach • Eleven classroom contacts from full-time staff development director
Port Huron Area Schools Port Huron, MI[c]	1	• Four-day new teacher orientation • Workshops on district departments, district programs, classroom management, professional standards and expectations, preparation for first week of school	• Monthly seminars for new teachers • Mentor to teacher ratio 1:1

[a]*Source:* Carver, C. L., & Feiman-Nemser, S. (2009). Using policy to improve teacher induction: Critical elements and missing pieces. *Educational Policy, 23*(2), 295-328.
[b]*Source:* Flowing Wells School District (2008). Staff Development, Induction, Mentoring, April 22, 2009, from http://www.flowingwellsschools.org/filestore/InductionMentoringBrochure.pdf
[c]*Source:* Wong, H. K. (2002). Induction: The best form of professional development. *Educational Leadership*, *59*(6), 52-55.

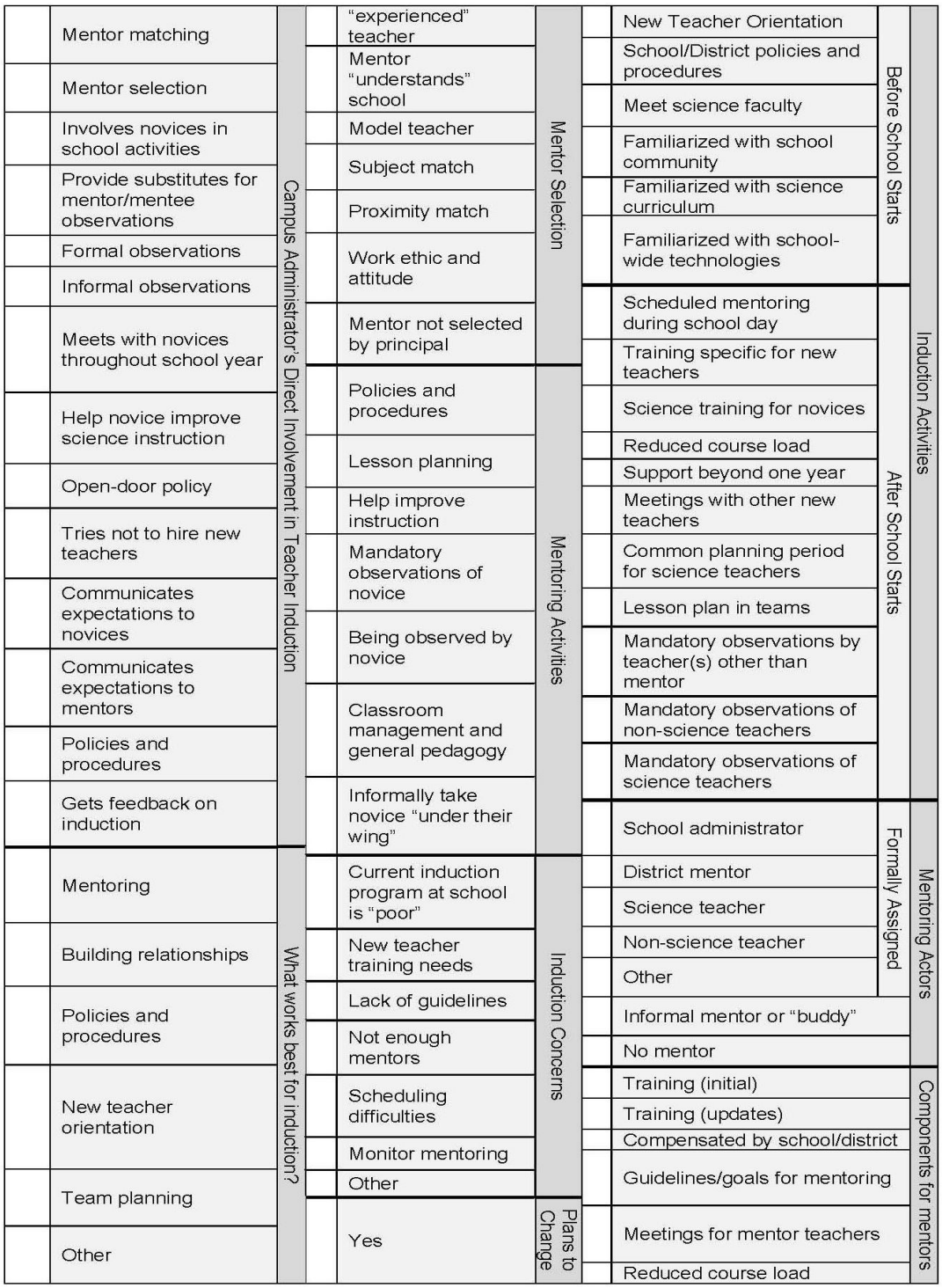
APPENDIX B

PRISE ADMINISTRATOR INDUCTION INTERVIEW PROTOCOL

1. How does teacher induction work in your school?
2. Explain your school's current teacher induction procedures.
3. Explain what induction procedures you have in place for beginning teachers, those currently in their first to third year of teaching, entering your school this year.
4. Explain what induction procedures you have in place for transfer teachers, those teachers currently in at least their fourth year of teaching but in their first year on the campus.
5. Explain what procedures you have in place for selecting and training mentor teachers who will participate in your school's induction program.
6. Identify "what works best" in your school's current teacher induction procedures.
7. Do you see teacher induction issues or concerns that are likely to emerge in the immediate future at your school?
8. Do you have plans to change your school's current teacher induction process?
9. How might our network help you with teacher induction at your school?
10. Is there anything else that you would like to tell us about induction at your school?
11. Is there anything else that you would like to tell us about induction that you think would be helpful to share with the network and/or with the population of schools that teach high school science?

APPENDIX C

INDUCTION SCORING RUBRIC



APPENDIX D

WEIGHTED INDCUTION SCORING RUBRIC

