From Classroom Teacher to District-Based Content Specialist: Exploring Organizational and Individual Teacher Identity in Science Teacher Leaders

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From Classroom Teacher to District-Based Content Specialist:
Exploring Organizational and Individual Teacher Identity
in Science Teacher Leaders

by

Jennifer Snow Mayo

A dissertation submitted in partial fulfillment
of the requirements for the degree of

Doctor of Education
in
Learning and Leading

University of Portland
School of Education

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Abstract

In the current educational context teachers are called to take leadership roles, formally and informally, by school districts, researchers, and policy makers. Increased emphasis on STEM/STEAM education and the introduction of new science standards have amplified the importance of the district-based science specialist. This study’s purpose was to explore: (a) the changing role of teachers by investigating paths teachers take from science classroom teaching to district-based science specialist; (b) how professional identity of teachers is affected by this transition; and (c) organizational factors of the role within districts. Utilizing Marcia’s (1993) ego identity statuses, Ebaugh’s (1998) role exit theory, and Wenger’s (1998) social learning theory, role transition from classroom teacher to district-based science specialist was qualitatively explored through organizational and individual perspectives.

Seventeen science specialists (11 teachers, six administrators) from seven geographically diverse states participated in two semi-structured interviews (via free, online video-conferencing platforms) and a participant questionnaire (via email). Data established two distinct district-based specialist roles: teacher science specialist and administrator science specialist. Primary roles and functions of the teacher science specialists were identified as forms of teacher support (i.e., curriculum, professional development, coaching) while administrator participants’ roles and functions were
primarily identified as organizational leadership (i.e., partnerships and grants, district and department meetings, budget). Teacher specialists expressed a high level of commitment to the role of teacher that administrative participants did not. Through exploration of how teachers described their evolving professional identity, seven characteristics of the transition including gaining clarity on role expectations, negotiating district politics, managing work time, re-establishing relationships with the science teacher group, were established. Common paths to teacher leadership were also identified.

Experiences of evolving teacher identity indicated individual acceptance of formal teacher leadership that may contribute to organizational efforts to distribute leadership in ways that are not only structural--establishing positions--but interactional (expanding definitions of teacher role). Organizationally, understanding the complexity of the role transition could allow for all involved to better prepare for the transition. Implications for future research include further exploration of the transition to district-based teacher leader and the effect of the change on professional identity.
Acknowledgements

The sentiment “I could not have done this without you” has never rung more true or been more meaningful for me than in the process of completing of this dissertation. Many have held up a life preserver for me over this course of study.

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Dedicated to

Team Kennedy, and all who Dare Mighty Things!

It is not the critic who counts; nor the one who points out how the strong person stumbled, or where the doer of a deed could have done better.

The credit belongs to the person who is actually in the arena; whose face is marred by dust and sweat and blood who strives valiantly; who errs and comes short again and again, because there is no effort without error and shortcoming; who does actually strive to do deeds; who knows great enthusiasms, the great devotion, spends oneself in a worthy cause; who at the best knows in the end the triumph of high achievement; and who at worst, if he or she fails, at least fails while daring greatly.

Far better it is to dare mighty things, to win glorious triumphs even though checkered by failure, than to rank with those timid spirits who neither enjoy nor suffer much because they live in the gray twilight that knows neither victory nor defeat.

Theodore Roosevelt
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Chapter One: Significance

When I tell a new acquaintance that I am a science teacher, usually he or she will smile and then, based on their social construction of the concept of a teacher, say something like, “Oh, how wonderful! What grade do you teach?” My response is typically something along the lines of, “Well, right now I work as a teacher leader out of the classroom…” At this moment I can practically watch the bubble of the image of “teacher” being burst in the other’s mind’s eye. Members of society have a common collective understanding of what it is to be a teacher, and it definitely involves a classroom. When I go on to say that I work as a Teacher on Special Assignment (TOSA) for Science in my district, that as a teacher leader I advocate for and support middle school science teachers and work to advance science instruction in the district, the person smiles and nods, and asks if I still get summers off. I have found there is little societal conception of teacher leaders such as myself and the 76,000 other teachers working in various capacities outside of the classroom in schools and districts across the country (National Center for Educational Statistics, 2015).

My personal experience leaving classroom teaching to become a district-based science TOSA was the impetus for this dissertation study. The experience of leaving my math/science classroom, filled with plants and posters of outer space, for a cubicle in the basement of the district office and a rolling suitcase to carry materials from workshop to workshop has had a tremendous effect on my professional identity. I have questioned the roles I inhabit in this position, the organizational boundaries I span as a TOSA, and the impact of leaving the classroom on my professional identity. Of
course, these questions are not only mine—they are the real professional experience of thousands teachers across the country: teacher leaders who support colleagues and administrators in pedagogy and content, and who have the potential to shape district, state, and national science education policy. Through this study I hoped our collective journey might be better understood.

The purpose of this study was to explore the changing role of teachers and to define the role of district-based science specialist through a qualitative examination of the role transition from science teacher to district-based science specialist utilizing both individual and organizational perspectives. This chapter presents the research problem of the transition from classroom teacher to district-based science specialist, first through my own story, then through a discussion of the changing role of what it is to be a teacher. Following the discussion of the research problem, the factors that establish the significance of and need for the study are discussed. The scope of the study and a brief discussion of terms relevant to the research are also presented in this chapter.

**Professional Narrative**

Storytelling is a common theme in qualitative research (Patton, 2002). Qualitative researchers ask questions inviting people to tell their stories; researchers work to make sense of them within the given context of a study (Merriam, 2009; Patton, 2002). Additionally, educational researchers are recognizing the importance of biography and discourse to better understand teacher identity (Alsup, 2006; Bukor, 2013; Zembylas, 2003). An excerpt from my own professional story establishes context for the development of the present research.
After 15 years of classroom teaching, the invitation to leave the classroom for
the science Teacher On Specials Assignment (TOSA) position came suddenly, and
immediately following the end of a school year. Over the previous two years I had felt
I was ready for something more, but could not conceive of what other options within
education would be. Going back to school for my administrative credentials was not of
interest; I was certain I did not want to be a principal. Despite my feeling of ennui
about classroom teaching and what might come next, the decision to leave was quite
difficult. Although I had no way of envisioning this district specialist role, I leapt. The
abrupt role change to district-based science TOSA initially completely removed me
from my grounding as an educator.

As I began my TOSA work I encountered a hard edge between my conception
of science teacher leader and the realities of the TOSA position. The first few months
on the job I seriously questioned if I was the right person for the role: my professional
identity was shaken to its core. What I knew about myself as a successful classroom
teacher simply did not prove applicable in this new context. As a first year science
TOSA I continued to identify as a classroom science teacher, not as an agent of the
district. In my second year, I felt I was a classroom teacher and also someone who
could navigate the district to help and advocate for teachers. As I write, year four is
coming to an end, and my own perception of my role is changing still. I am more
removed from the classroom, and from working with students, yet I have greater
clarity about my role in the district as science teacher advocate and advocate for
science instruction in the state and nationally. Throughout this transition my
professional identity has continued to evolve and my views about what it is to be a
teacher have continued to expand. The next two sections provide the broader context for this story by addressing the changing conception of what it is to be a teacher.

**Changing Role of Teachers**

The details of Lortie’s pioneering Five Towns and Miami-area study as discussed in *Schoolteacher* (2002) are common parlance in the higher education community. Lortie (2002) articulated the notion that a career in teaching meant little change in professional role. While the flat line of the teacher career path was a reality of the time, teaching today is no longer a job with limited opportunity for advancement. In fact, at the time of Lortie’s study, teacher leadership, as it is understood today, was not recognized. Lortie (2002) wrote about teacher leadership as classroom leadership. The “teacher’s leadership role” demonstrated the complexity of the role of classroom teaching through two primary leadership types: managerial (i.e., class management, motivating and eliciting work from students) and expressive (i.e., teacher as mediator of the emotional climate of the classroom) (Lortie, 2002, pp. 151-155). Even the phrase “teacher’s leadership role” brings up a much different connotation in today’s world.

Indeed, the nature of teaching is changing. U.S. Department of Education’s (2015) National Spotlight states:

In the past: Teachers have had limited opportunities to lead in their schools, districts, or States without leaving the classroom.

Today: Research shows that a **majority of all teachers want new roles**, which allow them to lead without giving up the teaching they love. (para. 1, emphasis in original)
The reality of the current situation is that while teachers do frequently take on a variety of leadership roles, most of them have been considered informal—helping out a new teacher, heading a committee, grade-level, or department and the like (Harrison & Killion, 2007). These roles may be so informal that perhaps teachers do not even recognize their roles as teacher leaders (Hanuscin, Rebello, & Sinha, 2012).

Derived from a review of studies seven dimensions of teacher leadership add to the teacher leadership conversation (York-Barr & Duke, 2004). The dimensions are: coordination and management, school or district curriculum work, professional development of colleagues, participation in school change and improvement, parent and community involvement, contributions to the profession, and preservice teacher education. Depending on their use and interpretation, these dimensions have the potential to take the role of teacher beyond the four walls of the traditional classroom. The seven dimensions also suggest that the role of teacher may expand to other roles and titles situated in and out of school buildings, including that of district-based content specialist.

**Formalization of teacher leadership.** Teacher leaders are recognized more formally in schools and districts as instructional coaches, content specialists, or mentor teachers (Fullan & Knight, 2011). One category of formal teacher leaders is a group of educators, an estimated 76,000 in number, who have left the classroom to work at the district level (SASS/TFS Table Library, n.d.). Working at the district level, these individuals presumably work under many titles and fill many roles, but they are neither classroom teachers nor school principals: they work in roles such as instructional coach, mentor teacher, or content specialist; they develop and deliver
professional development to classroom teachers, or guide district work in their areas of expertise (Whitworth, 2014).

As these new roles are recognized there is a movement to further formalize the position of teacher leaders. This includes credentialing coursework, state certification, and leader preparation programs all focused on teacher leadership (Klentschy, 2008; Teacher Leader Model Standards, n.d.). Among the eight states with teacher leadership certification are Idaho, Georgia, and Arkansas (ASCD, 2014; Matlach, 2015). Another eight, including Oregon, Missouri, and New Jersey, are in the process of developing state teacher leader certification (ASCD, 2014). The Teacher Leader Model Standards is a guiding visionary and policy document authored by the Teacher Leadership Exploratory Consortium with the recognition that:

…teacher leadership is a potentially powerful strategy to promote effective, collaborative, teaching practices in schools that lead to increased student achievement, improved decision making at the school and district level, and create a dynamic teaching profession for the 21st century. (Teacher Leader Model Standards, n.d., p. 3)

While not empirical research, this document will be cited throughout this chapter. The Consortium’s work represents a notable shift in understanding the role of teacher and was created by multiple and important stakeholders in the field of education. The Consortium document advocates a reexamination of the functions and structures of schools to support teacher leadership. Daily schedules, use of space, nature of the teacher’s interactions throughout the day, use of technology, community partnerships—all might be rethought in order to provide teacher leadership
opportunities that have the potential to affect student outcomes (Teacher Leader Model Standards, n.d.). To this end, in several parts of the country, states and universities are working together to develop leadership certification programs, and to revamp teacher preparation programs, and as mentioned above still others are offering teacher leader endorsements at the level of state licensure (ASCD, 2014; Teacher Leader Model Standards, n.d.). For example, Portland State University in Portland, Oregon offers a “Teacher Leaders Certificate of Completion” though a program “designed for K-12 teachers, teacher leaders, and coaches who seek a leadership career path distinct from that of a building administrator” (Portland State University, 2016). According to the website, “Participants can expect to develop and refine strategies and insights that create positive change in their schools” (Portland State University, 2016).

Many factors have contributed and are contributing to changes in function of role of teacher and to the recognition of both formal and informal teacher leadership roles (Harrison & Killion, 2007; Lieberman & Miller, 2004). Among them are: changing organizational structures, shifting student demographics, new standards and new standardized assessments, a call for greater “professionalism” among teachers, and assertions that just as all students are learners, all teachers are leaders (Barth, 2001; Hanuscin et al., 2012). These organizational factors are part of the larger changing educational landscape and are often the lens through with teacher leadership is explored in the literature.

Teacher leadership research is most often situated in schools, not school districts. This dissertation is focused on teacher leadership in school districts. Two
studies, discussed briefly here, explore both school and district teacher leadership though an organizational lens. Camburn, Kimball, and Lowenhaupt (2008) and Klentschy (2008) both describe the efforts of school districts to develop simultaneously district and school based teacher leaders. The latter explains that “inside-out” reform is the impetus for the Valle’ Imperial Science Project (Klentschy, 2008, p. 57), the former describes a district’s effort to improve literacy instruction in the context of district decentralization using literacy coaches (Camburn et al., 2008). Both studies recognize the challenges teacher leaders face, but do not address the individual identity transition a classroom teacher undergoes when she/he leaves the classroom for a formal teacher leadership position in a school or district. This is especially important when considering the sheer number of teachers in formal teacher leadership roles. If teacher leadership is indeed a viable career path for teachers, it may be helpful for teachers to understand the professional identity changes they may encounter. Better understanding how teachers may face their new roles may better prepare districts and teacher education programs to support teachers in the transition to formal teacher leadership.

Teacher identity in transition. For district-based content specialists to be effective in their roles, it may be necessary for classroom teachers and administrators to broaden their conception of “teacher.” When teachers leave the classroom for school- and district-based specialist positions, the process of their transition is worth serious consideration—the role of a teacher is different outside of regular classroom teaching. Changed role may lead to changed professional identity.
Understanding the impact of the change is interesting for several reasons. First there is the issue around the nature of providing help to teachers and administrators. Due to unclearly defined roles and boundaries, classroom teachers may perceive content specialists to be pseudo-administrators and not seek help from them, even though they may be in the best position to provide effective assistance. For similar reasons, administrators may perceive content specialists to be a threat to their leadership authority and not seek assistance from them, even though the administrator may be unfamiliar with both subject-specific content and pedagogy. Teachers and administrators simply may not know what it is that a district-based teacher does.

Second, as my story suggests, while science specialists hold a formal position in the district, they may come to their practice with informal teacher leader experience. It is worth exploring the transitions individuals experience as they move from classroom to district-based roles, and from informal to formal teacher leadership. This may assist teachers in making better-informed choices when seeking leadership roles. Understanding these transitions may also offer guidance as the process of formalization of teacher leadership continues.

Research Problem

The paths district-based science specialists follow to get to their formal teacher leadership positions are important to understand in the context of the teacher career path. As teacher leadership becomes more formalized and normalized, the role of district-based science specialist may become a viable career path on its own. Learning how individuals come to, experience, and define the district-based science specialist position may allow for a more clear common understanding around various science
teacher leader positions. This may lead to better professional development experiences for district-based content specialists—science focused and otherwise, and ultimately better student outcomes since district-based content specialists often provide pedagogical and content-specific professional development to classroom teachers. Individuals’ trajectory out of science classroom teaching and into district-based science specialist positions may provide insight into issues of teacher retention and attrition and begin to create an accounting of the leavers who remain in education. Additionally, the research literature reviewed to date simply has not examined the role of the district-based science specialist, much less the impact of the transition from classroom teaching and into a district-based content specialist position, science or otherwise, on the individual’s personal and professional identity in any depth.

There are many influential factors in education today. The formalization of teacher leader roles is perhaps indicative of distributed leadership; teacher leaders in district-based roles are likely to lead their districts to improve science education and implement new standards, particularly the Next Generation Science Standards; individuals in district-based science teacher leadership roles may assist teachers, principals, and district administrators in developing policy which will potentially guide student experiences in response to the seemingly national urgency for workforce development in science, technology, engineering, and mathematics (STEM). With this these factors in mind, the problem that this study sought to understand was how teachers experience the transition from classroom to district-based science specialist role. Specifically, the purpose of this qualitative research was to examine the changing work of teachers through documenting how district-based science specialists describe
their position within the organization and reflect on the degree to which assuming a new role has influenced their professional identity.

**Science education.** There is a paradox in science education: science is not an instructional priority subject (Abell, 1990; Blank, 2013), yet STEM/science jobs are a national priority (The White House, n.d.). 2011 marked the first occasion of the White House Science Fair, initiated by President Obama. Currently there are no less than five major STEM educational initiatives run by the White House’s Office of Science and Technology (The White House, n.d.). One program, the Educate to Innovate initiative, is a partnership between government, public and private sector industry, non-profit organizations, and science and technology focused organizations. Educate to Innovate was launched by President Obama in 2009 with the goal of moving American students to the “top of the pack” internationally in science and mathematics (Educate to Innovate, n.d.). In 2012 Obama announced the creation of STEM Master Teacher Corps. At the same time, the Administration also announced the immediate dedication of $100 million from the Teachers Incentive Fund to help schools establish well-defined, attractive career paths in STEM education for teachers who excel. The program required these highly effective teachers to model STEM instruction for their peers and take on additional responsibilities in their school districts (Educate to Innovate, n.d.). Clearly the field of science is a national priority.

President Obama, in a statement from the third annual White House Science Fair, remarked on the importance of science and STEM education—and science and STEM educators—evoked an urgent, militaristic intensity:
One of the things that I’ve been focused on, as President is how we create an all-hands-on-deck approach to science, technology, engineering, and math… We need to make this a priority to train an army of new teachers in these subject areas, and to make sure that all of us as a country are lifting up these subjects for the respect that they deserve. (Obama, 2013)

Schools across the nation are implementing radically different science standards requiring significant shifts in instructional practice, initiating STEM programs, and working to develop a scientifically literate citizenry ready for the demands of the 21st century. Even more recently, the reauthorization of the Elementary and Secondary Education Act, the Every Student Succeeds Act, included the transformation of STEM to STEAM by explicitly including the arts as an essential component of a well-rounded education for students (Rome & McClanahan, 2015). The role of the district-based science specialist is particularly important at this juncture. Individuals in this position have the opportunity to facilitate this renewal of science education.

**New standards.** The emphasis on students knowing facts and processes is being replaced by the developing critical thinkers who can analyze information in a variety of forms, engage in argumentation from evidence, and communicate well with others (Common Core State Standards, 2015; Elpa21, n.d.; NGSS Lead States, 2013). This shift in educational purpose reflects our societal transition away from education designed to support the industrial age to the information age (Lieberman & Miller, 2004). While we may not yet be able to envision the jobs of the future, we can identify the manner in which those jobs may be carried out. The demands of the Common Core State Standards in English/Language Arts and Math, the Next Generation Science
Standards (NGSS), and new English Language Proficiency standards for English language learners all establish increased rigor in the classroom (Common Core State Standards, 2015; Elpa21, n.d.; NGSS Lead States, 2013). Putting these new standards into classroom practice translates to necessary changes in teaching and learning. In order to meet these demands teachers need help. With the emphasis on English/Language Arts and mathematics instruction, science instruction is often left behind (Blank, 2013). District-based science specialists are likely to be in the position to assist teachers with the implementation of the new science standards and may have the opportunity to guide implementation of the NGSS and science education in their states and across the country.

Models of instructional leadership. Traditionally, school principals have been disciplinarian, chief executive, and pedagogical guide. Despite this popular image, many researchers have noted the role of principal has outgrown one individual person (i.e., Barth, 2001; Lieberman & Miller, 2004; Stein & Nelson, 2003). The educational system is in a period of a changing nature of instructional leadership, for example the leadership teams found in many schools. These teams may include principal, assistant principal, and teacher leaders in various capacities (Camburn et al., 2008; Hulpia & Devos, 2010). Leadership teams are forms of shared, intensified, or distributed leadership (Bolden, 2010; Kruse & Louis, 2008; Stein & Nelson, 2003). While distributed leadership research has focused on school-based leadership, it seems to me that teacher leadership in district roles, such as that of teachers working as district-based science specialists, is suggestive of distribution of leadership. This is relevant because instructional leadership seems to be where the interplay between new
science standards, national emphasis on science and STEM/STEAM education, and formalization of teacher leadership intersect.

**Research Rationale**

The combination of new science standards, demand for a growing STEM/STEAM workforce, and the incorporation of formal teacher leaders into district level work, such as that of district-based science specialists, has not been addressed in the research literature. The overwhelming majority of research literature about teacher leadership is based in school settings; there is comparatively little research about district-based teacher leaders, and even less research about district-based science teacher leaders.

A number of unanswered questions remain about district-based teacher leaders, including district-based science specialists, and their identity transformation as they take on formal teacher leadership roles away from the boundaries of individual schools and classrooms: Why is there little attention paid to the individuals filling these roles? Why is there not greater distinction paid between science classroom teachers and teachers who are district-based science specialists? In what ways are the two groups the same? In what ways are they different? How do these science teacher leaders navigate the space between classroom and district? In what ways is their professional identity altered by the transition to district work? What are their roles and functions in the district?

Four unpublished dissertations from 2010-2014 discuss science teacher leaders. Whitworth (2014) studied the efficacy of a training program for new science district-based science specialists, or science coordinators, as Whitworth refers to
individuals in this role, in Virginia. Hobson (2009) examined the impact of professional development in the form of a teacher leadership program for school based science teacher leaders. Stinson (2013) analyzed results of an Internet survey of self-identified school and district science teacher leaders in Ohio, and Willis (2010) completed an auto-ethnographic of his own identity as a science department chair in his high school. Willis’ (2010) research is a step toward better understanding the identity transformation that comes with teacher leadership in general, and with science teacher leadership specifically, yet it is limited to his own experience. The present study will contribute further perspective to this emerging area of study by exploring the transition from science classroom to district-based science teacher leadership by looking at the role from organizational and individual approaches.

**Interaction Among the Factors**

It is a unique time in history to study the developing role of district-based science specialists. New standards and the movement to integrative STEM/ STEAM education require significant pedagogical shifts. Educational culture is moving from isolated teaching to collaborative practice, which suggests an overall transition from hierarchical to distributed leadership and allows for a continuum of teacher leadership opportunities. Given all of this change it is naive to expect teacher professional identity to remain unchanged; this is particularly true in the case of those teachers who transition from science classrooms to district-based science specialist roles.

The professional identity of science teachers in particular is changing. The Next Generation Science Standards—requiring three-dimensional science teaching and learning—indicate classroom practices must change. The fusion of the science and
engineering practices, the disciplinary core ideas, and the crosscutting concepts embedded in the NGSS are a further step to reform science education. These factors, coupled with the expectation that science teachers take a lead in improving science education (National Research Council, 1996) make for a significant change in the role of science teacher leaders, particularly those in district roles.

Teachers and school and district administrators alike turn to building and district teacher leaders for assistance, particularly with subject-area content. Building-based science teacher leaders, such as science department chairs, are sometimes in the position of having no more experience with the new standards than their peers. As such, the natural place for them to turn for help and support is the district-based science specialist, the teacher of science teachers. Lortie’s 1964 study found just 0.5% of respondents turned to “resource teachers/subject-matter specialists” for help while Kottkamp, Provenzo, and Cohn’s (1986) twenty year follow-up to Lortie’s original study found 12.5% of respondents sought assistance from a teacher leader (p.563). When the categories “Department or grade-level chair” and “Other teachers in the school” are included in this assistance group, it is clear that teachers seem to get the most help from other teachers—over 50% in 1964 and over 60% in 1984 (Kottkamp et al., 1986). Clearly teachers are seeking help to develop their own expertise. This study exploring the role of district-based science specialists comes as the nature of science teacher leadership is positioned to be an area of interest in multiple arenas.

**Purpose of Study**

This study did not begin to answer all of the questions above; however, it did provide a starting place for understanding how people in the district-based science
specialist position are experiencing their role at such a complex time in science education. The purposes of the study were to:

- explore the changing role of teachers by investigating the path teachers take from science classroom teaching to district-based science specialist roles
- explore how the professional identity of teachers is affected by this transition; and
- examine the organizational factors of the district-based science specialist role within the districts in which these specialists are working.

Scope of Study

Researchers aim to be transparent regarding choices made during the qualitative research process (Patton, 2002). This includes addressing limitations and delimitations as in study design, as well as when they arise during research.

Limitations. While national in scope, this dissertation study draws from only seven states. Each state was a lead NGSS state and represented a different the National Science Teachers Association region in the United States. Lead states were committed to new the standards, the process by which they were written, the ideals of three-dimensional learning that the standards articulate, and by logical conclusion the shifts in science instruction that must take place as a result (NGSS Lead States, 2013). The districts were identified through the National Center for Educational Statistics 2011 list of the 500 largest districts. One in six students attends school in one of the 500 largest school districts (National Center for Educational Statistics, 2015); so this study drew from urban and suburban districts in the identified states.
**Delimitations.** This study did not explore the role of school-based teacher leaders, nor did it explore informal teacher leadership. This study was also delimited by the fact that only science teachers were study participants, not those from other content areas such as mathematics or English/language arts. As it was not a lead state in the development of the Next Generation Science Standards, Texas, one of the most populous states in the nation, was not included in this study.

**Discussion of Key Terms**

For the purposes of this study, and based on the literature, key terms are briefly discussed here. A more extensive discussion of each concept will be addressed in the Review of Literature, which is Chapter Two in this dissertation.

**Professional identity.** An individual’s professional identity is based in and “affected by the picture they build of their position. They see themselves as participants in social processes and configurations that extend beyond their direct engagement in their own practice” (Wenger, 1998, p. 173). Thus an individual’s identity is meaningfully constructed through the organizational context of participation and belonging. In this study professional identity is considered through both individual and organizational perspectives. This includes the professional roles of the research participants—how participants see themselves within the organization and the changes in their professional roles, identifying both how they looked on their role change and how others perceived it.

**Teacher leader.** York-Barr and Duke (2004) offer the following: “…teacher leadership is the process by which teachers, individually or collectively, influence their colleagues, principals, and other members of school communities to improve
teaching and learning practices with the aim of increased student learning and achievement” (p. 228). Formal and informal teacher leadership is found by York-Barr and Duke (2004) to be situated in conceptions of leadership that include distributed leadership. By virtue of their district-based positions, all participants in this study are formal teacher leaders.

**District-based science specialist.** District-based science specialists are the focus of this dissertation study. This role is distinguished from instructional coaches or mentors because while the position may include these roles, the role of district-based science specialist may include other roles such as development and facilitation of professional development and guidance of district policy (Whitworth, 2014). Focused on science content and instruction and based in a district, not a school, the science teacher leaders in this study fall into two categories: district-based science teachers working in roles out of the classroom supporting science teacher peers, and coordinators/directors who have administrative roles.

**Summary**

The role of teacher is changing. There are at least 76,000 teachers who are working for schools and districts but not in traditional classroom teacher positions (National Center for Educational Statistics, 2015). Presumably these individuals are teachers working in the role of school- and district-based content specialists, instructional coaches, teachers on special assignment, and other similar positions. The line between informal teacher leadership and formal teacher leadership is becoming more delineated as colleges and universities, even states, offer coursework and formal credentialing in teacher leadership and as schools and school districts continue to
utilize the expertise of teacher leaders in both content and pedagogy to work with teacher colleagues and school and district administrators. New national science standards and legislation recognizing the importance of STEM/STEAM education direct science teacher leaders, especially those in district-based science specialist roles to assist science teachers and their administrators in navigating this territory.

The remaining chapters of this dissertation will further detail this study. Chapter Two includes a discussion of the theoretical frameworks, which guide the research, and explores relevant research literature around teachers and leadership. Chapter Three provides a detailed explanation of the methodology for the present study. Chapters Four and Five present the findings, analyses, and implications for further research.
Chapter Two: Review of Literature

This study is designed to explore how organizational changes, such as those factors described in Chapter One, impact individual teacher identity through eliciting the perspectives of teachers who leave the science classroom to work in district-based science specialist roles. As discussed in Chapter One, teacher roles are not changing in isolation. Factors such as new instructional standards and the demand for a highly qualified STEM/STEAM workforce are playing a part. Distributed leadership may also be a factor in understanding changing teacher roles. In a distributed leadership model multiple individuals have specifically delineated roles and responsibilities that they contribute on behalf of the greater whole, such as a school or school district. This model may be providing a mechanism for change in education settings such as schools and districts. The changing nature of instructional leadership has an impact on the role of the teacher and teacher leadership, especially around content specific knowledge and pedagogy—even new standards. Building principals can no longer bear the title of instructional specialist on their own (Kruse & Louis, 2009). More and more principals depend on teachers for assistance in subject specific content knowledge and pedagogy (Spillane, 2005; Stein & Nelson, 2003). In addition to working with new standards and changing classroom demographics (Lieberman & Miller, 2004), teachers today are expected to take on the role of teacher leader (Barth, 2001; Teacher Leader Model Standards, n.d.). Such teacher leadership could be informal, such as collaborating with colleagues, or formal, such as leaving the classroom to act as an instructional coach (Fullan & Knight, 2011; Lieberman & Miller, 2004; National Resource Council,
1996.) As a result of the interplay of these many factors teaching and what it means to be a teacher are changing.

The areas of research and theory addressed in this literature review all interact around the role of teacher and teacher leader, as individuals and within organizations. This chapter will first explore the theoretical frameworks that inform this dissertation study. Identity theory, including role and role exit theory, and social learning theory inform this study. The review then discusses relevant literature on teacher identity, including science teacher identity, distributed leadership, and teacher leadership roles in schools and districts. The specific case of science teacher leadership concludes the leadership section.

**Theoretical Framework**

A theoretical framework is established to provide a lens through which the researcher approaches all aspects of the research process (Merriman, 2011). This lens extends to the readers of the research as well and allows the research to be situated within its larger context (Creswell & Miller, 2000). Readers of qualitative research will bring their own lenses to the research, so delineation of theoretical orientation is particularly important to establish the researcher and the research (Merriam, 1998; Patton, 2002).

This study was rooted in two theoretical lenses: identity theory and social learning theory—these perspectives offered both an individual and organizational focus. These perspectives guided my research process and analysis. In this section these theoretical frameworks are discussed in depth; each is punctuated by examples of the theory applied in education.
Identity theory. There are many ways to view the development of the self, and indeed many influences on the development of identity (Beauchamp & Thomas, 2009). There are also many dimensions of identity that interact and overlap. Social identity consists of identity based on membership, such as political or religious affiliation. Personal identity may be based on internal characteristics or qualities such as being friendly or shy or controlling. Role identity relates to an individual’s perception and interpretation of a role or position (McCall & Simmons, 1978; Stets & Burke, 2009). Global identity encompasses personal, social, and role identities (Ashforth, 2001). Theorists have many conceptions of how identity develops. This review discusses identity with the understanding that the role of teacher may be considered both role identity and social identity; these inevitably encompass aspects of personal identity as well. Thus there is necessarily overlap of many significant aspects of the self. These ideas are explored through the work of Erikson and Marcia.

Anchored in Erikson’s (1982) work on identity as a psychosocial developmental path, Marcia (1993) developed four stages of identity development—identity diffusion, foreclosure, moratorium, and identity achievement. Marcia noted that the path through adolescence (identity formation) might occur at various points in an individual’s life, depending on their current circumstances. The four ego identity statuses recognize the changing nature of identity formation, specifically the gradual onset of identity awareness (Marcia, 1993), and may relate to the process by which teachers transition from the classroom. Marcia’s ego statuses are not linear or hierarchical. Identification with any one of the ego statuses depends on the situation and the acceptance of, or commitment to, the experience/ crisis.
Foreclosure, or conferred identity, is an ego status in which an individual accepts situations or adopts the plans and visions of others, particularly those in authority, without personal commitment or crisis. Moratorium refers to the state or process of transition where crisis is not acknowledged nor a commitment to the identity made. Moratorium involves a deliberate avoidance move by the individual. Individuals in a diffuse ego identity state have no firm way of viewing themselves in the world, nor do they seek this out. Diffusion refers to lack of commitment and aimless, perhaps even flighty, exploration. Identity achievement is a result of both exploration and commitment to a particular view or way of being (Marcia, 1993). Achievement refers to commitment to a vision and the end of exploration. At least for that time, the individual becomes a fully committed participant in their new role.

Exploring the ego identity statuses can show to what degree individuals choose to participate in and create their roles, or are even aware that this is an option—as compared to going along with the status quo without questioning their circumstances. As teachers transition between roles they may encounter changes in how they are perceived by others and changes in how they perceive themselves. Role transition can happen at any time during a teaching career. While years of teaching experience can certainly affect one’s professional identity, it is reasonable to expect teachers to experience at least some sense of adolescent growth into one’s new role/ identity with each professional transition. It is also reasonable to expect the magnitude of the transition to be less when changing grade levels in the same building compared to the transition of leaving the science classroom for a district-based science specialist position. Changing between grade levels may or may not be experienced as crisis and
may be minimized (or exacerbated) by factors such as remaining in the same building, maintaining colleagues, and working with the same student population.

These same factors may be the very contributors that enhance commitment to the new grade level role. In the situation of a teacher leaving the school building for a district-based position it is the greater degree of discontinuity that could potentially create a crisis of experience. There are many potentially unsettling factors among them a non-classroom and non-school based work location, a new set of work politics to negotiate, and new colleague, that may present as discontinuity.

What is essential to the concept of ego identity statuses is the combination of crisis and commitment (Côté & Levine, 2002). When faced with a life change or transition, one can question or challenge the experience and its impact on identity or one can simply accept (commit to) the change without question. Similarly one might experience crisis with the transition, or not. It is with this understanding that the ego identity statuses are defined. For example, district-based science specialists can be expected to be well into chronological adulthood; yet in the circumstance of changing jobs individuals may find they question their teacher or role identity, or experience crisis. In the case of this study one may wonder to what degree are teachers committed to their new role as science content specialist? To what degree does this job shift represent a crisis? This may be informed by exploring their degree of commitment to their role as classroom science teacher, or even by exploring their plans for the future (Côté & Levine, 2002; Jarvis-Selinger, Pratt, & Collins, 2010).

Theoretical application to teacher leadership. In an essay directed at teacher educators, Collay (2006) invited readers to consider the move to leadership--both
positional leadership and informal teacher leadership—as a matter of vocation, of
calling. For many individuals, and certainly for popular culture, teaching falls into the
category of a calling. Jarvis-Selinger et al. (2010) might have identified this as high-
identity and high-commitment. Positional leadership, however, is not often understood
in that same manner (Collay, 2006). We often hear of individuals who always wanted
to be a teacher, but rarely do we hear, “I’ve just always wanted to be a principal.”
Leadership and identity intersect in the “deep, personal values that underlie each
leadership act” (Collay, 2006, p. 132). Experiences from one’s family and personal
values may be the base of teacher professional identity (Alsup, 2006; Bukor, 2013).

Calling for closer examination of the experience of teachers transitioning into
positional leadership roles, the process [of professional identity development] begins
anew” (p. 133). Suggestions for education faculty and pre-service teachers include:
examining assumptions of teacher leadership (e.g., content experts might bridge the
space between positional leaders and teachers), analysis of “professional socialization”
(Collay, 2006, p. 134) in order to understand how that social interaction supports or
limits leadership (e.g., organization of schools, lack of clearly defined roles for
mentors or instructional coaches who lead from the classroom, understanding adult
learners), and modeling vocational leadership in educational coursework (e.g.,
opportunities for discourse and reflection, support of adult learners). The present
research understands the role of district-based science specialist as a formal teacher
leadership role, that is a role of positional leadership. Collay’s (2008) broad
perspective is a step towards a comprehensive and intentional iteration of distributed
leadership discussed later in this Chapter) as it involves a direct examination of roles, the impact of personal experience and the context of the professional situation under which leadership may be assumed.

Identity theory and the ego statuses recognize the multiple role identities individuals have in their lives. Marcia (1993) focused on the concept of awareness of and commitment to experiencing a crisis. Role exit theory gives us another way of looking at transitions and their influence on identity. Examination of the individual within the organization/social system and role exit theory’s four stages may provide insight into the process of role transition for the participants in this study.

**Role theory.** Roles are different parts people play in their lives, giving structure to the various dimensions of identity (Côté & Levine, 2002). A teacher’s roles may include classroom teacher, cafeteria monitor, counselor, committee member, and afterschool coach. The role of teacher may encompass the majority of one’s primary or global identity, or it may not. The role transition experience is understood as a socially mediated process (Ashforth, 2001; Ebaugh, 1998). This interactive process acknowledges the individual’s identity as related to both old and new roles and globally, thus role identity is part of one’s social identity. The subjective importance (defined by the individual, internally) and situational relevance (defined by the outside situation, externally) of a particular role contribute to the determination of a role’s salience or hierarchy (Ashforth, 2001; Côté & Levine, 2002). Understanding how individuals experience role transitions is “vitally important to the health of individuals and organizations alike” (Ashforth, 2001, p. 9). An individual’s
commitment to their role may be under question when one prepares, consciously or unconsciously, for role exit or role transition.

**Role transitions.** Role transitions, such as a teacher leaving the science classroom for a district-based science specialist role, often result in changes in time and space particular to certain role boundaries. Change in time could be exemplified by qualifying for a new position based on years of experience. Examples of change in space are the actual packing and moving from one’s classroom and establishing a new driving route to the new workplace (Ashforth, 2001). Role transitions can also be macro, such as promotion or transfer within an organization. Or, they can be micro, such as a district-based science specialist interacting with district senior leadership in one meeting and facilitating a group of peers in another a short time later (Ashforth, 2001).

