July 2017

Experience of the Neophyte Science Teachers: Through Their Eyes

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Experience of the Neophyte Science Teachers: Through Their Eyes

by

David Thornton

A dissertation submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy in Curriculum and Instruction Department of Teaching and Learning College of Education University of South Florida

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Date of Approval:
July 17, 2017

Keywords: first-year teacher, science, secondary, experience, challenge, stress, bureaucracy, case study, multiple case study, qualitative

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Dedication

I dedicate this work to my mother and brother. My mother is responsible for planting and nurturing my beliefs and instilling my respect for all that is education. Without her fervent involvement and support, from the day I was born until the day she passed, my accomplishments and driving passion would be much less. I love you mom. My younger adopted and only brother who left this world all too soon. The undying love you provided and your undeserved pride in me kept me strong in my most difficult times. I am not near as strong or confident without you here. You will always be a big part of who I am. I love you Tim.

I dedicate this work to all those who have ventured into the field of education with a desire to make a positive impact in the lives of all students. To those who believe all children deserve the best education possible.
Acknowledgements

To my God.

To my wife, Catherine. You have supported my efforts and provided needed encouragement. Thank you my love.

To my father. You are the hardest working and most honest man I have ever known. Each day that passes makes my appreciation for all you have done and continue to do grow. I love and respect you.

To my children, Suzanne, Lisa, and Drake. You are my world.

To the head of my doctoral committee, Allan Feldman. Your wonderful support and guidance has lead me to grow in so many ways. Your humility is powerful.

To my committee members, Jennifer Wolgemuth, Rebecca Burns, and Zorka Karanxha. You have each proved vital members to my committee, and I appreciate your advice, support, and compassion.

To Valerie Janesick. Your confidence in me, support for my work, and enthusiasm for qualitative research helped me to uncover what I thought was lost.

To the participants in my study. Thank you for your time.

To the University of South Florida’s Writing Studio. With a special acknowledgement to both Jennifer and Georgia. Your efforts were valuable.

To the educators in my life. Thanks.
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Abstract

A variety of lenses were used to examine the world of the novice science teacher. A degree of agency was provided by looking through the eyes of the beginning teacher. Previous studies focused on researcher or program’s orientation, the successes of various educator preparation programs, or were limited in scope to elementary teachers of science. This study was conducted to better understand and appreciate the high school novice science teacher’s view of science, teaching, and teaching science in the today’s contextual setting. Experiences encountered during the initial year of teaching high school science and as perceived by teachers without previous professional teaching experience presents are presented. A multiple case study was built around four individual novice cases from one of the largest school districts in the state of Florida. Of the four cases, three participants were rehired for the following year. The fourth left teaching after nine weeks. The research questions are: How do today’s novice science teachers describe their first year’s teaching experiences? How do novice teacher’s feelings about being science teachers change during their first year of teaching? How do beginning science teachers describe their successes? And, what challenges do today’s beginning science teachers face? These research questions were asked to relate the novice experiences and perceptions associated with the initial year of teaching high school science. Emergent themes included concerns for questionable ethical administrative actions and poor administrative decisions as they are perceived by the novice science teacher. Findings of the multiple case study relate experiences perceived as positive, bureaucratic, involving student and parent apathy, local administration, and missed communications. Beliefs changed about student needs, mandated science exams, district
micromanagement, confidence, and unique personal changes. Descriptions provided of success involved mentoring, students, lesson planning, confidence, and retention. Perceived challenges were parent and student apathy, mandated science exam validity, student needs, micromanagement of science lessons, discipline, abandonment, and development. The researcher was employed as a science teacher in the same district as the participants, but at a separate high school.

*Keywords: novice, science teacher, secondary, first-year teacher, experience, case study, multiple case study, qualitative*
Chapter 1: Introduction

Those who can, do. Those who understand, teach. (Shulman, 1986)

The Problem

Due to the overall difficulty attracting high-quality science teachers (Strunk & Zeehandelaar, 2011) and the ongoing current shortage (Hutchison, 2012), keeping newly hired science teachers past their initial professional experience is essential (Luft, Bang, & Roehrig, 2007). To this end, examination of support systems valued by the novice teachers during their beginning experience is warranted (Abell, Boone, Arbaugh, Lannin, Beilfuss, Volkmann, & White, 2006). With elevated numbers of high school science teachers leaving the profession soon after they begin (National Science Foundation [NSF], 2014), this study was designed to provide an in-depth appreciation for, and understanding of, the novice teacher’s perceptions regarding science, teaching, and teaching science at the beginning of the professional practice.

The secondary science teacher inhabits an environment impacted by bureaucratic control, limited to non-existent advancement and reward, challenging workload, and numerous stressors (Lortie, 1975; Nieto, 2003), while attempting to provide students with opportunities to explore, pose inquiries, and learn about the world around them. The support systems vary not only between education school districts and individual buildings, but also take on nuances from one teacher to another as needs, values, and perceptions change (Feiman-Nemser, Schwille, Carver, & Yusko, 1999). School districts are exposed to increasing difficulty not only in finding, but also in maintaining highly qualified science teachers (NSF, 2014). Teachers’ experiences and their
perceptions during their earliest exposure to the profession of science education are the focus of this study. The following paragraph elaborates common themes found or directions taken in the literature I reviewed. It is through reflection on this literature and its targeted inquiry that I felt the point of view of the novice science teacher deserved special attention.

Previous studies looking to understand the induction experiences and associated perceptions of novice science teachers are limited and not typically designed to concentrate on the novice’s understanding or perception. Typical studies examine experiences of beginning science teachers in three general areas: predetermined orientation, particular teacher preparation program, or studies focus on elementary level teachers. Many studies use a lens focused on a predetermined philosophical orientation toward teaching science, considering the teacher’s beliefs, goals, and methods (Boesdorfer & Lorsbach, 2014; Britton, McCarthy, Ringstaff, & Allen, 2012; Brown, Friedrichsen, & Abell, 2012; Friedrichsen, Van Driel, & Abell, 2011; Hanuscin, Lee, & Akerson, 2011; Luft, 2012; Luft, Roehrig, & Patterson, 2003; Milford & Tippett, 2012; Roychoudhury & Rice, 2013). Other studies examine a particular preparation program, (Abell et al., 2006; Avraamidou, 2014; Bang & Luft, 2014; Britton, McCarthy, Ringstaff, & Allen, 2012; DiCicco, Sabella, Jordan, Boney, & Jones, 2014; Feiman-Nemser, et al., 1999; Friedrichsen, Van Driel, & Abell, 2011; Hutchison, 2012; Roychoudhury, & Rice, 2013; Worsham, Friedrichsen, Soucie, Barnett, & Akiba, 2013) or are concentrated on elementary level teachers as they look to provide their students with science instruction (Avraamidou, 2015; Britton, McCarthy, Ringstaff, & Allen, 2012; Hanuscin, Lee, & Akerson, 2011). Through focusing directly on the novice high school science teacher, I believe valuable understandings and insights into this world may assist researchers, public school policy, and high school science teachers themselves.
With education environments being dynamic, the contexts surrounding novice teachers as they develop professional skills differ by individual, setting, and temporality. This study limits understandings within this environment to perceptions held by novice science teachers. The conceptual framework is illustrated by Figure 1. Overall, the initial professional year of teaching high school science holds numerous experiences. Experiences novice science teacher were exposed to before entering their professional role that impact their initial year include personal expectations, preparations for becoming a teacher, recruitment into the profession, and the Apprenticeship of Observation (Lortie, 1975). These pre-professional experiences may continue into or impact perceptions of teachers first entering the profession. Other experiences may be isolated in the first year. Professional development within this year, perhaps some of which is designed specifically for novice teachers, one-year induction programs, and mentorship programs are examples of such experiences. There is likely to be a degree of overlap among

![Figure 1. Conceptual framework, The novice science teacher's first year, a rhizome in a complex contextual environment.](image)
experiences and the level to which novice science teachers experience challenges, successes, burnout, express resilience, and remain in the profession (Lortie, 1975; Nieto, 2003).