1	Mentor matching	Campus Administrator's Direct Involvement in Teacher Induction	1	"experienced" teacher	Mentor Selection	2	New Teacher Orientation	Before School Starts	Induction Activities
1	Mentor selection		1	Mentor "understands" school		1	School/District policies and procedures		
1	Involves novices in school activities		1	Model teacher		2	Meet science faculty		
4	Provide substitutes for mentor/mentee observations		2	Subject match		2	Familiarized with school community		
1	Formal observations		1	Proximity match		2	Familiarized with science curriculum		
2	Informal observations		1	Work ethic and attitude		1	Familiarized with school-wide technologies		
4	Meets with novices throughout school year		0	Mentor not selected by principal		4	Scheduled mentoring during school day	After School Starts	
4	Help novice improve science instruction		1	Policies and procedures	Mentoring Activities	4	Training specific for new teachers		
1	Open-door policy		2	Lesson planning		4	Science training for novices		
0	Tries not to hire new teachers		2	Help improve instruction		4	Reduced course load		
2	Communicates expectations to novices		3	Mandatory observations of novice		4	Support beyond one year		
2	Communicates expectations to mentors		3	Being observed by novice		3	Meetings with other new teachers		
1	Policies and procedures		1	Classroom management and general pedagogy		3	Common planning period for science teachers		
4	Gets feedback on induction		1	Informally take novice "under their wing"		3	Lesson plan in teams		
0	Mentoring	What works best for induction?	0	Current induction program at school is "poor"	Induction Concerns	2	Mandatory observations by teacher(s) other than mentor		
0	Building relationships		0	New teacher training needs		2	Mandatory observations of non-science teachers		
0	Policies and procedures		0	Lack of guidelines		3	Mandatory observations of science teachers		
0	New teacher orientation		0	Not enough mentors		1	School administrator	Formally Assigned	Mentoring Actors
0	Team planning		0	Scheduling difficulties		1	District mentor		
0	Other		0	Monitor mentoring		2	Science teacher		
			0	Other		1	Non-science teacher		
			0	Yes	Plans to Change	1	Other		
						1	Informal mentor or "buddy"		
						0	No mentor		
						2	Training (initial)		Components for mentors
						3	Training (updates)		
						2	Compensated by school/district		
						3	Guidelines/goals for mentoring		
						4	Meetings for mentor teachers		
						4	Reduced course load		