Micro-role transitions are dependent on the nature of the organization and the individual in the transition. Some educators may experience role boundaries defined by structure; these individuals might believe that the chain of command must be followed in making all requests. Some schools or districts may experience role boundaries as more situational; in some circumstances an educator might see it as entirely appropriate to contact the superintendent directly. In the case of this study a science teacher’s transition from the classroom to a district-based science specialist position would be a macro-role transition, while the various interactions they have during the course of each day in the new role are micro-role transitions. Both macro- and micro- role transitions may impact teacher identity.
Many theorists have discussed concepts such as transition bridges, role boundaries, and role transitions within the context of role theory (e.g., Ashforth, 2001; Ebaugh, 1998). Transition bridges—connections made with the new role identity—help the individual shift from one role to another by allowing the exiter to maintain a sense of their personal/global identity during the transition. Ashforth (2001) uses the term boundary crossings noting that individuals who identify more closely with their work role more significantly experience a transition away from that role, and that the transition is influenced by social contexts such as support from significant others. In this study, an example of social context might be the response from colleagues as a teacher takes on formal teacher leadership roles.

Exploring role transition has the potential to allow individuals to potentially better define their purpose in the new role. As a result they may more effectively negotiate role boundaries. Organizational leaders may benefit from studying role transitions as they work to better meet the needs of employees. School district leaders might also consider the impact such transitions have on the larger system. This study may provide insight into how the role and concept of teacher may be broadening. Role rehearsal for the exit or entrance may help set the scene for the role transition (Ashforth, 2001; Ebaugh, 1998). Role exit theory addresses specifically the transition of exit.

**Role exit theory.** Role exit theory assumes one’s major role is closely linked to one’s global identity. Ebaugh (1998) writes, “Role exits, as well as role entrances, are closely related to self-identity since the roles an individual plays in society become part of one’s self-definition” (p. 22). Role exit theory acknowledges the processes by
which and the impact of an individual’s role coming to an end, whether through choice or circumstance (Ebaugh, 1998). This perspective is important to a study of professional transition and to questions about whether the role of “science teacher” persists into the role of “district-based science specialist” or whether the move into a district role represents a complete departure from the role of teacher. Research has yet to explore whether teachers closely link their role as teacher to their global identity. Societal understanding of what the role of teacher encompasses is clear. The understanding of the role of teacher leaders, particularly district-based teacher leaders, is more ambiguous. It is interesting to consider role exit theory in the context of this study where the transition from classroom science teacher to district-based science specialist is being explored.

Most individuals who experience role exit go through a four-stage process identified by Ebaugh (1998) in a study of nearly 200 “exes,” individuals who identified in one role, such as a policeman, and who left that role. What links Marcia’s work to Ebaugh’s is the individual’s awareness of crisis and commitment to the process of transition. These individuals either choose, or are forced to choose, the exploration of crisis that can affect identity status (Marcia, 1993). The four stages (doubting, seeking alternates, turning points, and creating the ex-role), that may overlap or even become clear only in hindsight, are discussed in greater detail below (Ebaugh, 1998).

Doubting, the first stage, is encountered by individuals preparing to exit a role. This stage is characterized by generalized dissatisfaction with one’s role, and is often spurred by organizational change, burnout, changes in relationships, and other specific
events. In my own experience I recognized this stage by experiencing the sense that I was ready for something else; that my day-to-day experience in the classroom was becoming tedious. The doubting stage is mediated by cuing behaviors, the role of significant others (supporting the change or not, how others interpret cues and suggest alternates, making public a private issue) and interpretation of subsequent events. This stage is influenced by a degree of awareness of the emerging situation by the individual and socially mediated by the interactions of others in the individual’s life and the nature of the individual’s role within the organization (Ebaugh, 1998). “While the decision to exit is a very personal one, it is inevitably made in a social context and is highly influenced by the reactions of other people” (Ebaugh, 1998, p. 75). After beginning to doubt one’s present circumstances, individuals in the process of role exit begin to seek other options.

Seeking alternates is the second stage of role exit. This stage is influenced by the duration of the seeking period and consideration of factors such as the following: reversibility of the change, support available, social desirability, individual or group status related to the change, and one’s individual awareness of the situation (Ebaugh, 1998). Intellectual reckoning (considering options and weighing alternates, identifying the costs of “side bets”), emotional understanding (realization of choice, level of social supports), and looking at specific options (evaluating pros and cons of the transition, shifting reference groups, and role rehearsal for the new role) characterize this stage. I experienced seeking alternates as I became involved in a teacher leader group that participated in the pilot of the new district science curriculum. Here I saw teachers—both in and out of classroom roles—who were themselves experiencing professional
growth. This planted the seed, so to speak, that there were alternatives to classroom teaching.

As growing awareness emerges into cuing associated with greater dissatisfaction, new possibilities are weighed in comparison to one’s current situation. Growing dissatisfaction with the present role makes way for developing specificity in exploring and understanding alternatives. These are typically assessed as compared to one’s present and previous roles. Social support (knowing someone in a similar situation, approval from an important person) furthers the seeking of alternates and helps to make the option of exit a viable choice, a real possibility. This often leads to serious consideration of alternates such as identifying pros and cons of the alternate as compared to the current role (Ebaugh, 1998).

Another aspect of seeking alternates involves association with the new potential role and/ or group associated with the new role. Ebaugh (1998) refers to this anticipatory socialization as role rehearsal and identifies it as informal/imaginary and formal/reality. Formal role rehearsal might be student teaching or taking a class while informal role rehearsal might be socializing with friends in teaching. The commencement of role rehearsal is indicative of actually exiting and taking on the new role (Ebaugh, 1998). Side bets, the unspoken benefits of a role, such as seniority, place on the pay scale, and time spent gaining credentials, may be especially important to teachers considering role exit and may be real influences on whether teachers feel they have the latitude to even consider alternates. Transferability and translatability of skills also influence the viability of the process of seeking alternates (Ebaugh, 1998). Once alternate roles are identified the individual typically experiences a turning point.
Some individuals gradually come to fully realize that a change must be made, however most individuals experience a turning point. The third stages of role exit, turning points stage, is characterized by specific events that precipitate the change, a “last straw” situation, time pressure, excuses, and an either-or decision. While the specific event may be the trigger for role exit, most find that doubting and seeking alternates may have already occurred—at least in retrospect, subconsciously or symbolically. Last straw situations are specific identifiable events that result in an individual’s immediate decision to “take a stand firm and announce an exit” (Ebaugh, 1998, p. 128). Time related decisions might come at what the individual perceives as a milestone birthday or career point where a new path needs to be taken, after which the perception is that it would be too late to change. Excuses as turning points are illustrated by situations where a circumstance or specific incident allows the individual justification to—perhaps finally—leave the role, thus creating an exit that is socially acceptable for all involved. Often turning points are socially acceptable reasons for leaving, such as stress due to a medical problem (as opposed to simply stress or job dissatisfaction), which are accepted and supported by others. Another situation in which a specific incident may lead to the turning point is in the case of an extreme event such as an alcoholic blackout leading to a life or death type of decision making (Ebaugh, 1998).

The specific event of the turning point “becomes the reason why the individual cannot now do other than leave his or her present role” (Ebaugh, 1998, p. 134). The turning point allows for the decision to become public, for the individual to garner support and resources for the exit and to reduce the exiters’ cognitive dissonance.
(Ebaugh, 1998). Once the turning point has occurred—that is commitment has been made, the individual is well on their way to exiting the role and becoming an ex. In retrospect, I see my particular turning point, as described in Chapter One, as a series of conversations between myself, the previous science TOSA and several other individuals who spent time observing my classroom, and participation in a summer professional development experience with teachers from across the country.

Creation of the ex-role, that is transition out of the previous role and into the new role, is the final stage in role exit theory. Creation of my role as ex-classroom teacher started with an “out of the blue” phone call from the previous science TOSA and is ongoing—even four years after leaving the classroom. As described in Chapter One, this process can be very challenging as the individual’s perception of themselves, their identity, and is often rooted in the role that has been exited. Ordinarily this is compounded with the general societal expectation that the individual is still a full member in their previous community. This is the essential challenge in the creation of the ex-role: expectations are tied to the past, not anchored in the present or likely future—there is a “tension that exists between self-definition and social expectations” (Ebaugh, 1998, p. 150).

Becoming the ex is characterized by new presentation of self, the reaction of others to the new self, changes in friendships, interactions with other group members, and residual identification with the role exited (Ebaugh, 1998). Drawing from Goffman (1959), Ebaugh (1998) refers to the individual’s presentation of self as providing public cues directing others to the new role identity. These may include such props as clothing, physical appearance, and social behaviors. Acceptance by
others to one’s new role is in many ways affected by the status of the new role. Some role exits, teacher to principal for example, come with increased social status. Other exits, such as principal to teacher, are societally associated with an undesirable change in status or demotion—even though this may be what the individual has chosen for himself or herself. The social acceptance of the new role makes the establishment of being an ex either easier or more difficult for the individual. Exes do not become nonmembers of their previous group; they have insider information that is associated with full membership. While ex-members social and/or professional associations may still remain, the quality of those relationships may not be the same (Ebaugh, 1998).

Interestingly, Ebaugh (1998) identified one emotional characteristic that all individuals experience at some point in the role exit journey. The feeling of being caught between two worlds is identified as “the vacuum… in which taken-for-granted anchors of social and self-identity are suspended for the individual, leaving him or her feeling rootless and anxious” (p. 145). Those individuals who made connections (social, professional, or otherwise) to the next role were found to be able to most successfully bridge the gap between roles upon the exit. The vacuum along with the previously mentioned role rehearsal encompass Wenger’s (1998) legitimate peripheral participation and inbound trajectory into membership in a new community of practice (discussed below).

Though writing about ex-prostitutes “rehabilitation,” Ebaugh’s (1998) comments may have resonance for teachers who move into non-administrative district positions: “They are often caught in between the two worlds and find little acceptance
from either world” (Ebaugh, 1998, p. 158). District-based science specialists, particularly those remaining under teacher contract, have the potential to experience significant identification with their previous classroom teacher role. The residual role identification may subside as the ex-teacher’s former students age up away from the range in which the teacher may have had association with students after being their teacher. Classroom teachers who exit to become district-based science specialists face multiple exits: not only do they leave the science classroom; they leave the familiar school setting for school district offices. These teachers face the social stigma of leaving their students and the school on one hand and the perception of promotion on the other hand. For many science teachers their master role, that is the role that leads to one’s primary self-identity, is that of teacher. This may be true for district-based science specialists as well.

Marcia (1993) and Ebaugh (1998) provide lenses through which we consider individual role transition. Social learning theory, Wenger’s (1998) communities of practice in particular, provides lenses through which the individual’s role within in the organization can be understood.

**Social learning theory.** Lave and Wenger’s (1991) theories of the social nature of learning, especially how individuals’ identities develop as members of communities through situated experiences are central to this study. Wenger (1998) provides a framework through which to view the interaction of an individual’s identity and their community of practice. An individual joins a community of practice identified by shared work, mutual engagement, and joint enterprise. Communities of practice are “everywhere in our daily lives…[where] people voluntarily come together
for mutual engagement and develop a shared repertoire of how they do things together” (Hargreaves & Fink, 2008. p. 231). Each individual is a member of many communities. Often community boundaries overlap and members can participate freely as they move between groups. Many communities of practice can be found within a school and some members may belong to multiple communities of practice, and may shift back and forth between multiple community boundaries (Hargreaves & Fink, 2008; Wenger, 1989). When a boundary is new to an individual, or perhaps more clearly defined by hierarchy, or is in an entirely new area of membership it may be necessary to translate or code-switch from community to community.

Wenger (1998) situates communities of practice both within and across organizations based on engagement and relationship, thus communities of practice and boundary spanning are relevant to the individual and the organization. Boundaries can be spanned between any communities of practice. This concept is relevant to the present study: science specialists come from the teacher ranks yet through the process of becoming a science specialist “they have acquired very different status” (Wenger, 1998, p. 75). Thusly, the science specialist’s experience of being a former classroom science teacher changes professional identity, both for the individual personally and within the organization. In the context of leaving the classroom, science specialists potentially become boundary spanners. Boundary spanning is the process by which communities of practice interact. In the case of the present research, the science specialist negotiates the gap between science teachers, principals, and district administration around content and pedagogy. Science specialists may also span the
boundary between the interests of their content area and the district system-wide, or with state departments of education or other professional organizations.

An individual’s identity is meaningfully constructed through the organizational context of participation and belonging. Experiences of multimembership may shape the individual’s identity and provide the means by which one more fully experiences membership in their professional communities of practice. The practice of doing the work of the community, legitimate peripheral participation, gives the individual a means by which to belong to and become part of the community (Lave & Wenger, 1991). This may occur first peripherally, and later extended into fuller and more complex forms of participation as established members accept the new member’s inbound trajectory. Trajectory refers to the inbound or outbound paths individuals travel along as they become situated in or exit a role in a community of practice (Wenger, 1998). The very nature of what shape a trajectory takes is determined by the social interaction between members. Within the context of this study, a science teacher who has accepted a new position with several months to go before the end of the school year finds herself on an outbound trajectory from that position. She is not fully included in scheduling meetings for the fall because she will no longer be there. At the same time, when she accepts an invitation to meet a colleague from her new position for coffee the science teacher has accepted the offer to peripherally participate, and perhaps to initiate an inbound trajectory with her new work community.

Inherent in the role of the district-based science specialist may be spanning the boundary between many communities. This nexus of multimembership (Wenger, 1998) also impacts the individual as well as the organization. The individual science
specialist may appear to work independently, but of course this is not true. Their work and their professional selves, Wenger asserts, are the products of “the collective construction of a local practice that, among other things, makes it possible to meet the demands of the institution” (1998, p. 46): their actions broker around community boundaries—connecting some communities, overlapping with multiple other communities, and spanning the periphery of still other communities (Wenger, 1998, p. 114). Each individual has a unique experience and perspective related to each community in which they hold membership. Applying this theoretical perspective, then, suggests that exploring the degree to which district-based science specialists may experience boundary spanning or brokering as an essential part of their role may inform both the individual and the organization as science teachers transition into such roles.

**Theoretical application to teacher identity.** Akkerman and Meijer (2011) use dialogical self theory to suggest the following definition of ”being someone who teaches” (p. 315): that is, they say teacher identity is “an ongoing process of negotiating and interrelating multiple I-positions in such a way that a more or less coherent and consistent sense of self is maintained throughout various participations and self-investments in one’s [working] life” (p. 315). It is both the situations and the individual’s perceptions of themselves in various situations that allow exertion of multiple conceptions of one’s teacher identity over time.

Many conceptions of teacher identity in the literature have been product or outcome based, that is teacher identity is experienced as list of characteristics, an ends to be achieved. This objectifies and removes the teacher from identity formation
A dialogical approach to teacher identity recognizes the many parts of teacher identity (multiplicity), the process of identity development (discontinuity), and the contextual factors of identity formation (its social nature). This approach is necessarily postmodern (the individual as a product of the social environment) and allows for the traditional views of consistent self (unity), structural aspects of roles (continuity), and individual uniqueness (individual). This is a unique approach to understanding teacher identity in that it allows for and, not or in the conception of identity (Akkerman & Meijer, 2011).

This point of view makes sense for this study, as the individual does not relinquish teacher identity, nor is the classroom teacher role a non-experience, upon the transition to the district-based specialist position (Ebaugh, 1988). Thus each participant has multiple I-positions, or views of themselves, over the course of their career in education. Additionally, the conceptual definition of teacher identity suggested by Akkerman and Meijer (2011) provides room for teacher identity to continue to grow as the role of teacher and teacher leader continues to develop.

Zembylas (2003) theorizes that emotions are personal and social, private and political, that they vary by cultural norms and expectations, depend on the situation of their construction, including situational and relational power, and that emotions are central to the fabrication of teacher identity:

Teachers have to take profound personal and professional risk in everyday teaching practices, and they need to construct defense and support mechanisms to continuously re-construct and re-affirm their identities. Feeling inadequate may color a teacher’s entire emotional life. (Zembylas, 2003, p. 228)
This perspective differs from the psychological/developmental approach (i.e., Erikson) and the sociocultural approach (i.e., Vygotsky) in that Zembylas “argues that identity formation involves how the social operation of power and agency influences the discourses about emotion and identity and vice versa” (2003, p. 218, emphasis in original).

Such a viewpoint makes the concept of teacher identity as it is typically studied problematic because it removes teacher professional identity from a tangible and expected list of things a teacher should be or should experience (the factors or components of teacher identity); thus Zembylas (2003) suggests that teacher self and teacher identity are part of our teaching mythology (p. 214). Zembylas (2003) asserts dialogic interaction is an important experience in constructing teacher identity, noting teacher identity is formed as “a constituted outcome of this continuing dialog with students, parents, and colleagues” (p. 223, emphasis in original). Engaging in discourse, not just self-reflection, may provide teachers with a structure in which to identify better understand expected emotional responses and in turn provide them with a way to enact greater self-care and transform their situations. The present study then may become a means by which participants continue to develop and enact their professional identity. This study addresses the evolving nature of teacher’s professional identity and locates it at the point of transition from one clearly defined position to one with often less defined parameters.

The theoretical frameworks presented in this section provide a lens through which to view an individual’s identity related to the organizational context. Included in this were examples of research theorizing teacher identity. Next the discussion turns
from theory exploring the role of teacher and teacher identity to how teacher identity has been empirically studied in the literature.

**Studies of Teacher Identity**

Teacher identity is a complex topic that has been explored by educational researchers from many perspectives. The purpose of this section of the literature review is to provide the reader with the scope and variety of teacher professional identity literature, and to establish context for teacher identity. Studies related to professional identity formation tend to focus on development of pre-service and student teachers identity, or other specific groups of teachers and their beliefs on teaching and learning.

From their analysis of 22 articles related to teacher professional identity Beijaard, Meijer, and Verloop (2004) identified three major categories under which the research fell: professional identity formation (formation of student teachers and their beliefs on teaching and learning), characteristics of professional identity (related to specific issues or factors that may influence identity), and professional identity as teacher narrative (storytelling as a means of discovering or solidifying professional identity) (Beijaard et al., 2004). Professional identity is an ongoing process of development related to both the individual and the context in which they are situated (Beijaard et al., 2004). Additionally the literature implicitly recognizes the relationship between personal and professional identities (Beijaard et al., 2004). Research has focused on the many complex factors and roles related to a teacher’s identity that may be necessary in the development of professional identity. “[I]t can be argued that professional identity is not something teachers have, but something they use in order
to make sense of themselves as teachers” (Beijaard et al., 2004, p. 123, emphasis mine). The literature presented in this section, mainly from 2004 on, provides an update to that review. The classifications from Beijaard et al. (2004) serve as an organizational structure. The factors of professional identity formation are discussed next.

**Professional identity formation.** The focus of identity formation in the articles reviewed by Beijaard et al. (2004) was related to personal identity and the context of professional identity formation. These studies discussed aspects of professional identity, such as the situation of teaching and the roles teachers’ play. The Beijaard et al. (2004) review of the earlier work suggested there might be greater need to attend to the individual’s personal identity, that is, to bring professional and personal aspects of identity together. They noted biography—one’s life experience, impacts professional identity formation. There is potential for struggle in professional identity formation given conflict between idealized teacher roles learned in university programs and the reality teachers face in the classroom (Beijaard et al., 2004). Examination of the well-documented role transition from student to teacher may offer insight into the role transition explored in this study.

Hamman, Gosselin, Romano, and Bunuan (2010) were interested in the way new teachers, at different points in their early career, demonstrated similar or different possible selves. The authors identified four main categories new teachers used to define their future selves: interpersonal relationships, class management, instructional issues, and professional qualities. These were common to both groups of teachers despite the different points in their early careers. Student teachers overall indicated
more possible selves than first year teachers, perhaps indicating student teachers are more attentive to tasks and products while new in-service teachers are possibly more attentive to the process of their work (Hamman et al., 2010).

Hamman et al. (2010) situated their findings and discussion in the greater understanding of new teacher development. Those new to the teacher role may be likely to place emphasis in their understanding of their work and themselves as teacher. Possible selves theory might provide a unifying framework for teacher identity research. The reflexive opportunity provided by narrative discourse may ultimately give teachers’ greater agency and commitment (Alsup, 2006; Bukor, 2013; Hamman et al., 2010). All of these themes are reflected in the research literature.

Identity (self-perception) and commitment (dedication) were found to be common themes in Jarvis-Selinger, Pratt, and Collins’ (2010) exploration of the conflict between being a student in a teacher education program while at the same time being a student teacher in a school setting. These themes were used to create a framework of high-low commitment (from fallback career choice- to always wanted to be a teacher) intersecting with high-low identity (from student- to teacher). The resultant matrix provided a way to track and better understand the development and experience of 23 secondary preservice teachers who were enrolled in a one-year teacher preparation program. Though the expectation may be that individuals entering teaching have a developed teacher identity and are committed to the role, this may not be the case (Alsup, 2006, Jarvis-Selinger et al, 2010).

Understanding the perspectives of students as they enter teacher education programs—knowing someone’s starting perspective—may allow teaching faculty to
work more appropriately with teacher candidates to help them to shift to both higher commitment and higher teacher identity, or to help students recognize earlier that teaching may not be the best choice for them. The authors note such reflection is highly touted but not often put into practice in a manner that it truly meaningful for teacher candidates (Jarvis-Selinger et al., 2010). Alsup (2006) and Bukor (2013) offer insight into how teacher identity development might be accomplished through narrative and dialogue.

Another example of professional identity formation is Meijer’s (2011) discussion of working with a practicum student teacher. Through discussion of the role of crisis in student teaching and the concept of transformative learning, Meijer (2011) explored the development of teacher identity. Crisis is referred to as developmental crisis (Erikson, 1982). The author suggests that crisis in student teaching can be viewed by education faculty as opportunity to provide students the necessary assistance to progress toward identity commitment.

There is some predictability to crisis when one begins the transition from student to teacher. It is how that crisis is navigated that may determine the trajectory for those experiencing such role transition. Developmental crisis may be an opportunity for identity development. Support navigating the crisis may support identity transformation; lack of support or a prolonged crisis may lead to personal and professional difficulty (Meijer, 2011).

In this study the crisis is leaving the classroom and transitioning into the district-based science specialist role. Discussing crisis in experienced teachers Meijer states, “It would be very interesting how these teachers might be supported in schools
to turn such crises into developmental crises” (2011, p. 52). Understanding the predictability of teacher’s transitioning into new roles (Meijer, 2011) and supporting these transitions into teacher leadership with future-oriented talk (Urzua & Vasquez, 2008), may allow for greater enactment of possible selves (Hamman et al., 2010). By specifically exploring this transition this study allows teachers to identify and articulate their experience leaving science classroom teaching.

**Characteristics of professional identity.** Commitment, agency, and vulnerability, perspectives of student teachers and new teachers are oft-researched characteristics of teacher identity. The work of Marcia (1993) and Ebaugh (1998) bring agency and commitment into play in this study. Teacher identity research in this section provides insight into professional identity characteristics ranging from various areas of teacher expertise to teacher commitment, to agency and vulnerability. The conceptions of professional identity in these studies were anchored on the particular characteristic or role explored in the study. Beijaard et al. (2004) reported comparing this set of studies was difficult as they were so varied in topic; thus the findings were notably unique to each study. This is suggestive that the examination of individual facets of teaching and teacher identity may not be productive as once thought; that the distinction between personal and professional identities may not be helpful (Beijaard, Verloop, & Vermunt, 2000).

Beijaard et al (2000), in a mixed-methods study of teachers with at least four years experience, explored evolving teacher identity as it related to three categories: pedagogical, didactical, and subject matter expertise. These categories were further explored through several factors that influence teaching context (i.e., school culture),
teaching experience (distinguishing between experience and expertise), and teacher biography (past, personal experiences influencing professional life). Professional identity was conceptualized as teachers’ own perceptions about themselves and factors that may influence their perceptions (Beijaard et al., 2000).

Findings indicated a shift from beginning teacher selves to the teachers’ current identification. As beginning teachers nearly 70% of the respondents saw themselves as primarily subject matter experts. For example, math and science teachers were noted as moving from subject matter to didactic or to a more balanced stance, as compared to other subject area teachers (Beijaard et al., 2000). Teachers who identified strongly as subject experts also discussed the importance of didactical expertise. These teachers suggested that developing pedagogical understanding might serve them better as they continued in the profession (Beijaard et al., 2000). The authors noted that the influences of teaching context, teaching experience, and teacher biography seemed to be relatively equal influences as expressed by the respondents.

In a quantitative teacher identity study, Cheung (2008) developed an instrument to measure the professional identity of in-service teachers in Hong Kong. This study focused on the characteristic of teacher professionalism. Using the Hong Kong’s Education Bureau’s guidelines for professional Hong Kong teachers, professional identity and professionalism are considered closely linked. Cheung stated, “commitment and identity are associated with one another…the more committed that teachers are to their practices, the more likely they are to identify themselves as professional teachers” (Cheung, 2008, p. 378). To better understand the connection to
the three professional domains examined (student needs, school issues, and personal growth and development) Cheung (2008) suggested in-depth interviews.

Another factor that may affect teacher identity is the effect of reform initiatives. Day, Elliot, and Kington (2005) explored commitment of teachers in Australia and England during a period of reform and Lasky (2005) explored the agency and vulnerability of teachers during secondary school reform in Ontario, Canada. The researchers found that changes in standards and methods of tracking student achievement have changed the work of teachers in both Australia and England. Day et al. (2005) identified changes such as drawing teachers away from priorities such as working with children leading to more managerial responsibilities. Such policy changes may alter the way in which teachers experience their work and their professional identity. The opportunistic sample was 20 teachers and two district representatives, 12 in Australia and 20 in England. Data collection was through in-depth interviews, collected documents, and field notes. Analysis was directed toward the ways in which teachers indicated commitment and were coded into three major themes: 1) characterizing commitment, 2) changes with time and, 3) factors that sustain and diminish commitment (Day et al., 2005).

Day et al. (2005) found commitment to be complex, with many factors beyond the concept of dedication to the role and working with students contributing to the level and nature of teacher commitment. For teachers, having a connection with the school factors and their own values indicated greater emotional and intellectual engagement, which indicated a greater degree of commitment (Day et al., 2005). Participants also discussed the strain between their ideals and the changes in their
teaching climates. Factors such as the school and system in which they worked and personal factors such as life events both sustained and weakened commitment. The context of the system in which the teachers worked was found to be a significant contributor to decreased commitment (Day et al., 2005).

Linking educational reform to teacher agency as it interacts with teacher identity, Lasky (2005) defined teacher identity as “how teachers define themselves to themselves and others” (Lasky, 2005, p. 901). Included in this perspective are factors such as commitment, pedagogic and content knowledge, emotion, and vulnerability. These factors in turn affect teacher agency, possibly making the teacher less able to be appropriately vulnerable with students. Teachers in this study reported teaching content/curriculum and attending to the whole child—especially relationships with students were influencers in their professional vulnerability. One teacher described this saying, “You’ve got to sort of make yourself not necessarily professionally vulnerable, but vulnerable as a human being to do the profession right” (Lasky, 2005, p. 907). Such identity beliefs allowed the teachers’ greater agency and vulnerability in working with students. Lasky (2005) emphasized that “the larger social and political context can act as meditational systems” (p. 906) that significantly influence teacher identity. This suggested that the political and social climate at the onset of teachers’ careers might be just as important as more recent political and social changes (Cheung, 2008; Day et al., 2005; Lasky, 2005).

The research findings discussed in this section suggest complexity in the very nature of teacher identity (Beijaard et al., 2000; Cheung, 2008). The very nature of research such as this segments parts of one’s identity from the whole of one’s identity
and is perhaps more organizationally based. My research attempts to bridge this span by examining both organizational and individual aspects of transitioning from the classroom to a district-based science specialist position. Research considering the biography of the individual, including their past experiences and perspectives and their current situation may allow for identity to be explored in a more holistic manner, thus recognizing the importance of individual experience (Beijaard, et al., 2000). In order to develop an understanding of complex and multi-faceted teacher professional identity, the context of the teacher’s work must be understood (Alsup, 2006; Beijaard et al., 2004; Bukor, 2013; Zembylas, 2003); this is reflected in the individual’s perspective explored in this study.

**Professional identity as teacher narrative.** One way to explore teacher professional identity in context is through narrative based research and language based discourse. That discourse as more than just “talk” is described by several researchers (i.e., Alsup, 2006; Bukor, 2013). While Beijaard et al. (2004) reviewed only two narrative based articles they did discuss identity formation as storytelling stating professional identity formation is “a process of practical knowledge-building characterized by an ongoing integration of what is individually and collectively seen as relevant to teaching” (Beijaard et al., 2004, p. 123). Narrative based studies tend to recognize the *who* over the *what* (Arwood, 2011), meaning that the teacher research participants “were more concerned about who they were than about what they knew” (Beijaard et al., 2004, p. 121). Narrative and dialogic studies of teacher identity take a more holistic approach to exploring teacher identity and are discussed next.
Alsup (2006) explored teacher identity development with six preservice teachers through extensive conversations she termed “borderland discourse” (p. 6) over two and a half years of narrative research. The borderlands is the space where, through multiple discourse opportunities—such as facilitated dialog with peers, mentors, and instructor, through assignments and metaphor, and creating a personal pedagogical stance—one encounters the distinction between roles such as student and teacher. Holistic, transformative understanding of one’s self through “borderlands discourse” is the path suggested for preservice teachers and teacher educators with whom they work, in order to fully shift from student identity to teacher identity (Alsup, 2006). In the context of this study the development of the identity of the district-based science specialist through such discourse may be applicable. Though the role changes are different, this study utilizes multiple discourse opportunities to explore the transition from classroom to district-based teacher. The interview dialogue may allow for such features of identity as development of agency and expression of vulnerability to be explored by participants (Alsup, 2006; Day et al., 2005; Lasky, 2005; Zembylas, 2013), thus potentially furthering role commitment (Meijer, 2011).

Bukor (2013) examined teacher identity from the assumption that the line between personal and professional identity is not solid, that personal experiences influence one’s professional self and vise versa. Identity then is “a complex notion made up of several interconnected parts” (Bukor, 2013, p. 52, emphasis in original) situated in the contexts of their lives (Wenger, 1998). Bukor (2013) considered assumptions, beliefs, values and actions are the outward or enacted manifestations of one’s identity. This entirely holistic perspective is a departure from the most of the
other research literature reviewed and is applicable to this study as this more holistic perspective reflects the theoretical frameworks discussed earlier.

Bukor’s (2013) research incorporated journaling and weekly, guided visualization that the participants completed on their own in addition to three in-depth interviews over six months. Specific journaling prompts and guided visualizations (provided on CD) were designed to prepare the participant for each of the interviews. The author viewed her research as transformative for the participants saying, “This methodology focuses, then, exclusively on the participants’ sense-making of their life experiences” (Bukor, 2013, p. 55). That is, the three teachers in the study had the opportunity to deeply examine and reflect upon their own path to teaching and career as a teacher through exploration of the connectedness of professional and personal experience.

Common themes that emerged from the data included impact of family, resultant beliefs, and the impact of life experience as it came to bear on instructional practice (Bukor, 2013). From this Bukor (2013) described a cycle of relationship and influences between family, school experience, and career choice. Bukor (2013) offered the possibility that the career choice of becoming a teacher may offer individuals the opportunity for reflection and development of self. The author suggested the prior experience of individuals (such as family background and prior school experience) might greatly influence their own perceptions resulting in a very close link between personal and professional identities. Discourse and guided discovery may help an individual to become more clear in their global identity, including teacher identity (Alsup, 2006; Bukor, 2013; Lasky, 2005). To reflect the complex and multifaceted
understanding of identity the author suggested that research might shift away from attempting to explain and understand identity as solely personal or professional (Bukor, 2013).

Though not as entirely holistic as Bukor’s (2013) study, this dissertation research extends the borderlands to explore teacher leadership, specifically the space between classroom science teacher and district-based science specialist. The literature presented on teacher identity provides the context for understanding the literature around science teacher identity.

**Science teacher identity.** Like teacher identity research in general, science teacher identity is primarily directed to professional identity development in pre-service teachers with recommendations to education faculty on how teacher identity development might be more formally addressed in their teacher preparation programs. This section of the review is focused on literature related to science teacher identity as it relates to this dissertation. A particular emphasis is placed in developing science teachers prepared to enact science education reform in their classrooms. This is an issue of identity, as teacher candidates may not have experienced reform—based science education in their own time as an elementary or secondary student. With the implementation of the NGSS and emphasis on STEM education, participants in this study may be in a similar situation.

In a review of 29 empirical studies (2001-2013) and including two earlier studies (both 1998), Avraamidou (2014) examined of conceptions of science teacher identity within the field of science education. Of the works reviewed two were mixed-methods research; the remaining were qualitative in their methodology. Avraamidou
(2014) found that the body of research focused around several factors that may shape science teacher identity. These included: student identity around science learning, identity as relevant to teacher preparation, teacher identity in general, teacher identity and science education reform, identity as related to subject matter, identity as related to context and to others, life history, emotion and identity, positional identity, and development of identity through all of the following—preservice teaching experiences, out of school learning opportunities, use of technology (i.e., teacher keeping a blog), traditional professional development, and through experience with particular curricular materials. By way of synthesis, Avraamidou (2014) offered a summary of the collective assertions around identity development. Specifically, and consistent with general teacher identity research, identity was reported as a multifaceted construct to understand teaching and learning with emphasis placed on the role of the context of teacher development. Personal history and social markers also provide information on identity development (Avraamidou, 2014).

Many researchers have noted the importance of cogenerative dialogue in developing and constructing teacher identity (for example, Akkerman & Meijer, 2011; Alsup, 2006; Bukor, 2013; Zembylas, 2003). Mensah’s (2011) report of the Drawing-Elementary-Science-Teacher-Ideal-Not (DESTIN) procedure provides an example of this and suggests a structure for tracking the development of emerging science teacher identity through the examination of pre- and post-drawings made by pre-service elementary teachers. In the pre-drawing students were asked to draw the science teacher they did not want to become, and in the post-drawing the students were asked
to draw their ideal conception of a science teacher. Examining the drawings gave insight into developing elementary science teacher identity (Mensah, 2011).

In the classroom, each drawing episode was followed by a whole class discussion: pre what were the negative conceptions, and post how had experiences in the course led students to move toward the development of the ideal (Mensah, 2011). Background information regarding images of scientists and teachers—generally stereotypical—was discussed; it was suggested that these are perhaps barriers to development of elementary science teacher identity. Drawings provided an opportunity for pre-service teachers to conceive of themselves as their ideal science teacher. This discourse opportunity supported the social construction of their science teacher identity, while the pre-drawings allows for deconstruction of the stereotypes of science, scientists, and science educators.

Mensah (2011) found pre-drawings were mostly female teachers with students sitting at desks in rows. Common descriptors were statements such as “standing and lecturing” and “boring” (Mensah, 2011, p. 383). Post-drawings were more positive and included images representative of collaboration and science exploration by inquiry in the natural world. Examples of post-descriptors included “student centered” and “makes the classroom a safe space to learn” (Mensah, 2011, p. 384). Interestingly 21 of the teachers depicted in the post-drawings were often self-portraits—the student teachers as the teacher in the science classroom. This is reminiscent of findings from Beijaard et al. (2000)—that early in their careers teachers tend to see themselves as knowledge givers and subject matter experts. Additionally the process of drawing may have given individuals the opportunity to conceive of their future teacher selves.
(Hamman et al., 2010; Urzua & Vasquez, 2008). In this dissertation study evolving teacher identity was explored through focused conversations with research participants.

Luehmann (2007) highlighted science teacher identity in light of reform in science education and clearly established discussion of preparing teacher candidates to be able to enact reform practices in their classrooms and made recommendations to teacher preparation programs. Layered on to these typical new teacher challenges were those of being a “reform-minded science teacher” (Luehmann, 2007, p. 824) and perhaps being seen as different when one is establishing footing in science teaching in general. Luehmann (2007) posited that identity development might provide teacher education with a framework for supporting the development of effective reform-centered science educators beyond just knowledge and skills.

Science teacher identity in the face of departure from traditional science teaching was also examined in Pedretti, Bencze, Hewitt, Romkey, and Jivraj’s (2008) study of preservice science teachers’ potential adoption of science, technology, society, and environment (STSE) issues-based instructional perspective. Like Luehmann (2007), findings indicated new teachers were aware of their new status and were less likely to have the skills or confidence to be the “different” science teacher or negotiate the political climate. It seemed the general perception was that while adequately prepared for STSE teaching due to demands of time and planning and the complexity of the interdisciplinary approach more experience was necessary. Challenges such as power and control, feeling like they would not fit into their new school communities or make it through the required content and curriculum, and
thoughtful consideration of just how politicized they should be as teachers were themes identified in the qualitative data. As new teachers develop their professional identity they may be less likely to take on perceived challenges to the status quo of their new positions (Pedretti et al., 2008). This may also be true of district-based teachers, such as science specialists particularly as they negotiate the transition into the district role.