As a qualitative study, this “inquiry represents a legitimate mode of social and human science exploration” (Creswell, 2013, Kindle Version, Positioning Myself, para. 3), and this study looked to reach for the lived experiences encompassing the first year of teaching public high school science. The general approach discussed in the methodology chapter is based on portraiture (Lawrence-Lightfoot & Davis, 1997) and multiple-case studies (Creswell, 2013; Lichtman, 2011; Merriam, 1998; Stake, 2006). Parameters defining this case study are the induction period for high school science teachers and the novice science teacher’s perceptions of their chosen profession. The reality perceived and constructed by the novice was investigated through evidence found in themes of spoken narratives (Creswell, 2013). These shared narratives were analyzed to enrich our understanding for the experience of current novice science teacher induction (Creswell, 2013).

Rationale for the Study

According to the National Science Foundation (2014), today’s schools face a world in which retaining qualified science teachers past their first three years in the public high school setting is increasingly difficult. The flight of science teachers from the nation’s high schools has outpaced all other subject areas including those found in elementary schools. Additionally, this concern is amplified in low-income and high-minority student populated schools where the number of novice teachers is approximately thirteen percent higher (NSF, 2014; Strunk & Zeehandelaar, 2011). This leads high-need schools to operate with larger percentages of inexperienced science teachers.
As the nation’s new and qualified science teachers flee during their introduction to the profession (NSF, 2014), this study is important to better understand and appreciate the world of today’s novice science teacher. In the United States, there is currently a critical shortage of qualified science teachers (Yang et al., 2015). Researchers, policy makers, school leaders, teacher educators, and lead or mentor teachers may better serve the needs of novice teachers by building a better appreciation for the perceptions developed and understandings formed from the experiences of those novice teachers (Brooks, 1987; Hutchison, 2012). This study contributes to the work done by education researchers looking for a deeper understanding of how novice science teachers self-identify (Avraamidou, 2014; DiCicco et al., 2014), individuals looking to examine certification programs, and policy makers looking to fill vacancies in areas difficult to staff (Feiman-Nemser et al., 1999; Strunk & Zeehandelaar, 2011).

This study helps teachers better understand themselves and how they might interact within their educational setting, which is important for the formation of quality teachers (Nieto, 2003). As good and qualified science teachers are the number one promoter of student achievement (Nieto, 2003), keeping them employed and working with the nation’s youth will support the science education of the populace.

**Purpose of the Study**

The purpose of this multiple-case study is to examine novice science teachers as they enter the profession of teaching science in a public high school. How do their experiences and perceptions reveal themselves during this crucial time of professional science education induction? This study is conducted to better understand and appreciate the novice science teacher’s view of science, teaching, and teaching science in the current contextual setting. This
study holds the potential to assist policy makers, administrators, and teacher-educators in efforts to prepare science teachers for a successful entry into the world of public education.

There is a heavy push coming from around the world to improve the quality of science education (Bang & Luft, 2014; Craig, 2013; Howe, 2013; Kearney, 2014; NSF, 2014). Understanding the factors affecting the development of beginning science teachers, the contextual settings in which these factors operate (professional and personal), and their influence on teacher perceptions, beliefs, attitudes toward teaching science, and actions is vital (Avraamidou, 2014).

Looking at the early years of teaching, an increased rate of attrition from science and math teachers is two and a half times greater than their peers in different subject areas (NSF, 2014), and if new science teachers continue to leave at this rate, a crisis is quite likely on the way. Developing a deeper understanding and appreciation for the needs, drives, stresses, rewards, and perceptions of a beginning science teacher is beneficial for the continuation of science teachers (Doney, 2012) and students educated in our nation’s schools. The information gathered through this study holds potential to assist science teachers, department heads, school administrators, policy makers (all levels), and those who educate future science teachers. Failing to attend to the needs of the nation’s novice science teachers runs the risk of causing great losses to innovation, understanding, and discovery due to a failure to effectively use and develop our nation’s most important resource; its youth.

Research Questions

This study investigates the following four research questions:

*Research Question 1. How do today’s novice science teachers describe their first year teaching experiences?*
Research Question 2. How do novice teacher’s feelings about being science teachers change during their first year of teaching?

Research Question 3. How do beginning science teachers describe their successes?

Research Question 4. What challenges do today’s beginning science teachers face?

These questions are examined as situated in literature surrounding experiences before and during the novice science teacher’s initial year. The current dilemma in the United States with attracting qualified science teachers to the profession (Hutchison, 2012; Strunk & Zeehandelaar, 2011) appears devastating to efforts at improving science education as teachers who are new to the field leave after one to three years (Abell, et al., 2006; Luft, Bang, & Roehrig, 2007; NSF, 2014). The degree to which high school science teachers are currently leaving the field is more rapid than for any other group of educators at any level (NSF, 2014; Strunk & Zeehandelaar, 2011). Challenges faced include: inadequate preparation, difficulty of the teaching assignment, low salaries, lack of support, student discipline and motivation, and issues related to a lack of power or influence over school programs and policies (Friedrichsen, Chval, & Teuscher; 2007). The successes described by novice teachers relate to interactions with the school or department culture; interactions with students, peers, and mentors; manageable workloads; and formative evaluations (Feiman-Nemser, S., Schwille, Carver, & Yusko; 1999). Changes in beliefs and developed skills are expected, but research has shown changes from mentoring and induction programs hold mixed results (Bang, & Luft; 2014). All these experiences impact neophyte science teachers. The timeliness of this continually worsening problem, which is most pronounced in science education in our nation’s public high schools warrants examination.
Significance of the Study

This study is significant as it provides a better understanding of the first year science teaching experiences as perceived by today’s novice science teacher through better appreciating changes in feelings as related to teaching and teaching science. A view of successes and challenges as seen through the eyes of the novice teacher can help guide appropriate support systems and preparation programs.

A significant component of this study is that only participants serving in their initial year as teachers of high school science were involved. Four teachers, Abby Sciuto, Victor Escalante, Shelia Bones, and Phil Osopher, served as participants. Two of these, Shelia and Phil, were based in the same school. Each participant represents an individual case as a novice high school science teacher, and each entered the study with both unique and common experiences.

Secondly, this study allowed each novice science teacher to elaborate on their expectations and feelings before interacting with students or their experiences teaching science during their first year. This study took note of changes in perceptions or feelings related to teaching and teaching science from the novice participants.

Finally, this study was designed to examine the novice science teacher’s descriptions of professional successes and the challenges they face associated with their first year’s work. Specifically, the successes and challenges were described through the words and feelings of the novice teachers themselves. After analyzing and developing a picture for the experiences and their impact on each novice science teacher, the cases underwent cross-case analysis to produce a portrait of today’s novice science teacher.
The Researcher

Most of my childhood was spent on a family farm/ranch in northeastern Colorado. It was the combination of outdoor family excursions and working and playing out-of-doors throughout my life that encouraged my love for natural science. There has never been a time where I have lacked excitement or curiosity about scientific principles regarding the observable world. For most my time spent as a student, I got along well with the teachers and staff at the small country school I attended.

Along with a love for science, my parents expected me to perform well in school. The general belief was that education was to be valued, and that “teachers” were to be honored and treated with respect, their directions obeyed. Although I generally followed this expectation, I can recall whenever I was a student in a class taught by a beginning teacher, I had a considerable talent for pushing the limits of allowed behavior and taking advantage of their inexperience. To this day, I feel guilty about some of my behavior. I know how easy it can be for students to “push the right buttons” and make a teacher sweat, become disoriented, and possibly even want to leave the profession.