APPENDIX E

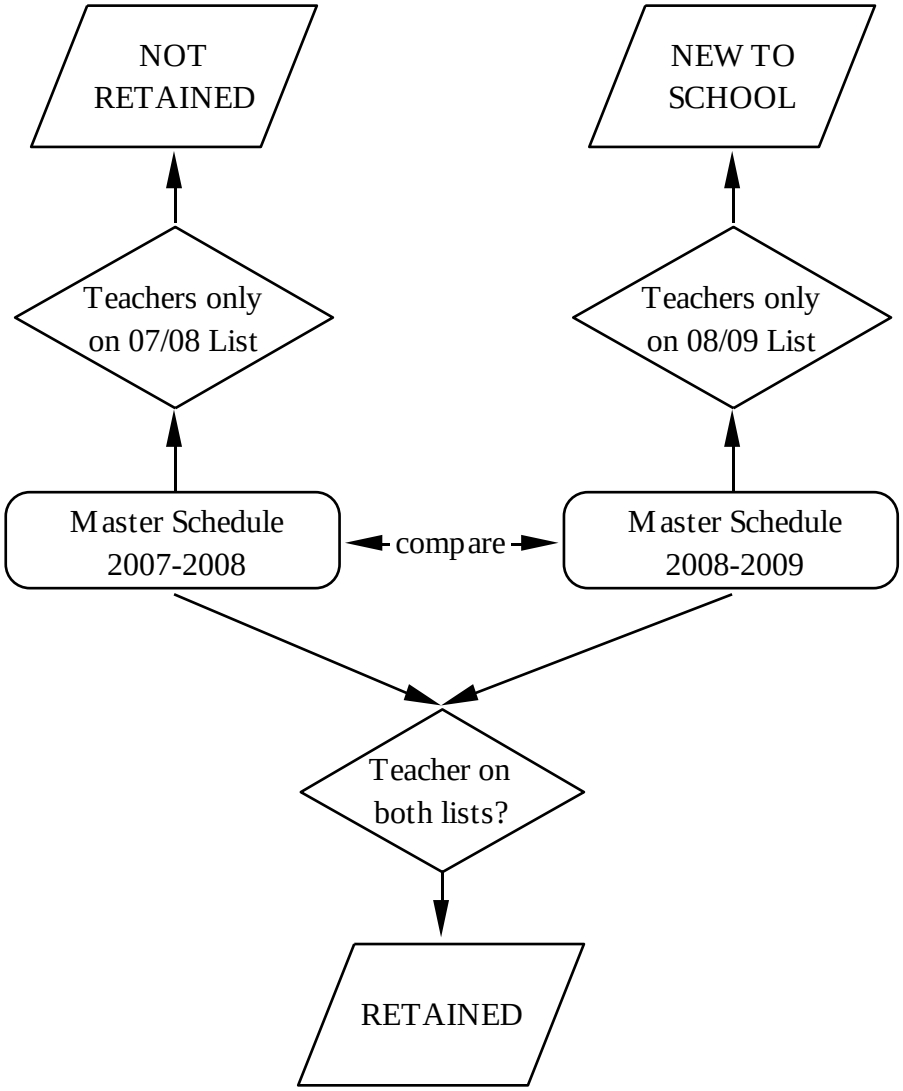
BEGINNING TEACHER INTERIVEW

1. Recruitment
    a. How did you first find out about your science position?
    b. Thinking about your interview process for this school, with whom did you interview with for your current teaching position?
    c. What did you do to learn about this school before accepting your current science teaching position?
    d. Did you do any of the following before accepting your teaching position?
        i. Tour the campus
        ii. Meet other science teachers on campus
        iii. View available teaching and laboratory equipment
        e. Review the curriculum scope and sequence for your teaching assignment
        f. View available instructional technologies
        g. Other
    h. What are the top three reasons that affected your decision to accept your current position?
2. Mentoring
    a. Do (or did) you have a mentor formally assigned by the school?
    b. Does (or did) your mentor teacher also teach science?
    c. Do you have a mentor that was not formally assigned by the school?
    d. How important is it to you to have a mentor that teaches the same content you do?
    e. How important is it to you to have a mentor in a classroom close to your classroom?
    f. How important is it to you to have a more experienced science teacher close to your classroom?
    g. How regularly do you meet with your mentor teacher?
    h. What is most helpful about the meetings with your mentor teachers?

3. Classroom Observations and Feedback
    a. How often do administrators formally observe your classroom?
    b. How often do administrators give you feedback about those formal classroom observations?
    c. How often do administrators informally observe your classroom?
    d. How often do administrators give you feedback about those informal classrooms observations?
    e. How often do other science teachers informally observe your classroom?
    f. How often do other science teachers give you feedback about those informal classrooms observations?
    g. How often are you able to observe more experienced science teachers in their classrooms?
    h. Are you formally provided with release time to observe the teaching of more experienced science teachers?
4. Working Conditions
    a. What type of extra-curricular duties are you assigned to (i.e., lunch and hall duty, club sponsorships, academic decathlon, etc.)?
    b. Were you assigned to these duties or did you volunteer?
5. Induction Program Evaluation
    a. If the administration of this school were to ask you what three things were the best supports for you as a beginning teacher, what three things would you tell them?
    b. If the administration were to ask you how to improve the induction program at this school for a beginning teacher, what three things would you recommend?
    c. Overall, how satisfied are you with your induction experiences at this school?

APPENDIX F

TEACHER RETENTION WORKSHEET



VITA

Toni Ann Ivey received her Bachelor of Science degree in geology from Texas A&M University in 2000. After entering graduate school at Texas A&M University to study environmental geochemistry, she found a passion for science teaching, transferred to the College of Education, and completed a Masters of Education in 2003. After teaching high school science for three years at MacArthur High School in Aldine ISD, she received a research fellowship funded through the National Science Foundation with the Policy Research Initiative in Science Education (PRISE). With this fellowship, she entered the Curriculum and Instruction doctoral program at Texas A&M University in August 2005 and received her Doctor of Philosophy degree with an emphasis in science education in December 2009. Her research interests include science education, beginning teacher induction, mentoring, education policy, research design, and mixed methodologies. She plans to continue her research agenda which focuses on providing instructional support for beginning teachers.

Toni Ivey may be reached at: Oklahoma State University, 232 Willard, Stillwater, OK 74074-4042. Her email is: toni.ivey@okstate.edu.