Melville, Wallace, and Bartley (2007) explored the intersection between science teacher leadership and science teacher identity. The science department in a secondary school in Australia was viewed as a community of practice in this qualitative study. There has been little formal study of school departments, and this study examined teacher leadership of the individuals within the science department, and briefly considered the department’s influence within the school. In this manner, this is the only study focused in the research literature that considered the individual within the context of the organization as is done in this dissertation. Through the framework of Bourdieu’s fields and game analogies, the science department was viewed as the field and the ten science teachers as players of the game of the science department within the school. This was layered with five qualities of teacher leadership identified by Silva, Gimbert, and Nolan (2000): 1) navigation of school political and organizational structures, 2) nurturing of relationships, 3) encouragement of teacher professional growth, 4) helping others with change, and 5) keeping focus on that is best for students.

After collecting data over the course of two years, these five qualities became the points of analysis identifying examples of teacher leadership of individuals based
on their unique understandings and expertise in teaching and learning within the school. Actions of teacher leadership identified were the initiation of a school Science Expo and the redesign of the science content/standards taught at all grades; each teacher offered specific individual contributions. The science department chair remained a background figure illustrating the apparent “decentralized nature of the leadership of this department” (Melville et al., 2007, p. 469). In fact the authors discovered that association with the school was peripheral as a whole (i.e., focus in school improvement); the science teachers had a primary focus of science education. Identity as a science teacher was developed through the practice of science teacher leadership within the department and these teachers played the game of science education rather than game of teacher at the school. School leaders who understand this occurrence may be better positioned to bring each department into the bigger picture of school management and improvement.

Avraamidou (2014) suggested future research examine identified research gaps. First that processes that form and develop science teacher identity are explored, rather than continued identification of characteristics of identity, as many of the reviewed studies were categorized. This recommendation is aligned with the teacher identity literature in general (e.g., Alsup, 2006; Beijaard et al., 2000; Bukor, 2013; Zembylas, 2013). Second, Avraamidou (2014) noted the importance of developing a broader base of knowledge of science teacher identity specifically because of reform and new standards in science education. This too aligns with the general teacher identity research around components of identity (Cheung, 2008; Day et al., 2005; Lasky, 2005). Finally, Avraamidou (2014) stressed the importance of studying science
teacher identity in the enacted context of the classroom. To accomplish this, Avraamidou (2014) argued the researchers needed to view identity as a process and not a product: “our efforts shouldn’t focus on characterizing [sic] a teacher’s identity but in examining its formation and the myriad factors and contexts that impact its formation” (p. 166). This study addresses many of these research gaps through the organizational and individual perspectives of the theoretical frameworks. Better understanding the science teacher leadership of district-based science specialists within organizations may provide school districts with insights to better integrate the multiple facets of distribution of leadership within the district.

School and District Leadership

School and district leadership have traditionally been bounded by hierarchical structures with principal and superintendent at the helm. Regardless of leadership model, teacher leadership is a form of distributed leadership in schools and districts. This section discusses distributed leadership in schools and districts after a general introduction to distributed leadership.

Distributed leadership. The theoretical context of distributed leadership is in individual and social cognition, and is affected by physical, social and cultural factors. As such it is a good match for education (Spillane, Halverson, & Diamond, 2001). Individual-centered leadership has perhaps served its purpose and societal leadership needs may now be different (Acker-Hocevar & Touchton, 1999; Bolden, 2011; Teacher Leader Model Standards, n.d.). Distributed leadership, overall, is in its adolescence (Bolden, 2011), however as it is situated in schools and education, distributed leadership is in its infancy (Hargreaves & Fink 2006, cited in Hulpia &
Devos, 2010). A socially situated process, distributed leadership examines the practice of leadership with different roles and different jobs for each individual (Bolden, 2011; Spillane et al., 2001). This is significant when consideration is given to exactly where in the educational system distributed leadership is practiced.

Gronn (2002) described three main patterns of distribution: spontaneous collaboration, intuitive working relationships and institutionalized practices (p. 425). Spillane (2005) stated distributed leadership is “first and foremost about leadership practice rather than leaders or their roles, functions, routines, and structures…leadership practice is viewed as a product of the interactions of school leaders, followers, and their situations” (p. 144). Hargreaves and Fink (2008) situated their conception of distributed leadership in the biological world and described distributed leadership as representative of living systems: “self-organizing networks of communication” which “foster creativity, imagination, and innovation” (p. 230). Hargreaves and Fink (2008) further embed distributed leadership in the natural world describing the interconnectedness of the systems to webs. It is the essential commonalities of structures that give frame of reference to those participating in the leadership network. Overemphasis on structures can destroy the system/web. All parts of the leadership web, including the people in the system, are connected and a change in the system in one area impacts the system elsewhere (Hargreaves & Fink, 2008). As Spillane (2005) puts it, “the distributed perspective defines [leadership practice] as the interactions between people and their situations” (p. 144).

Finland and England provide two examples of national efforts of distributed leadership in education. Finland’s educational system is an example of a distributed
leadership system built on communities of practice and highly functional networks of communication (Hargreaves & Fink, 2008). Its approach to distributed leadership is that of leadership practice, rather than simply structural. Finland has a “distinctive moral purpose that binds its people together” (Hargreaves & Fink, 2008, p. 234); in Finland, education is a universal societal given: its educational policy is free education through college. The educational system is decentralized and there is a National Board that provides guidance in educational policy while placing high trust in the country’s teachers. Finland’s focus on solving problems of practice through self-evaluation attends to learning as a process of learning, not as the product of test scores. The Finnish educational system is one of trust and clear purpose (Hargreaves & Fink, 2008), both elements of what Hulpia and Devos (2010) identified as essential components of teacher commitment. Teachers work together in teams to develop curriculum locally in order to meet the needs of their students. Principals share resources regionally to ensure everyone’s needs are met. Distributed leadership in Finland is effective because it is understood as a living system (Hargreaves & Fink, 2008).

England’s project of Raising Achievement/Transforming Learning (RATL) is an example of distributed leadership in a more structural, hierarchical system (Hargreaves & Fink, 2008). RATL is a school improvement model where schools are organized around themes (e.g., arts or sports). The RATL theory of action has clear goals, funding, choice, and is heavily focused on andragogy. Within two years of RATL implementation many schools made significant improvement in student outcomes under this new model (Hargreaves & Fink, 2008); however, this was not
lasting. Teachers experienced the benefit of a synergistic process, but without the deep process of transformation of leadership practice; student outcomes were the driver of success, not systemic functioning and change (Hargreaves & Fink, 2008), thus the practice of interactional distributed leadership was not fully enacted.

**Questions about distributed leadership.** Often leadership in organizations is experienced as status quo and is not critically explored. The nature of leadership in an organization should be implemented selectively and is appropriate when it matches the aims of the organization. Hargreaves and Fink (2008) ultimately question the context of distributed leadership, noting that teachers in the US and UK are often the objects of distributed responsibility. They suggest that distributed leadership can be a means for truly democratic social change and transformation as evidenced by the civil rights movement in the US or the end of apartheid in South Africa, or the educational system in Finland (Hargreaves & Fink, 2008). However, without the view that distributed leadership is at once a living system, community of practice, and network of communication—not simple parts, and without examination of the *hows* and *whys* of distributed leadership, effectiveness may be questioned (Hargreaves & Fink, 2008).

There is recommendation for further exploration regarding the distinction between distribution of leadership and distribution of power (Bolden, 2011). Worth consideration is the organizational context in which distributed leadership is practiced—and its influence on the wider community, specifically the impact of distributed leadership in a school system and the impact of that on education in general. With this comes the careful consideration of when and where distributed leadership may be appropriate—and who receives the benefits. Other challenges
include the basic assumption of a need for leadership, discontinuity among various conceptions of distributed leadership, and a lack of empirical evidence regarding the effectiveness of distributed leadership in schools (Bolden, 2011).

Division of labor is a large component of distributed leadership. Individuals are recognized for their proficiency in particular areas and are expected to contribute to the collective based on these strengths. “The key contribution of DL [distributed leadership], it would seem, is not in offering a replacement for other accounts, but in enabling the recognition of a variety of forms of leadership in a more integrated and systemic manner” (Bolden, 2011, p. 419). Helping teacher leaders prepare for their roles goes hand-in-hand with helping principals develop the skills to work with teacher leaders (York-Barr & Duke, 2004). The literature suggests this may involve redefining the role of principal, and possibly the organization of schools (York-Barr & Duke, 2004). As someone who can help both principals and teachers, the role of the district-based science specialist is important to understand, especially in the context of changing expectations for school leadership.

**Distributed leadership in schools: Changing nature of school instructional leadership.** The current school leadership paradigm is based in the industrial age, although the nature of society has changed. Most educational research and theoretical discussion of distributed leadership is situated in schools, perhaps in response to the shifting trends in educational leadership. To be more responsive to the information age comes a paradigm of new social structures and organizational formats for schools and school leadership, including teachers assuming leadership roles (Camburn et al., 2008; Fullan & Knight, 2011; Lieberman & Miller, 2004; Teacher Leader Model Standards,
Thus, while teacher leadership literature will be discussed specifically in an upcoming section it is heavily referenced in this heading.

Distributed leadership in schools is defined as “the distribution of leadership functions among the leadership team, which is a group of people with formal leadership roles…not limited to those at the top of the organization…” (Hulpia & Devos, 2010, p. 566). Other factors of distributed leadership are participative decision making among all school members, social interaction, and leadership team cooperation. With the improvement of instruction and student experience as the ultimate goal, the social construction of school leadership can be furthered to include the “mutually constitutive” interaction between teacher, student, and instructional materials (Spillane et al., 2001, p. 26). These features may be necessary to consider as they contribute to the educational system as a whole in a school or in a district.

Literature also distinguishes between principal (the school leader) and teacher leader as far as leadership roles (York-Barr & Duke, 2004). The principal as lone, hierarchical authority figure of the school is giving way to leadership teams and distributed leadership (Barth, 2001; Hulpia & Devos, 2010). The role of principal as building manager, administrator, teacher supervisor, and instructional specialist has grown too large for any one individual (Barth, 2001; Hulpia & Devos, 2010; Stein & Nelson, 2003; York-Barr & Duke, 2004). Barth (2001) pleas the case of the overworked principal stating, “I know of no administrator who doesn’t need help in fulfilling his or her impossible job description” (p. 445). One role that is missing from this literature is teachers in district roles, such as district-based science specialists.
Principals are critical factors in teacher leadership (Barth, 2001); if they are open to distributed leadership they may be better able to support and develop teacher leaders. The principal’s role is essential in the development of teacher leadership in a building; mutually beneficial is the functioning of teacher leaders to support the principal’s role (Aker-Hocevar & Touchton, 1999; Hulpia & Devos, 2010; Teacher Leader Model Standards, n.d.; York-Barr & Duke, 2004). This synergistic interaction is dependent on both teacher and principals. Distribution of leadership, such as shared decision making, depends on the principal’s outlook and willingness to recognize and trust teachers as professionals (Aker-Hocevar & Touchton, 1999). Traditionally, principals lead from the top and may end up working with a few “favorite” teachers rather than seeking out the unique expertise of all teachers with whom they work (Barth, 2001; Teacher Leader Model Standards, n.d.; York-Barr & Duke, 2004). However, principals may not be skilled in sharing leadership themselves, or they may not have the skills to cultivate a collaborative environment in which decision-making can be shared (Barth, 2001).

Teacher leaders can complement and support the principal in this change effort, particularly if the school culture is collaborative and supportive (Hulpia & Devos, 2010). Research has noted many contributors to this change. Lieberman and Miller (2004) identify several factors that are contributing to this leadership shift: the changing nature of the teacher workforce and economy, shifting expectations between what is considered public and private responsibility, changing student population, and policy that impacts teacher’s practice through standards and accountability. To meet new expectations this paradigm shift involves transitions such as: from individual
practice to community, from me/my classroom to our students/our school, from teaching to learning, from technical structures to relational leadership (Arwood, 2011; Hulpia & Devos, 2010; Lieberman & Miller, 2004; Spillane et al., 2001).

**Distributed leadership in districts: Changing nature of district leadership.**

Part of examining the practice of distributed leadership is considering the dynamics of power and authority, how decisions are made—and who makes them, and understanding the politics—macro and micro—within organizations. Distributed leadership in education is relatively new and still generally understood practically as division of labor within a school or district, such as the RATL project (Hargreaves & Fink, 2008). Distributed leadership as an intentional leadership practice and operating philosophy, such as in Finland, is less common. The educational research literature on distributed leadership in districts is scant. Only four papers were identified for this review: one for its exploration of micropolitics within a school district, one for its brief discussion of formal and informal distribution of leadership, one for its exploration of decision making in a district, and one as illustrative of the challenges in studying teacher leadership as a product of distribution of leadership.

Bjork and Blasé (2009) studied middle managers involved in a single school district’s distributed leadership efforts in a longitudinal case study over ten years. The middle managers charged with enacting a state-level decentralization effort were ultimately resistive, as the distribution of leadership from central office to school principals may have placed the middle managers roles’ in jeopardy. This perception in turn impeded the success of the new superintendent’s successful implementation of the initiative.
The researchers found that while the effect of macropolitics (e.g., external factors such as federal, state, and local policy) may have set the process of decentralization in motion micropolitics involved played a significant role in enacting change in the district decentralization. Micropolitics such as the gap between policy and reality—how things actually happen in the districts or schools and whether the change actually happens—were found to be prevalent (Bjork & Blasé, 2009).

Micropolitics include alliances, perceptions of outcomes of initiatives, and individuals strategizing to maintain their positions. “Micropolitics involves conflictive and cooperative processes that shape school and district ‘political culture’ and in doing so, constitute the central mechanism through which organizational outcomes are decided” (Bjork & Blasé, 2009, p. 205, emphasis in original). When district priorities are identified or reform efforts established, considering the perceptions of implications of such efforts may help to provide guidance and understanding during periods of role transition.

The distributed perspective taken by Bjork & Blasé (2009) seems to be one of structural distribution, not as a leadership practice by the district (Spillane, 2005). Veins of micropolitics are apparent in the other district distributed leadership papers, too. From a theoretical understanding of distributed leadership Lumby (2009) explored outside partnerships to support student learning. Lumby (2009) suggested that leadership be broadened beyond one school to “multiple players and organizations” (Lumby, 2009, p. 310) when considering partnerships stating, “it will not be enough to study partnerships or collaboration as a phenomenon that is divorced from school leadership” (Lumby, 2009, p. 311). The leadership community may often be more
than just within the school building. This is relevant to this dissertation in that the district-based science specialists may be viewed as partners who enter into collaboration with both teachers and administrators at schools and with other district-based science specialists and administrators. The context of the leadership, both that of the district-based science specialists who retain a teacher role and the others with whom they interact, must be considered when exploring partnerships and collaborations.

The practice of distributed leadership might seem idealistic, but its theoretical underpinnings may provide structure by which schools and districts can better work with each other and through which the district-based science specialists may be effective leaders and conduits for action. At the district level, district-based science specialists may be asked to carry out decisions that they do not agree with. Or, like the middle managers described by Bjork and Blasé (2008), they may find their positions in jeopardy due to decisions made by those in positions of greater positional power. The use of evidence in making decisions related to curriculum and instruction at the district level was the focus of this study in which Coburn, Toure, and Yamashita (2009) found district decisions are typically based on argumentation and persuasion and are highly relational. This use of micropolitics seems to be part of the district culture (Bjork & Blasé, 2009).

The role of the individual was significant in that analysis examined individual and group construction of knowledge and social interaction and networking within the organization that led to curriculum and instruction decisions (Coburn et al., 2009). Four main factors were identified as shaping the decision making process. Content
knowledge influenced how district leaders shaped solutions and used evidence. The perspective of the knowledge also influenced the decisions: the research department had a different perspective than the curriculum department around what was important in early reading, for example. Organizational structure such as the nature of distribution of leadership across the district and the different content knowledge each department brought influenced decision-making. If there was little organizational structure for departments to work together and to know one another’s work, there was greater change for conflict in decision-making. The third factor in shaping decisions was competing priorities for limited district resources. More decisions were made with less personnel input leading to more decisions following the status quo and less innovation. Constrained resources also led to less rigorous use of evidence: “as substantive use of evidence declined political us of evidence increased” (Coburn et al., 2009, p. 1142). The last factor identified was leadership turnover. District leaders make positional decisions that others must enact, even if they do not agree. To handle this, individuals may shape their actions into something they find palatable (Coburn et al., 2009).

The authors recommended recognition and support for the “complexity of decision making” (Coburn et al., 2009, p. 1145) and highlighted the necessity of school district departments to work together, including with each other’s content, data, and research. Especially relevant to this dissertation is the final point made by the authors:

in many districts, as in this district, positions related to instruction (e.g., directors of professional development or subject matter specialists) are
marginal to the main lines of authority in the district…As a consequence, those who are more likely to have content expertise tend to be peripheral to central decision-making authority, and those with decision-making authority do not necessarily have content expertise (Coburn et al., 2009, p. 1146).

District-based science specialists may be best suited to provide both content and pedagogical expertise, yet their scope of influence may be limited due to the distribution of leadership and the manner in which they span boundaries, both with science teachers and district leadership.

Firestone and Martinez (2007) explored distributed leadership in school districts by asking, “How do districts influence teaching practice?” and “How do teacher leaders influence teaching practice?” (Firestone & Martinez, 2007, p.3). In order to explore these questions they turned to a National Science Foundation Math Science Partnership (MSP) working to develop inquiry in math and science instruction to explore the development of teacher leader roles in schools and districts over approximately two and a half years.

Findings indicated that districts and teacher leaders work towards goals identified by the district through different processes. Factors influencing the effectiveness of the teacher leaders included: trust, time constraints, experience, knowledge, and the “tension between monitoring and providing professional development” (Firestone & Martinez, 2007, p. 9). The authors concluded that distribution of leadership was evident because “teacher leaders complemented district leadership efforts. They participated in some of the same leadership tasks as the district…but did so in a different way” (Firestone & Martinez, 2007, p. 25).
What is interesting about the Firestone and Martinez (2007) study is the lack of precision around the various teacher leader roles and use of the terms “teacher leaders” and “districts.” Through the descriptions of the Riverside district it was revealed that teacher leaders in math, called math specialists, “taught one course and had free time for a variety of assignments” and that additional “specialists supported the teaching of science” (Firestone & Martinez, 2007, p. 10). Roles of agents of the district were also not precisely described. Various titles mentioned in the Riverside district were: mathematics supervisor, deputy superintendent, math and science education leaders of the district, specialist positions, and superintendent (Firestone & Martinez, 2007, p. 10).

Given the complexity of the interactions as illustrated by Bjork & Blasé (2009), Coburn et al. (2009), and Lumby (2009), establishing greater clarity and precision in language defining and describing research populations and participants and their roles, relationships, and responsibilities seem prudent. In the discussion of key terms in Chapter One of this dissertation the distinction was made between district-based science specialists in teacher roles and administrator roles. The teacher leaders discussed in this dissertation are based in the district, not in schools.

**Teacher Leadership**

There seems to be no simple explanation of what exactly constitutes teacher leadership. Teacher leadership can be housed in the context of organizational leadership in general and instructional, participatory, distributed, and parallel leadership more specifically (York-Barr & Duke, 2004). These are different perspectives than the traditional view of leadership as hierarchical or heroic, and
which places authority and power upon an individual (Gronn, 2002; York-Barr & Duke, 2004). The parameters and experience of teacher leadership can be difficult to negotiate. “Teachers cannot be given power (empowered) without accepting it. This has to occur on the part of teacher” (Acker-Hocevar & Touchton, 1999, p. 28). While many teachers have assumed leadership roles over the course of their careers, many do not identify as teacher leaders and prefer to maintain an informal role. Despite this, all teachers are now expected to be leaders (Barth, 2001).

There are many characteristics and qualities teacher leaders display and many important roles teacher leaders fill formally and informally, in both schools and districts. After exploring definitions of teacher leadership, this section reviews pertinent literature around factors that encourage and limit teacher leadership. This is followed by a brief examination of the formal teacher leader roles of instructional coaches, mentor teachers, and teachers on special assignment (TOSAs). A discussion of science teacher leadership concludes this part of the review.

**Teacher leadership described and defined.**

In the research literature teacher leadership is often described, but not exactly defined. York-Barr and Duke (2004) reviewed over 20 years of teacher leader literature and commented on the challenging nature of the review task with its varied contexts and descriptions of teacher leadership. The empirical research in their review was mostly qualitative; small study populations focused on dimensions of teacher leadership. There were very few quantitative studies and they only exemplified the difficulty in capturing the complexity of teacher leadership. As a result of their synthesis of the literature this definition of teacher leadership was offered: “teacher
leadership is the process by which teachers, individually or collectively, influence their colleagues, principals, and other members of school communities to improve teaching and learning practices with the aim of increased student learning and achievement” (York-Barr & Duke, 2004, pp. 287-288). Lieberman and Miller (2004) also completed a review of 20 years of teacher leadership research literature. They identified three themes in which to organize their review: individual teacher leader roles and organizational realities, learning in practice, and teacher leadership and reshaping school culture. Speaking to reform in science education Howe and Stubbs (2003) offered the following description of teacher leaders: “Teacher leaders work with colleagues within their schools, school districts, and professional organizations to introduce new ideas, support the growth of others, and lead the way toward reform” (p. 284). From Harrison and Killion (2007): “Regardless of the roles they assume, teacher leaders shape the culture of their schools, improve student learning, and influence practice among their peers” (p. 4). A teacher leader is also identified as “a teacher who assumes formally or informally one or more of a wide array of leadership roles to support school and student success” (Teacher Leader Model Standards, n.d., p. 37). These ideas exemplify teacher leadership as a highly relational and complex process. This study, focused on the role of district-based teacher leaders and their transition from the science classroom teacher, looks at a clearly defined district-based teacher leader role and at the individual in that role transition.

Teacher leaders operate both informally and formally, most with the goal to influence colleagues through relational means rather than authoritative structure (Harrison & Killion, 2007; Hulpia & Devos, 2010; Lieberman & Miller, 2004; York-
Barr & Duke, 2004). Individuals drawn to teacher leadership are experienced and effective teachers, well regarded by peers, and in a position in life where they are ready to give back and focus on others (York-Barr & Duke, 2004). “[T]eacher leaders seem to come from the ranks of effective classroom teachers” (York-Barr & Duke, 2004, p. 268), and understand and can work within a school culture, including the political culture and have a philosophy or outlook that frames their work in the classroom (Acker-Hocevar & Touchton, 1999).

Even though most of the literature is situated in school-based leadership, teachers are embracing roles outside of the traditional classroom. Many teachers who stay in the profession do eventually look for opportunities to experience professional growth and change. A traditional route for professional growth is to move into school administration, however not all teachers wish to become principals (MetLife, Inc., 2012; U.S Department of Education, 2015). Opportunities for teachers and teacher leaders alike are “numerous and varied” (York-Barr & Duke, 2004, p. 263) though still follow a relatively flat trajectory (Lieberman & Miller, 2004; Lortie, 2002). York-Barr and Duke (2004) categorized seven teacher leadership domains based on their review: coordination/management, school or district work around curriculum, professional development of peers, school improvement process, family and community engagement, work with professional organizations, and preservice education (p. 266). These domains open the concept of teacher leadership to more than the option of becoming a school principal and suggest there are many areas in which professional growth and change may be focused. In considering teacher leadership it is
necessary to better understand the factors that impact teacher leadership and how such leadership may be carried out both in and out of the classroom role.

**Factors that influence teacher leadership.** Like the overlapping and layered components that contribute to teacher identity, depending on the culture and climate of the school or district and influence of one’s own background, there are many factors that influence teacher leadership. Three factors significant to the teacher leadership are explored in this section: collaboration and teacher voice, clearly defined goals, and relationships. The presence of these three factors is generally seen as supporting the growth of teacher leaders.

**Collaboration and teacher voice.** A cornerstone of teacher leadership is being able to work with others, to be able to make one’s self heard, and to effectively hear the voices of other teachers. Teacher leaders themselves benefit from the experience of leadership; they experience less isolation and may remain better attached to the profession (York-Barr & Duke, 2004).

Acker-Hocevar and Touchton (1999) explored teacher commitment by examining teacher perspective regarding leadership, politics, decision-making, and personal agency in making school-based decisions. Four themes arose from the data: structure of decision-making, politics-including micro-politics, the teacher’s personal story, and teacher culture (Acker-Hocevar & Touchton, 1999). Collaboration and teacher voice run through two of these categories as described next.

Established collaborative teacher culture was one factor that seemed to be able to weather conflict with administration: if teachers’ voices were able to stay together teachers continued to feel involved and empowered to participate in school decision
making (Acker-Hocevar & Touchton, 1999). When not fully part of the process of the school culture, and not specifically designated by the administration, teachers only went through the motions of participating in collaborative opportunities (Acker-Hocevar & Touchton, 1999).

Teacher perception of collaboration was found to be important as related to decision-making structures in Acker-Hocevar & Touchton’s (1999) study of teacher agency and decision making. Even if structures were in place for teacher voice, administrative structures (i.e., positional authority) could override teacher structures. Teacher decisions related to classroom or grade-level practices were seen as more attainable as compared to teacher voice on a school improvement team for example. Collaborative decision making depends on the principal’s outlook and willingness to recognize and trust teachers as professionals. Such an outlook may influence the manner in which teachers and teacher leaders perceive themselves and their work. The perception that they are valued may then positively impact motivation. Collaboration may be best when supported with some degree of autonomy. “Teachers with more agency use their autonomy to make decisions supported by their administrators, reflect, and dialogue with other teachers…Autonomy affords other opportunities for creative ways to address challenges in the schools and build collective agency among teachers” (Acker-Hocevar & Touchton, 1999, p. 28).

In order for distribution of leadership to be effective, a collaborative approach in which structures are in place for teachers to be heard and valued seems to be important. As teachers working in district offices, district-based science specialists are
in a unique position. It seems prudent that they be effective collaborators and
listeners with both fellow teachers and administrators.

*Clearly defined purpose, goals, or role.* Another component for success of both administrators and teacher leaders is the clear identification and articulation of goals (Fullan & Knight, 2011; Hulpia & Devos, 2010). These rational-technical factors (formalized procedures, rules, roles, etc.) could be communicated to all school members in order to foster cultural-process factors such as trust, unity, shared values, and participation (Hulpia & Devos, 2010). Reciprocity between principal, teachers, and teacher leaders is suggested, as is acknowledgement of the unique experience and skills brought by teachers and teacher leaders (Teacher Leader Model Standards, n.d.). This means more formally recognizing teachers as instructional and content leaders.

Professional networks with clear purposes support sharing and information transfer for participants, while networks with unclear purposes have minimal participation and do not function in an overall positive manner (Barth, 2001; Hargreaves & Fink, 2008.) In a study of factors impacting teacher leadership influence Clarke (2013) reported that none of the six participants received a job description of their science department head role. Among the findings were that “[a]ll research participants experienced role confusion and frustration” (Clarke, 2013, p. 1227). The lack of clearly defined purpose led to ambiguity on the part of the department heads and the teachers with whom they worked (Clarke, 2013). Likewise, Fullan & Knight (2011) suggested administrators and instructional coaches must have clearly identified and articulated goals, and required professional development themselves; otherwise teacher leaders may instead fall into a pseudo-administrator role.
Margolis and Huggins (2012) explored the nature of the “hybrid” teacher leader (HTL) position also highlighting the importance of clear role definition for teacher leaders. (Hybrid here indicated the teachers had classroom assignments 1-3 periods each day and then had release time to act as teacher leaders in a math reform effort.) Though many attempts were made to locate a job description or role definition of the HTL’s role across the four research districts, none was obtained. Margolis and Huggins (2012) explained that the teacher leaders ended up defining the roles themselves based on how their roles were situated in their schools and districts:

Thus, the lack of foundational understanding surrounding exactly how the HTLs were supposed to spend their designated daily teacher leadership time created de facto definitions of their roles. These de facto definitions were determined by the district and school leadership, the funding sources for the HTL positions, and the HTLs themselves. (Margolis & Huggins, 2012, p. 963)

The development of the de facto role definitions figured heavily into the experience of the HTLs and their relationships with the teachers on their buildings.

Actionable tasks and district initiatives may suggest a rough path, but like many formal teacher leaders, district-based science specialists may or may not have organizational structure and guidance in their roles. Role definition, especially the formalization of a teacher leadership role, may be challenging to accept for some teacher leaders, however clearly defined roles do seem to help teachers, teacher leaders, and administrators fully utilize the skill set of formal teacher leaders (Margolis & Huggins, 2012; Munroe, 2014).
**Relationships.** Teaching and learning is a social endeavor so it is not surprising that relationships are an important factor in successful teacher leadership. One relationship, the principal-teacher leader relationship, is discussed often in the research literature. In most situations the principal is the power holder and has the potential to make or break the relationship and thus the effectiveness of the teacher leader (York-Barr & Duke, 2004). As such, the impact of administration on the effect of teacher leadership cannot be minimized:

The loss of commitment because of poor leadership is hard to measure on an achievement test. Principals can choose to develop supportive teacher cultures encourage meaningful involvement, recognize teacher expertise and utilize it, and be a cheerleader for the teachers in the school. Or, they can provide no time for reflection, dialogue, and ignore teacher knowledge and expertise, take no action disrespect, where as Lynn says, “people feel crucified” (Acker-Hocevar & Touchton, 1999, p. 27).

Here commitment to the teacher role is implicitly tied to teacher leadership support and development through the influence of the administrator. Relationships with peers are also essential for the teacher leader.

The literature describes peer relationships in terms of being a role model, with excellent content knowledge, pedagogy, and communication skills (York-Barr & Duke, 2004). Extending influence and facilitating meaningful conversation with peers and administrators and over the culture of a school are highly relational teacher leadership skills. In an ASCD survey, over 60% of respondents indicated these to be the primary characteristics of teacher leaders (ASCD, 2014). Recognizing the learning
and relational needs of the teachers such as time for collaboration, true influence in decision making, and honoring the practice of teaching can all positively impact teacher leadership (York-Barr & Duke, 2004). Relationship and connection to others is also reflected in exertion of agency such as advocacy for staff needs or sharing professional development experiences (Acker-Hocevar & Touchton, 1999). This literature identified what teacher leaders do; it did not investigate the process by which teacher leaders enact these relational tasks.

District-based science specialists have a different supervisory relationship that has not yet been explored in educational research. Teacher leader literature emphasized the teacher-principal relationship; the supervisory relationship may be different for district-based science specialists. Relationship with peers is also an interesting area for district-based science specialists. This group may have left teacher colleagues in schools and may or may not have immediate peers in the form of other district-based science specialists or those in other content areas.

**Factors that limit teacher leadership.** The factors discussed above are most often associated positively with teacher leadership. The literature also identifies factors that seem to negatively influence, or limit, development of teacher leadership.

Structural challenges related to traditional hierarchy, norms, and organization of time can limit effective teacher leadership (York-Barr & Duke, 2004). Other impediments to teacher leadership have been identified as: too much already on teachers’ plates, limited time, the accountability and standards movement, and colleagues who view leadership as for others (particularly principals), resistance to taking on additional roles and social exclusion (Barth, 2001). Those teachers who felt
they were on their own to solve problems, and whose principals felt limited in time and ability to support teachers, demonstrated low commitment and were identified as having little potential for effective teacher leadership (Hulpia & Devos, 2010).

Major factors in limiting teacher leadership were the feeling of isolation reported by some teachers and the impact of poor professional relationships, particularly that between teacher and principal (Acker-Hocevar & Touchton, 1999). Teacher culture is relational which affects the nature and perception of power distribution (Acker-Hocevar & Touchton, 1999). Many teachers described the isolation of teaching as rooted in conflict with administration. This conflict, related to perception of not being trusted and to disagreement between principal or assistant principals, was generally expressed by teachers as staying in their own classroom, working to avoid other teachers and administrators—just making it through each day (Acker-Hocevar & Touchton, 1999).

Having a community of practice with clearly articulated purposes and goals provides teachers with culturally predictable roles and responsibilities within schools. District-based science specialists may not have the benefit of peers, a clear job description or such a socially understood position.

**Formal teacher leadership roles.** As discussed previously, teacher leader roles can be formally or informally situated within a school or district. Teacher leader roles include resource provider, classroom supporter, instructional specialist, curriculum specialist, learning facilitator, mentor, school leader, data coach, catalyst for change, and learner (Harrison & Killion, 2007). Though Harrison and Killion (2007) refer specifically to teacher leadership in schools, the roles of instructional
specialist and curriculum specialist seem to offer the most connection to the
district-based position discussed in this dissertation. Paths to formal teacher leadership
can include leading from the classroom, participation in local or state organizations,
and identification by principal for role in school or district (Teacher Leader Model
teachers have left the K-12 classroom and currently work in a school or district setting
(NCES, 2015). Surely this accounts for teacher leader roles such as instructional
coaches, mentor teachers, teachers on specials assignment and other formal teacher
leader roles. This section contains discussion of three formal teacher leader roles:
instructional coaches, mentor teachers, and teachers on specials assignment (TOSAs).
Where it is clearly stated in the literature, roles specific to schools and roles specific to
districts are identified.

**Instructional coaches.** There seem to be many titles for the role of
instructional coach whose primary function is generally identified as working in
schools to provide teachers with support in improving instruction (Camburn et al.,
2008; Denton & Hasbrouck, 2009; Fullan & Knight, 2011). Though instructional
coaches are sometimes assigned pseudo-administrative work, ideally they spend their
time working with and for classroom teachers and students (Fullan & Knight, 2011)
by observing or modeling lessons, providing feedback to teachers on their instruction,
planning with teachers, assisting with use of assessment and other classroom data, and
leading professional development (Denton & Hasbrouck, 2009; Gallucci, Van Lare,
Yoon, & Boatright, 2010). Several authors suggest that systemic improvement in
student outcomes will occur when principals and instructional coaches, district-wide,
work together and are in turn supported in their work (Fullan & Knight, 2011; Munroe, 2014).

Denton and Hasbrouck (2009) reported that specific content knowledge as well as “the specific skills involved in working with peer colleagues” (p. 169) was necessary for successful coaching. Training in this area was particularly important. Denton and Hasbrouck (2009) stated: “interpersonal skills were consistently cited by teachers, principals, and coaches as facilitators or barriers to effective coaching” (p. 170). The lack of a defined coaching model may also contribute towards role ambiguity. Effectiveness of instructional coaches may not be able to be clearly determined until role ambiguity is resolved (Denton & Hasbrouck, 2009).

Discussing instructional coaches as learners themselves, Gallucci et al. (2010) “challenge the notion that people who enter the role of coach are established experts, well prepared to support the learning of others” (p. 921). Using the Vygotsky Space model, Gallucci et al. (2010) examined the case of Dan, a new instructional coach in a district that has systemically introduced instructional coaching as a district-wide effort. The Vygotsky Space model provided a framework from which to look at the individual’s learning and experience while at the same time examining organizational support factors that may have influenced the coach’s own experience and the experiences of those he worked with. Gallucci et al. (2010) defined coaching in broad terms reporting that instructional coaching was non-supervisory or evaluative and embedded in classroom teaching, its aim to meet school or district reform efforts (Gallucci et al., 2010, p. 922).
Based on the analysis of Dan’s experience (multiple interviews with Dan and teachers with whom he worked, observations over two years, collection and analysis of school district data, and interviews with central office administrators), three areas of organizational support were identified as contributors to the support of learning to be an instructional coach. First, a clear goal and shared vision was identified from the district and consistently pushed out to schools. The provided direction and support as school staffs were engaged as learners through the formal structures established by the district and schools. These experiences built professional relationships and became part of the school culture. Secondly, there were similar instructional coaching structures at schools across the district that “formed a system of support for coaches as learners” (Gallucci et al., 2010, p. 950). In addition to the school-based studio classes and work with the consultant, the district organized meetings for instructional coaches to come together monthly to develop their practice. Third, the content and process of school and departmental meetings shifted to focus on the reform vision of the district. There was a “systemic effort to coordinate professional learning experiences in relation to the vision for literacy reform” (Gallucci et al., 2010, p. 952). In essence the work of the instructional coach was normalized in the building at the same time all staff were engaged as professional learners moving toward a common goal (Gallucci et al., 2010).

The role of instructional coach is more complex when examined through the Vygotsky Space model where the coach as learner is taken into account. Coaches seem to first engage in their own sense making before they are able to share content expertise with peers. Gallucci et al. (2010) suggested a “professional development
system may be necessary to support the group of instructional leaders (such as coaches, specialists, or principals) who surround the classroom teacher” (p. 954, emphasis in original). This might better support the individual’s development in their role while addressing organizational structures that support the shared purpose. In this dissertation, district-based science specialists are likely learners, too, and may experience on the job training, as Dan did. It may be through the experience of doing the job that they learn the role. This may be mediated by the various contexts of the participant’s school districts, including clear roles and organizational support. While the literature has not yet addressed the transitions of district-based science specialists, there are instructional coaches, both school- and district-based who have shared their experiences in peer-reviewed journals.