The combination of a value for learning and a love of science, however, led me to seek and obtain an undergraduate degree in Biological Science with an emphasis in Physiology at Colorado State University. While working on this degree, I was provided with an opportunity to work in a genetics laboratory and gain experience not only prepping laboratory classrooms, but also serving as a laboratory and field technician. Additionally, I enrolled in a prescribed series of education courses and underwent student teaching, adding a Colorado Science Teaching Certification to my Biology degree.
Following graduation, I secured a teaching position in a middle school near Denver. Working there for two years, I taught not only science but also social studies and art. After observing what I perceived to be a non-academic focus held by the school leadership and having to teach non-science classes, I became disillusioned with teaching and opted to pursue a graduate degree at Oklahoma State University.

Although initially my interests were in zoology and my performance was more than satisfactory, as I taught various laboratories at the university, my interests returned to education. I completed an athletic administration master’s degree with school leadership certification and returned to teaching. Although I taught for one year in Oklahoma, and thoroughly enjoyed the experience, the salary was so limited, I held down extra jobs whenever possible just to pay bills.

At the age of 28, I began working as a vice principal/athletic director. I did this for four years. In this capacity, I felt committed to assisting teachers in their efforts to provide quality education for their students. My enthusiasm for helping teachers grew. When I got the opportunity to lead the opening of one of the largest and first charter schools in the state of Colorado, I jumped.

I experienced a large degree of stress and found my personal family time consumed by school administration. With 10 years of experience, I accumulated a variety of administrative experiences at all levels; elementary, middle, high, and district. Although I was fortunate enough to be involved in several successful school improvement efforts, I found the experiences emotionally and physically draining. I then took a four-year leave from direct involvement in the schools. During this time, I kept my foot in the water by serving as a curriculum trainer for an international Language Arts company, and held positions as an adjunct professor at two smaller colleges.
As my three children entered high school, I returned to teaching. This was mainly driven by a personal desire to keep tabs on their schooling. This return was to what is locally touted as the best school in the district; however, I was taken aback by what I perceived as extreme apathetic behaviors of many students. Initially, I felt the return would be short-lived, but my need to monitor my own children increased my resolve to stay.

Over the past eleven years, I have taught various science courses. I now teach all the Advanced Placement Biology, some Honors Biology, and either Chemistry or Regular Biology dependent on the school’s needs. My personal desire to have successful students, along with a slightly competitive nature, continue to fuel my teaching efforts. Scores from my Biology students consistently rank as the highest average scores throughout the district, and student enrollment in AP Biology has increased. I have been fortunate enough to receive repeated requests by parents, including those of fellow staff members, to place their children into my classes. This has provided me with a degree of personal satisfaction.

I do feel support for my teaching efforts is limited at best. Only in quick passing, have I been told by building administrators they are satisfied with my instruction. Once an assistant principal indicated she saw long-term purpose for student learning behind my day-to-day instruction. Additionally, I have experience as a cooperating teacher for student teachers. The most recent student teacher was actively recruited by the administrators at my school.

I have always desired to obtain a terminal degree and instruct in higher education. It is in the final stretch of this process in which I now find myself. I have developed a strong interest in qualitative educational research. With my experiences in administration and teaching science, I have a desire to see beginning teachers succeed and develop a stronger understanding for the education world as perceived by beginning science teachers.
Delimitations

Participation in this study was limited to first-year employed science teachers lacking in previous professional experience. All participants were employed in a single school district located in the southeastern United States. This study focused specifically on novice secondary level science teachers working in grades nine through twelve during the 2016-2017 academic school year. Only perceptions of the novice science teachers were sought for answering all research questions. The sample size for this case study was four participants. This number is recommended by Creswell (2013).

This study was limited to the respective participant experiences, perceptions, and understandings communicated in response to semi-structured questions seeking to delve into the novice science teacher’s world. I was witness to their relayed stories and made efforts to appreciate directional changes which accompany emergent data possibly leading the study in unexpected directions (Creswell, 2013; Merriam, 1998; Seidman, 2013).

Case study work was limited by the researcher’s decisions over inclusion and exclusion on the quantity of available data (Stake, 2006), but as the analysis and interpretation were conducted solely by me, the reliability was increased and as such it existed with the opportunity to glance into the world of the novice science teachers participating in this study (Lawrence-Lightfoot, 1997; Stake, 2006).

Limitations

As researcher, I served as the research instrument, as is characteristic of all qualitative research (Merriam, 1998). Data collection, analysis, and research findings in this study may all be influenced by the researcher’s unique position as a teacher employed within the school district in which the study was performed and unique personal history as both a teacher and an
administrator. Throughout the study, efforts to bracket, limit, and clearly communicate researcher bias were employed (Creswell, 2013; Lichtman, 2011). Additionally, member-checking of transcribed interviews and triangulation of results were employed as explained in chapter three (Creswell, 2013; Lichtman, 2011). In the final product, I am relaying the participants’ stories.

Generalization to the population of all novice science teachers is not possible from a case study (Stake, 1995).

My reflexivity served as a valuable tool in this study (Creswell, 2013; Janesick, 2016; Lichtman, 2011).

**Definition of Terms**

To avoid confusion and add clarity, the following terms have been defined for their use in this study:

*Alternative Teacher Certification* – Programs administered by states, districts, universities, and other organizations to expedite the transition of non-teachers into teaching (National Science Foundation [NSF], 2012). These “programs make it possible for individuals who are knowledgeable in science, but have not graduated from traditional teacher-preparation programs, to begin teaching” (Koballa et al., 2005, p. 287).

*Apprenticeship of Observation* – A “student-oriented perspective” (p. 62) developed from approximately 13,000 hours of direct and close observation of teachers while serving as a student (Lortie, 1975, p.61).

*Burnout* – A syndrome characterized “of Emotional Exhaustion, Depersonalization, and reduced Personal Accomplishment. Emotional Exhaustion occurs when teachers are unable to
physically and emotionally provide for students due to overwhelming feelings of fatigue and stress” (Grayson & Alvarez, 2008, p. 1350).

Classroom Management – The methods used by teachers to maintain a conducive, orderly, and effective learning environment. Disciplinary measures are considered a component of classroom management for this study.

Development – “Activities designed to affect teaching and student achievement” (Wang et al., 2008).

Ethics – “Conforming to accepted standards of conduct” (merriam-webster.com, 2017).

Induction – “The process of becoming a professional teacher. This definition includes acculturation through preservice, in-service, formal, informal and informal teacher education” (Howe, 2013, p. 295).

Mentorship – The “learning relationship between an experienced professional and an individual who is entering a new experience and who is ready to learn a new craft” (Hutchison, 2012, p. 544). Formal mentorship – used to indicate a building or district mentor was assigned by the administration for the novice teacher. Informal mentorship or “professional friendly alliance” – used to indicate a mentorship formed without administrative guidance or involvement.

Novice – A teacher involved in the first year of professional teaching.

Orientation – Theoretical, point of view labels/categories provided by researchers for expressing patterns/profiles empirically found in beliefs held by science teachers about the goals or purposes of science teaching, views about science, the nature of science, and science teaching and learning (Friedrichsen et al., 2011).

Pedagogical Content Knowledge (PCK) – The content and pedagogical knowledge required to teach an age and subject (Shulman, 1986).
Recruitment – Efforts used to stimulate interest in the profession of teaching science.

Support – Used by some researchers to indicate development provided to mold teacher professionalism (Avraamidou, 2014; Britton, McCarthy, Ringstaff, & Allen, 2012; Luft et al., 2007) and elsewhere to reference resources of sustenance/care for individual teachers (Abell et al., 2006; Bang & Luft, 2014; Cooper & He, 2011; Luft et al., 2007). For the purpose of this study, support generally refers to the resources of sustenance/care available to teachers; other uses of support will be specifically identified.

Chapter Summary

The problems on which this study was built are the shortage of qualified science teachers, and the departure of novice science teachers leaving the profession soon after they begin. Unique individuals enter this profession through a variety of paths and encounter both individual and common challenges during their first year. Changes in participants as they travel through their induction experiences were examined, along with how they viewed challenges and successes during this initial year teaching science. This study examines teachers of today, attempting to see through their eyes and create a metaphorical self-portrait.