Several individuals have written from their own experience, or through close study of the experience of others about the transition from classroom teacher to school-based instructional coach and the reverse, from instructional coach back to classroom teacher. Cataldo (2013) and Zuspan (2013) both shared personal accounts of their own experiences becoming established as math instructional coaches in their schools. Both were experienced teachers and both began their instructional coaching practice as informal teacher leaders within their buildings. Both described formulating their own job descriptions, Cataldo (2013) with the guidance of a former math coach and Zuspan (2013) through initial meetings with the principal to establish role expectations and boundaries. Going into the first coaching year with an agenda and administrative support allowed both authors to gain teacher trust and develop a collaborative atmosphere as the year progressed. Adjustment to the coach role was a
process of transition as formal teacher leadership roles were established; the nature of the relationship with former teaching colleagues was altered. With consistent practice, teacher’s trust, and administrative support both authors described a shift in school culture in regards to math teaching and learning and their own leadership (Cataldo, 2013; Zuspan, 2013).

Both noted complexity of the role transition, and Zuspan (2013) in particular emphasized the helpfulness of clarity of role, purpose, and goals. The experience of both Zuspan (2013) and Cataldo (2013) reflect the findings in the research literature that clearly defined purposes, goals, and roles support teacher leader effectiveness (Clarke, 2013; Hulpia & Devos, 2010); that collaboration and teacher voice do allow teachers to be heard and increase participation in teacher leadership (Acker-Hocevar & Touchton, 1999; York-Barr & Duke, 2004); and that relationships are paramount to successful formal teacher leadership (ASCD, 2014; York-Barr & Duke, 2004).

Munroe (2014) explored the teacher leadership transition from the other end, that is, the experience of teacher leaders, instructional coaches in particular, as they transition back to classroom teaching. After an examination of the experiences of several educators, six common tensions experienced in this process were identified: definition of new role, lack of recognition and acknowledgement of past experience, opportunities—but no time—for instructional leadership, brief versus in-depth professional conversations, self-imposed high expectation for teaching, and recognition of being in a unique position (Munroe, 2014, p. 11). Munroe & Driskill (2014) were interested in exploring the effect of knowing about the possible sources of stress ahead of time and if Driskill (returning to the classroom herself) might
experience any of the tensions identified in Munroe’s previous research. The team found that Driskill did experience each of the six tensions, and that Driskill’s “advanced knowledge of the possible tensions helped her to cope throughout the three phases of her career transition” (Munroe & Driskill, 2014, p. 10). Considerations for teacher leaders and administrators were made in three areas: awareness, intention, and support. These suggestions recognized the challenges such role change may present to teacher leaders and provide guidance as they navigate the path back to the classroom.

While this dissertation examines the transition from the opposite end of the continuum (from classroom to district-based role) the considerations made by Munroe and Driskill (2014) and Munroe (2014) may prove useful for teacher leadership in general, applicable to many teacher leader roles, not just instructional coaches.

*Mentor Teachers.* Mentor teachers are also formal teacher leaders. As it pertains to this dissertation, this section of the literature review focuses on teacher leadership in mentoring and the complexity of the mentor role.

Ponte and Twomey (2014) presented mentors as boundary spanners. Mentors connected the space between novice teacher, school culture, university faculty, and their own school community. Mentors in the study reported they saw their role as teacher as evolving and began to redefine the teacher role through mentorship. Ponte and Twomey (2014) found mentors eager for and receptive to professional growth and learning, and that they found that through working with both mentees and university faculty. Mentors gained perspective beyond their own experience by supporting student teachers on multiple school campuses. Mentor interaction with multiple mentees was reported as leading to personal reflection on the mentor’s teaching
practice, which in turn led to an expanded community of practice for the mentors (Ponte and Twomey, 2014).

Shillingstad, McGlamery, Davis, and Gilles (2015) emphasized that teacher mentors perform a mix of formal and informal teacher leadership roles that influenced mentees, peers, and school culture. The mentors provided evidence that their own professional development (mentor meetings, reading, attending conferences, learning from mentees and peers) enhanced their own teaching skills. Shillingstad et al. (2015) reported mentors must walk the line to support their mentees in navigating the culture of their workplace and must be adaptable when the school culture is not in line with their own views. All in all, findings suggested though mentors may have a variety of leadership styles, they all took on multiple roles as they guided new teachers in their early years in the profession (Shillingstad et al., 2015). Like the instructional coaching literature reviewed earlier, Shillingstad et al. (2015) noted mentors need ongoing support as they learn their role and that relationships and building trust are essential for success. Of the teacher leadership roles discussed, there seems to be the least role confusion about the role of teacher mentor.

**Teachers on special assignment.** Teacher on special assignment appears to be a blanket term for teachers in non-classroom based roles. TOSA literature was extremely limited. Over the course of this study ERIC and Educational Source web searches using “Teacher on Special Assignment” revealed just 14 citations. Of these ten were authored or co-authored by TOSAs in a variety of fields (for example ESL, English, science, technology, special education) and two referred to district superintendents as teachers on special assignment. Utley, Basile, and Rhodes (2003)
discussed a university-school program site coordinator as “a master teacher on special assignment” (p. 515). As this was a school based role this article served only to further illustrate the gap in the literature concerning district-based TOSAs.

Klentschy (2008) wrote about a district’s effort to improve science instruction utilizing district-based science specialists identified as TOSAs. This comprehensive and long lasting project illustrated the importance of clear role definition. The Valle’ Imperial Project in Science (VIPS) established teacher leaders at both the district and school level across fourteen participating districts in southeast California in a well planned, systemic enterprise to develop teacher leadership leading to better science education for students. TOSAs served to provide systemic, district leadership and connect with local partners. In this project TOSAs received extensive preparation and training for their work. Lead Teachers (school based) were volunteer teachers who worked with the district-based science TOSAs and also received professional development related to their school-based role.

This project simultaneously established two levels of teacher leaders in a three-year pilot including three schools and one TOSA. The TOSA, a science educator, received extensive training including job shadowing a TOSA in another district for a month “to learn on the job what a TOSA does and how they support teachers” (Klentschy, 2008, p. 59). This project was designed to scale-up to 42 schools. To do this the original TOSA became the program director and three new TOSAs and a new cadre of Lead Teachers were recruited. In collaboration with a university partner a Master’s program in science education was established which “provided an excellent career pathway for teacher leadership” (Klentschy, 2008, p. 60).
VIPS provided development of teacher leadership, science content, and pedagogy in the midst of emphasis on standards and accountability—especially in reading and math—by changing the culture of science teaching and learning in the region. This resulted in greater collaboration in the schools and was supported by district administration. TOSAs and Lead Teachers had clearly defined roles and expectations. All involved were focused on the VIPS science education reform efforts.

**Science Teacher Leadership**

There are clear signals to science education leaders to guide science teaching and learning away from memorization and exposure to basic scientific facts toward social issues related to scientific literacy (i.e., Bybee, 2009; National Research Council 1996; NGSS Lead States, 2013). Commenting upon President Obama’s emphasis on science education and analyzing the 2006 PISA science scores for the United States, Bybee (2009) mentioned implications for science education leaders such as the need to provide equitable science instruction and for the development of scientifically literate instruction and learning. Given this critical work and national call for science and STEM education it is interesting that those science education leaders are rarely specifically named in policy or commentary. Given the varied roles and titles found in the research literature, science teacher leaders in all manner of roles, and all involved the school community, will benefit from clearly defined roles and responsibilities as suggested by other researchers (e.g., Margolis & Huggins, 2012; Munroe, 2014). This study begins to identify exactly who those science education leaders are within school districts.
**Science teacher leadership roles.** Of specific interest to this study are examples of science teacher leadership roles in both schools and districts. Common science teacher leader roles are the elementary science specialist and the science department head (Abell, 1990; Century, Rudnick, & Freeman, 2008; Peacock, 2014; Ritchie, Mackay, & Rigano, 2006). Some schools and districts have lead science teachers, and some have science teachers in district-based roles as TOSAs or in administrative roles such as science coordinators or supervisors (Klentschy, 2008; Madrazo & Motz, 1982; Lee, Leary, Sellers, & Recker, 2014; Whitworth, Maeng, Wheeler, & Chiu, 2015).

**Science teacher leaders in schools.** In the literature, the role of science specialist is most often focused on science instruction in elementary schools. There is a lack of science instruction in elementary schools and elementary science specialists, individuals with undergraduate degrees in both a science field and education, may be able to fill that void (Abell, 1990; Blank, 2013; Century et al., 2008). This is especially important given that pre-service teachers harbor many of the same scientific misconceptions as students (Abell, 1990) and that most in-service teachers have not taken college-level science coursework. In the role of elementary science specialist a building based science teacher provides science instruction to all students—often as a stand-alone experience. According to the 2000 National Survey of Science and Mathematics Education, 12 percent of elementary students received science instruction from only a science specialist, while 15 percent received science education opportunities from both a science specialist and their classroom teacher (Weiss, Banilower, McMahon, & Smith, 2001). On average in self-contained elementary
classes, 19 instructional minutes were spent in science grades K-3, and 24 were spent in grades 4-6 in 2012. This is drop from the 2000 data: 23 minutes of science instruction on average for grades K-3 and 31 minutes in grades 4-6 (Banilower, Smith, Weiss, Malzahn, Campbell, & Weis, 2013; Weiss et al., 2001). Some potential barriers to science instruction at the elementary level include lack of proper science facilities, lack of funding for science activities, and attitude of generalist elementary teachers (Abell, 1990; Century et al., 2008; Schwartz & Gess-Newsome, 2008).

Several studies suggested models for schools with elementary science specialists (Abell, 1990; Century et al., 2008). Century et al. (2008) presented a framework to describe elementary science specialists and called for consistency as the roles, functions, and outcomes of elementary science specialists are further researched noting, “currently, the ‘science specialist’ approach is ill-defined” (p. 33). One unique aspect to the Century et al. (2008) paper is their approach that the elementary science specialist is an intervention, an “improvement strategy” (p. 34). It seems that science teacher leadership is not widely studied, and despite the models and frameworks suggested by the literature, there is still little cohesion.

Kesselheim (1998) identified seven categories of assistance science facilitators provided to teachers: content knowledge, direct classroom support, indirect classroom support, professional development, connections, resource finding, and science education leadership. Teacher perception identified assistance as immediately applicable, related to their professional growth, and useful. Science facilitator assistance resulted in more classroom time devoted to science instruction, a better
understanding of systemic initiatives and policies (within grades, schools, and
district), and transformations of teaching philosophies (Kesselheim, 1998).

High school science departments also provide science teacher leadership roles.
The science department leader has several designations in the literature: science
department head, chair, coordinator, and lead. Regardless of title, high school science
department chairs seem to fulfill similar roles (Peacock, 2014; Ritchie et al., 2006). In
an extensive review of literature related to high school department chairs Peacock
(2014) identified five consistent themes around the roles and functions of this formal
teacher leadership role: 1) in addition to instructional and curricular responsibilities,
chairs preformed administrative and managerial roles, 2) spanning the boundary
between administration and teachers led to role conflict, 3) role ambiguity is
experienced due to unclear expectations, 4) ideally chairs would focus their time and
energy on improving instruction, and 5) formal authority, release time, compensation
and the like can lead to chairs being more effective in their role (p. 37). Other findings
included the influence of school leadership structure on role definition of the chair
position, the necessity of “favorable organizational environment, specific leadership
skills, and sufficient time to support teachers” (Peacock, 2014, p. 41) as factors that
can influence change in the school, and the recognition that instructional leadership
occurs through means of social interactions (Peacock, 2014).

Ritchie et al. (2006) found leadership roles were “perceived differently” (p.
149) by those in different positions (science teacher, science department chair, school
administrator). It was the organizational structures of the science department that
afforded teachers the opportunity to enact their individual agency in order to
accomplish much of their work. The department chair’s focus on keeping the group moving forward and the interactions between group members—either helping or getting out of the way—was part of this structure, and a way in which the department chair enacted her own agency (Ritchie, et al., 2006).

Peacock (2014) offered a conceptual model as a guide for further research in the area of science department chairs. With science instructional leadership at the center, this conceptual model had four primary leadership capabilities, each to be viewed as interconnected with the others and suggestive of what science department chairs might be in the ideal conception of the role. Science department chairs would have deep science leadership content knowledge, advocate for science and science education, work to build collegial learning environments, and navigate a variety of contexts and problems (Peacock, 2014, p. 43). Peacock (2014) cautioned:

Neither of the four leadership capabilities included in this model nor the underlying practices should be considered a leadership checklist for science department chairs. Rather science instructional leadership by a chair is constantly negotiated and enacted through social interactions with teachers, administrators, and other school stakeholders. (Peacock, 2014, p. 44)

Aside from “classroom teacher” it is relatively easy to understand the roles of elementary science specialist and high school science department chair. These roles have been in place for some time and are established roles in schools for science teachers. Less familiar is the role of the science teacher in district-based positions. In the context of the science education reform and the instructional demands of Next Generation Science Standards district-based science specialists are natural leaders.
Science teacher leaders in districts. If the position of the elementary science specialist is “ill-defined and as such a poor subject of study” (Century et al., 2008, p. 33), the district-based science specialist role is even more so. There is a lack of specificity regarding district-based science teacher leadership performed by teachers (i.e., district-based science specialist, science instructional coach, science TOSA) and district science leadership performed by administrators or supervisors (such as science coordinator or science supervisor).

Over the past 35 years there has been limited research on science teacher leadership roles. Madrazo and Motz (1982) commented on a 1978 National Science Teacher Association Survey of science supervisor roles. In doing so they encouraged all districts or school systems to hire one or more science supervisor to support science teachers. In this case ‘science supervisor’ was not explicitly defined. However, the context clearly established the role as a district-based role that perhaps had administrative capacity such as evaluating and hiring. The 210 survey respondents (mostly teachers and administrators) identified the following as roles of science supervisors: instruction, curriculum, staff development, implementation, management, assessment, and assignment, transfer, load (Madrazo & Motz, 1982). A slightly later study noted the lack of clarity around the role of science supervisor and the limited research around effectiveness of the position (Madrazo & Hounshell, 1987).

The more recent findings of Lee et al. (2014) and Whitworth et al. (2015) identified similar roles and functions in district-based science leaders who both sets of researchers identified as science coordinators. Lee et al. (2014) identified five primary and several secondary roles of district science coordinators: primary roles were
aligning curriculum, purchasing curriculum, overseeing assessment, facilitating professional development, and translating state and district standards. Whitworth et al. (2015) also found professional responsibilities of district science coordinators to be wide ranging. The top five roles identified were: aligning curriculum with standards, disseminating information to teachers, working with administrators, analyzing data, working with teachers—including professional development (Whitworth et al., 2015).

Though Lee et al. (2014) and Whitworth et al. (2015) both used the term district science coordinator to describe the leadership role; they provided different role definitions. Whitworth et al. (2015) stated “[i]n the present study, a district science coordinator is defined as an individual responsible for science curriculum and instruction within a district” (p. 2). Participants in the Whitworth et al. (2015) study self-identified as district science coordinators, and were drawn from the membership of a national science education leadership organization. Lee et al. (2014) drew from a larger study in which district science coordinators were already included. They defined the role as “the official liaison between the Earth science teachers and the school district central office” (Lee et al., 2014, p. 310). Though the roles of science teacher leaders in schools and districts may not be clearly defined, nor the distinction between district science teacher and administrator roles made, the literature does indicate an effort to develop science teacher leaders.

**Intentional development of science teacher leaders.** It is clear that given time and clear focus science teacher leadership is something that can be developed. Science teacher leader development in the literature is identified through university
partnerships, coursework in science content, and professional development experiences and opportunities

Mentzer, Czerniak, and Struble (2014) found that there was increased confidence in participants’ teacher leadership (as evaluated by the Leadership Inventory given to participants during each year of the three-year National Science Foundation Math Science Partnership). Areas of evaluation included: designing professional development, facilitating professional learning communities, sharing content resources, advocating for science education, and interacting with outside partners. Participant science content knowledge and beliefs around science instruction were also reported to have improved significantly.

This program included summer coursework with the partner university in science content, project-based learning, and leadership—with leadership coursework extending into the academic year. Monthly science professional development led by the participants was directly supported through the leadership coursework (Mentzer et al., 2014). The combined coursework in science content and leadership was reported to have led to more efficacious science teacher leaders. Moreover, the science teacher leaders in this project had the opportunity to practice and refine their own leadership practice over the course of the three years (Mentzer et al., 2014).

Howe and Stubbs (2003) distinguished between a program of leadership development and the process by which leaders are developed. The SCI-LINK project they discussed was anchored in a two-week summer experience for teachers where teachers and scientists worked together; the scientists shared their research and content knowledge and the teachers immediately translated that into classroom experiences for
the next school year. This experience extended to offer support in the form of an ongoing community of practice that offered additional learning opportunities such as additional seminars and workshops both during the academic year and summer (Howe & Stubbs, 2003). They suggested that a program to develop teacher leadership must attend to the process of leadership development and offered four components of the SCI-LINK project that are both program and process: mutual respect, challenging tasks, development of a community of practice, opportunities for leadership roles (Howe & Stubbs, 2003). These components were identified through teacher voice, important for teacher leadership (Acker-Hocevar & Touchton, 1999).

Teacher voice was essential to the Physics First initiative described by Hanuscin et al., (2012). As part of this program teacher participants were expected to act as leaders by advocating bringing the program to their schools. This study sought to better understand participants’ perceptions and ideas about teacher leadership through the framework of York-Barr and Duke’s (2004) seven dimensions of teacher leadership, and through the “assumption that teacher leadership should be embedded in teachers’ practice” (Hanuscin et al., 2012, p. 14). Through the Teacher Leadership Inventory (designed to identify various perceptions around teacher leadership) and participants’ written definitions of teacher leadership, Hanuscin et al. (2012) found most teacher leadership experience came from school and district curriculum work and was related to professional development and school improvement. The teacher definitions of teacher leadership provided two categories of leadership: those of personal qualities and those of skill and knowledge. Hanuscin et al. (2012) found most of the teacher written definitions centered on both categories. The authors reported
that teachers did not identify teacher leadership in the same manner as the research literature on the subject; teachers do not consider their work leadership (Hanuscin et al., 2012). This crossroads is an interesting one. The present research offers an opportunity to hear from teachers who have clearly crossed the boundary into formal leadership and may offer insight into this observation.

Science teacher leadership has been discussed in the research literature for over 30 years and there have been several waves of calls for further research (Century et al., 2008; Madrazo & Hounshell, 1987; Madrazo & Metz, 1982; Schwartz & Gess-Newsome, 2008). With the emphasis on transforming science education through the Next Generation Science Standards and the national need to develop a qualified STEM workforce, it does seem that those calls for science teacher leadership research have the potential to finally be heard.

Need for Additional Research

To fully understand the impact of the changing conception of teacher—from “just a teacher” to teacher leader—the professional and personal identity of teachers must be taken into account. Literature around teacher identity offers a starting place for this work. Avraamidou (2014) identified many factors that may impact science teacher identity. This is especially important as Avraamidou specifically identified the need for further research in the context of teacher identity as situated in the setting in which the teacher’s work is done (2014). While the literature identified several formal district-based teacher leadership roles, the research is skewed toward school-based teacher leaders such as instructional coaches (Camburn et al., 2008; Coburn et al., 2009; Fullan & Knight, 2011).
While it is unlikely that many teachers will read this dissertation, it is important to hear teacher voice in the research literature as those enacting the teacher leadership certainly have much to say regarding their experience. District-based science specialists, both teachers and administrators, are missing from the research literature.

**Research Questions**

The purpose of this study was to explore the changing role of teachers and to define the role of district-based science specialist through a qualitative examination of the role transition from science teacher to district-based science specialist utilizing both individual and organizational perspectives. To address this, the questions for this study are focused on two aspects of identity, individual and organizational. The study is designed to address two questions related to district-based science specialists individual professional identity:

How do district-based science specialists describe navigating the process of leaving science classroom teaching and transitioning into the district-based science specialist position?

How do district-based science specialists describe the impact on professional identity following the transition from classroom science teaching to a district-based science specialist position? What factors do they identify as influencing their evolving professional identity?
The study also explores one research question focused on organizational factors that may influence professional identity:

In what ways does the job description align with the district-based science specialists’ perceptions of roles and functions of their position?

The next chapter will introduce the specific methodology and process used to carry out this study.
Chapter Three: Research Methods

Rationale for Research Methodology

Qualitative research explores problems; quantitative research seeks to explain problems (Creswell, 2012, p. 76). The essence of qualitative research is to find meaning in the context of real life situations (Merriman, 2009) and to accurately represent the reality of the research participants (Creswell & Miller, 2000). The very nature of qualitative research is that of discovery, of finding out (Merriam, 2009) through an emerging process (Creswell, 2012). Through this study I explored the science teacher’s transition into a district-based role. There was no hypothesis, nothing to prove.

Seeking to understand “meaning in context” (Merriam, 2009, p. 2) is a process which humans are uniquely suited. Merriam (2009) identified four epistemological perspectives qualitative researchers might take depending on the nature of their research: positivist/postpositivist, interpretive/constructivist, critics, and postmodern/poststructural. The purpose of this study was to explore the role transition from science teacher to district-based science specialist. Because I did not hypothesize, attempt to build theory, view from a critical stance or problematize the roles explored; the best fit was the interpretative or constructivist lens. Given that my goal was to explore the science specialist as situated in a district-based role, case study rather than phenomenology, grounded theory, or a critical approach for example, was the best fit.

The situation of the district-based science content specialist is unique. Understanding the personal experience of each district-based science specialist in the
present study was important: with the minimal research base on both the role and district situation an interview-based qualitative approach informs the design of this study. By learning people’s stories, a social construction of experiences, in the workplace for example, is developed (Lave & Wenger, 1991; Wenger, 1998). Storytelling through one’s own language and personal experience, such as case study, allow for issues to be understood in a way in which graphs and charts cannot (Patton, 2002). “Qualitative inquiry can be used to discover, capture, present, and preserve the stories of organizations, programs, communities, and families” (Patton, 2002, p. 196).

In the case of this study a community of practice was formed among myself as researcher and the participants involved around the case of the district-based science specialist role. Though participant anonymity was maintained the participants knew of each other and several made reference to that during the interviews.

**Case Study**

Various researchers described case studies slightly differently. While there is overlap in theoretical stance, there are many particular viewpoints and vocabulary explored by researchers (Patton, 2002). Creswell (1998) defined the case study in the following way:

A **case study** is an exploration of a ‘bounded system’ or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in context. This **bounded system** is bounded by time and place, and it is the **case** being studied—a program, an event, an activity, or individuals. (Creswell, 1998, p. 61, emphasis in original)
**Case Definition.** The present study was an attempt to understand the experience of science teachers’ as they become district-based science specialists. The participants together represent the case of this transitional experience.

Merriam (2009) distinguished between the case and the product when discussing case studies. She identified the case as “delimiting the object of study” (Merriam, 2009, p. 40) defined by the boundaries established by the researcher. Boundaries identified may include broad categories such as social or political boundaries or specific establishment of time and place (Creswell, 2012). The context of the present research focused on the situation of the district-based science content specialist role. Multiple examples, those of the individual participants, were situated in the context of the larger case study of district-based science specialist role. The questionnaire and both interviews were analyzed through the situation of the district-based science specialist role (Patton, 2002; Yin, 2003). This allowed me to look at both the individual and the situation of the individual within their unique role in their district.

**Interview.** Merriam (2009) stressed that the qualitative research interview is a systemic and deliberate process that is especially important when direct observation is not an option. Byrman (2012) stressed the importance of flexibility in the qualitative interview. Depending on the research, interviews can range from unstructured and informal, to semi-structured, to highly structured and standardized (Merriam, 2009). The present research, with its clear focus, utilized a more structured approach as there were multiple cases being studied. Hence, this structure was used to create comparisons-- helpful in my analysis of the data (Byrman, 2012).
Face-to-face interviewing is the ideal in qualitative research: however, if there is a geographic distance between interviewer and interviewee the expense can be prohibitive (Byrman, 2012). While telephone interviews may help to reduce bias based on physical features of the interviewee and interviewer, the telephone alone does not allow for nonverbal expression such as a look of puzzlement of an eyebrow raised punctuating a point just made (Byrman, 2012).

There was discussion in the literature around the growing options for the interview in qualitative research (e.g., Hanna, 2012; Holt, 2010; Opdenakker, 2006). Options included synchronous and asynchronous interviews through a variety of media. Synchronous interviews are face-to-face, conducted in person, on the telephone, or via Skype, Google+ Hangout or other Internet platform. Asynchronous interviews are those conducted through mail correspondence, email, or online chat or messaging platforms such as MSN messenger (as discussed in detail by Opdenakker, 2006). There are advantages and disadvantages to each and growing recognition in the literature that the particulars of the research question, research situation, and research participants are critical in selecting the best fit interview technique and process (Deakin & Wakefield, 2013). When selected appropriately for the research population online interviews, while initially seen as a last choice alternative to face-to-face interviews, are now considered feasible and an option (Deakin & Wakefield, 2013). This study utilized a variety of free, online video conferencing platforms.

**Credibility**

Creswell and Miller (2000) considered the abundant literature, discussed the establishment of validity in qualitative research and placed emphasis on accurate
representation of the reality of the research participants. In the field, there were many perspectives on establishing validity in qualitative research. Essentially these boiled down to issues of establishing trustworthiness and authenticity. Validity in qualitative research can be established if the researcher considers her own epistemological paradigm assumptions along with the perspective of self as researcher, perspective of participants, and perspective to those outside the study such as reviewers and readers. Creswell and Miller (2000) established a two-dimensional framework to suggest validation methods that may better establish validity of qualitative research given the paradigmatic assumption and lens used by the researcher. The framework identified nine validity procedures researchers can consider as best matched to their own assumptions and lens: triangulation, member checking, creating an audit trail, disconfirming evidence, prolonged engagement in the field, thick and rich description, researcher reflexivity, collaboration, and peer debriefing (Creswell & Miller, 2000). This study utilized creation of an audit trail including field notes, researcher reflection from pilot to completion, peer debriefing, member checking, and rich description. Triangulation was accomplished by using multiple participant voices from multiple school districts across the country contributing to multiple data points collected over two interviews per participant.

Additionally, Patton (2002) identified three primary elements of credibility in qualitative research: rigorous methods, researcher credibility, and philosophical commitment. This study was designed with these features of credibility in mind and I expand on each of these in this section. The next section discusses my role as researcher, including my philosophical stance and unique perspective I bring to the
methodology. This is followed by detailed description of the present research process. Together, these serve to establish both my credibility as researcher and the credibility of the present research.

The Researcher’s Role

The very nature of qualitative research, humans as both research subjects and instruments of research is what makes this form of research so compelling. Qualitative researchers bracket and disclose bias and provide a great amount of detail as they collect and work with data. Establishing and clearly identifying the researcher’s role in qualitative research is essential to the integrity of the research process (Creswell, 2012; Merriam, 2009). Merriam (2009) states the researcher must know her/his epistemological lens. For this reason it is appropriate to establish myself in the context of this study, which in turn is anchored in the larger context of my own life. The narrative in Chapter One was developed to accomplish this orientation.

In this section I discuss my predispositions and situation at the time this study was completed in order to make apparent the influences of my own experiences and thinking (Patton, 2002). Most important was that my current full-time employment was as Science Teacher on Special Assignment (TOSA) for my district. That is to say that I was in a similar role as some of the research participants in this study. It was the combination of my work role, my role as doctoral student, and an essential curiosity about the experience of transitioning out of classroom teaching and into other non-administrative positions in education that led me to the present study. Experience in a similar role as research participants afforded me unique understanding into the climate of science instruction in districts in the general sense, and into the experience of
research participants specifically. During the interviews it was not uncommon for a participant to ask if others had said something similar—seemingly seeking validation of their own role. When such questions and comments arose I told participants my plan was to share the findings with them, not as individual cases, but as holistic findings between all participants. I also found myself in the position of wanting to make connections between participants who were facing similar struggles or working on similar initiatives. In these cases I noted the potential connections in my interview field notes and post-defense might work to connect interested participants outside the bounds of the IRB.

Naturally, I had thoughts, opinions, and particular experience working in a similar role in my own district that were necessary for me to maintain as separate from this study (Berger, 2015). While some non-verbal communication during interviews from participants, such as eye-rolls or prolonged periods of eye contact meant to emphasize a point, may have been invitations for comment from myself, I worked to maintain a neutral stance, and occasionally used the onscreen image of myself to do so. Interview field notes allowed me to process my own thinking and experience and address my reflexivity (Berger, 2015). Additionally, I frequently debriefed my experiences with my dissertation advisor and colleagues in my cohort. Next, the unique lens through which I considered this study is discussed.

Neuro-semantic language learning theory, which recognizes that language function is representative of one’s level of conceptual knowledge and understanding (Arwood, 2011), was related to this study as my general stance on the nature of qualitative research. I drew upon this theory from the perspective that through the
research participant’s language, layered with my own language, meaning is constructed. I feel as one acquires facility in qualitative research it is incumbent on the individual researcher, as both tool for investigation and tool for analysis, to attend to data as fully and completely as possible.

The life experience of each individual is uniquely their own, and it is our biological processes that tie us together. The neurobiological basis for the words research subjects’ use in an interview is language use in that particular interview setting. In this study, participants knew of the research interest in transition from classroom to district role; inevitably this influenced how they responded (Akkerman & Meijer, 2011). Even in the most relaxed, unstructured research interview the conversation is focused and guided by the researcher. The respondent is aware of this and uses language specifically intended for the interview situation. The same research subject might later be observed facilitating a work meeting, or speaking on the telephone to a client. Or, the research subject may complete a questionnaire containing open-ended questions. Such language use may often be taken for granted in the research setting without regard for the level of language the individual is producing.

It is this concept of our neurobiological processes mediated by socially constructed language use, individually and with others, that anchors neuro-semantic language learning theory (Arwood, 2011) to this research process and to identity theory, particularly to Wenger’s (1998) work on communities of practice and Ebaugh’s (1998) work on role exit.
Sample

Sample size in qualitative research is truly dependent on the nature of the questions and the case guiding the research (Patton, 2002). The goal of this study was to explore the role of teacher in a new capacity, that of teacher moving from the classroom to a district-based position in a teacher capacity. To build consistency, and due to my proximity to the subject, science teachers were the focus. By diversifying the geographical range of the teachers but holding the role constant, the goal of the research sample was to balance patterns and unique experiences.

The present research drew from urban and suburban communities in seven geographically diverse states that were lead supporters of the Next Generation Science Standards. These states were considered more likely to be reform-oriented and served a large number of students. Larger districts were also thought to be more likely to support a district-based science specialist. Three states were in the western United States, one was in the Midwest, one was in the northeast, and two were southeastern states. The states were selected for this study based on the following three criteria: 1) Each state was a lead NGSS state. The 23 lead states were committed to new the standards, the process by which they were written, the ideals of three-dimensional learning that the standards articulate, and by logical conclusion the shifts in science instruction that must take place as a result (NGSS Lead States, 2013). 2) The National Science Teachers Association (NSTA) is the largest science teacher’s association in the US with more than 55,000 members (NSTA, 2016). Each state in this study represents a different NSTA region. There are 17 NSTA regions in the United States; seven of them were represented in this study in order to represent geographical
diversity of experience across the country. 3) Each community was one of the 500 largest school districts as identified by the National Center for Educational Statistics (2015). One in six students attend school in the 500 largest school districts (NCES, 2015), so this study drew from urban districts in the identified states. The sample was made up of larger districts in seven states, each in a different NSTA region that also served as lead states for the NGSS. Additionally, districts that met the sample criteria listed in the above section were thought to be large enough to support a full-time, district-based science specialist. There were several occurrences where there was more than one large school district state that was also an NGSS lead state and in the same NSTA region. In such instances, the state with a higher ranking in the NCES list was selected.

**Introduction to the Districts**

Seven states were selected for the research sample, however the districts were not predetermined. District size, based on student population is presented in Table 1. Both a study number and a regional identifier identified each district. For example, districts 1-8 are in the Western states. Both districts one and two are in Western state 1, districts three and four are in Western state 2, and districts 5-8 are in Western state 3.
Table 1

*District Size: Student Population*

<table>
<thead>
<tr>
<th>District Study #</th>
<th>State/District</th>
<th>Student Pop.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>West 1</td>
<td>52,000</td>
</tr>
<tr>
<td>2</td>
<td>West 1</td>
<td>69,000</td>
</tr>
<tr>
<td>3</td>
<td>West 2</td>
<td>57,000</td>
</tr>
<tr>
<td>4</td>
<td>West 2</td>
<td>46,000</td>
</tr>
<tr>
<td>5</td>
<td>West 3</td>
<td>27,000</td>
</tr>
<tr>
<td>6</td>
<td>West 3</td>
<td>19,000</td>
</tr>
<tr>
<td>7</td>
<td>West 3</td>
<td>19,000</td>
</tr>
<tr>
<td>8</td>
<td>West 3</td>
<td>18,000</td>
</tr>
<tr>
<td>9</td>
<td>Southeast 1</td>
<td>100,000</td>
</tr>
<tr>
<td>10</td>
<td>Southeast 2</td>
<td>55,000</td>
</tr>
<tr>
<td>11</td>
<td>Southeast 2</td>
<td>24,000</td>
</tr>
<tr>
<td>12</td>
<td>Midwest 1</td>
<td>17,000</td>
</tr>
<tr>
<td>13</td>
<td>Midwest 1</td>
<td>39,000</td>
</tr>
<tr>
<td>14</td>
<td>Northeast 1</td>
<td>23,000</td>
</tr>
<tr>
<td>15</td>
<td>Northeast 1</td>
<td>32,000</td>
</tr>
</tbody>
</table>

**Participants**

Initially, two science content specialists were sought in each of the identified states. Fourteen participants offered breadth to examine the role of organizational differences that contribute to shaping the science content specialist position while allowing for enough depth to understand the position and role identity of each of the participants.

The original research concept was that targeted participants would work in a district-based science specialist position only. This purposive sample was sought precisely because there was something to be learned from individual experiences in a common role, leading to “information-rich cases” (Patton, 2002, p. 46) that provide unique insight into the “perspective/worldview” (Patton, 2002, p. 231) of the case—
the role of district-based science specialist. For the purpose of this study, a science specialist was defined as a district-based, full-time position focused only on science. Additional participant criteria included full-time employment as a classroom teacher in the role prior to work as a district-based science specialist.

My goal was to keep the case bounded as such (Creswell, 1998; Merriam, 2009); therefore, if a potential participant worked in the role of science specialist and math specialist, for example, he/she would be considered for the study only if someone more fully meeting the criteria could not be found. This delimiting factor helped to maintain the integrity of the case.

Utilizing the NCES list, 138 potential school districts were identified. From there, district-based science specialists were identified through extensive searching in each school district website. I initially started with the larger districts in the identified states. Possible role titles indicating full-time, district-based science specialist positions included science supervisor, science coordinator, science specialist, science TOSA and the like. Locating names and emails of potential research participants proved challenging as different districts had many different department titles (for example, Learning, Teaching and Learning, Student Achievement, Curriculum & Instruction, Professional Development) within which district-based science specialists might be associated. The varying website formats for the numerous districts were also surprisingly difficult to navigate.

In total, 113 individuals were identified and contacted as potential participants for this study per the procedures and policies outlined in the university’s human subjects review board. (Further details of the IRB process are discussed later in this
Invitations to participate, through an initial contact email stating the nature and purpose of the present research was sent to possible participants (Appendix A), were sent out in four waves. I had hoped to capture participants before they returned to work in the fall and sent out the first participation requests in August 2015. A second wave of invitations was sent in early September 2015. Both of these were sent from my university email and received few responses. Thinking that being seen as a peer rather than a student researcher might be more advantageous, I sent all further initial requests and follow-ups through my school district email. Shortly after I sent the first follow-up email in mid-September potential participants began to respond via the participation survey, which was designed to confirm that the individual met the study criteria (Appendix B). Additional waves of participation requests and follow-up emails were sent in early October and early November as the ideal participants were still being sought. Potential participants responded to the participant survey in two waves: mid through late September and early November-early December. Twenty-six people responded to the invitation to participate by completing the participation email. Three additional individuals contacted me via email stating they were interested but too busy to participate, or felt they were not a good match for the research at hand.

As responses were received, and appropriate fit was established, participants received an email confirming their willingness to participate in this study and the first interviews were scheduled. Scheduling was almost always completed via email. On three occasions I had email contact beyond the participation survey to clarify the potential participant’s role. Although the research design was to interview two participants from each of the seven states in the sample, the respondent pool did not
balance in this manner. The final participant group, 17 participants representing 15
districts across the country, is presented in Table 2 below.

Table 2

<table>
<thead>
<tr>
<th>Final Participant Group By State</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>West 1</td>
</tr>
<tr>
<td>West 2</td>
</tr>
<tr>
<td>West 3</td>
</tr>
<tr>
<td>Southeast 1</td>
</tr>
<tr>
<td>Southeast 2</td>
</tr>
<tr>
<td>Midwest 1</td>
</tr>
<tr>
<td>Northeast 1</td>
</tr>
</tbody>
</table>

Prior to the first interview participants were emailed the research consent form
(Appendix C). They were asked to sign, scan, and return the consent form, also via
email.

Of the 26 responses to the participation interest survey, 20 were science
teachers based in the district and six were science administrators. The administrative
role was not one that I had anticipated exploring, yet its clear presentation was not to
be ignored. In retrospect, the two roles began to emerge as district websites were
searched for any mention of anyone in a science leadership role. Though I was
specifically looking for individuals in a district-based science teacher leadership role,
many websites contained only information for Science Coordinators or administrative
leaders of Curriculum and Instruction Departments, not individuals in teacher
leadership roles.

Research participants ultimately included six science administrators and eleven
district-based science teachers. Data were analyzed using this distinction between
administrative district-based science specialist and teacher district-based science specialist. This allowed me to better understand the similarities and distinctions between the roles within the district context. Further details about the participants are presented below.

Teacher Participants. The teacher participants are described here; further detail is presented in Table 3. As a group the 11 teacher participants were quite experienced. Abigail, with five years in education, was the least experienced while Regina stood out with 28 years in education. Eight of the 11 in this group held degrees in science. There was a predominance of expertise in the life sciences with seven teacher participants holding degrees in related fields (biology, plant sciences, forestry). One participant, Beth, held a degree in chemistry. Matthew held a doctoral degree. Only Abigail and Teresa were brand new to the district-based role. Each was just months into their role transition at the time of the research. Seven teacher participants had 1-3 years on the job; Edward had eight years experience, and Regina 20 years experience in the district-based role. All but three teacher participants focused only on supporting science in their roles. Matthew’s position also focused on math and Regina also supported social studies in her position. Beth’s position was focused on grants, but was described as entirely science related.
### Table 3

**Teacher Participant Information**

<table>
<thead>
<tr>
<th>Participant</th>
<th>Position Title</th>
<th>Years in District Role</th>
<th>Years in Education</th>
<th>Science Degree</th>
<th>Educational Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abigail</td>
<td>Secondary Science Specialist</td>
<td>0.33</td>
<td>5</td>
<td>Biology (BA)</td>
<td>MA (Urban Ed.)</td>
</tr>
<tr>
<td>Alex</td>
<td>Science Instructional Coach</td>
<td>3</td>
<td>35</td>
<td>Biology (BA)</td>
<td>MS Ed (Sec. Science)</td>
</tr>
<tr>
<td>Beth</td>
<td>Grants Project Coordinator</td>
<td>3</td>
<td>10</td>
<td>Chemistry (BS)</td>
<td>MEd (Ele. Ed.)</td>
</tr>
<tr>
<td>Edward</td>
<td>K-12 Science Specialist</td>
<td>8</td>
<td>30</td>
<td>Biology (MS)</td>
<td>MS (Biology)</td>
</tr>
<tr>
<td>Evan</td>
<td>K-8 Science Curriculum Coach</td>
<td>2</td>
<td>15</td>
<td>Biology (BS)</td>
<td>BS (Educ. &amp; Bio.)</td>
</tr>
<tr>
<td>Lisa</td>
<td>Content Specialist, High School Secondary Science Specialist</td>
<td>3</td>
<td>11</td>
<td>Plant Sciences (BS)</td>
<td>BS (Plant Sciences)</td>
</tr>
<tr>
<td>Marie</td>
<td>Curriculum Specialist</td>
<td>3</td>
<td>8</td>
<td>Forestry (BS)</td>
<td>MAT</td>
</tr>
<tr>
<td>Matthew</td>
<td>TOSA Secondary Implementation Associate: Math &amp; Science Elementary Science &amp; Social Studies Content Specialist</td>
<td>1</td>
<td>20</td>
<td>None</td>
<td>EdD</td>
</tr>
<tr>
<td>Regina</td>
<td>Science Academic Coach</td>
<td>20</td>
<td>28</td>
<td>None</td>
<td>MA (Ele. Ed.)</td>
</tr>
<tr>
<td>Teresa</td>
<td>District Elementary Science Coach</td>
<td>0.25</td>
<td>15</td>
<td>Biology (BS)</td>
<td>BS (Biology)</td>
</tr>
<tr>
<td>William</td>
<td>District Elementary Science Coach</td>
<td>1</td>
<td>12</td>
<td>None</td>
<td>MA (Admin.)</td>
</tr>
</tbody>
</table>

**Administrator Participants.** The administrator participants are described here; further detail is presented in Table 4. With at least 8-33 years in education, the administrative group was also quite experienced. (Darius did not complete the participant questionnaire; some demographic information was culled from his interviews, but may not be complete.) Only two of the administrative participants held
science degrees. Juliette and Serena both studied Biology as pre-med undergraduates. Bernadette, and Serena held doctoral degrees. With just four months on the job, Serena was new to the role at the time of the interview. Three others had worked in their roles 5-7 years, and two others 1-2 years. Three of the administrator participants, Bernadette, Gus, and Ruth had roles that focused only on science. Darius’ role encompassed science, math, and career and technical education. Juliette supervised science and health, and Serena’s role covered science and technology.

Table 4

<table>
<thead>
<tr>
<th>Participant</th>
<th>Position Title</th>
<th>Years in District Role</th>
<th>Years in Education</th>
<th>Science Degree</th>
<th>Educational Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bernadette</td>
<td>Director of Science, K-12</td>
<td>5</td>
<td>15</td>
<td>None</td>
<td>EdD (Curric. &amp; Inst.)</td>
</tr>
<tr>
<td>Darius</td>
<td>STEM Director</td>
<td>2</td>
<td>8</td>
<td>Not Reported</td>
<td></td>
</tr>
<tr>
<td>Gus</td>
<td>Supervisor PreK-12 Science Curriculum</td>
<td>6</td>
<td>31</td>
<td>None</td>
<td>MS (Ed. Admin.)</td>
</tr>
<tr>
<td>Juliette</td>
<td>Coordinator K-12 Science &amp; Health/Fitness</td>
<td>1</td>
<td>32</td>
<td>Biology (BS)</td>
<td>MS (Curric. &amp; Inst.)</td>
</tr>
<tr>
<td>Ruth</td>
<td>Science Program Coordinator</td>
<td>7.5</td>
<td>33</td>
<td>None</td>
<td>MEd (Ed. Leadership)</td>
</tr>
<tr>
<td>Serena</td>
<td>Supervisor of Science &amp; Technology</td>
<td>0.33</td>
<td>16</td>
<td>Biology (BS)</td>
<td>PhD (Science Ed.)</td>
</tr>
</tbody>
</table>

Instrument development. The research instruments were piloted in May 2015. An initial draft of the interview protocol was formulated from determining key aspects of each of the research questions as supported by previous research and the theoretical
framework, especially the work of Ebaugh (1998). Emphasis was twofold:
exploring the role of the individual within in her/his organization and exploring the
individual identity transformation of each participant as they transitioned settings and
practices (science classroom to district role). It was during this process that the two
interviews emerged as a helpful format and the questions were then separated into
those more organizationally focused and those that might elicit more of the unique
experience of each participant. Questions related to demographics of both the
individual (e.g., years teaching experience, educational background) and the
organization (e.g., role title, number of teachers/students served) were then moved
into a research questionnaire.

The initial instrument was then tested in a pilot study, and refined for this
study. Eight district-based content specialists from the local community were each
asked to respond to five of the research questions. As each interview ended these pilot
study participants were asked to comment on the order and meaning of the questions.
The pilot interviews were audio recorded and later summarized by the researcher. The
researcher and her advisor met after three interviews had been conducted to determine
if the responses to the questions elicited the type of information necessary for analysis.
Questions were then revised and the final three pilot interviews conducted. All pilot
interviews were then reviewed and summarized to make additional revisions to the
questions and finalize the data collection process.

The resulting interview protocol was divided into two sections. Interview One
(Appendix D) focused on the participant’s organization. This was a shorter interview
that allowed the researcher and the interviewee to get to know one another. Interview
Two (Appendix E) focused on the participant’s personal experience and evolving identity. Interview Two typically lasted longer than the first interview, especially for the teacher participants. The order of the questions in both interviews was determined in order to build background and establish a progression of thought. The participant questionnaire (Appendix F) was reorganized to act as a bridge between the two interviews.

**Data Collection**

To capture both organizational and individual dimensions of the case, multiple sources of data were gathered from each participant. This included Interview One with an organizational focus, a participant questionnaire, and Interview Two with an identity focus. It was also requested that participants send a formal district job description for their position. Appendix G presents a synthesis of the research questions and analysis by data source. All data were entered into NVivo software for management during the coding process. The study provided three opportunities to learn about the research participants directly: in each of the two interviews and from the participant questionnaire.

**Interview Process.** While the interview questions were structured, it was expected that responses were unique to each individuals’ situation and experience. As such I was flexible, re-wording questions following the flow of the interview sequence to focus on probes and to elicit deeper information from the interviewee, to better hear their voice (Byrman, 2012).

Given the emphasis on use of technology in science and STEM education, it was reasonable to expect research participants of this study to be familiar with the use
of technology such as Skype and Google+ Hangout. This technology is regularly used in classrooms throughout the country and is available for free download. As mentioned earlier, this study was conducted using free and accessible online video conferencing platforms, which are relatively new to qualitative research. With limited budget and research participants from across the country use of online video conferencing was determined to be the best option for the completion of this study. In this instance, the study population was expected to have regular computer and Internet access as part of their work environment. Geographic diversity was the primary driver in the selection the sample states. Without use of the online interview “the scope and reach” (Deakin & Wakefield, 2013, p. 607) of this study would have been severely limited, therefore online interviews were a viable and logical choice. I invited each participant to select the best online video conferencing platform for his or her circumstances. The online video conferencing platforms used in this study were FaceTime, Google + Hangout, Skype, and Zoom.

During the interview I kept running field notes. I attempted to capture as much of the participant’s language as I could. I also noted time stamps during moments of non-verbal interactions and recorded what I could of the nature of that interaction. Following each interview I read through the field notes and wrote a reflective research memo.

Each interview was recorded on a password-protected computer using QuickTime’s audio recording feature. A back-up recording was made using the Audio Notes feature in Word.
Interview One: Organizational interview. To learn about the research question *In what ways does the job description align with the district-based science specialist’s perceptions of the roles and functions of their position?* the organizational interview focused on the science specialist position within the district. The organizational interview asked questions regarding the district-based science specialist roles within the district, preparation for work in this role, training once on the job, and tasks of the position (Appendix D). Question one identified the school district’s work related to the position as described by the science content specialist. Question four identified the major tasks of the work done regularly in the experience of the individual in the role.

In order to establish trust and rapport with the participants (Merriam, 2009) the organizational interview was conducted first. These interviews typically lasted 20-30 minutes. This provided the researcher and participants with a personal interaction focused around the role of their organization before the identity interview. Approximately 24 hours before each interview a reminder email was sent to each participant. Then, approximately 20 minutes before each interview I sent the participant a final reminder with the interview questions attached for their reference. The text of the email stressed that there was no preparation necessary for the interview. Most participants referred to the interview question document during the interview, and it was apparent that several had written brief notes prior to our meeting.

Participant questionnaire. Participants were emailed the participant questionnaire immediately following the organizational interview. The questionnaire (Appendix F) included questions related to the participant’s time in the district-based
content specialist role, their classroom teaching experience, educational background, and organizationally minded questions related to the number of teacher/students they serve in their role. The request for the formal district job description was also made here. The purpose of the participant questionnaire was to learn about the participants themselves and to identify potentially relevant organizational features. All of the participants responded by typing directly into the questionnaire document, though they were offered the option to print the questionnaire and write their answer by hand. The completed questionnaires were emailed back to me. All but one participant completed and returned the questionnaire; most returned it a couple of days prior to the identity interview as requested.

**Interview Two: Identity interview.** To learn about research questions *How do district-based science specialists describe navigating the process of leaving science classroom teaching and transitioning into the district-based science specialist position?*, *How do district-based science specialists describe the impact on professional identity following the transition from classroom science teaching to a district-based science specialist positions?*, and *What factors do they identify as influencing their evolving professional identity?*, the identity interview focused on the experience and perceptions of the district-based science specialists themselves. The identity interview asked questions regarding the individual’s path to teaching and about their path to the district-based science specialist position. This interview also explored personal and professional identity in the transition to working as a district-based science specialist, and the reaction of others towards the participant’s new role (Appendix E). Questions two and six looked at the navigation of leaving the
classroom. Questions three, seven, and eight explored the transition into the district-based science specialist position. Questions five, six, and eight were related to professional identity as it shifts from classroom teacher to district-based science specialist. Factors possibly influencing identity were explored in questions four, nine, and ten.

The identity interview followed the organizational interview, and in most cases the completion and return of the questionnaire. This sequence was designed in order to maintain and build on the rapport established in the organizational interview. There was typically a one to three week interval between interviews, though one set of interviews was completed within four days and another set had an interval of over a month. The same email reminder procedure detailed above was followed for the second interview. In order to prepare for the identity interview I read through the field notes from that person’s organizational interview and reviewed their questionnaire. Lasting about 45 minutes, the identity interviews were typically longer than the organizational interview. For each identity interview, as I did with the organizational interview, I recorded field notes, captured non-verbal moments, and wrote a reflective memo.

Data Analysis

In qualitative research rich description is used, rather than numbers and graphs, to relate information and convey findings (Merriam, 2009). This allows the researcher to describe and observe and to bring the research along concretely before moving into interpretation and analysis (Patton, 2002). Meaning is constructed through the researcher’s perspective, guided by theoretical framework or other lens of analysis.
Throughout the research process the researcher develops a depth of connection with the data that allows the researcher to identify and describe patterns and themes (Patton, 2002). This may also allow for an understanding of why these patterns and themes occur and ultimately provide insight into the case (Patton, 2002); this is where interpretation and description merge (Patton, 2002).

The process of data analysis was as follows. Each interview, after being professionally transcribed from the audio recording, was first read and edited in order to maintain participant anonymity. As I read, the interview field notes and memos sat side-by-side and I referred to them frequently. Initial codes were developed based on the nature of the interview questions and the literature and these were used as a starting point to move my work with the data away from simply interview-by-interview (Saldaña, 2009). Examples of these initial codes are: participant background, teaching story, and nature of the district role. This was followed by additional readings of the transcripts following a focused coding, or line-by-line process (Saldaña, 2009). These initial categories were then reworked and refined in order to capture the data at a higher level of abstraction (Thornberg & Charmaz, 2014; Schreier, 2014). After findings were established they were sent to participants for member checking. While these findings represented the entire participant group, it was important that participant perspectives were accurately represented and that the categories and themes identified were recognizable to the participants (Creswell, 1998; Merriam, 2009). This process of review by participants, while potentially time consuming, provides valuable feedback and further establishes the credibility of the research.
Two participants responded to the member check; both expressed interest in the findings but did not offer additional comments.

**Participant questionnaire.** Once completed and returned, each questionnaire was edited in order to maintain anonymity, associated with the participant’s pseudonym and loaded into NVivo for use in analysis. Each question provided information regarding the participant’s background or their role within the district and was initially coded accordingly. As themes were established, data from participant questionnaires proved relevant.

**Job Descriptions.** All job description data provided were used as is in this analysis. Several were complete and on district letterhead. Several were cut and pasted into the questionnaire by participants; these appeared to be incomplete. Analysis included exploration of the roles and functions of the position. Qualifications for the role were also examined.

**Organizational interview and identity interview.** Each interview was professionally transcribed from its audio recording then analyzed inductively as described above. By looking for a variety of findings I was able to immerse myself in the data (Patton, 2002). This cyclical process of exploration and confirmation led to discovery of “important patterns, themes, and interrelationships” (Patton, 2002, p. 41) that may not have been uncovered if the data were approached deductively, or from a positivist approach. Moving from specifics found to general motifs allowed me to more fully consider and develop my own language and thinking. Variety of analysis lends to creative synthesis of the data and findings (Patton, 2002).
In addition to the development of inductive themes as described above, the data were analyzed through the additional deductive lens for signs of boundary spanning and outbound and inbound trajectories as suggested by Wenger (1998) and for Ebaugh’s (1998) four stages of role exit: first doubts, seeking alternates, turning points, and creation of the ex role. Final coding categories are in Appendix H.

To address the organizational research question *In what ways does the job description align with the district-based science specialists’ perceptions of roles and functions of their position?* data were drawn from Interview One and the job descriptions provided by the participants. Three interview questions explored the district-based science specialist roles and functions: one question asked directly about roles and functions of the position, a second asked participants to identify task categories and time usage in the role, and the third asked the participants how they would explain their work to a new acquaintance as succinctly as possible. Data identifying roles and functions of the position from an organizational perspective was also drawn from the responsibilities/duties section of the job descriptions. These multiple data sources, drawn from multiple contexts (Interview One, Interview Two, and the job descriptions) establish primary roles and functions of the district-based science specialist position from the organization (school districts) and via the experience of the individuals working in the role.

To address the individual focused research question *How do district-based science specialists describe navigating the process of leaving science classroom teaching and transitioning into the district-based science specialist position?* data were drawn from primarily from Interview Two (Appendix E). Three interview
questions explored the exit from the classroom and three explored characteristics of the transition. The classroom exit questions invited participants to tell the story of how they developed interest in the district-based science specialist role, probed participants’ sense of teacher self, and looked at the use of philosophy of teaching both in the classroom and in the district role. Participants were asked to consider their own experience and the experience of others in order to identify characteristics of the role transition. From Interview One, the job orientation question read through the lens of the individual’s experience informs entry into the new role.

Data from Interview Two also established the findings to the individual focused research questions *How do district-based science specialists describe the impact on professional identity following the transition from classroom science teaching to a district based science specialist positions?* and *What factors do they identify as influencing their evolving professional identity?* There was overlap in purpose to many Interview Two questions: therefore, to explore the impact of the role transition on professional identity questions asked about the reaction of others and self as the transition was made. Interview Two, question twelve asked participants directly if they would still be classroom teachers were they not in the district position. Data from many questions in Interview Two contributed to understanding the evolving professional identity of the research participants. The process of transition from science classroom teaching included concepts of commitment and crisis and role exit theory (coded as “choice/questioning,” “crisis/commitment,” “doubting,” “seeking alternates/outbound trajectory,” and “turning points”). The characteristics of the transition and entry into the district role included concepts such as peripheral
participation, boundary spanning, inbound trajectory, and role entry. These were coded as stated.

**Ethical Considerations**

Human subjects are, of course, protected by the institutional review board of the research institution (Creswell, 1998). The Institutional Review Board (IRB) at the University of Portland reviewed the qualitative interview process for this dissertation. It was determined that the nature of the content of the research, and the research process itself, would cause no harm to the participants. Informing respondents of their rights as study participants included: acknowledging voluntary participation, right to withdraw from the study at any time, the study’s purpose and procedures, risks and benefits of participation, and guarantee of anonymity (Creswell, 1998). Participants were informed of all study procedures and were asked to sign a consent form indicating their willingness to participate in this research (Appendix C). Signed consent forms, along with all other research data collected were stored in secure files on a password-protected computer in accordance with university policy.

**Limitations**

There are potential limitations to online interviews: recruitment may have been limited to computer savvy participants, technology may have failed or Internet connections may be lost, participants may feel more free to not attend the online interview as compared to an in-person meeting (Deakin & Wakefield, 2013). To address these I did the following: offered to assist with the set-up of Skype, or the like, if potential participants were not already familiar with its use, conducted the interviews from a location where I could quickly access a back-up computer in case
my own technology or Internet connection failed, suggested to participants potential best scenarios and locations for their interview setting, and worked to establish rapport and accountability via email and telephone communication to ensure participants would “show up” for the interview (Deakin & Wakefield, 2013).

Despite these best efforts technology glitches did occur. In each instance the participants demonstrated remarkable resiliency and commitment to the interview process as we navigated the problems. In our first interview Juliette and I found that three common forms of video conferencing (Skype, FaceTime, Google + Hangout) seemed to be blocked by her district’s Internet settings. To complete this interview we spoke by cell phone. I placed my phone close to the computer and proceeded as planned recording the audio. While the audio file lacks the clarity of those recorded through the computer, it was manageable for the transcriptionist. I learned about Zoom when FaceTime failed to connect at the time of Gus’s first interview. Again, we spoke on cell phones to address the issue. He recommended Zoom, and within a couple of minutes I sent him a videoconference link via that platform. Juliette and I then used Zoom for her second interview and experienced trouble hearing one another. Process of elimination on her end led to the discovery of no speaker output; so she attached a set of external speakers to her computer and we proceeded with Interview Two. There were several similar occurrences over the course of the 34 interviews conducted for this study; all were solved quickly and each interview proceeded as planned.

There were two occasions when participants were unable to attend at our scheduled time. Email and cell phone calls allowed us to rapidly reschedule for a time more convenient for each of these two participants. Though they were not able to
provide me with advance notice of this change, it was helpful that I could be
immediately responsive to their needs. This allowed both researcher and participant to
be prepared and more fully present when the interviews did happen. Had I travelled to
the interview district such flexibility would not have been possible.
Chapter Four: Findings

The purpose of the research was to explore the role transition from science classroom teaching to work as district-based science specialist, and to define that role. First, the organizational examination of the district-based science specialist position will establish roles and functions of the position as officially described by districts and as participants defined and described the nature of their work within the organization. The second section focuses on how participants described their role transition and evolving professional identity. A brief narrative illustrating evolving professional identity through this role transition introduces the second section of this chapter.

One essential finding presented itself quite quickly in the process of this study: the overall category of district-based science specialist can be broken into two distinct groups. There is an administrative role (e.g., Science Coordinator, Science Program Manager, Science Supervisor) and a teacher role (e.g., Science Specialist, Science Coach, Science TOSA). Throughout the rest of this dissertation the language “teacher participants” will be used to identify and refer to the 11 participants who work in district-based science specialist roles in the capacity of science teacher. “Administrator participants” identifies and refers to the six participants in this study who work in district-based science specialist roles in an administrative capacity. Findings are presented from these two roles when the distinction is necessary.

Organizational Perspective

First the primary roles and functions of the position are established as they were reported in the job descriptions. Next, the qualifications for the position and the participants’ reported preparation and experience are discussed. Following this the
primary roles and functions of the district-based science specialist position are explored through the voices of the research participants. The organizational findings conclude with the establishment of role statements for both district-based science specialist roles.

**Organizational perspective of roles and functions.** To establish the organizational expectations data were gathered from participant’s job descriptions. These findings were categorized as primary roles and functions of the position. Job descriptions can be complex documents, written sometimes to appeal to candidates specifically and other times written to cast a wide net. It is an application document that establishes job specifications and might even serve as a means of performance evaluation. The job descriptions provided by the research participants fell along this expected range—from extremely detailed, thus providing insight into the priorities of the organization, to quite minimal, a brief listing of position responsibilities. Of the 17 research participants, 12 provided job descriptions. As described in Chapter Three, the analysis examined the responsibilities/duties and qualifications components of teacher and administrator job descriptions separately. Next the primary roles and functions identified in the teacher job descriptions are discussed; this is followed by identification and discussion of the primary roles and functions in the administrator job descriptions. Appendix I displays the primary role and functions of the district-based science specialist for each position as established through each of the four primary data sources.

**Teacher Participants.** Nine of the 11 teacher participants were able to access and provide a job description for this study. Of these seven were clearly formal district
job descriptions on district letterhead. Two were incomplete as the text was pasted into the participant’s questionnaire; one of these was quite minimal. All job descriptions provided by participants were included in data analysis.

Some participants contacted their district office for a copy of their current job description. Not all of the human resource offices had these records and substitutions were made. In Marie’s case the human resources office provided her a posting for an elementary position, even though her role is to support secondary science. Matthew reported that he asked his human resources office several times for a job description. When he received it he emailed it to me with me a brief note stating, “I asked again about my job description. Here’s the best they have” (Matthew, personal communication, 10/6/2015). The most frequently coded roles and functions in the teacher participant job descriptions were data and student assessment, creation and facilitation of professional development, curriculum and content materials, and instructional coaching.

Professional development. As reported in the teacher participant job descriptions, creation and facilitation of professional development opportunities for affiliated teachers is a major part of the role. District-based science specialist teachers work within the context of the larger agenda of their districts to provide many types of professional development offerings in a variety of settings and circumstances.

Creation and facilitation of professional development was coded in most of the teacher participant job descriptions. Descriptions of responsibilities included general statements about facilitating professional development based on content and standards.
Types of professional development as well as the settings of professional development sessions were specified: settings—summer workshops, after-school, in-service days, one-to-one sessions; types of professional development—inquiry, science notebooking, scientific method, analysis of lessons and student work. Teacher participant job descriptions made mention of specific district initiatives or policies related to professional development. For example, Lisa’s job description specified that professional development sessions were to be planned and coordinated collaboratively with colleagues and that “the Science Content Specialist will plan and coordinate the implementation of an ongoing set of experiences that support professional growth within a culture of dignity, transparency, collaboration, and support” (Lisa, Job Description). Abigail’s job description identified the district’s long-term strategic plan to build capacity across the district as an essential component of professional development.

Curriculum and content materials. Districts seek teacher science specialists who can provide expertise in working with both curricular and content materials and do so with teachers, schools, and districts. Working with curriculum and content materials may happen in professional development sessions, yet the distinction was made that this category involved tasks such as management and coordination of district science materials and running curriculum/materials adoptions. According to job description data, to do these teachers must be familiar with district science curriculum and materials and science standards. Implied in the job descriptions is that these individuals must also be able to effectively translate and transfer that knowledge to their constituent teachers.
Examples of curriculum in the teacher participants’ job descriptions include: development of tools and resources for NGSS and for quality science instruction, collaborating with schools and district departments on alignment of instructional supports for students—including curriculum and assessments and specific use of the district’s adopted curriculum. The curricular charge in Beth’s job description was to establish and maintain “a library of resources appropriate to the goals” (Beth, Job Description) of the grant. This was unique to her grant specific science role.

*Instructional coaching and mentoring.* In the district-based science specialist role teachers are expected to collaboratively work with both new and experienced teachers around science instruction in both coaching and mentoring roles. The job description analysis indicated this might involve model teaching or co-teaching, analyzing instruction, or providing differentiation strategies to support student learning. Instructional coaching and mentoring suggest that the district-based science specialist would work with teachers on a one-to-one basis.

It was not surprising that aspects of instructional coaching were mentioned frequently in Teresa’s and Alex’s job descriptions, given their titles of Instructional Coach. The essence of the instructional coach role was described succinctly in the job description provided by Teresa. The instructional coach will:

- Provide collaborative support to teachers through problem solving, modeling lessons, scheduling opportunities for peer observations, and conducting mini-training sessions.
• Provide assistance in blending core content knowledge and knowledge of differentiated instruction for core academic teachers.

• Support core academic teachers by sharing materials and strategies to meet the needs of all students. (Teresa, Job Description)

This level of role definition was unique to the district-based instructional coach job descriptions.

**Administrator Participants.** Just three of the six administrator participants were able to provide job descriptions for their roles. Ruth’s job description was general to program manager and contained a statement that subject or content specific responsibilities would also apply to the position. Juliette’s and Serena’s job descriptions also appeared to be complete. Two administrators told me there was no official job description for their position, and one did not respond to this request.

Given the limited data to explore there were four codes that were utilized more frequently than others: leadership, curriculum and content, collaboration, and district and department meetings. Leadership and district and department meetings are discussed here as they are identified overall as two of the primary roles and functions of the administrator role.

**Leadership.** In contrast to the teachers’ job descriptions, all three administrative job descriptions contained references to leadership and made it clear that the position was a leadership role. The following examples from the administrator job descriptions are descriptions of leadership as an identified and explicit part of the role:
Provide leadership and support for all [related] initiatives… (Serena, Job Description)

Lead [various] committees…(Ruth, Job Description)

Serve as member of the leadership team of the district. (Juliette, Job Description)

The individual in the district-based science administrator role is expected to act as a district leader.

*District and department meetings.* The language in the job descriptions implied both attendance at meetings and leadership of meetings. If one is to “lead curriculum committees through the evaluation of selected program areas” (Juliette, Job Description) the implication is that one would be present at and likely facilitate such meetings. One job description had three different references to leading and serving on district committees, and another contained a reference to chairing committees related to the position. There was a great deal of variety among the three administrator job descriptions provided. Further analysis proved difficult with the limited data.

The district job descriptions described the primary roles and functions for the teacher science specialist and the administrator science specialists quite differently. The primary roles and functions for teacher science specialist based in the district were: instructional coaching, creation and facilitation of professional development, working with curriculum and content, and using data and student assessment. The primary roles and functions for the administrator science specialists based in the district were: leading and attending meetings, interdepartmental work and collaboration, working with curriculum and content, and being a district leader. It is
clear from the job descriptions that there are two types of district-based science specialists one of administrative capacity and one of teacher capacity.

 **Qualifications and preparation.** It is standard for job descriptions to list minimum qualifications for a position followed by desired or preferred qualifications representing the ideal candidate. Most of the 12 job descriptions provided by the participants contained both minimum and desired qualifications. In this analysis all qualifications were examined as a whole. Ideally, one’s professional experiences make one qualified for a position, thus participants were asked in Interview One *What experiences prepared you for the work in the science specialist position?* Next, job description qualifications analysis is described. This is followed by an examination of the participants’ identification of what prepared them for their work district-based science specialist.

 **Teacher participants.** In general the teacher job descriptions were consistent in the stated qualifications for the role. The job description qualifications for district-based science specialists working in a teacher capacity in this study included the following: Bachelor’s degree (preferably in science), Master’s degree (preferably in education), five years classroom teaching experience, experience with professional development, mentoring or coaching experience, and teacher leadership in some capacity. The other qualifications listed include: use of technology, appropriate state certifications, knowledge of state standards, and strong content knowledge. Only two job descriptions mentioned NGSS specifically.

 According to the job description specifications all teacher participants were qualified for their roles based on their responses in the participant questionnaire. All
had been classroom teachers. All met the minimum requirement of five years of classroom teaching experience. They had the required certifications and degrees and prior experiences. The teachers met the qualifications on paper, but the interviews (Interview One, question two) showed that they did not mention the job qualifications as experience and preparation for their work. Most of the teacher participants (but not all) mentioned classroom teaching as something that prepared them for this role. Though they all met the educational requirement for the position, only thee teachers mentioned their university degrees as helpful in the role. William and Beth mentioned their undergraduate science degrees and Matthew discussed his doctorate:

My doctoral courses were extremely valuable. I didn’t know that going in…but the courses and the study and the work on the dissertation was extremely valuable in being able to provide, especially in the staff development role that I have now. (Matthew, Interview 1)

Several teacher participants reported their own professional learning experiences as what prepared them for their district-based work. These experiences ranged from working in other fields to working with the state department of education. Lisa’s previous school had a lot of “bad PD” (Lisa, Interview 1). She followed this comment saying, “I was also an avid seeker-outer of good PD on my own” (Lisa, Interview 1). In Evan’s previous position he became a certified facilitator for Critical Friends Groups. Marie told me that she really loved standards and had done a lot of work on her own around the NGSS. She also worked with her state department of education writing science assessments. Neither Evan nor Marie identified these examples of teacher leadership as such.
It is clear that the teacher participants were well experienced, however the qualifications sought in the job descriptions were not necessarily the experience base from which this group drew upon to enact their district-based science specialist roles. While teacher participants met qualifications as stated in the job descriptions, they viewed other experiences as more relevant to the district role.

**Administrator participants.** The job description qualifications for the administrative participants were varied, even among the three provided job descriptions. Of the three administrative job descriptions, only one included a requirement of five years of successful science teaching in addition to administrative degree, state licensure, and a Master’s degree. Another required a Master’s degree and valid state teacher’s certification, but did not specify any necessary classroom teaching experience. The third required a Bachelor’s degree, four to eight years of administrative experience and at least one year of supervisory experience. In this third job description a Master’s degree was in the preferred, not required, category. Two of the three available administrator job descriptions provided extensive lists of preferred qualifications such as skills with public relations and producing records and reports. Though the preferred qualifications for administrators were similar to the preferred qualifications for teachers, the teacher participant’s job descriptions did not reflect record keeping and public relations responsibilities.

The administrator group reported many experiences they felt prepared them for their district-based roles. Five of the six administrator participants (Bernadette, Darius, Juliette, Gus, and Ruth) described their own work as teacher leaders as essential preparation. Each administrator participant also described experiences that provided
them with perspective beyond their classrooms and the role of “just a teacher.”

After a variety of teaching experiences, Serena spent eight years working for a regional educational service district. There she coordinated science kit materials and professional development for more than 30 school districts in the region. Ruth spent five years as a teacher leader in a National Science Foundation grant focused on effective science education. During this time she described providing a lot of professional development to teachers and administrators and to being “professionally developed herself” (Ruth, Interview 1). Darius reported working in multiple positions over time in the same district. Though much of the administrator group’s experience is science related, none of the six specifically discussed science knowledge as a preparing factor.

Based on the three administrative job descriptions provided, the preferred and desired qualifications were lengthier than the teacher job descriptions. Given the limited number of administrator job descriptions no conclusions could be drawn as to alignment between what the participants expressed as preparation for their role and the general qualifications for the science administrator role. In general, the experiences the administrator participants described as preparation for the role were more broad based, and less focused on professional identity as teacher.

**Participant perspectives of roles and functions.** Two distinct district-based science specialist roles have been established: the teacher and the administrator. To further understand the positions three questions served as data to establish the primary roles and functions of the district-based science specialist role as enacted by the research participants. Interview One, question one asked participants directly about the
roles and functions of the district-based content specialist position. Interview One, question four provided a list of task categories participants might encounter as roles or functions of the district-based science specialist position. Both teacher and administrator participants were able to identify task categories they participated in, but due to the perception of interconnectedness among many of the task categories it was difficult for participants to consistently identify the time spent on each task category.

Interview Two, question three asked How do you respond when asked “What do you do?” Will you please describe your role/position to me as you might describe it to a new acquaintance? Participants were asked to respond as succinctly as they could, and in many interviews the respondent was invited to respond as if this were an elevator speech.

Teacher participants’ primary roles and functions. Each of the teachers described their roles and functions in a unique and personal manner. Some jumped in with a lot of detail; some took a bigger picture view. Analysis of Interview One, question one led to the identification of the following primary role and function categories of the teacher group: develop and facilitate professional development, provide teacher support including acting as instructional coach or mentor, and work with science curriculum and content materials including materials adoptions. To a lesser degree teacher participants also reported they support district initiatives, write and facilitate implementation of grants, act as a liaison between the district office and the teachers, work with district assessments and data, and guide districts in all manner of NGSS work.
When responding to Interview One, question four, the task category analysis question, all participants in the teacher group spoke of the overlap of the various categories of tasks and of the comprehensive nature of the list in question four. Evan began the conversation this way: “As I was glancing through this list just before we started the call I was really kind of amazed…I can tell you right now that I do every one of these on the list” (Evan, Interview 1). When asked if she could give percentages to the time spent on various task categories, Abigail gave this response:

I would put curriculum up to fill the rest of the time—oh wait no—working with local partnerships. I’ll give that one a 5%. I’d like to increase that though…30, 40%—I’ll give a (pause) – bump [to] curriculum, up to 30. And give the professional development 60. And then email and research just like goes over all that. So like, constantly you’re checking in with teachers, making sure all the logistics and prep, make them come to meetings, and then when you are creating professional development, researching new strategies about facilitation… (Abigail, Interview 1)

Participants were asked to provide percentages for average time spent on the task categories, but as illustrated in Abigail’s comment above this proved to be very difficult. Teacher participants saw task categories as highly interconnected and not as distinct categories. Analysis demonstrated the majority of teacher participants were highly involved in the creation and facilitation of professional development, support of teachers, working and connecting with partnerships, attending district and departmental meetings (both high school science department meetings and meetings of
their district-level department), and working with curriculum development and
content materials.

To a lesser degree teacher participants were involved with grants (writing and
implementation) and guiding and supporting science policy and programming for the
district. Contact with students was described as rare. Communication, primarily
through email, was a connector between virtually all aspects of the roles of the teacher
participants.

Analysis of Interview Two, question three led to two clear categories: teacher
support including acting as instructional coach and support of curriculum and content
materials. Six teacher participants expressed that their role was to support teachers.
This is exemplified in Abigail’s response:

I am a teacher that serves students by serving teachers, to support teachers’
own professional identities, and I’m given the time to do the research for new
strategies or for new curriculum and deliver that to teachers since the teachers
don’t have the time to do it themselves. (Abigail, Interview 1)

Teacher participants reported working as an instructional coach. Two of the
instructional coaches offered athletic comparisons in their elevator speeches. This is
how Evan explained his role:

How I explain it to adults outside the educational world would be…everybody
needs a coach. Michael Phelps needs a coach and Michael Jordan needs a
coach, and they were the best in their position. So even the greatest teachers
need an outside perspective from time to time, and that’s what a person in my
perspective can provide. (Evan, Interview 2)
Programmatic support related to materials adoptions, curriculum development, and implementation of new standards was also identified as primary role in the district-based science specialist position related to this question.