The rationale identified for this study focuses on the crisis currently facing the nation’s schools, retaining qualified science teachers. The research upon which this study is built includes related major concepts, such as the dynamic contextual environment around each individual and varied professional preparation. A relative abundance of previous studies examined in chapter two focus on beginning teachers through program, pedagogical specific, or other “outside” lenses. However, previous research has lacked appreciation and validation for the perceptions or understandings held by the novice science teacher. The research questions presented clearly
focus on validating the novice science teacher’s perceptions and understandings. Those looking to assist science teachers succeed may benefit from the findings in this study.

It is for benefiting both researchers and education practitioners that this study looks at experiences and perceptions during the lived experience of induction for novice science teachers. There is importance in helping these beginning teachers in their drive to be successful. This study is significant as it attempts to look through the eyes of the novice science teacher, and offer an increased understanding for how their world is currently perceived.

My self-description is included as it relates to this study. This is to allow for the reader’s consideration while reviewing and analyzing information. Finally, this chapter presents the delimitations and limitations of this research, and the definition of terms as used in this study are presented.
Chapter 2: Literature Review

Introduction of the Literature Review

The following literature focuses on the experiences and perceptions encountered during the entry of beginning science educators into teaching careers. First, literature discussing experiences and perceptions made as a student of teachers and teaching is examined. Then, discussion follows with a look at experiences related to science from personal, professional, and recreational history. The discussion relating to personal histories additionally includes professional preparation paths and potential influences prior to professional teaching. I grouped experiences found during the literature search into two categories; extrinsic experiences and intrinsic experiences. Using this rationale, extrinsic experiences are experiences directly related to a position teaching public school science and over which the teacher holds no direct or immediate control. Extrinsic experiences are exemplified by structured salaries, scheduled workload, and bureaucratic policies and practices governing the profession. Experiences I considered intrinsic to the teacher were those to which some degree of control existed in the hands of the novice science teacher or were at least unique to the individual having the experience. Emotions, beliefs and values, motivations and the ability to deal with a variety of stresses are considered intrinsic experience. Toward the end of this chapter, the experiences common to the contexts in which novice teachers enter are elaborated upon. The identification of personal support systems includes both intrinsic and extrinsic forms of support and is included.
Conceptual Framework

The conceptual framework for this study draws from literature regarding the entry of would-be educators into careers teaching science with a focus on the variety of experiences encountered during this time. These include: science teacher preparation, Lortie’s “Apprenticeship of Observation,” induction, mentorship, development, recruitment, challenges faced, retention, and burnout. Characteristics and expectations of novice science teachers such as their beliefs, typically caged as teacher orientations, regarding teaching and science have been defined and guide most previous studies. Related studies and writings, including various works from Julie Luft (Bang, & Luft, 2014; Luft, 2012; Luft, Bang, & Roehrig, 2007; Luft, Roehrig, & Patterson, 2003; Luft, Nixon, Dubois, and Campbell, 2014; Luft, Wong, and Semken, 2011; Roehrig & Luft, 2006), Patricia Friedrichsen (Brown, Friedrichsen, & Abell, 2012; Friedrichsen, Chval, Teuscher, 2007; Friedrichsen & Dana 2003; Friedrichsen, Van Driel, & Abell, 2011; Worsham, Friedrichsen, Soucie, Barnett, and Akiba, 2013), Sharon Feiman-Nemser (Feiman-Nemser, 2001; Feiman-Nemser, 2003; Feiman-Nemser, Schwille, Carver, & Yusko, 1999), Richard Ingersoll (Ingersoll, 2012; Ingersoll & Strong, 2011), and Lucy Avraamidou (Avraamidou, 2015; Avraamidou, 2014), cover recruitment and preparation of beginning science teachers, induction through various researcher lenses, development/support, and science teacher orientations and identity. Literature defining induction references specific time periods of entry into the teaching profession or programs of professional introduction. When discussing induction programs, research supports broad topic coverage and more formal organization. While examining introduction periods, researcher calls are generally made for extending novice support for up to three through five years based on an expressed desire to mold teacher orientations.
Personal History

Some of the earliest experiences known to impact teacher beliefs are the perceptions learned as students during their formative years of schooling; the then-learners observed teachers in the performance of their occupation. These early ventures serve as a foundation upon which the knowledge of future science teaching is built (Brown et al., 2012). Dubbed the “apprenticeship of observation,” time spent as a student observing science teachers in the performance of their jobs directs beliefs and attitudes, affecting the preparations for becoming a teacher (Brown et al., 2012; Lortie, 1975). Beliefs on teaching based on these pre-collegiate experiences are commonly found among science teachers (Brown et al., 2012). Students’ observations of teachers and science education build robust perceptions and ideals related to teaching science (Danielsson & Warwick, 2014; Howey & Grossman, 1989).

The degree to which the apprenticeship of observation impacts the thinking of prospective teachers is not surprising, as the time spent observing teachers working totals around 13,000 hours by graduation from high school (Lortie, 1975). Such an extended surveillance is not found in most other professional preparations and is not of a casual nature. The teacher and students develop a relationship in which norms are developed and a two-way interaction operates (DiCicco et al., 2014; Lortie, 1975). The beliefs and actions taken by beginning teachers are greatly influenced by this apprenticeship of observation (DiCicco et al., 2014; Roychoudhury & Rice, 2013).

The apprenticeship of observation is only one component of a science teacher’s unique history that serves to form beliefs related to teaching and teaching science. Making a decision to enter teaching science can be attributed to early positive experiences in science, personal values and beliefs, as well as education (Barmby, 2006; Eick, 2002; Worsham et al., 2013). Individual
life-histories—especially those related to science—impact science teacher development, and experiences in science prior to teaching, such as involvement in previous science, technology, engineering, and mathematics (Abell et al., 2006) careers, influence how the beginner identifies as a science teacher (Avraamidou, 2014; Nhalevilo, 2011). Exposure to aquariums, zoos, parks, museums, and hobbies and games as they relate to science are influential adventures identified by Avraamidou (2015). These environments are credited with making noteworthy impacts on science teachers’ development of content and pedagogical content knowledge as well as their understanding for the nature of science, science and society, scientific inquiry, and the work of scientists. These environments also provide occasions for teaching via specific methods, teaching practice, and supporting motivational strategies (Avraamidou, 2015).

The histories owned by individuals may serve to benefit or restrain novice science teachers as they embark on their teaching careers. As pointed out by Danielsson and Warwick (2014), conflict between past experiences and beliefs with expected practices (norms) may create a point of tension for those entering science teaching. Novice science teachers may find themselves negotiating their development through situations that force them to question their own beliefs and practices. They may face challenges within teacher training settings as they encounter conflicts between conservative and reformative pedagogical philosophies (Thompson, Windschitl, & Braaten, 2013). The identity of an individual science teacher and an individual's self-perception is influenced by the manner of participation in various professional practices. A science teacher’s identity is subject to new influences and expectations throughout training and as they enter a career (Danielsson & Warwick, 2014; Nhalevilo, 2011). Bang and Luft (2014) recognize the existence of various philosophical norms related to teaching within any identified teacher community of practice, and discuss how the member interactions, in particular between a
mentor teacher and the mentee, may result in either acceptance of differences or even the manufacture of “pseudo-communities” (p. 29) in which the novice teacher only acts to believe or adopt community norms.

The histories accompanying the individual science teacher include a unique combination of various undertakings related to teacher preparation (Abell et al., 2006; Thompson et al., 2013). As pointed out by Britton, McCarthy, Ringstaff, and Allen (2012), approaches taken by teachers in earning a degree or a certification appear to influence novice teacher practice during formal induction programs. Novice teachers with traditional degrees appear less likely to adopt reform-based methods of instruction than do their educational degreed, alternatively certified, or special program completing peers. However, entrants to the profession, bringing with them previously formed traditional views and beliefs of teaching, tend to hang onto these beliefs, and the associated practices appear quite robust regarding pedagogical changes (Britton et al., 2012). Differences are found in university degree program, success within that program, contextual settings available for student teaching, and freedom or constraints within that setting. The contextual settings include grade level of students, level of taught curriculum, size and location of assigned school, and the facilitative or constraining nature of the cooperating teacher (Thompson et al., 2013). Additionally, the variety of paths possible for certification compound the number of unique experiences available to any one teacher of science.