Data from all three sources identified teacher support as a primary role and function of teacher participants. In responding to the task category analysis teacher participants further established what teacher support meant. Most stated, “I support teachers by…” and then listed or described the roles and functions of their positions. Many said they were the teacher for teachers, made the distinction that they worked with teachers directly (e.g., individual meetings or 1:1 coaching), or that they did not work with teachers directly (e.g., managerial support involving materials or developing professional learning sessions). The reports of direct contact with constituent teachers varied quite a bit among the teacher participants who primarily support teachers in groups at professional development sessions. Abigail mentioned that she rarely worked one-on-one with a teacher in her large district, as “it gets inequitable” (Abigail, Interview 1). In Regina’s district teacher support around content or pedagogy could be requested by the teacher or by school administration. For Edward teacher support focused on meeting with “teachers around the work of teaching,” (Edward, Interview 1) such as during content-specific afterschool or release day workshops. Working with science departments, email support, classroom and school visits all fell into the area of teacher support. In the context of the multiple roles and functions of the district-based teacher specialist position, instructional coaching and mentoring, professional development, and working with curriculum and content materials were identified as the primary roles and functions of the teacher participants.
Instructional coach/mentor. Teacher participants reported acting as instructional coach or mentor teacher as a distinct type of teacher support. One function of mentoring was reported as providing an orientation to the district science kits to new teachers at the beginning of the year. Marie described that she checked in with the new teachers monthly via email to offer support and connection beyond that one-day session in August (Marie, Interview 1). The instructional coaches mentioned regular contact with teachers as a form of teacher support. The three instructional coaches were the only teacher participants to focus their comments around direct teacher contact.

Most of examples of teacher support identified by the teacher participants, with the exception of the instructional coaches just mentioned, are not working with teachers directly on a one-to-one basis. As Abigail noted in her district it was not possible to support teachers one-to-one due to the perception that helping one teacher would mean needing to help all, and that would result in inequities. Several other participants reported they worked with teachers directly only when requested—some by the teacher, some when the request came from an administrator. Regina summed it up saying, “We’re pretty much at their [the teachers] service” (Regina, Interview 1). Teacher participants implied teacher support was directly working with teachers. They did not always articulate that many of their roles and functions provided essential, yet indirect, support to teachers. As is discussed next, teacher participants support science teachers in a variety of ways.

Professional development. Teacher participants’ task analysis indicated that above all other roles creation and facilitation of professional development was where
most of them spent most of their time. Most teacher participants reported being heavily involved in creation and facilitation of professional development. Frequently, this was viewed as inextricable from teacher support. Teacher participants described developing and facilitating professional development around a number of topics and in a variety of settings. This included monthly sessions for the general science teacher groups (primarily middle and high school), and additional sessions for science teacher leaders (elementary, middle, and high school). In these meetings there were typically one or two science teacher leaders per school in attendance. Most teacher participants also discussed the time and preparation necessary to develop, create, and lead these sessions. Edward stated:

> Creation and facilitation of professional development, this is the major part of my work…that to me means a very broad range of kinds of work. So that includes one-hour meetings with people. It includes me being present when buildings are leading their own work and I’m in consultation mode as well as more formal kinds of workshops... (Edward, Interview 1)

Marie reported development and facilitation of professional development was the bulk of what she did. Abigail and Lisa were able to place specific percentages of their time specifically on this task category: 50% and 30% respectively. Teresa said, “At least 15- to 20% of my time [is devoted to professional development]” (Teresa, Interview 1).

Some examples of specific professional development reported by the teacher participants include: professional development sessions focused on specific content knowledge; examination of student test data; conference presentations; working with
teacher leaders who will facilitate professional development due to limited capacity of the district-based science teachers; working with teachers during two-hour late start meetings, release day workshops, and afterschool workshops; and working with various stakeholders to align current curriculum and materials with the NGSS. The teacher participants all expressed that they developed and facilitated professional development in their districts. The above examples provide illustrate the scope of this role.

**Curriculum and content materials.** Curriculum development, especially related to the NGSS, science kits, and science materials adoptions are reported to be a particular focus of the teacher participants in the district-based role. Most teacher participants merged the task categories of curriculum development and working with content materials into one concept. There were two areas that many participants brought up, frequently in regards to NGSS alignment: science kit materials and science materials adoptions.

Teacher participants reported district support of science kit materials, often at a central warehouse with a distribution staff. Several teacher participants stated they worked with the warehouse staff providing ordering information for kit material refurbishment. Regina provided several examples of working with kit materials beyond the ordering of supplies. The science kit materials such as teacher’s guides are edited and reworked as needed and Regina facilitates this work. Regina also told me that if materials were not “working out then we’ll try them out and see what we need to do to improve that; change it out for a different-size container, or…different beans—whatever [the issue] may be” (Regina, Interview 1). Also in the context of
teacher support, Regina occasionally delivers materials that may have been missing from a kit to schools.

Working with curriculum and content materials was also brought up in context of science materials adoptions. Many teachers discussed the considerable time involved in the materials adoption process. Edward described part of this process:

[I study] two, three different K-5 science instructional materials
[curricula]…there’s quite a bit of that because I have to understand what will the adoption team, which is about 50 people, what will those people see when they look at that. How do I set things up so that when they are using an adoption rubric to look for certain things in the materials, what is that experience like. I also have to select the parts of the materials that they should look at so it conserves their time. (Edward, Interview 1)

This work was reported to also involve coordinating the classroom pilot of recommended materials and “the revamping of the curriculum guides” (Evan, Interview 1).

Teacher participants reported curriculum development with the new science standards. Many of them stated this work was just beginning at the time of the interviews. Several anticipated that working with the NGSS alignment of curriculum and content materials would “end up being a good chunk of [their] time” (Lisa, Interview 1) this year.

**Administrator participants’ primary roles and functions.** The six administrator participants were all quite quick to describe the roles and functions of their position. Analysis of the discussion by administrative participants related to their
roles and functions in Interview One, question one led to these most frequently described roles and functions: to provide leadership, to provide and organize professional development, to write and manage grants, and to manage budgets. Administrators reported NGSS implementation and supervision of staff (administrative assistants, TOSAs, warehouse or science kit personnel, and staff who worked on sites unique to districts such as outdoor centers) to a lesser degree in their responses to this question. One participant described her role as a “jack-of-all-trades” (Serena, Interview 1).

The administrator participants responded to the task category question (Interview One, question four) with uniform brevity and offered relatively minimal follow-up explanation. Many simply read through the list stating if the task category was part of their role or not: yes, no, not any more, weekly, and quarterly were frequent responses. Juliette commented that while there was a lot of overlap among the task categories, her work from week to week varied greatly. Gus, like many of the administrators in the group, attempted to offer an accounting of how his time was spent and at one point commented, “…probably by the time I’m done I’m going to end up with 150 percent or something…” (Gus, Interview 1).

In answering the task category question, administrative participants spoke about many of the same task categories as the teacher participants, however each of these was discussed with a nuance different from the teacher participants. Administrative participants most frequently mentioned participating in department and district meetings, working with partnerships and grants, and working with budgets. Though research, teacher support, and coordinating content materials were also
frequently coded, participants most often spoke about how they did not participate in these task categories. As established earlier, various forms of teacher support and working with curriculum and content materials are primary roles and functions of the teacher role.

Analysis of the administrator participant responses to Interview Two, question three, the question in which participants were encouraged to respond as briefly as possible, led to less clearly delineated response categories than the teacher group. Administrators in the district-based science specialist role often ended their comments with a focus on science and teacher support, but teacher support was not the primary role or function addressed. Five of the administrator group identified curriculum and materials as a focus. Two were clear that science teaching and learning was a primary focus. One stated, “My job is to take care of anything that has to do with science in the district including at a district level” (Gus, Interview 2). This sentiment was expressed by several of the administrator participants.

Administrators in this study reported many of the same roles and functions as teacher participants. However, analysis led to the identification of primary roles and functions that were distinct from the teacher group. Most distinct was the role and function of leadership.

Leadership. Administrator participants identified themselves as leaders in their districts, communities, and on the state and national level. They described being in charge of events and people and programs. Bernadette told me she viewed her role as community advocate for science education. She listed legislators and city council members among those whom she reaches out to. Several administrators were
influential in the organization of their departments. Due to a reduction in staff Gus made the decision to focus on the administrative role rather than instructional coaching. Darius was also involved in the creation of his role. He reported that this was an effort to bring the departments that had previously been “distinct” (Darius, Interview 1) together. “So the idea is that we will work in a more integrated and coordinated way, not perfect at first but take a very strategic first step towards that, and a big part is me overseeing the entire department” (Darius, Interview 1). Darius and Gus implicitly communicated the authority of their positions by the types of decisions they made to structure science staffing in their districts.

Administrators identified leadership (e.g., supervision of staff, managing budgets, leading district meetings) as a primary role and function of the position. Almost all of the administrator participants reported being involved with state and national science education leadership. Other examples of leadership described by the administrator participants include: supervision of district-based science TOSAs or instructional coaches (individuals in the same role as the teacher participants in this study); working with district science materials warehouse staff (several reported being the direct supervisor for that staff); and acting in an evaluative capacity. All administrator participants mentioned staff of some sort “below” them, whom they led, guided, coordinated, supervised, and often evaluated. Gus described being the district science leader this way: “So science and anything that touches science I’m in charge of” (Gus, Interview 1). Leadership, as described above, is clearly indicated as a primary role and function of the administrator district science specialists.
Partnerships and grants. Working with and maintaining relationships with partner organizations was found to be a major part of the administrative participant role. Gus explained why partnerships were so important:

We don’t have the materials. We don’t have the resources to get the teachers what we need…that’s just a fact…I’ve got myself, 1 other full-time staff person…there’s no way I can do that, so I have to look to my partners, I have to look this the local university STEM Center. I have to look at major companies based here [named two associated with the region]. I have to look to a number of smaller partners that bring in stuff…I’m at 52 active partners, community partners that I manage relationships with, and we are at just under $4 million worth of goods or services provided to either students and/or teachers. So this isn’t money that comes directly to me. It could be somebody providing materials or training or… [a major company] gives us a fellow which is a grad student that they pay, and we get to work with the grad student on stuff we need. Right now I have a Mandarin immersion program that’s trying to become a STEM program. Try to do STEM in Mandarin and find somebody that can support them. I – [the major company] helped me…that’s $20,000 of pay that I don’t have to put out. But yet, I get the benefit of that. So that’s how I calculate that $4 million figure. (Gus, Interview 1)

Gus described in great detail how he worked to support science in his district. With his administrative role comes the authority and organizational structure to bring in a great deal community support. Gus’ comments also provide insight into the complexity of the administrative role. Supporting the STEM Mandarin immersion program is an
example of this. Like Gus, nearly all administrator participants identified grant writing as a necessary part of their role. Bernadette commented, “You want to keep your program afloat” (Bernadette, Interview 1). Given what Gus explained perhaps Bernadette’s comment is an understatement. Among other things, administrators reported grants funded science kits in elementary classrooms, provided teacher professional development, and funded research on student achievement. Working with community partners, grant writing, and management is evidenced to be a large part of the administrative role.

*District and departmental meetings.* Administrative participants described spending significant time in meetings. To a high degree administrative participants described the organization of the many meetings they were involved in rather than the content of those meetings. Darius described the pervasiveness of meetings this way:

So of all things I spend most of my time in district meetings…you could probably do 30 percent on the top three: district meetings, department meetings, meeting with teachers, and then 10 percent on partnerships. So my schedule during the day, I’m -- I don’t have free time. So I have meeting after meeting after meeting, and it’s rare that I would ever be sitting at my desk answering, you know, answering emails or something. That to me has to happen before work hours or at night. (Darius, Interview 1)

Gus also spoke about spending a lot of time in meetings: “Yeah, that’s probably about 50 percent of my time” (Gus, Interview 1).

Examples of meetings provided by administrators were: teacher leader professional development meetings, office of teaching and learning meetings,
immediate department meetings, high school science department meetings, weekly district level meetings, and team meetings.

**Budget.** Unique to the administrator participants was the discussion of managing and working with budgets. Budgets were mentioned in all three of the administrator job descriptions, and four of the six administrators discussed their work with budgets. Bernadette stated she worked with “budgets and financial matters” (Bernadette, Interview 1) monthly. Ruth reported that her experience as a school principal was where she learned about budget management. Darius painted a picture of what managing his budget included: “…budget covers staffing, it covers materials, it covers professional development for all of the teachers in the schools, and the staff in the STEM department” (Darius, Interview 1).

This section has established the different primary roles and functions for each research participant group and explored their perceptions of the ways in which previous experiences prepared them for their roles. Support provided to individuals upon entry to the district role is examined next.

**Job orientation.** Job orientation if of interest as the orientation to a new position suggests that a role transition has occurred. In order to further understand the organizational setting, and the experience of the individual situated within it, Interview One, question three asked teacher participants *What type of job orientation or professional training did you receive when you began this position?*

**Teacher participants.** Most teacher participants responded to this question with a quick “Zero” or “None” or “It was all on-the-job training.” Frequently this was followed with nervous laughter, and then sometimes an attempt to explain the
situation. Beth simply started chuckling as I asked the question. “I’m sorry. I have to giggle because… I’m work[ing] in a larger district and so consistency’s always a challenge” (Beth, Interview 1). Beth’s comment about consistency in her large district points to features of the district’s organization.

None of the teacher participants reported a formal job orientation when they began their district-based role. Abigail mentioned that she asked just this question in her interview for the science specialist position. She reported the interview team told her, “You just get hired and get going, get rolling” (Abigail, Interview 1). Several teacher participants speculated they received no job orientation because their organizations expected them to be equipped for their new roles given their prior experiences and skill sets. This was reported to be the norm. Evan said, “I think the reputation of the organization I worked for proceeded me in my application for this job” (Evan, Interview 1). William mentioned on-the-job-training and continued with the following comment:

I think that may have been one of the ways that helped me get this position… all of the trainings I received through my masters in school administration through being a science and math curriculum, [and being] sales person [for a science materials company]… All these different trainings that I receive[d] I think kind of helped me get this position so that I wouldn’t need a lot of before getting started training [teachers]. (William, Interview 1)

Several teacher participants reported district reorganization that led to the creation or redefinition of their positions within the organization. Others reported participating in brief, broad based workshops, such as a state training on assessment, near the time
they began their district-based science specialist work. These were trainings geared as continuing professional development, not specific to the science role within the school district.

Unique among the teacher participants was Marie’s experience. Though she reported it was a matter of circumstance, not a planned action by the district, she had the opportunity to work with the outgoing science specialist for two weeks:

So I actually got that little…I actually got some quality time with her…managing those first two weeks of the school year my first year. And then after that I’m in a department where if you don’t know how to do something…none of us are afraid to ask. And when stuff shows up that’s apparently your job, you do it and if you don’t you figure out how to do it. (Marie, Interview 1)

Marie’s final comment was a sentiment expressed by many teacher participants. They simply had to figure things out, situationally, as they began their district-based roles. With little to no professional orientation to their new roles, the teacher participants were on their own, dependent on their team—if they had one, new district-based content specialist colleagues like themselves, or their supervisors, for guidance in their roles and for simple help, like where to get a stapler.

Administrator participants. For both administrators and teachers in district-based science specialist roles, the most frequent job orientation was reported to be on-the-job-training. Like the teacher participants, the participants in the administrative group were quick to answer in the negative when asked about job orientation when they started their positions. Bernadette and Serena gave remarkably similar answers describing beginning their work in the administrative role as “trial by fire”
(Bernadette, Interview 1) and “baptism by fire” (Serena, Interview 1). Darius and Ruth both told me about working with the outgoing administrator as part of their transition into the role. Darius described his entry into his position this way:

Really I was already doing that, but they just formalized what I was already doing. I would argue that when I was a specialist I was actually acting as a director…there was a hole leadership wise, and so I just kind of stepped up and started organizing and…when the position opened it was just kind of natural [for me to fill it]. (Darius, Interview 1)

Like Marie (one of the teachers described above), Ruth had the opportunity to work with the outgoing science administrator. Ruth described her orientation experience as informal and between herself and the previous person, not a formal arrangement from the district. Juliette commented that high turnover in both coordinator and upper district administrators might have contributed to lack of job orientation or professional training when she began her position.

**Summary of organizational perspective.** The purpose of the organizational research was to further define the role of district-based science specialist. The roles and functions of district-based science specialist, as reported by participants and analyzed here, are different depending on the more global role of teacher or administrator. The language in the nine job descriptions for teacher participants emphasized use of data, assessments, and standards to guide one’s practice in the role. Only two teachers mentioned use of data as a regular feature of their work. Also emphasized in the teacher job descriptions were providing professional development, working with science curriculum and content materials, and instructional coaching.
When reporting their roles and functions teacher participants most often identified creating and facilitating professional development, teacher support in the form of instructional coaching and mentoring, working with science curriculum and content materials—including materials adoptions. These responses were consistent among the three interview data sets and the teacher job descriptions.

The language in the three administrator job descriptions emphasized leadership, working with science curriculum and content materials, interdepartmental work and collaboration, and participating in district and department meetings. The voices of the administrators in the district-based science specialist role did not demonstrate the high degree of consistency heard from the teacher group regarding primary roles and functions. Administrator participants responded differently depending on the question. Providing leadership, supporting professional development, curriculum and materials support, participating in district and department meetings, working with partnerships and grants, and managing budgets were all reported as primary roles and functions of the administrator participants.

All participants expressed they received little to no job orientation as they began their district-based positions. Many participants, both teacher and administrator, attempted to explain this as a result of frequent change or lack of consistency within their districts. The few participants who did report some form of organizational transition into their roles stated those opportunities, such as Marie working with the outgoing science specialist for two weeks, were not the organizational norm.

Both groups of participants described their roles as multifaceted and there were many roles and functions that were coded in this study. According to the data, teacher
participant job descriptions are more closely aligned to the teachers’ reported experiences in the role than the administrator participant job descriptions. It may the very nature of the administrative leadership role comes with more diffuse boundaries.

Based on the body of organizational findings the following descriptive role statements are offered for each position. District-based Science Teachers support science teachers in the district primarily by: creating and facilitating professional development, acting as instructional coach or new teacher mentor, and supporting content and curricular materials (e.g., working with science kit materials, facilitating curriculum and materials adoptions, writing/editing district curricular documents).

District-based Science Administrators support science in districts by: acting as part of the district leadership, through attending district and department meetings, working with partnerships, securing grants, and managing budgetary processes.

**Shifting Landscapes: Being is Becoming**

The individual perspective is at the heart of this study. This section is focused on the participants’ descriptions of how they transitioned from the science classroom to the role district-based science specialist. The findings in the previous section identified two distinct district-based science specialist roles; naturally that informs the two research questions explored in this section, which takes a more holistic view of the experience of the teacher transition from the classroom to the district role. Distinction between the teacher and administrator science specialist roles is made as necessary in this section.

Unlike the organizational dimension of the district-based science specialist role (i.e., establishing the roles and functions) leaving the familiarity of classroom teaching
for the district-based role is a distinctly human endeavor. The complexity of the
leaving one role for the other, and the impact that has on one’s global identity, is more
fully understood in its entirety. Therefore, an individual story, focused on the evolving
identity of a teacher participant, follows. Each participant’s story in this study was
unique, whether teacher or administrator. It is not expected that any one participant
would reflect the entirety of the findings; however, Marie’s story captured many of the
features from the sample as a whole. Marie’s role transition and evolving professional
identity exemplify an abrupt transition, stages of role exit typical of a teacher, and
illustrates many of the other findings related to the transition to the district teacher
role. Additionally, as exemplified in the quotes in her story, Marie’s language was
detailed and descriptive. This allowed a complete picture of her experience to be
constructed. Elements of the role transition are discussed in further detail after this
brief illustration.

Marie’s Story.

Marie, the daughter of a teacher, began her career in education as an informal
educator in forestry and environmental education programs and had no intention of
becoming a classroom teacher. In order to be qualified to pursue other positions of
interest in forestry, Marie entered the most convenient Master of Arts in Teaching
program she could find, intending to skip the student teaching portion. Following the
suggestion of her mother to keep her options open, Marie completed the program’s
student teaching experience. Commenting on this experience, and establishing her
commitment to the teacher role, she stated:
I ended up student teaching and loving it. It was hard and horrible and I hated public speaking and felt sick and my students were overall good but some of them were so bad…and I loved it. I enjoyed the challenge and I liked that I was pushed way out of my comfort zone – plus I love school. I love standards and assessment and knowing stuff. I love office supplies and organization and constructing knowledge and writing a test question that makes students apply what they know. I love how science is beautiful and organized for being so messy…Working with students to get them to “get science” is rewarding. So I ended up applying for teaching positions instead of forestry ones. (Marie, Questionnaire)

Marie was a classroom teacher for six years before transitioning to her district role, Secondary Science Curriculum Specialist, a teacher on special assignment position (TOSA). As discussed earlier in this chapter, Marie’s transition from the classroom was an abrupt one. She accepted the position just a few days before students were to return from summer break. Marie reported starting her work as district science specialist feeling optimistic, but also so overwhelmed that she had significant trouble sleeping. She also reported that while adjusting to her new role she “pretty much had a breakdown” and “ended up with some pretty serious situational depression” (Marie, Interview 2). She further described this as “completely identity driven. Like wait. Who am I and what’s going on?” (Marie, Interview 2). Marie’s comments suggested she understood the role expectations for being a classroom teacher; when she became a classroom teacher there was the opportunity to engage in social anticipation of the
role (that is, she had the opportunity to imagine herself in the role of teacher prior to becoming a teacher). This does not seem to be the case for district-based teachers.

As a classroom teacher, Marie described demonstrating high commitment to the teacher role and to teacher identity. She responded with a quick and emphatic, “Yes,” when asked about returning to the classroom and described the ideal TOSA role as teaching a class or two each morning. Marie described herself in the classroom as an individual who paid careful attention to how she presented herself to students. Both her actions and appearance were important cues to her classroom teacher identity:

As a classroom teacher I was known by my students as being someone whose hair you never ever saw down…if I would just take it down to re-situate my bun they would freak out and comment on it because they knew that it was always up. And I took this job, and I cut my hair off. Like a breakup, right? And not being in front of students, I don’t have to be that kind of in-front-of-students guarded…And that… that was very, very different… I was way more uptight and professional in the classroom than I am here I guess is sort of the way to say that. (Marie, Interview 2)

Marie described her physical self and presence in the classroom as restrained and reserved, “more uptight and professional” (Marie, Interview 2). The very act of her haircut was a signal of role transition (Van Gennep, 1960, p. 166) and a demarcation of Marie’s “breakup” (Marie, Interview 2) from classroom teaching. Marie then discussed being more self-directed in the district position. With this came fewer opportunities for collaboration and not having to “be on stage all the time” (Marie,
Interview 2). Marie’s presentation of self was different when her primary role was to be in front of students. As Marie encountered the expanded roles and functions of being a district teacher she accepted the primary role of teacher leader.

When asked about how she felt as experienced in the role, strong, overwhelmed, and networked are the words Marie used to describe herself. After three years in the district role Marie reported remaining overwhelmed. The work of district-based teacher is dramatically different from that of classroom teacher; Marie’s description of the word networked hints at why. Her use of network had expanded beyond the district science teacher group to other science TOSAs in her region. With the help of a supportive administrator and learning the role by doing it Marie was able to “navigate the district side of things” (Marie, Interview 2). She now assists others as they transition to the district teacher role:

…your network of people changes so much in this role…and there’s been a lot of TOSA hiring up here…I run the region. Like at our…regional TOSA meeting it was insane how many brand new people were in this role. And even only being here three years, suddenly I feel like I’m on the other side of that…So I think I finally…feel comfortable supporting other people who are in this role (Marie, Interview 2).

With experience in the role, Marie ultimately gained confidence in her role as teacher leader and initiated providing support to others in the district science TOSA role.

Marie reported performing the role as critical early experiences that led to seeing herself in the role; that is, by doing the role she was able to travel the shifting landscapes and become a district teacher. Marie described several key events as
indicators of her evolving professional identity; each shows her evolving professional identity and growing commitment to the district teacher role. Planning for and meeting with teachers demonstrated to her that she had the skills and insight to see teaching and learning from the district perspective. Her relationship with district science teachers, particularly the biology group with whom she most identified, weathered the transition. She described making it through the relational transitions by being clear about the role, its limits, and her commitment to supporting teachers: “…all of the coworkers who you were very much peers with, all [of] the sudden they’re calling you boss…they’re being ironic…and they also feel a little bit like that” (Marie, Interview 2). Marie was clear that she saw her work as teacher support and consistently demonstrated that to her teachers.

Leading NGSS professional development workshops in her first months as a science content specialist helped Marie to realize that her knowledge base and understanding of NGSS was at a deeper level than the teachers with whom she was working. Marie reported defusing a situation with a confrontational principal led to the development of a strong working relationship with that principal and demonstrated to Marie and the teachers who were in the room that she was capable of negotiating the district’s politics.

Marie described her transition from confident classroom teacher and district teacher leader to novice district-based science specialist teacher as challenging. Though the process of role transition was difficult, Marie consistently stated commitment to and understanding of both district teacher and classroom teacher roles. Coming full circle, Marie reported that she is now a regional leader. Not only does she
support new teachers in her district, she supports new science specialists in the region who are making the same transition as she did. While poignant, Marie’s story was not unusual: other participants also went through extremely challenging personal situations as they negotiated entry to the role of the teacher outside of the classroom. Like Marie, most of the teacher participants asserted high commitment to the teacher role and teacher identity. The remainder of this chapter contains in-depth discussion of findings related to leaving the classroom (role exit theory), boundary spanning (social learning theory), and commitment to the teacher role and teacher identity. These are discussed through both teacher and administrator science specialist roles. The final set of findings, discussions of the characteristics of the transition, impact of the transition, and evolving professional identity, are reported through the collective experience of both participant groups and focus on the transition from the classroom to the district role.

**Leaving the classroom, not the role.** Teacher participants in this study demonstrated three of the four stages of role exit (Ebaugh, 1998): doubting, seeking alternates, and turning points. There were no significant examples of creating the “ex role”—in this case, that is fully becoming something other than classroom teacher—among the teachers. Administrator participants demonstrated just the doubting stage of role exit, and in different ways than the teacher group. Boundary spanning is discussed after the role exit sections.

**Teacher participants.** Among the teacher participants the doubting stage of role exit manifested in the following ways: personal reflection around one’s situation, clarification of professional goals/identity, germination, and competing identities.
Reflection took the form of seeking (personal growth, often leading to hoping to make an impact). Matthew spoke of being at a point in his career where he thought he “should be influencing teaching, not just influencing students” (Matthew, Interview 2). This line of thinking led him to apply for the district-based position. Goal clarification is exemplified by coming to a clearer or more specific understanding of one’s professional goals or emerging professional identity. Edward described several deliberate decisions that led to his position with his district, and like Teresa, he decided he was ultimately interested in working with teachers. He did this first at an educational service district, and then when that role became more administrative he sought a district-based role. Germination indicates the planning of the seeds of suggestion of a new role. Based on her observations and interactions with her science TOSA predecessor Marie stated: “…quite honestly, I was kind of interested in how I would even do in the role” (Marie, Interview 2). The seed had been planted. Competing identities (i.e., provider for family or mom) also led to doubting the commitment to classroom teaching. For example, William discussed pressures to support his family as the sole income provider. This was a major factor in his decision to leave classroom teaching.

After careful analysis of the initial “seeking alternates” codes, it was apparent that most were really doubts or turning points. Perhaps it is not surprising that “seeking alternates” did not prove fruitful as a code: alternates to classroom teaching are only emerging as options for teachers. Beth and Abigail provided examples of seeking alternates. By expressing her ideal science specialist role of teaching one class and discussing going back to school, Abigail explored alternates both in her current
position (ideal role) and for the future (back to school). For Beth a personal crisis led her to look at job postings that she may have not previously explored or considered:

…I saw this like amazing job title…it said grant project coordinator, and it was up toward the top because it was under G (chuckles) not down by T for teacher and in the middle, M, math, or science (chuckles) -- closer to the Ts. (Beth, Interview 2)

She found her current position not under teaching positions or subject specific positions, but under grants. The qualifications for this non-teaching position were directed to teachers: BA or MA in education and valid state teaching certification. Teachers are actively being sought for positions outside of the classroom.

Turning points is the third stage of role exit. For teacher participants turning points were categorized into sudden change/realization, clarity about wanting the role, personal crisis, and end of commitment. Four teacher participants were very clear that they wanted to move into the district-based role. The three coaches, Teresa, William, and Alex all reported being interested in the role from the time they learned about it, demonstrating clarity about wanting the role. Edward reported clarity too, describing that he had built his career around teacher professional development and that when he saw his previous role becoming more administrative he made a purposeful choice to return to a district-based role. Several teachers reported sudden change by making a quick decision to accept the district-based science specialist position. The turning point for Regina wasn’t until she actually had to make the decision to accept the role. Though she had the summer to get used to it, she described having to make a quick
decision. “I -- it was a real shock. It was a real surprise. I had no intention of leaving, so it was kind of like a quick decision I had to make and I remember it was -- I mean it was like the last day of school …” (Regina, Interview 2). There was a definite element of suddenness to Marie’s situation, too. Though she had considered the TOSA role beforehand, her plan was to apply in a couple of years. However she was confronted by the opportunity when, during the prep week before school started, the then science TOSA decided she would retire. Both Marie and a peer felt each other should do the job. Both applied, and after the colleague turned the position down deciding he was not ready to leave the classroom, and with three days to the start of school, Marie accepted. Abigail’s turning point was the end of her commitment to herself to teach in the classroom for five years and Beth’s was recovery from a personal health crisis.

**Administrator participants.** Before transitioning to the administrative role four of the six administrator participants worked in district-based teacher science specialist roles. Of the other two, one participant worked as a building-based instructional specialist and another was a science coordinator for a regional education service district. It is their reports on the transition from the classroom to the district teacher role that inform these findings. As the administrator participants shared their stories of leaving the classroom, many made comments like ‘that was a while ago’ or ‘let me think back on that.’ This suggested detachment from the teacher role and teacher identity. Manifestation of the four stages of role exit from the classroom was not evidenced in the data from the administrative participants.
Analysis found administrator participants experienced doubting, the first stage of role exit, slightly differently than the teacher participants: when leaving the classroom they followed suggestions of others or were deliberately seeking new challenges or professional growth. Two administrators accepted the suggestion of others when they applied for their teacher specialist positions. After receiving a national teaching award, Gus was approached by a district leader and invited to apply for the district-based teacher role. This encouragement from the district person and support from his then principal led Gus to apply for the district job. After submitting this application Gus entered a period of reflection on his professional growth. He told me, “the more I thought about it and prayed about it, the more it’s like yeah, this is where I wanted to go…And that was…about 12 years ago, 14 years ago something like that” (Gus, Interview 2). Other administrator participants, just as the teachers did, described seeking professional change or wanting that type of position from the time they learned about it. Based on her experience with the previous district science administrator Bernadette set the science specialist position as a new challenge and for professional growth:

And I just set my eyes on it. I love curriculum and instruction. I loved helping teachers. And so I decided you know what, I would love to have that science job at the district level. And in some instances to be a support that I felt like I needed…there were some things that the individuals before me did give to the position but, you know, on the other side of the receiving end I had a list of things that I would love to have [had] more of. So I was like well, if I could
ever get in that position this is what I would do. You know, to expand
upon their work. (Bernadette, Interview 2)

Serena was identified as experiencing doubting through her reflective process.
She really seemed to be seeking her best-fit role. In explaining her interest in her role
as a science specialist with a regional education service district Serena demonstrated
low commitment to teacher identity. She expressed it this way: “And I say this with
respect because I was a teacher, I wanted more than just being a teacher. I wanted
something else. And there’s not a lot of opportunities to be more than just a teacher
unless you take on one of these supervisory roles” (Serena, Interview 2). She provided
other examples of lack of commitment to the teacher role: leaving the classroom for a
doctoral program and her reported goal to become an assistant superintendent—she
described her current administrative role as “a great stepping stone to get into
something like that in a local district” (Serena, Interview 2). Serena’s use of “just a
teacher” (Serena, Interview 2) seemed to be part of her continued process of seeking
alternates as she looked for the right professional role and further underscores the lack
of conventional understanding of the changing role of teacher.

The remaining stages of role exit theory (seeking alternates, turning points, and
creation of the ex role) were not coded to any significant degree in the analysis.
Juliette’s situation proved quite unique: her role exit was identified as combination of
germination and facing a significant and sudden turning point. Juliette, recently hired
as a teacher science specialist, applied and was hired into the administrator science
specialist role when the coordinator resigned shortly into the beginning of the school
year. Juliette elaborated, “So I was the specialist, and that’s the entire department for
(chuckles) science. So then I applied for the coordinator position” (Juliette, Interview 2). It was the synergistic effect of being new to the teacher specialist role, the unexpected resignation of the previous science administrator, and suddenly seeing herself as the science department that set Juliette on the path to district science coordinator.

Bridging the gap. Boundary spanning was identified as a feature of both district-based roles, not as a feature of the transition into the role. For teacher participants, examples of boundary spanning within the district teacher role include bridging the gap with knowledge or expertise, relational boundary spanning, and the tension of boundary spanning. Boundary spanning by expertise is exemplified by Marie’s story. Marie “defaulted” (Marie, Interview 2) into leading the back-to-school workshops for the biology team because she had worked with the state department of education on the end-of-course assessments. She stated, “So I had that insight, and so I was bringing that back to my bio team. And that’s why I was leading the bio teachers” (Marie, Interview 2). Marie’s reported intent in working with the state on the biology assessment was not to be a leader and bring this knowledge back to her district and team, yet that is how her expertise was used in the district. This was a product of working in the role rather than transitioning into the role. Evan provided several interesting examples of relational boundary spanning, also as part of his role. Evan reported spanning boundaries between university partner and teachers in many capacities. A local university partner bought equipment for use in classrooms but did not provide training in how to relate equipment use to science/STEM content:
What we don’t have necessarily is the teacher training and the student understanding of how to connect that stuff with the content and what has to be taught. So that’s a big part of my work…working with the university to craft that summer experience [using the university-bought equipment] and follow up with teachers throughout the year on how they’re taking their summer experience and culminating it in the classroom. (Evan, Interview 1)

In a similar vein, Evan mentioned supporting teachers in a PLC or visiting the school’s STEM lab and the going over to “talk to the university guys” (Evan, Interview 1) about the needs of the teachers whom he just visited. Another way Evan expressed boundary spanning was in his relationships with administrators in the district: “… for the first time in my professional life I don’t get around a principal and feel like this person’s my boss, you know. I feel like it’s -- this is a person who’s -- I’m on level playing field” (Evan, Interview 1). In his role Evan spans many relational boundaries: university partner to teachers, teachers to university partners, and with building principals. All of those further, and contribute to the definition of, his role as district-based science specialist.

Tension in spanning boundaries was reported by many teacher participants. Especially common was the relational tension between district-based science specialists and affiliated teachers and the perception that the district teacher role is a promotion rather than a lateral move. Beth spoke about the challenge in spanning this boundary with teachers:

… I’m a science specialist and…I used to be a classroom teacher but now I’ve sort of risen into this district-level position. And it can be off-putting, and it’s
hard for me sometimes because they create that space so then I feel like I’m kind of like oh, no. You know I’m one of you. (Beth, Interview 2)

Several teacher participants used language like “up here” similar to Beth’s “risen” to describe how they are situated in the district. None these participants reported their transition into the district role as a promotion; in fact almost all teacher participants discussed their non-evaluative status and efforts to remain “just” a teacher. These participants reported a struggle between their district-based position and maintaining peer status with the teachers.

Beth also identified another common tension in boundary spanning: the tentative nature of the position. She is both district specialist and teacher, and according to her that was how her role was seen in the district: “… [there] is just all of the policy [around] district-level positions… there’s nothing saying that my district won’t pull me at any time and put me wherever they want” (Beth, Interview 2). If needed, she could be pulled back to the classroom as she experienced at the beginning of the school year:

They did, in fact, at the beginning of the school year they put me in a middle school science classroom…it just broke my heart because… you couldn’t do anything real. It was just a stop-gap measure. I was just plugging a hole. And the kids were like …are you going to leave too? And when are we going to get science? So it’s those kinds of things that are heart-wrenching but I have absolutely no control over, you know. So that’s really hard in these positions. (Beth, Interview 2)
Many teacher participants reported the roles and functions of their positions changed from year to year, and that their positions were dependent on funding or district initiatives. For this reason, boundary spanning was reported a necessary feature of the district-based position.

Boundary spanning in the administrative role was also found to be minimal. In the administrator science specialist role boundary spanning was more about the nature of the role than actually bridging the gap between individuals or groups of systems. Serena reported boundary spanning when she spoke about her connection and daily access to district administration. She said, “It’s very demanding because we are the mouthpiece between the superintendent and the assistant supers and the teachers” (Serena, Interview 2). This suggests Serena disseminated information rather than bridging relations between the groups she mentioned. Gus reported boundary spanning in his position as the need to be strong in both curriculum and professional development. Juliette described working as a teacher science specialist and stated she “was already doing a lot of the coordinator responsibilities” (Juliette, Interview 1) since the previous coordinator had resigned.

It is possible that brokering, rather than boundary spanning, is a feature of the district-based role. This will be discussed further in the next chapter.

**It can be tricky: Transitioning to the district-based role.** It was clear from the data that there were common features of role entry experienced by new to the role district-based teacher science specialists. Though the transition of leaving classroom teaching and entering the district-based science specialist role was unique to each person, the common features of the transition were identified through analysis of
multiple data sources in Interview Two, particularly these questions: *Have you known other people who have moved into a content specialist?* and *When an individual transitions from the classroom to content specialist what types of changes—personal, professional, organizational—have you observed taking place?* This section is informed by the combined voices of teacher and administrator participants. The following statement from Gus provides insight into the overall understanding of this role transition.

… the only thing I would stress is that at, least in my experience, there’s no preparation for this [role] and there’s no preparation for the transition. It’s really a sink or swim kind of thing. It’s like they throw you in the deep end, you know. And hopefully you got some support with the people around you. But if you don’t, you're going to do whatever you can do to go forward. And that’s something that I don’t know how to make a change of…because this position is not honored or recognized very highly. And I know it’s the same in other districts around the country. People understand what a principal does. They understand what a superintendent [does]. They understand a teacher. They don’t understand a coach [an instructional coach] or why a coach is important or a curriculum director. It’s oh, anybody can do that…And there are some very unique parts of this [role] which you need the skillset for and [to] be prepared for some of the changes in how you relate to the people in the district in it. (Gus, Interview 2)
As Gus emphasized, almost all participants reported that “there is not preparation for the transition” (Gus, Interview 2) from classroom teaching to the district role, and that most people “don’t understand” (Gus, Interview 2) why the district role is important.

Analysis identified many distinct features of the transition from classroom teaching to the district-based science specialist role, most of them related to the changing role of teacher in the district role. The primary characteristics of the transition are related to adjusting to the district role, establishing leadership, lost connections, role definition, flexibility/time usage in the new role, professional learning, and affiliation to the position. There is a great deal of overlap among these features, especially as the matter of role definition affects them.

Adjusting to the district role. Adjusting to the district role was reported as including the “being in over my head” (Evan, Interview 2) sensation, adjusting to the multifaceted district roles and functions, and learning the systems of the district, including politics. Many participants indicated that entry to the district-based science specialist role was just plain overwhelming. Because it was so very different, several teacher participants reported going through a period of questioning and deep reflection in the early months of their new role wondering if they had made the right decision. Similar to how Marie described her experience, Matthew reported it was “really hard going from a position where I knew what was expected of me to a position where I had no idea what was expected of me” (Matthew, Interview 2). Like Marie, Matthew engaged in this crisis. Through conversation with his wife he came to the following resolution:
I finally just had to stop looking for someone else to define what I should be doing… that was a really significant change…it wasn’t an overnight thing…part of it involved just developing more confidence and things like that, but very much saying okay, I have to define this role myself. (Matthew, Interview 2)

Most participants reported knowing what was expected of them as classroom teachers. They also reported a period of adjustment to the district role that often involved deep personal reflection in order to “see” themselves in the district teacher role.

*Establishing leadership.* Establishing leadership was reported as negotiating the political space of the district office such as understanding district leadership and organizational structures, often without training or preparation. Many participants reported that they did not realize how good they had it in their schools and classrooms, suggesting they were sheltered from the political aspects of the district role. Another major aspect of the transition was being confronted by a number of beliefs and experiences around leadership, the ability to collaborate and learn from others—regardless of content specialty, and the challenge of being/ becoming both an expert in content and professional development. Learning to interact with the teacher group as a whole, rather than a small group of colleagues in a building was yet another commonly reported feature in this category. Regina shared this insight:

You are now providing service to teachers versus providing service to students…that’s kind of like a paradigm shift and it’s hard to focus in that direction…You just kind of have to… think in terms of what’s good for all teachers not just what would work for me. Because when you have 56
elementary schools they’re a lot of different levels of experience of teachers, and you have to take all of them into consideration when you're designing professional development, when you're planning an activity, when you're writing curriculum. And sometimes that’s kind of hard to wrap your brain around. (Regina, Interview 2)

Many teachers reported moving beyond what worked for them as individuals in their own classrooms to figuring out what would work for the entire science teacher group as they established themselves as district teacher leaders.

Participants all described pivotal experiences early in their district leadership role where they became the leader. Marie provided two examples of leading workshops at the high school level. She stated by “doing that training I realized I actually do know a heck of a lot more about the next gens [Next Generation Science Standards] than any of these people” (Marie, Interview 2). Matthew described co-leading an interdepartmental workshop in which the other facilitators were new to the district role. With one year out of the classroom at the time, he had the most experience in the district role. Matthew related, “it was just really fun to see how we could work together to make something significant happen for the team” (Matthew, Interview 2). Actually doing the role was commonly reported as a path to establishing one’s leadership.

Participants further described establishing leadership as renegotiating and re-establishing relationships with teacher colleagues, particularly those with whom they had relationships prior to the district position. Teachers “have a hard time shifting with the people who were their friends. They come into this job and now all the sudden
they’re not seen in the same light” (Gus, Interview 2). This tension was described by several participants who reported they felt they were the same person they were in the classroom but that was not how they felt they were perceived by the same colleagues with whom they had worked with for years. Matthew, below, discussed negotiating the space between the known teacher role (classroom teacher) and the unknown teacher role (district-based teacher).

It’s taken a year for me to gain some credibility with teachers because…even though I am a teacher and I’m still paid as a teacher… I’m not in that administrative level of things… A lot of what you do is gaining credibility and convincing the teachers that you really are there to support them. (Matthew, Interview 1)

Many participants reported relational transitions as difficult. Contributors to this were the perception of promotion, moving work location from a school to the district office, and lack of understanding of what the district teacher role really was. It was reported that many groups—associated science teachers, district and school administrators, and sometimes the science specialists themselves—often did not know what the parameters of the district teacher role were.

**Lost connections.** The lost connections reported by participants mainly include issues of separation from students and colleagues. Participant after participant, many of them with great emotion, reported that the most common experiences they recognized in themselves and in others who had made the transition were giving up relationships with students, teacher colleagues, and the sense of being a team as part of a school staff. It was reported that this was one of the most difficult parts of adjusting
to the district role and often the cause of individuals returning to the classroom.

Teresa described the impact of her exit from the classroom on herself and her students in particular detail. This transition took place several months after the school year had started:

So I had to wait until he [her former principal] found a replacement, which…was very difficult and…took a long time. And those poor babies [the students] -- I didn’t want to give them my full energy because I knew I was going to be leaving and I just kind of [wanted] to set it up for the next teacher so they could come in and step in. So [the students] didn’t get my full 100%...I was really torn by that…It was really hard for me. I was excited about moving on…in the summer. But when I had to leave like that [into the school year] it was really hard because those students, they were -- have you ever had those really special classes that you really connect with?...that was the time I was leaving. And all the kids were just in love (chuckles). And so it made it a lot harder. (Teresa, Interview 2)

Teresa reported being caught in district politics. She had been hired into the district instructional coach role but the principal was reluctant to “let her go” (Teresa, Interview 2). This seemed to lead to a higher degree of severity in the experience of the already abrupt transition and in emotion she expressed around the lost connections with former colleagues and students. Abigail spoke of the tension of working the same hours, but in a different location than her former teacher colleagues and students. She discussed the “geographic isolation” (Abigail, Interview 2) she felt working from the central office while the colleagues she worked with were at her former school: “I think
the intimate relationships aren’t there so—that happened in the transition” (Abigail, Interview 2). Being part of a team and the comradery of being in a school building together, “the energy, the identification of yourself as part of a team of teachers working toward a common goal” (Matthew, Interview 2) was reported as difficult to leave. Matthew went on to suggest, “you have to identify your team as something different” (Matthew, Interview 2). All participants reported lost connections of some sort.

*Flexibility and use of time.* Daily experience in the classroom is built on routine and predictability. Many participants spoke about how different multitasking in the district-based science specialist role was multitasking in classroom teaching. When participants commented upon flexibility and time usage it was often related to the difficulty and perks of establishing one’s own day-to-day schedule. Ruth described the shift in terms of role ambiguity and different responsibilities:

… I don’t have children in front of me, so it’s a different organizational thinking about your day… it’s very different than going in and being responsible for children all day, but [in this role] you're definitely responsible for your work. But really, what is that work? So I think it’s kind of negotiating all that. (Ruth, Interview 2)

Without students and the school schedule to structure the day participants reported learning to manage work responsibilities differently than they had in the classroom. The transition to managing their own time was more difficult than anticipated for participants. Beth described the “flexibility as somewhat burdensome” (Beth, Interview 2) because she had to learn to say no to some things as she established
priorities. Other participants commented that they felt a loss of control or autonomy due the changing priorities one might experience over the course of a day or week. Abigail reported that she had enough time over all to do her work, but that it was poorly scheduled, that everything came at once.

Flexibility of working hours was mentioned equally as much by participants as a benefit of their role. While district-based science specialists reported learning how to manage their own schedules, they also reported the flexibility to take care of their basic needs during work hours. Many participants stated this idea of flexibility extended to the weekends, too. William reported this about his supervisor: “[My supervisor] has said on the weekend that’s family time... to be healthy so we can be supportive [during the work week], turn it off during the weekend…you can’t do that as a teacher” (William, Interview 2). William reported that this was quite different from his work as a classroom teacher. Planning and grading took up much of his weekend time. Several participants mentioned that in the district-based role they could schedule an appointment during the day and work later in the evening or on the weekend. Teacher participants reported “more flexibility to…go out to the school when they want or need to rather than being tied to the classroom and only having…ten minutes to scarf your lunch down and eat, you know, or go to the bathroom” (Regina, Interview 2). Time for a work-free lunch and the opportunity to use the restroom when needed, not in the bell schedule was reported as a “benefit” (Matthew, Interview 2) of the district role.

**Affiliation to the position.** Most participants reported some type of personal connection to the position that influenced their decision to apply for and accept the
district-based work role. Most participants were science teacher leaders in their districts prior to the transition, and knew someone who was in the same or a similar role through that experience. In addition to this connection many participants reported they were specifically invited to apply for the position by these contacts. Several participants mentioned family member’s encouragement and their longevity with the district as such a connection. Two participants, one teacher and one administrator, reported a strong personal interest in the role as a factor connecting them to the position even before they applied for the job. This characteristic of the transition further establishes the relational nature of the role.

*Role definition.* Most participants reported issues and examples around the lack of definition of the district-based science specialist role. Teacher participants spoke about being asked to do things that were not in their job descriptions, figuring out how to deal with their administrator—and how that person defines the work, and not knowing how the district operated. Several reported experiencing a sense of frustration as they came to understand the district’s systems. Though there is overlap with adjusting to the district role, the majority of participants reported not being clear on what it was they were supposed to be doing—even when they had a job description. Regina put it this way, “I didn’t know exactly what I was going to be doing or if I would…know how to do the things that I was asked to do” (Regina, Interview 2): this after she had worked with the science team as a teacher leader, been encouraged by them to apply for the job, interviewed for and accepted the position. Seeking clarity around job expectations was reported to be a common experience upon role entry. Many participants, especially the administrators, described classroom
teaching as very well understood. Darius put it this way, “…there is of course just the confusion of what is my job, because it’s not the most well-defined job at all. Being a teacher is very straight-forward of what your duties are” (Darius, Interview 2). Matthew told me this story that described the tension individuals new to the district-based science specialist role experience in contrast to classroom teaching:

A colleague new to the role asked, ‘Am I even close to being in what I should be doing?’…when you’re teaching you get immediate feedback eight hours a day…and if you are…continuing to use some formative assessments or have the student responses, you’re continually getting feedback and you know yeah, here is my learning outcome for the day, and I know when I’m done whether the students got that or not. You don’t have that [in this role], and I think it’s worse because we don’t have a job description. We don’t even -- we don’t have anything to go by to say am I doing what I should be doing. And so there’s just this whole redefinition of whether I’m capable and adequate and doing what I need to do. (Matthew, Interview 2)

As suggested by Matthew, redefinition of what it is to be a teacher is a challenging part of the transition to work as a district-based teacher. Typical measures and indicators of success in the classroom were reported as not applicable to the district role.

**Professional learning.** Participants also reported the opportunity for professional learning came with the territory of the district-based science specialist role. Professional learning in the role encompassed learning that was needed to be effective in the position, and learning beyond what the typical classroom teacher
received. In order to be effective and to stay ahead of the game participants reported spending time observing in classrooms. They also reported needing to be the first to know what’s coming (e.g., new standards and assessments or district policies that may impact science teachers). The perspective gained from both activities allowed district-based science specialists to “think about what aspects of this are important for the work of teaching, and then think about how to work with teacher leaders and teachers to help them to implement those standards and assessments” (Edward, Interview 1).

Many participants described how they felt they were strong teachers when they started and how they were further “professionally developed” (Serena, Interview 2) by being in the district-based science specialist role. In this role, district-based teachers were “freed up to attend more conferences” (Alex, Interview 2) and participate in learning opportunities outside of the school district related to curriculum, content, and pedagogy. They also reported the opportunity to learn about “the bureaucracy or system of a school district” (Lisa, Interview 2) as a component of this professional development. Participants reported learning “a lot about leadership” (Matthew, Interview 2), including how to work with adults. Many reflected the sentiment that they now “could be a really good teacher” (Lisa, Interview 2). Gus stated that professional learning was a clear gain of the transition to the district teacher role:

…I was extremely active as a classroom teacher, but the PD I’ve been able to get and the conversations I’ve been able to have and the thinking I’ve been exposed to, the opportunities for grants, to teach at the college level, all of
those things would not have come at all if I would have stayed in the
classroom. (Gus, Interview 2)

Participants identified professional learning as a hallmark of gaining experience in the
district-based science specialist role. This development of depth of knowledge in the
position is suggestive of distribution of leadership and the development of teacher
leadership.

The profound impact of the transition. The transition from science
classroom to district-based science specialist affected the teachers in a variety of ways.
Generally the transition was met with a supportive reaction from colleagues and
constituent teachers. There were comments from the science teachers about “going
over to the dark side” and “drinking the Kool-Aid” (Matthew, Interview 2) that were
regarded as expected, and at the same time there was the reported sense that
constituent teachers were appreciative, if not somewhat surprised, by the role
transition. Most teacher participants reported the story of their role transition factually
and without emotion. However, four participants described the transition as a loss,
often with great emotion. Marie described the transition as a “more profound loss than
we were expecting” (Marie, Interview 2). This personal impact suggests the blurring
of the lines between professional and personal identities.

Based on their own stories, the reports of the reactions of others, and the
aggregate data, teacher participants experienced two types of transitions from the
classroom: purposeful transitions and abrupt transitions. Purposeful transitions were
deliberate, anticipated, and planned for. Seven of the teacher participants experienced
purposeful transitions. Abigail, for example, had completed her personal commitment
of five years in the classroom, was reflective and seeking, and was well connected to the district’s science department due to her personal connections and teacher leadership work. William was clearly in a reflective and seeking mindset. He was interested in the position from the time he learned that such a role existed, and despite family pressures to seek an administrative position he “held out” (William, Interview 2). The teachers who experienced the purposeful transition did not report significant loss or disruption to their lives.

The other four teacher participants experienced abrupt transitions. These transitions were at the extreme end of a school year, just before the student start day, or weeks or even months into the school year. Though she had the summer to anticipate the new role, Regina reported that actually deciding to take the job was a sudden decision at a critical time. Regina brought up this sense of pressure to make a decision during the last student days several times in both interviews. Teresa, Marie, and Edward each faced abrupt changes just before or during the early months of the school year. As discussed earlier, Marie applied for, was offered, and accepted the position during the prep week before students began. At the time she was immersed in classroom preparation and sharing her biology expertise with other teachers. Edward reported that he could see the writing on the wall in his teaching position and after the school year began informed his then principal that he was looking for a position more focused on working with adults. Within two weeks he left the classroom and began work at an educational service district in his area. Teresa’s story of transition, also discussed earlier in this chapter points to organizational conflict. Teresa was offered the instructional coach position in January of the previous school year. She reported
the paperwork had been finalized and that she had anticipated her new role as the summer progressed. Teresa reported that she was obliged to begin the next school year in the classroom because her principal was reluctant to let her go. This resulted in a transition that was both personally and professionally difficult for her and for the students in her science classes. Teresa described wavering commitment to her science students; knowing she was going to leave she did not give them one hundred percent, which she questioned. Abrupt transitions were reported as difficult for both the participants, their families and colleagues, and in cases like Teresa’s students, too.

**Surprised to savvy: Evolving professional identity.** This study focused on the district teacher role and several questions established participants’ commitment to their identity as a teacher. In order to establish context, Interview Two began with a short exchange around professional identity: participants shared their ideas of professional identity and were then provided the research description (Appendix E: Interview Two). Though a couple of participants stated they had not considered professional identity before, the majority of participants defined professional identity around both individual and organizational terms, how they saw themselves and their role within the district. In her description of professional identity Marie discussed professionalism (a topic several participants brought up), competency, and the difference between classroom teacher identity and the multiple perspectives she takes in the district role:

Professional identity is how you present as a professional. And...what skills you're bringing to whatever it is you're doing and what knowledge you're bringing to whatever it is you're doing. And it would be completely -- although
all part of the same thing…completely different depending on which group you're with…Especially in this [role], whereas I think as a classroom teacher it was like…I was a teacher and there’s just like one identity and now it’s different depending on if I’m at one of my schools or at the district office or meeting with the, you know, the STEM TOSAs. (Marie, Interview 2)

For Marie, interacting with the STEM TOSAs would bring out one facet of her professional identity but working with a science teacher group would bring out another. These day-to-day or hour-to-hour micro-transitions are different from what might be expected when discussing professional identity with a classroom teacher.

Bernadette was the only participant to suggest professional identity was indicative of global identity: the “culmination of who I am…credentials, experiences this far, personalities, belief statements… I think those kind of come together to…shape my professional identity” (Bernadette, Interview 2). Several other participants, including Evan’s reported driving force of social equity, indicated their personal identities as cornerstones of their professional identity.

Participants, both teachers and administrators, demonstrated an initial high degree of commitment to teacher identity when asked about their sense of self as a teacher in the district-based role as compared to classroom teaching. 13 of the 17 participants reported they saw themselves to a high degree as a teacher, including four of the six administrators. Three participants indicated they saw themselves partly as teachers in the district role, and only one (an administrator) stated she definitely did not see herself as a teacher.
Questions about returning to classroom teaching and taking on administrative roles further established levels of commitment to teacher identity in this study group. Six participants indicated high commitment to teacher identity through their responses: they would whole-heartedly return to classroom teaching. Five others answered in the affirmative; of these several indicated returning to classroom practice would take some getting used to again or that they had specific preferences for schools. In this group were two administrators who reported they would seek positions in higher education, not K-12 classrooms. Four other participants, three of whom were teachers, clearly stated they would not return to the classroom. This indicated low commitment to teacher identity. Additionally, two participants—one administrator and one teacher, both male, reported they were the breadwinner of the family and that financial considerations were a major factor in their negative response. Both reported if money were not an issue they would return to the classroom, therefore actually suggesting they maintained high commitment to their teacher identity.

Five of the six participants in the administrator group held administrative degrees and licensure. After two years in the administrator role, Juliette reported since administrative licensure was not a position requirement she would not pursue it. She further reported felt she maintained better relationships with the science teacher group with out administrator certification. Of the teacher participants, only one participant reported she might consider seeking administrative credentials in the future. She reported learning a great deal from her current supervisor opened up this potential to her. Though she was not sure if she would pursue administrative credential, she reported even considering this was a big shift in her thinking. Most teacher
participants reported that going into administration was just not something they were interested in. Most teacher participants shook their heads “no” when asked the question and emphasized their feelings with quick negative responses. Edward responded in this manner:

No. No. Absolutely not. When I was teaching…I saw how my principal was spending time and…he was spending too much time doing things that I would not want to do. And he was not spending enough time, and not as a high a level working with teachers to make teachers better…developing systems to help teachers work with each other. He wasn’t doing enough of those kinds of things. That’s what I want to do. Those kinds of things. The principal has to do so much…So I want a specialist job where that’s entirely what I’m doing working with teachers and for teachers. (Edward, Interview 2)

Edward’s comments further substantiated his commitment to the district teacher role. Though the stated belief for both teacher and administrator participants indicated high commitment to teacher identity, when considering all relevant data the administrator group indicated much lower commitment to teacher identity than the teacher group. The findings presented establish high degrees of commitment to teacher identity from the teacher participants and markedly lower degrees of commitment to teacher identity from the administrator participants.

Commitment, as described above, framed the exploration of evolving teacher identity as teachers moved from the classroom to district-based roles. Participants described their evolving professional identities in several ways over the course of Interview Two: they directly reported how they viewed their evolving professional
identity describing themselves as novice then credible practitioners in the district-based role, and they described key events leading to this point in their careers.

Though participants used a variety of unique descriptors to portray themselves as novices in their roles, there was remarkable consistency in the optimism and trepidation they expressed. Looking back on their experience participants reported beginning their district-based roles eager, unsure, hopeful, partially skilled, and overwhelmed. Bernadette stated, “I was really naïve to the roadblocks with the red tape, if you will, and the politics that came along with this position” (Bernadette, Interview 2). Matthew reported:

I was just hoping I could make a difference. I was hoping that I could bring a level of respect to the teachers that I was working with…at that time they would feel somewhat appreciated. I was hoping that I’d be able to make that kind of a difference. (Matthew, Interview 2)

Experience in the role led to greater confidence, compassion, practicality and knowledge. Many participants reported knowledge of how the system works, understanding when to exert themselves and when not to. Ruth said with experience in the district-based role came the sense that “I have a better idea of what I think I need to do” (Ruth, Interview 2). Regina’s depth of understanding with 20 year’s experience in the district role is demonstrated by her description of the word compassion:

...you have to be sensitive to teachers, where teachers are coming from…basically giving them the benefit of the doubt…You can’t assume they know something or don’t know something…you walk a fine line and…from
experience, it’s always better to be on the side of…being their ally, being their friend… (Regina, Interview 2)

Giving teachers “the benefit of the doubt” (Regina, Interview 2) and not making assumptions about their experiences or knowledge suggests moving beyond a deficit model of viewing teacher practice. This subtle acknowledgement of distribution of leadership, where both district teacher and classroom teacher might join together in support of one another, was reported by many participants at the end of Interview Two where many shared their thoughts on the importance of the role.

Analysis of the three-word descriptors also indicated that with experience in the role participants extended their influence directing their work towards personal goals, or a personal agenda. Examples of this are feeling “concerned and competitive” (Teresa, Interview 2) regarding science test scores and “looking for greater accountability” (William, Interview 2) in science instruction in the elementary grades. Established in the district-based teacher role and with ten years until retirement, Edward described his individual commitment to equity work:

…my whole career as a professional developer, I’ve been learning about different aspects of equity and diversity…I don’t want to get to the end of my career and be disappointed about [not]…working on equity and diversity. I want to actually do something about it so I’m not waiting for people anymore. The Next Generation Science Standards were constructed with equity and diversity right from the get-go, so I have a leap in learning and talking publically about this… and starting to put that into play exclusively in my work with teachers. (Edward, Interview 2)
Exertion of personal goals into one’s work as a district teacher, such as Edward’s passion for equity, may indicate a more complete transition into the new role.

When directly explaining the ways in which their professional identity had evolved since transitioning to the district-role, participants described moving from novice practitioner to a credible person in the role, from my-way-as-teacher-is-best to seeking what works for all, and from distance regarding the role to seeing one’s self in the role and understanding how other see them. Moving from novice to credible practitioner was reported as understanding the district’s systems and procedures. This also involved acceptance of the leadership role and its accompanying positional authority. An aspect of this was to acknowledge the changed relationship with teachers.

Many participants described the shift away from thinking they were strong classroom teachers and that constituent teachers should learn to teach like that. Participants described coming to the understanding they could provide teachers with the opportunity for leadership development, focus on teacher professional development in general, and focus on science content. This involved translating those skills into professional development at an adult level, letting “go of the idea that I was going to be working with kids, and now my locus of control was going to be the teachers” (Gus, Interview 2). In this transition participants reported they learned how to provide space for constituent teachers to become their best. They also reported the importance of forming partnerships with teachers and teacher groups based in science content, something they all had in common despite their different roles.
A large part of the evolution of professional identity accompanying the role transition from classroom to district-based teacher was described as coming to see one’s self in the role and accepting what others see. Lisa described not being sure she was prepared for the role, which was new in her district. By providing professional development sessions to fellow science teachers Lisa stated: “…I [now] own my role and I think I see myself as somebody who does exactly that. Supports science education for high school in our district. And I think that a lot of the people I work with also view me as a resource” (Lisa, Interview 2). Through becoming “a resource” (Lisa, Interview 2) for district teachers, Lisa’s understanding of her identity expanded beyond that of classroom teacher.

Both Beth and Bernadette spoke about evolving identity as awareness of public image in a leadership role. Both commented about the need to be careful with their speech. “I can’t just kind of speak candidly…off the cuff…I have to bite my tongue sometimes so my head’s not rolling down the hallway, you know” (Beth, Interview 2). Being mindful about one’s speech suggests understanding the district-based role and how to operate within it.

Another aspect of identity evolution was reported as a changed sense in feeling responsible for individuals. Ruth described feeling really responsible for the students as a classroom teacher; the responsibility she described in the district teacher role was working with adults and sharing information or working on projects. Ruth suggested that the level and type of responsibility in the district-based role is different than the classroom-based teacher role. Most participants also described a change in perceived responsibility and access to higher-level district leadership. Teresa reported that in her
role she could now participate in principal meetings, meetings that as a classroom teacher would have been outside her scope of access. She told me, “People see me in more of a leadership role even my interaction with the science coordinators…just the hierarchy is different now” (Teresa, Interview 2). Evan, too, reported feeling that he was on more of a peer level—particularly with the principal group. The manner in which others saw the participants was reported to affect self-perception and evolving identity in the district teacher role.

The evolving professional identity of participants in this study is very much situated in how the individuals see themselves within their organizations. This is reflected in the key events participants reported as ultimately contributing to their identification with their district-based roles. Three categories emerged among the many events and experiences participants described as pivotal in their careers: relationships, personal learning and teacher leadership, and doing the role. Many participants reported a particular person with whom they had an influential relationship. This experienced other, often a principal, identified and encouraged leadership capacity in the participants. The recognition these individuals provided were often the nudges that led to further professional learning or teacher leadership. Ruth explained, “I had lots of people along the way saying you’d be really good at that. You should try it…And so that encouragement helped provide confidence and stepping out of my comfort zone and saying oh, you know, maybe I will try that…” (Ruth, Interview 2).

Professional learning and teacher leadership were key experiences reported by most participants. Presenting at state and national conferences, being part of
professional organizations, working with others in similar roles, and acting as science department chair all were reported. Juliette reported the following: receiving National Board Certification (NBCT), becoming a facilitator for NBCT—teaching adults in that role, and acting as a curricular leader on district and state committees. She also reported a health issue as a key experience. She said, “in a personal way, then it was kind of like, well if you want to do something you should just go ahead and do it… not just think that you can’t…that there are roadblocks and things—and go ahead and give it a try” (Juliette, Interview 2). Several others reported more personal events as circumstances that contributed to the shaping of their professional identity. While personal learning and teacher leadership provided the individual the resources and capacity to enact the role, more personal experiences influenced evolving professional identity, too.

For a number of participants actually doing the role was reported as the key event that led to more fully integrating and accepting the identity transition. Interestingly, it is the some of teacher participants who experienced the abrupt transitions who reported that the actual doing of their roles and functions were significant in their evolving professional identity. Doing the role was described as initiating a successful professional development session and receiving positive feedback from teachers, meeting with teachers and handling a confrontational principal, and working with other content specialist and thinking of new ways of sharing information with teachers. Lisa reported that delivering three NGSS professional development sessions for teachers very early in her work as science specialist “helped me learn…this is my role” (Lisa, Interview 2); actually doing the
work of the role helped to ground Lisa in the role transition and become a district teacher. Lisa described her evolving professional identity as in tandem to the evolving role definition of her position, which—along with the entire science department—was newly created. As mentioned earlier, Lisa spoke of how she came to identify herself as a secondary science specialist seeing herself as a person who provides support for high school science education in her district. Lisa’s expanded view of both how she sees herself and how others see her is an example of evolving identity. Lisa went on to provide further examples of how she saw herself as a resource for teachers in the district:

…when I work with teachers and administrators and anyone to either work on a science pedagogy or just work on disseminating information or getting feedback…I feel like I’m not so much their teacher, I’m a resource…I’m not teaching all day. I have time to learn about this stuff. I have time to think about the best way to present it. I have time to support people…more and more teachers in the district are viewing me that way. (Lisa, Interview 2)

Though Lisa, like all of the teacher participants, was on a teacher contract, what she did as a district teacher was quite different from what a classroom teacher does on a daily basis. By doing the role Lisa, like Marie and several other participants, reported becoming a district teacher.

The collective experiences of the individuals in this study provide further understanding of the process of becoming a district-based science specialist, and the affect that has on one’s identity. Taken with the organizational perspective of a more complete picture of the district-based science specialist has been established. Those
who became teacher science specialists seemed to experienced classroom exit in a
different way from those who ultimately became administrator science specialists.
Regardless of teacher or administrator role, there are common features or experiences
of the transition reported by participants. The nature of the transition was reported as
influencing the process of role transition. Additionally participants reported different
experiences that ultimately allowed them to identify with the role transition. There was
much of interest in the findings detailed in this Chapter. These are discussed further in
Chapter Five.
Chapter Five: Discussion

The purpose of this study was to explore the changing role of teachers and—utilizing both individual and organizational perspectives—to define the role of district-based science specialist through a qualitative examination of the role transition from science teacher to district-based science specialist. In this chapter, the findings are first reviewed then discussed through the lenses of the major topics in the literature review, including the theoretical frameworks.

Summary of Findings

To answer the organizationally focused research question *In what ways does the job description align with the district-based science specialists’ perceptions of roles and functions of their position?* and to define the district-based science specialist role multiple sources of data, primarily from Interview One, were utilized. Data established two distinct district-based science specialist roles: teacher science specialist and administrator science specialist. In their responses the two groups demonstrated different levels of commitment to the teacher role and to teacher identity. The teacher group consistently responded in the interviews with a high degree of commitment to the teacher role and teacher identity. Depending on the question, the administrator group responded differently. For example, when asked *Considering your overall sense of self, how much of yourself is “teacher” as compared to when you were in the classroom?* responses tended to demonstrate commitment to the teacher identity. When asked about returning to the classroom as a teacher, responses tended to demonstrate low commitment to teacher identity. The lack of consistency in
responses suggested, overall, a lesser degree of commitment to the teacher role and to teacher identity.

These district-based science specialist roles have distinct job descriptions, different job qualifications, different roles and functions—identified by both the job description language and research participants’ reported experiences. Primary roles and functions of the teacher science specialists identified by this study are forms of teacher support: working with curriculum and content materials including working with district science kits programs and facilitating materials adoptions; creating, developing, and facilitating professional development for a variety of audiences and settings; and acting as instructional coach or mentor to other science teachers. Administrator participants reported primary roles and functions of the position to be providing district leadership, working with partnerships (often including grant writing), participating in a variety of district and department meetings, and working with the budget.

Qualifications for the roles, as reported in the job descriptions, were different in the area of leadership expectation and teaching experience. Many of the teacher science specialist roles required five years teaching experience while only one of the administrator job descriptions had this requirement. Language in the administrator job descriptions made clear the position was one of district leadership; while the teacher job descriptions contained mentions of leadership only in reference to work with teacher leaders or district leaders. There was greater congruency among the teacher science specialist job descriptions, qualifications, and participant roles and functions than the administrator positions.
Though there is much that is unique to both types of district-based science specialist, they have one reported feature in common: both groups reported receiving no formal job orientation or professional training specific to their district-based science role. One administrator described entry into the role as “trial by fire” (Bernadette, Interview 1). Abigail, a teacher, described it as, “You just get hired and get going, get rolling” (Abigail, Interview 1).

To answer the individually focused research questions *How do district-based science specialists describe navigating the process of leaving the science classroom and transitioning into the district-based science specialist position?*, *How do district-based science specialists describe the impact on professional identity following the transition from classroom science teaching to a district based science specialist positions?*, and *What factors do they identify as influencing their evolving professional identity?* multiple sources of data, primarily from Interview Two, were utilized. Data were explored through the perspectives of role exit theory and features of social learning theory. Findings illustrated that the complete process of role exit was not fully manifested by participants in this study. For teacher participants, the doubting stage was identified as personal reflection, often leading to clarification of goals and professional growth. Another aspect of the doubting stage was the germination of an idea seeded by an experience or influential other. Three participants reported competing identities—often related to family as a form of doubting. Seeking alternates—the second stage of role exit—was also not identified to a high degree in this study. Examples provided were more strongly tied to commitment to the teacher role and aspects of personal reflection, often in response to personal crisis (e.g., a
health situation). Turning points were identified as sudden changes leading to an abrupt transition or clarity of goals leading to a purposeful transition. Creation of the ex role was not evidenced by any teacher participants.

Administrator participants described their exit from the classroom in a different manner and for the most part did not demonstrate the predictable stages of role exit theory in their transition to the teacher science specialist role. Analysis revealed the doubting stage as following the suggestion of the influential other and seeking growth or professional challenge.

Also not evidenced strongly from the data were characteristic elements of social learning theory. Legitimate peripheral participation and boundary spanning were very infrequently coded in the data for administrators. Boundary spanning was identified in the teacher data; some of which was later identified as brokering. Teacher participants described boundary spanning as bridging communities via expertise and relationships. The teachers also discussed the tensions of boundary spanning.

Examining the impact of the role transition led to the identification of two types of transition from the classroom: purposeful transitions and abrupt transitions. Reflective doubting, or doubting that led to clarification of professional goals and growth, characterized purposeful transitions. Transitions that were made at the extreme end of the school year (the last few days with students, during the preparation week before school, or even after the school year had started) characterized abrupt transitions. Purposeful transitions were identified as easier on the participant. This type of transition was planned for, managed, and anticipated; still challenging, but not disruptive. Abrupt transitions were identified as more personally disruptive and
professionally challenging. Abrupt transitions occurred at a critical time, under a quick timeframe, and are disruptive to teacher and others, including students, schools, and families.

Issues of role definition seemed to compound the difficulty of abrupt transitions, perhaps because the individuals who experienced purposeful transitions had time to imagine themselves in the role and explore the role before stepping into it and those who experienced abrupt transitions did not. Regardless of type of transition experienced, participants were led to the district-based teacher science specialist leadership role mainly on three paths: through an influential relationship/accepting the suggestions of others, through personal learning and teacher leadership, and by actually enacting the role.

The study also established seven characteristics unique to the transition from classroom to district-based role. These were common experiences or features of the role transition as reported by participants.

- Adjusting to the district role involved questioning as to whether the decision to leave the classroom was the right one and a general sense of being overwhelmed. Adjustment included learning to negotiate the district’s systems and politics.
- Establishing leadership included dealing with the changing relationship with constituent teachers.
• The idea of lost connections was most frequently reported as coming to terms with no longer working with students or having a sense of community such as a school or grade-level/subject team.

• Most participants reported needing to adjust to the flexibility of time usage in the district-based position; creating and managing one’s own schedule was contrasted with the structure of the classroom routine. A component of this was adjustment to what might be considered a professional schedule (e.g., one could schedule a dental appointment during the workday and make up the hours by coming in earlier than usual).

• Participants reported being “professionally developed” (Lisa, Interview 2) in the district-role beyond what they would receive as a classroom teacher, even though they also reported no job orientation or training upon entry to the role. Examples of described professional development were time to research, read, and attend conferences.

• Issues of role definition occurred for many participants when they began the district work. As Regina and Matthew reported, many participants did not know exactly what they would do in the role, even after accepting then position.

• Finally, all research participants reported some affiliation to the position before they became established in the role. Examples of this were aspirational alignment with the role or being invited to apply for the district-based position.
All of the features just discussed are areas where professional identity might be affected. The role transition in its entirety may contribute to evolving professional identity. Participants in this study described their evolving professional identity as moving from novice to credible practitioners in the district-based role. In the early stages of their district work they recognized themselves as expert teachers and pursued direct translation of their skills to the science teacher group thinking what worked for them in the classroom would bring success to others. With experience in the role several participants described how they learned to meet the needs of the wide range of experience and knowledge between their teacher and administrative audiences. Many participants reported a shift in their professional identity when they came to accept their position of leadership and authority in the district teacher role. Most often it was the doing of the role (e.g., leading workshops, coordinating materials, meeting with teachers) that led to this shift.

**Teacher Leadership Findings: Literature Connections**

Teaching itself is a nuanced art, so it is not surprising that the concept of teacher leadership is best defined along the informal to formal continuum by example. Educational leadership itself is changing; the traditional hierarchical model simply does not provide room for broad based teacher leadership. While the nature and purpose of distributed leadership must be examined and intentionally put into practice, it offers a promising option as school leadership shifts from private classroom practice to shared school endeavor (Lieberman & Miller, 2004, Spillane, 2005). Teachers in this study are certainly teacher leaders by virtue of their district-based positions. Though the district teacher position may not come with traditional decision-making
authority or power, as the administrative science specialist does, these teachers are leaders: their roles and functions include most of those identified by Harrison and Killion (2007). Yet, teacher participants did not ever explicitly state, “I am a leader,” nor was the expectation of leadership explicitly set in the teacher job descriptions. Acker-Hocevar and Touchton (1999) suggested that accepting leadership must come from the teachers, even as it is established as a growing expectation by districts, researchers, and state and national certification efforts as discussed in Chapter One (e.g., Barth, 2001; Teacher Leader Model Standards, n.d.).