As reported by Abell et al. (2006), teachers coming into the profession through alternative certification paths often bring with them experiences different from those who traveled the standard teacher education path. Generally, those coming through alternative pathways include a higher percentage of minorities, males, and individuals with urban
backgrounds. Individuals with previous work experience outside of education are represented more frequently in the alternative programs (Abell et al., 2006).

There are costs associated with any career path, and the costs associated with training to become a teacher with a teacher’s salary are often mentioned as concerns held by those looking to enter the field (Barmby, 2006). Potential teachers consider the overall costs associated with securing certification against the relative security of teaching positions that certification provides (Ng & Peter, 2010; Tiala & Harris, 2011). Various types of financial incentives may be offered to induce potential highly qualified individuals into science teacher preparation programs (Abell et al., 2006; DiCicco et al., 2014; Hutchison, 2012; Latterell, 2009; Luft, Wong, & Semken, 2011). Yang et al. (2015) indicated nearly 100 percent of potential highly qualified students interested in obtaining teacher certification expressed a need for financial assistance to do so. Along with financial incentives, alternative certification/licensure programs have also been adopted to recruit prospective science teachers (DiCicco et al., 2014).

**Experiences**

The individual science teacher, therefore, enters professional teaching with beliefs and perceptions regarding teaching, science, teaching science, and teacher roles within the realm of science education. Occurrences impacting their lives as they enter teaching are intense (Feiman-Nemser, 2003; Feiman-Nemser et al., 1999; Friedrichsen, Chval, & Teuscher, 2007) and worthy of examination (Abell et al., 2006; Avraamidou, 2014; Wang et al., 2008). This review looks at experiences novice science teachers face and presents them as either extrinsic, intrinsic, or a combination of these categories. The metaphor of a developing rhizome is used to represent the novice science teacher’s journey through the first year teaching.
Extrinsic experiences over which the teacher has little or no control (Alverson & Karreman, 2011) include the bureaucratic running of schools, support for discipline or classroom management, salary and benefits, teacher workload, and participation or not in some form of an “induction program.” While science teachers undoubtedly face such experiences, they also come across intrinsic experiences. These include individual needs, changing perceptions of self-interests, development of self-doubt, and personal emotions and resilience. Some experiences might contain both intrinsic and extrinsic components. Teachers find and take advantage of various support systems. They may possess different motivators and feelings associated with satisfaction, and experience other stressors as they undertake journeys into education. Various experiences related to the beginning year of novice science teachers follows with extrinsic experiences considered first.

**Bureaucracy.**

Looking at the experiences a beginning science teacher may encounter, those involving the bureaucratic governance and running of the public schools need attention. Nieto (2003) discusses expert teachers’ reflection on their early undertakings and their thoughts of not being prepared, and in fact being “ill prepared” (Eisner, 1991) for bureaucratic actions, which were seen as an impedance to their teaching and was a source of frustration. Schools operate within specific cultures that utilize policy driven timetables, prescribed curricula, and elevated accountability practices, all of which frame the experiences of novice secondary science teachers (Danielsson & Warwick, 2014). As much as policy makers at local, state, and national levels are responsible for adequately resourcing school science programs, there is an insufficiency of funds, facilities, and equipment available specifically for science education (NSF, 2014).
Teachers approaching the stresses associated with student discipline desire support from their school’s administration as well as from governmental bodies (Barmby, 2006). From a contrasting point of view, as issues involving discipline are ultimately concerns inherited by administrators, a mentor’s guidance may lead a novice teacher in the management of discipline minimizing the involvement of those in charge (Bang & Luft, 2014), and administrative actions/policy can be instrumental in supporting teachers as they face stresses of misbehaved students (Grayson & Alvarez, 2008), in a study by Latterell (2009), graduate students considered highly qualified to enter the profession of science teachers expressed a belief that those running schools need to make more concentrated efforts toward improving school discipline. As an issue affecting beginning teachers, student discipline or handling unruly students is perhaps one of the most reoccurring items found during this literature review. This issue reappears in a variety of discussions as it also relates to occurrences beyond school bureaucracy.

Arguably, most or all aspects within a school are in some way either directly or indirectly related to the way in which any educational facility is organized and governed. This is exemplified by Danielsson and Warwick (2014) as they consider a district’s adopted “embedded institutional perspectives on the curriculum and on approaches to teaching and learning” (p. 115). Local districts looking to implement and adopt curricular mandates passed down from the federal level such as the Common Core State Standards (CCSS) will experience “substantial” (p. 20) adjustments to the school level curriculum and instruction (NSF, 2014). Bureaucracy around curriculum impacts the degree to which a science teacher can implement instruction reflecting personal aims and understandings for scientific literacy (Danielsson & Warwick, 2014).

Other bureaucratic experiences listed as potentially adding aggravation to teachers include; injustices forced upon students (teacher beliefs that any student or group of students is
treated unfairly), uncertainty of the education system (teacher feelings that the education system is in a constant state of ebb-and-flow), and confusion due to a separation between decision makers and those required to implement policy (Nieto, 2003). This is seen locally and at the national level as Olson, Tippett, Milford, Ohana, and Clough (2015) point out, where guidelines often appear set by those unaware of expert research and disconnected from those who must operate within set policy. These policies serve to guide practice for the novice science teacher.

As mentioned earlier, teachers look for administrative and governmental support regarding student discipline as well as for help with overbearing workloads (Barmby, 2006). Brooks (1987) notes that factors contributing to teachers leaving the profession include; workplace conditions, salaries, isolation, perceived professional status, and limited opportunities for advancement. Some beginning teachers will leave the profession due to these factors, and unless these are addressed, even formal induction programs are likely to fall short in their attempts to impact teacher retention (Brooks, 1987). When public school policies fail to reward or incentivize teachers in their career, especially at hard-to-staff schools, quality teachers will leave positions where the need may be great but the reward limited (Nieto, 2003).

Districts and universities have attempted to develop reciprocal induction-type relationships between new teachers and the institutions in which novice science teachers begin to work (Brooks, 1987). Kearney (2014) indicates while formal induction programs are globally noted as instrumental in the eventual success of beginning teachers, and many components are identified as to what helps make induction work, finding a shared or accepted standard practice is not yet common. Listed strategies used by various induction programs date back to as early as 1987. In order of regularity, from the most common to the least, these include: special in-service sessions, frequent evaluations, assigned “buddy” teachers, induction time extended over one
year, required two-year to three-year induction, contracted undertaking with college or consultant, required college coursework, creation of intern status, reduced workload, provision of additional planning time, and removal of extracurricular duties (Kearney, 2014).

Local level induction programs are of two basic types implemented by districts looking to improve overall teacher quality; both deficit and developmental models look to fill voids in individual teacher preparation or to build upon an already developed set of skills respectively (Brooks, 1987). With a wide variety of formats used for their implementation (Brooks, 1987; Howe, 2013), some common goals of teacher induction programs include orientation, psychological support, acquisition and refinement of skills, increasing retention, and assessment and evaluation of novice teachers (Brooks, 1987). Induction programs are often designed around the needs of the teacher and those of the school (Howe, 2013).

**Discipline/classroom management.**

Assistance with handling discipline is ranked, along with reducing teacher workload, as the most important factor in keeping beginning teachers from leaving the profession (Barmby, 2006). Latterell (2009) recorded teachers express concerns with the level and amount of disciplinary management impacting their jobs. A novice’s focus on classroom management and procedural issues, rather than improving student learning and teaching, may be attributed to the practice of requiring new teachers to step directly into a role of typically held by more experienced educators (Thompson et al., 2013).

A teacher’s ability to maintain proper classroom discipline is seen by researchers as necessary for those who teach science, specifically if their intent is to teach skills associated with inquiry (Colburn, 2000; DiCicco et al., 2014). Beginning teacher efforts to develop student-centered instruction may be hindered as teachers are forced to deal with issues involving
classroom management (Koballa et al., 2005). Classroom supervision concerns can contradict with the beginning teachers’ ideals regarding instruction by forcing them to prioritize classroom control over concerns related to instruction (Jackson & Talbert, 2012; Koballa et al., 2005; Roychoudhury & Rice, 2013) or to adopt disciplinary techniques with which they may feel uncomfortable (Ng & Peter, 2010). Handling student behavior consistently appears as a vital concern for new science teachers in numerous studies (Danielsson & Warwick, 2014; DiCicco et al., 2014; Eick, 2002; Friedrichsen et al., 2007; Roychoudhury & Rice, 2013; Wang et al., 2008; Worsham et al., 2013). Teacher control over student behavior is not only a top problem mentioned by beginning teachers, but also a priority shared by administrators (Feiman-Nemser et al., 1999).

Although requirements currently in place for certification tend to require coursework related to running a classroom (Olson et al., 2015), researchers have argued for more demanding coursework to better prepare certified teachers in the development of management skills and techniques (Koballa et al., 2005). When compared to those arriving through more traditional paths, teachers who arrive in the profession through accelerated alternative certification paths tend to have even greater needs related to classroom management (DiCicco et al., 2014).

New teachers may seek assistance from administrators with discipline procedures and discipline policies (Doney, 2012). Novices learning the particulars of student discipline may also benefit from the input or advice of experienced mentors (Bang & Luft, 2014). There is a possibility that peers emphasize maintaining classroom discipline over the actual teaching of science (Luft, Nixon, Dubois, & Campbell, 2014); however, as beginning science teachers enter conversations with other novices, valuable ideas and information—including possible classroom management techniques—can be shared. (Friedrichsen et al., 2007). An example of a commonly
shared belief is the idea that keeping a more rapid instructional pace will decrease discipline management issues (Shulman, 1986). The key issues responsible for teacher burnout were student behavior and discipline problems, including elements such as verbal disrespect and violent behavior (Grayson & Alvarez, 2008). A lack of student discipline is a cause of science teacher job dissatisfaction (Friedrichsen et al., 2007), and problems with school climate may necessitate the sharing or developing of behavior management strategies among the staff (Grayson & Alvarez, 2008).

Although many teachers and administrators appear to feel discipline is a special concern for beginning teachers (NSF, 2014; Ng & Peter, 2010), survey data from 2012 of beginning science teachers indicated a general confidence in ability to handle disciplinary situations (NSF, 2014). However, neophyte teachers have been found to possess unrealistic expectations regarding the level of disciplinary concerns that may surface in their classrooms (Friedrichsen et al., 2007). DiCicco et al. (2014) provided an example of this with a teacher commenting how she expected to dedicate only a limited time to discipline, concurrently believing most of her time between the start and completion of the school day would be spent teaching. She was overwhelmed and disappointed by the actual experiences related to classroom management, which overran her instructional efforts, interfered with her instructional plans, and forced unforeseen changes in overall classroom expectations. Science graduate students involved in a program looking to attract highly qualified individuals into teaching expressed a high degree of astonishment and disappointment with the amount of classroom discipline required in the secondary setting (Latterell, 2009). Instructional support for new science teachers can include training in classroom discipline (Luft et al., 2007). Lack of administrative support for maintaining classroom discipline causes frustration in those attempting to teach science and
weighs heavily in decisions to stay in or leave the profession (Ng & Peter, 2010). Teachers may perceive maintaining control over discipline in the classroom as primary before effective teaching can occur (Koballa et al., 2005).

Brooks (1987) notes, when beginning teachers are immediately placed with more difficult and challenging workloads, the stresses placed on those professionals is compounded. The difficulty related to the individual teaching assignment may be increased in a variety of ways including classroom management issues. Teaching in areas not considered their specialty, working with low-ability, unmotivated, or unruly students, having multiple preparations, moving among classrooms (floating), or even being assigned additional extra-curricular responsibilities contribute to the challenges potentially faced by novice teachers (Brooks, 1987). The challenge involved with being issued a class or disciplining a class may force beginning teachers to feel that they must compromise their ideal teaching directions to maintain behavior (Koballa et al., 2005). This issue may further be complicated for teachers who choose to work in high-needs schools as data considered by the National Science Foundation indicated behavioral issues appear more regularly in high poverty schools than in low poverty school districts (2014).

A district’s provision of professional development may benefit novice teachers looking to grow in skills related to classroom management (Hutchison, 2012), and teacher participation in a formal induction program has been linked to more effective beginning teacher performance regarding management of classrooms (Ingersoll, 2012). Providing beginning teachers with support for classroom management at the expense of other areas such as emotional needs, resource acquisition, and instruction may be a temporary necessity (Feiman-Nemser et al., 1999). Once individual teacher’s needs are met, further development can be planned. Researchers have categorized various stages of development that occur over time as teachers begin their careers.
Following the phase progressions, beginning teachers are typically concerned with matters of discipline and classroom management as a mode for just getting through their initial experiences. As they progress to following stages, teachers then begin to focus on issues of instruction, curriculum, teaching practice, and student learning (Thompson et al., 2013). It is interesting to note how new teachers may judge the success of their first year. A commonality found in self-reflection after the first year of teaching is the judgment of success based on perceived ability to manage an acceptable degree of classroom behavior (Thompson et al., 2013).

**Workload.**

According to Barmby (2006), alongside classroom discipline, the workload to which teachers are exposed is one of the top reasons provided by teachers for leaving the field and even for others choosing not to pursue the profession. A factor analysis identified six factors as primarily responsible for those leaving the field of teaching: school management, workload, work conditions, financial, society’s view and flexibility (Barmby, 2006). Looking to assist beginning teachers, some schools provide a reduced workload for entering teachers (Ingersoll & Strong, 2011). An unacceptable workload has been identified as one of the top reasons teachers list for leaving the profession (Barmby, 2006; R. M. Ingersoll & Strong, 2011), along with government initiatives and stress (Barmby, 2006). Teachers rated reducing workloads along with support in discipline as the top two important concerns needing to be addressed to encourage them to remaining in teaching and to recruit others to the vocation (Barmby, 2006).

During their tenure as students, teachers may have developed a shortsighted view of the teacher workload, underestimating the various tasks associated with a teacher’s actual job performance (DiCicco et al., 2014). Workload is identified as responsible for pushing prospective teachers away from considering the career as a viable option (Barmby, 2006).
Once in the profession, beginning teachers are likely to find themselves in positions where value is given to those who can work alone, independent of other teachers (Feiman-Nemser, 2003; Feiman-Nemser et al., 1999; Lortie, 1975). Under such a situation, the novice teacher may hesitate or refrain altogether from requesting assistance from peers as they feel this may be a sign of inadequate abilities or skills for the profession (Feiman-Nemser, 2003; Feiman-Nemser et al., 1999).

Teachers who avoid seeking assistance may cut into their own professional growth as well as decrease the potential for maximizing collegial influence and developing shared standards within the educating staff (Feiman-Nemser et al., 1999). Some researchers have stated beginning teachers must first work their way through the trials associated with being new to the profession before student learning in the classroom can effectively be addressed (Feiman-Nemser et al., 1999).

Too many responsibilities and the number of hours worked have been cited as factors causing teachers to abandon the profession (Barmby, 2006) and interfering with professional development (Feiman-Nemser, 2003). The various aspects of workload assigned to novice teachers is an important consideration for school district personnel looking to mitigate challenges facing new teachers (Friedrichsen et al., 2007) and further develop teaching proficiency (Feiman-Nemser, 2003). In a study by Barmby (2006), an overbearing workload has been identified as a reason for not entering teaching in the first place. According to Brooks (1987), when beginning teachers are immediately loaded with more difficult and challenging workloads, the stressors placed on them are compounded. The difficulty of the teaching assignment may be increased by having to teach unfamiliar or multiple subjects, being assigned challenging students, teaching out of multiple rooms, and having to take extra-curricular activities. Many new teachers express
feelings of anxiety and of being unable to cope with the responsibilities of their new occupation. This may include feelings of demoralization and dispiritedness toward their profession (Feiman-Nemser et al., 1999).