The preparation and experiences teacher respondents reported suggests alignment with York-Barr and Duke’s (2004) assertion that teacher leaders are experienced, effective in the classroom, and ready to give back to the profession. York-Barr and Duke (2004) in their landmark definition suggested “teacher leadership is the process by which teachers, individually or collectively, influence their colleagues, principals, and other members of school communities to improve teaching and learning practices with the aim of increased student learning and achievement” (pp. 287-288). In this study the latter was not reported to a high degree. Student outcomes were identified in some of the teacher job descriptions, but were mentioned by only a few participants. Both teacher and administrator job descriptions had numerous examples of leadership. Teacher job descriptions listed such duties as working with teacher leaders and designing and facilitating professional development sessions. Administrator job descriptions listed such duties as providing leadership to various committees and district initiatives and to coordinate and support professional development. Only the administrative job descriptions consistently used the language
of leadership. Such language places traditional power and authority within the administrative science specialist position but not the teacher position. The focus of teacher leadership reported by the majority of the teacher participants was attention to making the transition into the leadership role, to supporting teachers with content materials and curriculum, instructional coaching and mentoring, and professional development (Teacher Leader Model Standards, n.d.).

The professional experiences teachers in this study reported were certainly examples of teacher leadership as distributed leadership. The interaction between individuals and their situation in a social environment is essential to both learning and distribution of leadership (Spillane et al., 2001; Wenger, 1998). The practice of distributed leadership is attendant to the “product of the interactions” (Spillane, 2005, p. 144) of members rather than on structure, roles and functions. Distribution of leadership is contributing to changing the role of teacher. This effort is being led both from teachers and from other influential stakeholders. The continuum from formal to informal teacher leadership, and identifying from whom leadership is initiated, is itself recognition of distribution. All of the participants reported various activities indicative of both informal and formal teacher leadership in both their current work and prior to their transition to the district role.

Teacher leadership as distributed leadership is as Hargreaves and Fink (2008) described a series of “self-organizing networks of communication” which “foster creativity, imagination, and innovation” (p. 230). In this sense Edward’s clarity of preference in working with teachers (not students), Marie’s and Lisa’s working into the role, and Matthew’s creation of his own role definition are all forms of distribution
of leadership that move beyond traditional conceptions of authority and power (Teacher Leader Model Standards, n.d.). At times an individual leads and at times they follow depending on skills, needs, and capacity. The context of distribution of leadership is important to consider. Participants in this study may not recognize their role in distributed leadership because they might not yet identify themselves as leaders (Acker-Hocevar & Touchton, 1999) and they may be working in districts whose leaders may not understand the systemic applications of distribution; common educational applications of distributed leadership are often structural and mechanical rather than an intentional practice (Hargreaves & Fink, 2008). It may be that changing interactions at the district level, especially as upper administrative roles continue to expand, will continue to shape leadership overall into a more complete process of distributed leadership allowing the expertise and influence of all to be more fully realized.

Much of the research literature examined teacher leadership from a school-based organizational perspective. The York-Barr and Duke (2004) review identified seven domains of teacher leadership. Four of the domains (coordination and management, curriculum, professional development, and work with professional organizations) were reported as roles and functions of the position by participants in the district-based teacher science specialist roles. Two additional domains seemed to have comparable district-level associations. At the district level, the school improvement domain might be working with district initiatives and the family and community domain might be working with partnerships. While several participants reported teaching preservice teachers at the university level, the domain of work with
preservice education seemed to be the least evidenced domain in the study findings. While teachers in the district role did not report working with student teachers via a traditional classroom placement one administrator did report working with someone doing an administrative practicum. The domains established in the York-Barr and Duke (2004) review have much in common with the roles and functions of teacher leadership reported in this study. Yet while the York-Barr and Duke (2004) definition of teacher leadership acknowledges teacher leadership as a process, its organizational perspective leads to a focus on the what of teacher leadership rather than exploring the how, the process of becoming a teacher leader. This study extends the work by exploring how and establishing common features of the process individuals’ experience when becoming teacher leaders, especially at the district level. While Interview One attended to the roles and functions of the positions, Interview Two focused on the experience of the individuals as they made the transition from classroom teaching to formal teacher leadership based in the district.

It is suggested that as our society changes, teaching and learning need to change from technical structures to relational leadership (Arwood, 2011; Hulpia & Devos, 2010; Lieberman & Miller, 2004; Spillane et al., 2001). Collaboration and teacher voice, relationships, and clearly defined roles were identified from the literature as factors enhancing teacher leadership (Acker-Hocevar & Touchton, 1999; Clarke, 2013; Hulpia & Devos, 2010; York-Barr & Duke, 2004), and thus seem essential to successful distribution of leadership. Some teacher participants were part of the district science team; others were the district science team. Research participants reported collaboration to varying degrees. Some had supervisors with
whom there was frequent contact and interaction. Others reported finding opportunities for collaboration with content specialist from other departments or with constituent science teachers. Several participants reported feeling isolated, geographically and socially, from teacher peers including former coworkers. Without collaborative relationships, district-based science teachers may not be their most effective selves (Hamman et al., 2010). Other lost connections, reported in terms of missing interaction with students and not having a team with which to identify, were voiced by most research participants. Without a community of practice within which to collaborate and establish relationships, teacher leadership will remain a structural offshoot of traditional hierarchical leadership; that is, teacher leadership may only be structural enactment of distribution of leadership. Many teacher participants reported participating in state, regional, and national professional communities. Some reported association with district specialists in other content areas, but generally professional science connections in the district role were limited to the science teacher groups whom participants supported. In this study of district-based science teacher leaders perhaps this sense of little or no community of practice is amplified. Nationally, instructional emphasis is on mathematics and literacy (Blank, 2013); perhaps district-based mathematics and literacy teachers would indicate greater evidence of collaboration and hallmarks of social learning theory as a result of greater structural support in districts.

Most participants spoke about the difficulty reestablishing relationships with teachers following their acceptance of the district teacher position. Importance of relationships in the literature is mostly focused on the principal-teacher relationship
despite the suggestion that teachers influencing peers is an essential component of
Though district teachers, such as those in this study, act as a role model or
knowledgeable other in content and pedagogy (York-Barr & Duke, 2004), the changed
relationship between classroom teacher and district teacher seems to become an
imbalanced one, at least until one becomes established in the role.

The common assumption is that a teacher outside of the classroom is an
administrator; however none of the teacher participants reported interest in such
traditional positional leadership. Despite this, several teacher participants reported the
perception that science teacher group now viewed them as administrators and
evaluators; this suggests that the current understanding of the district teacher role is
that it is a promotion from the role of classroom teacher—which, although the roles
and functions are substantially different, it technically is not. Matthew reported the
necessity of justifying to his peers that he was not an administrator by stressing that he
remained on the teacher contract, thus establishing himself relationally with the
teacher group. Indeed, the role of district-based teacher seems to be highly relational.
In many instances, findings spoke to the need for trust and relationship between the
research participants and their affiliated teachers and for the need for clarity in role
definition and expectations. Role ambiguity may be indicative of structural
distribution. Though most teacher participants expressed issues around role
definition/role ambiguity, experience in the role seemed to establish at least some
boundaries and role definition. Perhaps it is the experience of ambiguity that allows
for structural distribution to become interactional.
Clear purpose in a role would likely lead to increased function while lack of clarity, no job description for example, may lead to role confusion (Clarke, 2013; Hargreaves & Fink, 2008; Margolis & Huggins, 2012; Peacock, 2014). Technical factors are necessary organizational (Hulpia & Devos, 2010). Organizational features such as job orientation acknowledge role transition. This was seen in the role-out of both Science TOSAs (district teachers) and Lead Teachers (classroom-based) in Klentschys’s (2008) study of the Valle’ Imperial Project in Science. No job orientation, as the participants in this study reported, suggests that district leaders may view the district-based role as “just” a teacher, and make the assumption that classroom teacher experience is enough preparation for the district role. Rational/technical factors, such as how to negotiate the district’s communication system or reserve a room for a professional learning session or a clearly defined job description, are indicative of clearly defined goals. Elements such as these are also suggestive of a structural understanding of distribution of leadership (e.g., that teacher roles are equivalent regardless of setting and audience). This study has shown that the roles and functions of district-based science teachers are clearly different from the roles and functions of classroom teaching. Teaching teachers is different than teaching students.

Lack of clear purpose, including the lack of job orientation, brings the potential for the individual in the role to create de facto role definition (Margolis & Huggins, 2012). As discussed in Chapter Four, this was part of Matthew’s experience and is strongly suggestive of the high degree to which lack of role clarity can lead to crisis and possibly lack of commitment to the new role, and to defining the role by one’s self. Matthew himself suggested that his district poorly conceived the role of district
teacher. His experience, too, exemplified the lack of social construction of the district teacher role.

Professional networks with clear purpose support sharing and information transfer for participants, while networks with unclear purposes have minimal participation and do not function in an overall positive manner (Barth, 2001; Hargreaves & Fink, 2008; Peacock, 2014). Thus, it is important to consider the context under which distributed leadership is employed. For example, hierarchy among district leadership may affect the nature of distribution of power and authority in different ways. Very few teacher participants reported they had regular conversations with senior district leadership. These individuals reported a significant hierarchical structure to their school districts. Individuals such as these in district roles may experience greater isolation and greater role ambiguity in their role.

Prior literature identified both formal and informal paths to teacher leadership. Formal paths included experiences such as advanced degrees or certifications; informal paths included experiences such as participating in local or state organizations, or being identified by principal for role in school or district (often preparation for transition to administration) (Teacher Leader Model Standards, n.d.). Paths to teacher leadership were reported by research participants as relational (an influential other provided a suggestion), through personal learning or other teacher leadership (Hanuscin et al., 2012; Teacher Leader Model Standards, n.d.), and practical (i.e., doing the role allowed participants to grow into their position and title) (Gallucci et al., 2010; Luehmann, 2007).
As reported, the findings identified seven characteristics of the process of the transition to formal teacher leadership in the district-based teacher role. Though the context of prior research was different (school-based), the transition to teacher leadership has been minimally explored in instructional coaching and mentor teacher literature. Zuspan (2013) and Cataldo (2013) wrote of what they each did when feeling overwhelmed in their school-based instructional coach roles and as they re-established relationships with teachers. Clarke (2013) and Hulpia and Devos (2010) wrote of the helpfulness of role definition. To my knowledge, features of the transition to formal teacher leadership have not been synthesized previously—at the school or district level as this study did. Munroe (2014) identified common experiences of instructional coaches returning to classroom teaching, and Munroe and Driskill (2014) explored that process as Driskill experienced the transition whilst knowing about the potential stressors. Better understanding the common features of the experience of transitioning into a district-based teacher role may assist teachers as they enter into district-based work.

Identity Theory Findings: Literature Connections

In role exit theory four often non-linear stages occur as one makes the transition out of a clearly defined role (Ebaugh, 1998). Both teachers and administrators reported about their transitions from classroom teaching into district-based teacher roles for this study. As described in the summary of findings, teacher participants evidenced the first three stages of role exit, at least to some extent. The study identified only the first stage of role exit, doubting, in administrator participants. Perhaps there is a more clearly defined role exit from teaching into administration.
Creation of the ex role, the last stage of role exit, perhaps did not manifest because teacher participants see themselves as temporarily in the situation of the district-based role. This may be possible for several reasons. In order to fully commit to a role one must be secure in the position and be credible and established in the role. For classroom teachers the process of being a teacher is known and there are some basic assumptions that come with the territory, leading to both high commitment and high teacher identity as suggested by Jarvis-Selinger et al. (2010).

For district teachers the process of becoming a specialist is a poorly defined transition as there are few social and cultural expectations for the role. Furthermore, several participant teachers in this study reported not being confident they would be retained in the district role from year to year. This group was nervous because they did not know if the position would be maintained and at the same time concerned that they would lose credibility with teachers they supported if they stayed out of the classroom for too long. Their concern was not due to poor performance but from shifting district administrators and ever changing priorities, and therefore inconsistent funding. Perhaps this leads to lower commitment to the district teacher role and as such disrupts full manifestation of role exit. This aligns with Bjork and Blasé’s (2009) findings that changing priorities (and changing district leadership) and associated micropolitics shaped the district’s culture. Several participants commented on the political nature of the district role, including weathering changes in district leadership. Participants reported rearrangement of district positions, being placed under a different department, and structural changes within their departments. With this undergirding of
instability, lack of consistency and changing roles, the ex role is very difficult to establish.

Findings suggest district-based teachers must keep a foot in the classroom door in order to establish and maintain credibility with constituent teachers and to maintain their identity as classroom teachers. Unless they are clear that their path is to not return to the classroom (e.g., move into administration or leave teaching) they are unlikely to completely exit the classroom teacher role. Until the role of district-based teacher becomes more socially understood individuals currently in these positions will likely remain committed to classroom teacher identity. There is no role to exit from; it is simply a role transition—and a possibly incomplete one at that.

In roles with clear societal expectations, role residual may occur (Ebaugh, 1998). Role residual is the held over identity of facets from the previous role (Ebaugh, 1998). When considered as role residual, the lost connections reported by participants, especially missing the students, become even more interesting to consider. Social construction of the classroom teacher position may cause individuals to feel obliged to report they miss working with students as classroom teacher role residual. When describing role entry most participants expressed surprise that they did not have the opportunity to work directly with students in the district role. Bernadette spoke of removing her “rose-colored lenses” (Bernadette, Interview 2) and coming to terms that the district job was going to be different than she had anticipated. Regina told me about seeing new content specialists transition into the district teacher role. These teachers, she reported, had a difficult time around the first day of school, the much-anticipated time when teachers and students meet (Regina, Interview 2). The teacher
role has certain societal expectations and perhaps this is what teachers are conditioned (aware or unaware) to report. Edward commented that he thought many teachers would say they missed working with students. He was certainly aware of this social construction when he stated he would in public “never, ever tell people that I don’t miss working with students” (Edward, Interview 2). Edward is a teacher who embraced teacher leadership as a role, and over his career sought out opportunities to work as a teacher outside of classroom teaching because he “loves working with teachers” (Edward, Interview 2). When discussing what the future might hold Edward was most clear among the teacher participants that he would seek other options before returning to the classroom. Of the teacher participants, perhaps Edward was most successful in creating the ex role.

**Social Learning Theory: Literature Connections**

Social learning theory situates the individual’s identity within an organization. This double lens of the individual and the organization purposefully recognizes the multiple roles that contribute to the whole of one’s identity. Institutionalized role exits (e.g., teacher to principal) come with an expected path. Teachers exiting the classroom for positions other than administrative positions generally do not follow a predictable path; that is, this transition from classroom teacher to district-based content specialist is not a normalized (Ashforth, 2001) part of the teacher experience. In this case, both former classroom teachers and those around them must negotiate a new path, including macro and micro role transitions, and create a new community of practice. Outbound and inbound trajectories, boundary spanning, and peripheral—the expected means by which role transitions are accomplished (Ashforth, 2001; Wenger, 1998)
were not fully evidenced in this study. Typically gaining membership in a new community of practice such as a district-based role might involve occurrences of boundary spanning between the new role and former role. Also identifiable might be instances of peripheral participation on an inbound trajectory or limiting participation on an outbound trajectory (Wenger, 1998).

Since the district-based science specialist role is relatively un-researched it is difficult to determine what activities might be considered legitimate peripheral participation. Many teacher participants reported teacher leadership activities as experiences that prepared them for the district role (e.g., science department chair, school representative to district science meetings, presenting at state and national conferences), but one must wonder if these are necessarily precursors to the district-based teacher role.

Insignificant examples of peripheral participation were found in this study. Perhaps this is because the role is poorly defined; even in a research situation perhaps my social construction of the role limited my understanding and interpretation of the data. For classroom teachers seeking membership in a new district-based community of practice, peripheral participation may not occur—there may not be an established community in which to join, even peripherally; there may be no opportunity for apprenticeship. Lack of peripheral participation has the potential then, like poorly defined role expectations, to inhibit commitment to the new role. It is difficult to know what or how to practice if there is no community to observe, if one cannot imagine their possible selves enacting the new role (Hamman et al., 2010).
Boundary spanning in this study was identified as a function of the role, not a feature of gaining membership. In the district-based role both teacher and administrator participants reported transitioning between the world of the teachers and the world of the district office as part of their work, not as part of the process of becoming a district-based teacher. For example, Marie’s experience with the state department of education’s end-of-course assessments provided her insight into the assessments other teachers did not have. She was able to bridge the gap between the state and colleagues via her expertise. Boundary spanning involves initial establishment of relationships and voice in the new role (Ashforth, 2001; Wenger, 1999). As mentioned previously, without an established community with which to interact, even peripherally, boundary spanning as part of an inbound or outbound trajectory is difficult to identify. It seems brokering, as an entry into district-based practice, may be an initial step to membership in district communities. Serena described this form of interaction as being “the mouthpiece” (Serena, Interview 2) between district administration and teachers, and is exemplified by Matthew’s interactions as go-between the school board and the teachers over the direction the board wanted to go with the district curriculum. Perhaps it is boundary spanning or brokering that really defines the district teacher specialist role. Membership in a community of practice is established through shared work, mutual engagement, and joint enterprise (Wenger, 1998). If each of these elements remains nebulous to district-based teachers, then so will entry into their new community of practice.
Teacher Identity: Literature Connections

The process of becoming a teacher leader, like the district-based science specialists in this study, had not been explored in the literature previously, yet identity must be affected in such a role transition. Factors influencing classroom teacher identity, including commitment to the role, are well established (e.g., Beijaard et al., 2000; Cheung, 2008; Day et al., 2005; Jarvis-Selinger et al., 2010) and inform the findings here. Many prior studies focused on various facets of teacher identity and explored teacher identity though organizational perspectives (e.g., Day et al., 2005; Lasky, 2005). This study offers a baseline for further exploration of the intricacies of the processes of role transition and evolving identity.

As participants described their evolving professional identities they reported being initially concerned with gaining clarity on role expectations, negotiating the district politics, and figuring out how to work with the vast expanse of the work day without the structure of the school bell. These are examples of attending to organizational features (Acker-Hocevar & Touchton, 1999; Hulpia & Devos, 2010). With experience in the role individuals began to set their own parameters and exercise influence on issues that mattered to them, suggesting exertion of the individual’s commitment to the role and to the authority of teacher leadership. Matthew and Edward provided examples of this. As discussed in Chapter Four, Matthew initially struggled in the district-based teacher role until he decided to define his own role and act upon that until he was told otherwise or fired. Matthew accepted the power and authority, the distribution of leadership, which is a commonly unspoken feature of the district based teacher role. Matthew through the intensely personal process of
conversations with his wife about his new district-based teacher role came to his own understanding and enactment of the role. At the same time he indicated he would be just fine going back to the classroom, demonstrating commitment to both teacher roles (district teacher and classroom teacher) and to his evolving teacher identity. Experience in the role and a growing sense of legacy allowed Edward to move beyond organizational roles and functions and insert himself as a leader into equity work in his district. Such crisis (entry into the role and approaching the end of one’s career) may assist in evolution of identity (Meijer, 2011).

In the general context of both research interviews participants made little distinction between their personal and professional selves. However, when asked specifically, participants spoke about their ideas of professional identity. As suggested by Beijaard et al. (2004) the distinction made in the literature did not seem to hold true for these participants; the entirety of one’s experience impacts multiple aspects of identity development (Akkerman & Meijer, 2011; Alsup, 2006; Bukor, 2013; Zembylas, 2003). Indeed, the lines between the various aspects of self seem quite blurred in reality. Marie’s abrupt transition to the district role did not only affect her as a professional, it influenced her as a person. This suggests her global identity was closely tied to her professional identity. When she told me about how her acceptance of the district’s offer was made public, Marie explained that she received a flood of text messages from “all her friends” (Marie, Interview 2)—teacher colleagues—saying things like, “Please don’t leave me here” (Marie, Interview 2). Another colleague sent Marie a text message later that same day, in the evening, saying he was quite emotional about her decision. Like most participants, Marie spoke of her work
colleagues as close personal friends. The immediacy and personal nature of the text messages, especially communication outside of typical work hours, indicate a high level of integration between personal and professional. Such integration suggests commitment to the role and points researchers to a more holistic approach when approaching teacher identity (also suggested by Avraamidou, 2014; Bukor, 2013 and others).

Lack of clear purpose in the district teacher role and high commitment to his teacher identity seemed to leave Matthew in a middle ground regarding his current position. The whole of who he was, not only what he did in his day-to-day work, was called to question. When discussing his evolving professional identity Matthew reported trying to figure out who he was in the district teacher role. Like Marie, Matthew presented an integrated personal/professional identity. In wrestling with who he was—and considering multiple possible selves (Hamman et al., 2010), Matthew was evolving both as a person and as a teacher.

**Future research**

Future research might build on both the strengths and limitations of this study. Two distinct research populations, previously not recognized in the literature were established. Future research might further explore distribution of leadership by examining district pairs of teacher and administrator science specialists where they exist, as well as singleton district science specialists—both teachers and administrators, and the supervisors, if any, associated with those positions. Additionally constituent science teacher’s perceptions of the support offered by district-based science teachers would provide insight into the relational issues
emphasized in the literature and in this study. It might also be helpful to explore what others in the district, including those responsible for hiring, think the roles encompass. Before exploring the efficacy of such positions it will be prudent for researchers and districts to establish clear and consistent language around the various district-based roles and positions. Greater attention must be paid to the semantics of the district-based roles and titles (e.g., Science Specialist vs. Science Coordinator) in order to further establish the role of district-based teacher. Most research to date has focused on teacher identity, teacher leadership, and distributed leadership as enacted in school-based settings. The role and setting of teaching is changing, and research would benefit from following this trend.

Conclusion

Traditional teaching, that is classroom teaching, has clearly defined expectations all around. Organizationally, schools and the way they function are well understood. The same is true for the roles and functions of classroom teacher. Practicum experiences, educational coursework, and teaching certification and licensure all provide opportunities for inbound trajectory to the community of practice that is being a classroom teacher. Legitimate peripheral participation and role rehearsal in the form of student teaching are de rigueur. It is known and understood that classroom teachers span the boundary between home and school, so commonplace is the classroom newsletter or updates to the classroom blog. Individually, future teachers, through their own student experience and teachers portrayed in television and movies, have a strong sense of what is it to be a teacher (accurate or not).
District-based teaching has none of these societal and organizational anchors; so engrained is the collective “apprenticeship of observation” (Lortie, 2002, p. 61) around classroom teaching. District-based teachers, such as district-based science specialists, likely have few role models through their own educational experience. The role is poorly defined within individual districts, and when this study’s data are viewed as a whole, among them as well. Teachers are claiming power and authority by attaining National Board Certification, accepting teaching roles outside of the classroom but within school districts, and by doing what they have always done—participating in the life and governance of school buildings by chairing committees, facilitating student learning, and supporting one another. Others are distributing power and authority to teachers through the creation of teacher leadership standards, courses of study, certifications and credentialing initiatives (e.g., Teacher Leader Model Standards, n.d.).

To bring teaching into the 21st century it is the positions that teachers fill, in and out of the classroom, along with their roles and functions, that will lead to a more distributed reality or keep teachers along the same path of traditional authority and leadership. If the latter occurs many classroom teachers may face the reality of limited options for growth and evolving identity and sense of self. It is the Akkerman and Meijer (2011) expanded dichotomy of the dialogic approach and the “and” of Zembylas (2003) that might allow the research community to establish social construction and understanding of teacher leadership as an individual process situated organizationally.
Both teacher identity and teacher leadership in the literature seem to have been viewed as products or outcomes, essentially leaving the person out of the picture. This objectification and removal of the person from identity formation or leadership development is exactly what several researchers suggest moving away from (Akkerman & Meijer, 2011; Alsup, 2006; Bukor, 2013). Even though this study identified several common features of the role transition from classroom to district these are not meant to be a checklist of experiences. Rather, exploration of the changing role of teachers provides a foundation for examination of the process of role transition, including evolving identity, in teaching through the perspective that identity achievement is a uniquely human process (Marcia, 1993).

It is time for educational research to recognize that in response to our changing society the conception of teacher and leadership is changing dramatically, and to be specific about it. Just as the participants in this study described their evolving identities, the role of teacher is evolving to meet the demands of our ever-changing society. The changing role of teacher and the practice of distribution of leadership are essential to the paradigm shifts that teaching and learning are moving toward.

These shifts will lead to a new set of social structures and organizational formats for schools and district leadership, including teacher leadership (Teacher Leader Model Standards, n.d.). Research to date has suggested a framework teachers and schools can take to further enact teacher leadership (York-Barr & Duke, 2004) and recommended a “new conception of principals and the teaching profession” is necessary (Teacher Leader Model Standards, n.d., p. 28). I argue that school districts consider these changing structures and models of leadership, too, and in doing so those
who do so might set the tone for teacher leadership of the 21st century.

Organizational features may lead to greater role definition for teacher leaders in and out of the classroom, but without attention to the evolving identity of teachers—that is the process of becoming a teacher leader—the promise of the practice of distribution of leadership may not be fully realized.
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Appendix A

Initial Contact Email
Greetings!

You are invited to participate in a study that is part of my dissertation research.

This research is examining the transition from classroom teaching into various teacher leadership roles, specifically to that of district-based science content specialist. This position is identified by many titles including science TOSA, science coordinator, science supervisor, and may or may not be associated with a particular grade band.

I’m inviting you to consider participating in dissertation research that will include a brief email questionnaire, a short interview focused on your organization, and a longer in-depth interview regarding your experience as a science content specialist. The interviews will be conducted at a time and location of your convenience—on the phone or via Google Hangout. I anticipate the interview initial will take no more than 20 minutes and that the second interview will take about an hour.

If you are as interested as I am in the journey from the classroom into district level teacher leadership I would love for you to work with me on this study. Please click on the link below to complete a short survey to indicate your interest in participating and I will contact you soon.

Thank you for considering participating in this research opportunity.

Jennifer Mayo
Appendix B

Participation Survey
1. Name:

2. School District:

3. Please list the official title of your position:

4. Are you currently employed full time by your school district? Yes  No

5. Is your position focused only on science? Yes  No
   If No, what other content areas does your position focus on?

6. In the position immediately prior to your work as science content specialist,
   were you employed full-time as a classroom teacher? Yes  No

7. Best time to reach you:

8. Best method to reach you:

9. Preferred phone number for research related contact:

10. Preferred email for research related contact:
Appendix C

Research Consent Form
The purpose of this document is to provide you with information to help you decide if you will participate in this research.

The purpose of this dissertation research is to examine roles within teacher leadership. If you consent to participate, you will: complete a demographic survey, participate in a 15-20 minute initial interview focused on your school district, and a week later participate in a second interview (approximately one hour) focused on your experience. Interviews will be conducted—in person or via Google Hangout—at a time and location of your preference.

Interviews will be recorded so that I can document your responses accurately. Your anonymity will be maintained by the use of pseudonyms and the recordings will be kept under a password secured computer and stored according to the Institutional Review Board policies at the University of Portland.

There are no known risks or benefits to participating in this research.

If you have any questions about the study, please feel free to contact my advisor, Julie Kalnin, kalnin@up.edu (503) 943-7886. If you have questions regarding your rights as a research subject, please contact the IRB (IRB@up.edu). You will be offered a copy of this form to keep.

Your signature indicates that you have read and understand the information provided above, that you willingly agree to participate, that you may withdraw your consent at any time and discontinue participation without penalty, that you will receive a copy of this form, and that you are not waiving any legal claims.

I have read the above information and agree to participate in the Content Specialist Pilot Interview.

Printed name _________________________

Signature ___________________________ Date____________________________
Appendix D

Organizational Interview

Interview One
1. Describe the purpose of the content specialist position in your district. What are the roles and functions of the content specialist in your district?

2. What experiences prepared you for the work in the content specialist position?

3. What type of job orientation or professional training did you receive when you began work in this position?

4. A list of tasks you may regularly participate in as part of your content specialist work is listed below. Consider these tasks and add any other that reflect the overall nature of your work. Indicate which of the tasks below you have participated in through the course of your daily work over the last full year by placing an X next to the task, then draw a quick pie chart to the right indicating the approximate percentage of time each task takes considering your overall work. (Follow-up: After initial pie chart is complete. Is this your typical experience overall? How would you change the pie chart to show other years? What was the difference between the years? What would your ideal pie chart be for this position?)

   a. Meeting with/ supporting teachers
   b. Working with students
   c. Department meetings
   d. District meetings
   e. Curriculum development
   f. Working with content materials
   g. Email
   h. Contact with publishers, materials reps., etc.
   i. Work with local partnerships
   j. Research
   k. Development of district programming/ policy
   l. Phone calls
   m. Interdepartmental work/collaboration
   n. Creation and facilitation of professional development
   o. *Other (please list and label):

5. Based on the tasks you just described, how would you characterize your interactions with the teachers you support?

6. Based on the tasks, how would you characterize your interactions with school and district administrators?

That is the end of this interview. Is there anything else that you would like to add around your role in your district?
Appendix E

Identity Interview

Interview Two
As you know, one of the purposes of this research is to examine the transition from classroom teaching into teacher leadership. In this interview, we’ll be talking about the idea of professional identity. What does that phrase, “professional identity” mean to you?

(Follow-up with clarification based on response: “When I use that phrase, I’m thinking about ______ ideas you just mentioned, like the roles a person takes on in the work setting. I’m also thinking about how people see themselves within the organization and how they think others see them. One of the important aspects of this way of thinking about professional identity in terms of this interview is that sometimes, individuals feel there are ways they are supposed to feel about the work they do. For this interview, I’d like you to be as honest as you can about how you regarded your professional roles and the changes in your professional roles, identifying both how you looked on your role change and how others perceived it. Does this way of thinking about professional identity make sense do you have other questions about defining professional identity? )

1. Tell me about what led you to become a teacher. In the questionnaire you told the story of…
   • (Use as necessary as a follow up to the study questionnaire.)

2. How did you become interested in the science content specialist position? Tell me the story of how you came into the science content specialist position.
   • What factors contributed to this decision?
   • Tell me about how you felt leaving the work of classroom teacher.
   • What are your plans for the future?

3. How do you respond when asked, “What do you do?” Will you please describe your role/position to me as you might describe it to a new acquaintance?

4. Considering your overall sense of self, how much of yourself is “teacher” as compared to when you were in the classroom?

5. Have you known other people who have moved into a content specialist?
• Y: When an individual transitions from the classroom to content specialist work, what types of changes—personal, professional, organizational—have you observed taking place? (Follow-up: From your personal experience and from watching others enter content specialist work, what are common features of the transition?)

• N: From your own experience starting this transition, what types of changes took place for you—personally, professionally, within the district/organizationally?

6. What was/is the reaction of teacher friends and colleagues as you transitioned from the classroom into content specialist work?

  • Follow-up: What gains and/or losses did you experience in this transition? How did this influence your professional identity? How did you respond to those reactions?

7. What three words would best describe you as a novice content specialist? Why? What three words would describe you today?

8. Since beginning content specialist work until now, how would you describe your evolving identity as a professional? How does this identity relate to your identity as a classroom teacher?

  • If NEW content specialist: In what ways was your professional identity shaped by your experience in the classroom? How do you see that relating to your identity as a content specialist?

9. What key events or experiences would you see as pivotal experiences or landmarks in your development into the role of content specialist?

10. In what ways do you experience success in your work?
• Follow-up: How do you define success? To what extent would you say you have a sense of success in your role? What are your obstacles, and what would help eliminate those?

11. To what extent would you say you held guiding principles or a philosophy of teaching when you were in the classroom? Do you have a philosophical or theoretical outlook to your content specialist work/ what guides your work as a content specialist? How does this (presence or absence) influence your view of the your purpose in your work?

12. If you were not in your current position, would you still be in a classroom teacher? Would you go back to the classroom? Please explain your thinking regarding this.

13. Sometimes teachers move into school administration. Have you/would you consider becoming an administrator like a principal or vice-principal? What factors would inform a decision for or against moving into administration?

OR if already an administrator: At what point did you begin to consider becoming an administrator? What factors influenced that decision?

That is the end of this interview. Is there anything else that you would like to add around the transition from classroom teaching to working in your district-based science role?
Appendix F

Participant Questionnaire
Thank your continued participation in this research! Please complete this questionnaire as thoroughly as you can. You may type into this document, save, and then email it back to me, or you may print it out, write by hand, and scan/email back to me. Email: kelleyje16@up.edu

Name:
School District:

**Please consider your current position when answering the following questions.**

Official position title:

Years in this position:

Number of teachers you serve:

**Please consider your school district when answering the following questions.**

Please attach district job description for your position. If there is no formal description, note that here.

How many other content specialists are in your district? Please list content and number of people in the role. (Example: Literacy/ELA, 5; Special Education, 7; Math, 5; ELL, 5)

**Please consider your background in education when answering the following questions.**

Previous position (title, years in that position):

Years in education:

Educational Background (Please list all degrees and certifications):

Tell me the story about what led you to become a teacher.
Appendix G

Synthesis of Research Questions and Analysis by Data Source
Synthesis of Data Sources for Collection and Analysis

<table>
<thead>
<tr>
<th>Role/Transition</th>
<th>Job Description</th>
<th>Interview 1: Organizational</th>
<th>Interview 2: Individual/Identity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roles and Functions (Organizational)</td>
<td>Responsibilities, duties, etc.</td>
<td>1, 4</td>
<td>3</td>
</tr>
<tr>
<td>Preparation for Role (Organizational)</td>
<td>Qualifications</td>
<td>2</td>
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<tr>
<td>Further Defining the Role (Organizational)</td>
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<td>5, 6, Anything Else?</td>
<td></td>
</tr>
<tr>
<td>Classroom Exit (Individual-role transition)</td>
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<td></td>
<td>2, 4, 11</td>
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<td>Characteristics of Transition (Individual-role transition)</td>
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<td></td>
<td>5, 6, 9</td>
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<tr>
<td>Entry into District Role (Individual-role transition)</td>
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<tr>
<td>Impact of Transition (Individual- evolving professional identity)</td>
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<td></td>
<td>3, 6, 11, 12</td>
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<tr>
<td>Evolving Professional Identity (Individual- evolving professional identity)</td>
<td></td>
<td></td>
<td>4, 7, 8, 10, 11, 12, 13, Anything Else?</td>
</tr>
</tbody>
</table>
Appendix H

Final Codes
Characteristics of Role Transition
- Bridge Job
- Establishing Leadership
- Push Back
- Relationship Building
- Flexibility in District Role
- Professional Treatment
- Gain Skill Set
- Getting Help
- Lost Connections
- Personal Considerations
- Role Definition
- Connection to Position

District Information
- Job Orientation
- Official Position Title

Document Type
- Interview 1
- Interview 2
- Job Description
- Questionnaire

Professional Identity
- Description of Professional Identity
- Evolving Professional Identity

Role
- Administrator
- Teacher

Role and Function
- Administrator Interaction
- Budgets
- Coaching
- Communication
- Contact with Publisher
- Content Materials
  - Science Materials in the District

Role and Function (ctd.)
- Creation & Facilitation of Professional Development
- Curriculum Development
- Data, Assessment, Standards
- Grants
- Instructional Practices
- Interdepartmental Work and Collaboration
- Not an Evaluator
- Partnerships
- Policy
- Research
- Student Contact
- Supervision of Staff
- Task Percentages
- Tasks and Time Usage
- Teacher Interactions
- Teacher Leaders
- Teacher Support
- Trust and Relationships

Role Exit
- Boundary Spanning
- Choice-Questioning
- Creation of Ex Role
- Crisis-Commitment
- Doubting
- Entry Into District Role
- Feelings About Leaving
- Gains and Losses
- Outbound Trajectory
- Peripheral Participation
- Reaction of Others
- Seeking Alternates
- Turning Points

Teacher Self
- Back to the Classroom
- Consider Administration
- Guiding Principles
- Sense of Self as Teacher
Appendix I

Primary Roles/Functions by Data Source
Primary Roles/Functions by Data Source

<table>
<thead>
<tr>
<th>Job Description</th>
<th>Interview 1, question 1</th>
<th>Interview 1, question 4</th>
<th>Interview 2, question 3</th>
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<tr>
<td>Teachers</td>
<td><strong>Professional Development</strong></td>
<td><strong>Professional Development</strong></td>
<td><strong>Professional Development</strong></td>
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<td><strong>Curriculum &amp; Content Materials</strong></td>
<td><strong>Curriculum &amp; Content Materials</strong></td>
<td><strong>Curriculum &amp; Content Materials</strong></td>
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<tr>
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<td><strong>Teacher Support, Instructional Coach, Mentor</strong></td>
<td><strong>Teacher Support</strong></td>
<td><strong>Teacher Support, Instructional Coach, Mentor</strong></td>
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<td>Data, assessment, standards</td>
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<td>District &amp; department meetings</td>
<td></td>
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<tr>
<td>Administrators</td>
<td><strong>Leadership</strong></td>
<td><strong>Provide leadership</strong></td>
<td><strong>District &amp; department meetings</strong></td>
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<td><strong>District &amp; Department Meetings</strong></td>
<td><strong>Partnerships &amp; grants</strong></td>
<td><strong>Partnerships &amp; Grants</strong></td>
<td><strong>Science Teaching &amp; Learning</strong></td>
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<td><strong>Budget</strong></td>
<td><strong>Budget</strong></td>
<td><strong>Everything Related to Science</strong></td>
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<tr>
<td>Interdepartmental Work &amp; Collaboration</td>
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