Per Brown et al. (2012) learning to teach from a reform-oriented, science inquiry perspective may add to the workload facing today’s science teachers. Specifically, these researchers commented on how those studying to become science teachers felt the workload associated with the skill development necessary to teach science from an inquiry-oriented form of instruction (student learning as investigation of problems or questions) was quite demanding and would require additional teacher commitments in both time and effort. Similarly, requirements needed to teach new academic standards places increased difficulties in front of the new science teachers (Feiman-Nemser et al., 1999).

The way individual teachers address and cope with increased workloads can impact their success in mitigating stress. This is exemplified in a teacher’s ability to recognize the source of the stress, act toward lessening the perceived stressors, and practicing meditation or relaxation techniques to lower associated anxiety with stimuli such as a demanding schedule (Doney, 2012). Stress may stem from the individual teacher’s insecurity regarding their ability to accomplish responsibilities placed on them (Feiman-Nemser et al., 1999). Teachers identified as efficacious see difficult situations as challenges rather than as risks or threats (Doney, 2012). As districts and individual schools look to bring in new science teachers, careful consideration should be given to workload and degree of professional development needed by the new group of professionals (Friedrichsen et al., 2007). Various forms of professional development may be instrumental in helping first year teachers learn critical self-evaluation of their daily activities (Feiman-Nemser et al., 1999).
Feiman-Nemser et al. (1999) and Howe (2013) stated some European and Asian countries do not assign beginning teachers the same job nor do they expect them to hold the same skills as the more experienced teachers. New teachers in these situations are provided with less challenging workloads and with assistance and time to develop and hone their teaching skills. Administrators can assist new teachers by assigning similar sections of a class thereby cutting the amount of preparation time required from the novice (Friedrichsen et al., 2007). Providing teachers with time and opportunities to learn and control the tasks placed upon them is seen as vital (Feiman-Nemser et al., 1999). Barmby (2006) further suggests addressing the workload placed on teachers is necessary to increase recruitment and retention of new teachers. Again, workload is a factor often cited as influential regarding teachers’ flight from the profession (Kersaint, Lewis, Potter, & Meisels, 2007).

**Salaries, status, and benefits.**

The financial conditions affecting those electing to enter teaching science as a career have received some notice by researchers and policy makers (Barmby, 2006). Numerous financial incentives have been designed and offered to entice qualified individuals into teaching science as a career (Abell et al., 2006). Examples of how states are attempting to lure new science teachers include offering alternative certification pathways often with decreased costs or financial incentives including programs paying educational expenses. Interns participating in a particular preparation program opined that teaching salaries were not structured in an attractive manner and there was no system in place for what they considered career advancement (Latterell, 2009).

Some attempts are underway to provide financial incentives attracting teachers into subjects like science that are deemed difficult to staff (Barmby, 2006). One such alternative
certification program offering a considerable financial incentive was provided to science interns, but 100 percent of the participating subjects indicated the funds were not worth the problems they had to face in the classrooms on a day-to-day level (Latterell, 2009).

Some believe financial incentives put out as enticements to enter the teaching profession need to be weighed critically against the possibility the incentive may serve to attract individuals into teaching who lack a necessary teacher’s commitment (Nieto, 2003). Worsham et al. (2013) found in contradictory studies little is known about the overall effectiveness of financial incentives at the recruitment phase for acquiring new teachers. Although increased financial incentives have been associated with improved teacher recruitment, their effect on teacher quality has not been determined (NSF, 2012).

Although moral and financial support may be provided by a new teacher’s extended family members especially while undergoing certification processes (Mhishi, Bhukuvani, & Sana, 2012), once hired, salary concerns may fluctuate in severity dependent on life experiences of the individual teacher such as changing family commitments (Eick, 2002). Barmby (2006), recognizes salaries for many novice teachers are likely the highest concern regarding their chosen profession. Even though there is a wide range in perceptions and beliefs held by individual teachers regarding incentives or motivations behind entry into the teaching field, there is great importance associated with addressing low teacher salaries and retaining teachers (Barmby, 2006).

Although the compensation and security of a teaching position may be relatively attractive, a study examining choices made by alternatively certified teachers showed three out of four participants had indicated salaries were insufficient when compared to other available positions outside of education (Ng & Peter, 2010). Better paying private sector jobs are seen as
incentives for teachers to exit the field (Eick, 2002). Teacher salaries are considered to be lower than salaries of other professionals with equivalent educational background (NSF, 2012; Rahmawati & Taylor, 2015). Rahmawati and Taylor (2015) further indicate how pay in other science specific professions is frequently higher than that found in a teaching career. Therefore, science teacher salaries may seem inadequate when compared to other available salaries (Ng & Peter, 2010).

Although poor salaries are identified as a reason for potential teachers not to pursue teaching certification, some expressed the overall compensation package (salary, benefits, and working conditions) found in teaching was worth consideration (Worsham et al., 2013). Latterell (2009) proposes paying teachers more and developing opportunities for advancement, similar to that found with university professors. It is believed that this would serve to incentivize more to enter the profession. One European induction program adjusts the salary and workload over time as teachers develop from novice into a more veteran status (Howe, 2013). A touted induction program found in New Zealand offers novice teachers an 80 percent workload compared with more veteran teachers while maintaining a 100 percent salary (Howe, 2013). Here in the United States, alternative certification programs work to induce individuals to participate through offering financial incentives along with a minimal teaching requirement (Latterell, 2009). Conquering the concerns of salary and advancement opportunity are issues that must be dealt with by the profession itself through calling upon those in charge of policy and funding (Brooks, 1987). Decent salaries are a factor considered important in keeping good teachers in the classroom (NSF, 2012).

According to Brooks (1987), the systemic nature of factors affecting the status of teaching and impacting entrant considerations to elect teaching as a career demands focus on
multiple areas. The interrelated aspects of salary, talent pool of entrants, quality of those in the profession, student achievement, school effectiveness, and numerous other factors affect the profession’s attractiveness to potential teachers (Brooks, 1987). Low salaries are attributed to the exodus of novice science teachers from the field (Friedrichsen et al., 2007). Compared to teachers in mathematics who feel a lack of autonomy, student discipline, and a lack of content professional development are major reasons cited for leaving education. Science teachers indicated the stagnant nature of salaries as vital, along with discipline problems and a lack of meaningful staff development (NSF, 2012). Rural schools with further reduced salaries and substandard facilities often have increased trouble attracting science teachers (Tiala & Harris, 2011). The low teacher salaries are a cause of increased teacher stress (Grayson & Alvarez, 2008).

Difficulties attracting teachers are compounded by the salary and perceived status of the teaching profession. Brooks (1987) compares problems with the relationship between teacher salaries and status of the occupation to the age-old question asking, “Which came first, the chicken or the egg?” (p. 11) as he opines without correcting both, neither can be advanced. As long as society envisions the status teachers as relatively low, teacher salaries will remain low, and as long as salaries are low, perceived status will remain low (Brooks, 1987).

**Induction programs.**

Many school systems today recognize there is value in providing some form of induction program to assist teachers as they enter the education field and attempt to overcome feelings associated with isolation; these programs are seen as ways of increasing retention and teacher success with students (Ingersoll, 2012). The term “socialization” is often interchanged by researchers with the idea of informal induction, which occurs regardless of formal program
availability (Feiman-Nemser et al., 1999). Successful induction programs have been interpreted as those that guide teachers toward an effective inclusion in a professional community of practice (Kearney, 2014). A common preparation found in many school systems today is the inclusion of a formal planned induction as support for beginning teachers (Ingersoll & Strong, 2011). Offering a “formal” program is no guarantee regarding the induction program components. Formal programs range from state directed support and assessment, to district orientation, and building assigned mentorship programs (Feiman-Nemser et al., 1999). Measures from 1990 indicate about one half of the beginning teachers took part in some type of formal induction program, but as recently as 2008, the percentage of first-time teachers participating in an induction program increased to 91 percent (Ingersoll, 2012).

Ingersoll (2012) found the provision most common to formal induction is regular communication with an administrator or department head. Collaboration with a mentor (official or not official) teacher, peer collaborative planning, provision of an aide in the classroom, and reduced workload have also been found in induction programs. Most of today’s new science teachers participate in some type of formal induction program typically involving a measure of regular or increased communication with an administrator or department head (Ingersoll, 2012). Although various researchers have defined formal inductions in a similar manner, there are some interesting differences regarding timeframes of implementation.

Feiman-Nemser et al. (1999) points out formal induction programs limited to a timeframe within the first year of teaching and others extending through the third year of teaching. Sitting at the extreme ends of what some consider induction is a principal’s simple hello and welcome to our school, to a coordinated program organized around state guidelines and implemented within districts and buildings. Other researchers differentiate formal induction
programs from simple teacher orientations and choose to focus on assisting the novice teacher’s growth. Although the value of separating evaluations for teacher growth from the summative evaluation process is debated by those in the education field (Feiman-Nemser et al., 1999), suggestions from many researchers point to a need for separating the formal process from the assessments and discussions designed to assist teachers in reflecting upon their practice and growth as a professional (Brooks, 1987; Feiman-Nemser et al., 1999; Howe, 2013). Evaluations of novice teachers must be viewed in the light of their intention, to create successful and capable teachers (Feiman-Nemser et al., 1999).

The isolation felt by science teachers as they begin working within a new school setting provides the typical “sink or swim” mentality placed on those entering the field of education (Ingersoll, 2012). While investigating a mentorship program, Armstrong (2009) determined mentees benefit is derived from their mentor’s ability to provide useful advice and information, serve as a confidant, and express confidence in the rookie’s eventual success. According to Wang et al. (2008), novice science teachers consistently ranked work with mentor teachers as important and valuable. The more often the mentor-mentee interactions occurred, the more valuable the novices perceived the interaction. Beginning teachers have found value in the experiences of observing other peers and having their own teaching observed. They feel this experience is a good opportunity to reflect upon their own lessons and learn how to they might increase student learning (Wang et al., 2008).

Another possible component of a formal induction program established for new teachers is the use of workshops designed for beginners. Wang et al. (2008) indicated workshops for guiding teacher development are dependent on the environmental context within which the teacher is working. There is limited evidence to suggesting subject-specific development
induction programs are useful for novice teachers; however, due to research limitations, variety and number of participants, and depth of investigations regarding subject-specific programs, these have not been investigated enough for generalization to broader populations (Wang et al., 2008).

The Organization for Economic Co-operation and Development (OECD) has put forward guidelines for providing comprehensive induction programs. The various suggestions include: an orientation to the particular school, a mentorship program including mentor observations of the mentee, collaborative planning with colleagues, release time (for mentor meetings, documentation, and reflection), specific training/development, and a plan to continue professional development throughout the teacher’s career (Kearney, 2014). In the United States, state level guidance for induction programs exists in over half the states. The implementation process is, however, often constrained due to budget cuts and differing legislative agendas (Feiman-Nemser et al., 1999). Wang et al. (2008) noted there is a popularity for the workshop style approach toward induction development with its relatively low costs of implementation, but research on the effectiveness of workshops for novice teachers is limited. The beliefs which beginning teachers carry into workshops appear to have strong impact on the effectiveness of this type of development, and the impact of workshop training on teachers may be dependent upon where the individual teacher is relative to overall teacher development (Wang et al., 2008).

Induction programs are costly to districts, and those programs offering more comprehensive inductions are naturally more expensive for the schools (Ingersoll, 2012).

Ingersoll (2012) stated the value of induction programs was evidenced in a variety of ways. Those teachers who participated in induction were better able to keep their students task oriented, devise useable lesson plans, implement activities and questioning practices within the
classroom, and have positive and successful classrooms. Of expressed importance, the students of teachers who participated in an induction program obtained higher scores on achievement tests (Ingersoll, 2012). There is a cost-benefit consideration districts must make when considering what to offer in the way of induction (Ingersoll & Strong, 2011). The costs associated with a district’s ability to implement induction programs may limit the degree to which the benefits of induction may be realized (Kearney, 2014).

In some successful Pacific Rim countries, induction evaluations take the form of informal peer feedback serving to guide the growth of novice teachers (Feiman-Nemser et al., 1999). In Alberta, Canada, teachers must successfully practice as a professional for two years in which they undergo two summative evaluation processes addressing knowledge, skills, and the “attributes [of] effective teaching” (p. 13) before permanent certification is issued (Olson et al., 2015). The induction programs found in Japan reflect the elevated status placed upon teachers. Japan invests significant funds on beginning teachers and requires a self-study related to entry into the teaching profession (Kearney, 2014). Induction programs in Switzerland start with pre-service teachers and continue throughout the teacher’s career (Kearney, 2014). Germany and France have developed induction programs resembling apprenticeship programs (Kearney, 2014). When listing components of a British induction programs found to be most useful in learning to teach, new teachers cited classroom visits from mentor teachers, district supervisors, peers, and university tutors with assistance mainly focused on maintaining classroom discipline and securing teacher resources (Wang et al., 2008).

Ingersoll (2012) found what appeared as positive influence from induction programs on novice teacher retention. Specifically, researchers pointed to a mentor teacher and collaborative planning as most valuable. Influence from districts grouping various induction components was
also mentioned as a positive influence on retention. In fact, their findings indicated a stronger impact on teacher retention from combining various induction components; more inclusive induction programs were much more effective than those with more limited supporting roles (Ingersoll, 2012). Formal induction programs do not guarantee that teachers will receive assistance providing their students with more ambitious learning activities. For this to occur, the individual needs of the teacher must be recognized (Feiman-Nemser et al., 1999). Beginning teachers have spoken with a high opinion regarding formally organized mentorship assisting with the development of teaching practice and student learning (Wang et al., 2008).

**Intrinsic Experiences**

The bureaucratic running of schools, support for discipline or classroom management, salaries and benefits, teacher workload, and participation in (or not) some form of an “induction program” are experiences addressed in the preceding over which the teacher has little or no control. The following experiences reflect areas of a more individualistic nature and are those I considered intrinsic experiences. The individual needs of teachers, changing perceptions of self-interests, development of self-doubt, and personal emotions and resilience are addressed in the following.

Individuals may tend to seek teaching as a profession based on their self-perceived psychological and physical needs (Worsham et al., 2013), and those needs experienced from one new science teacher to the next are likely to differ. Influences from the early years as a professional teacher are instrumental in shaping endurance and overall development as a teacher (Feiman-Nemser, 2003). The first year of teaching is a complex experience due to the interaction of personal and situational factors associated with feelings of survival and intense emotions as the novices struggle through a steep learning curve (Feiman-Nemser et al., 1999). The needs of
the entry-level science teacher are unique and revolve around not only teaching and learning of the subject matter, but include the daily work of the students and the particular problems of practice associated with the teaching profession (Feiman-Nemser et al., 1999). As Brooks (1987) points out, the various combinations of problems facing novice teachers at any one time influence all beginning teachers differently. Programs designed to assist teachers starting their careers should be flexible enough to offer timely assistance and distinctive enough to address unique individual needs (Brooks, 1987). Beginning teachers have specific learning needs such as learning the instructional practices, district policies and procedures, and instructional resources (Feiman-Nemser et al., 1999). The questions facing the novice teacher are seemingly endless and cover topics related to getting to know their students to learning policies and procedures of the new school, and fitting into the new school or department culture (Feiman-Nemser, 2003).

Feiman-Nemser (1999) contends needs of those new to teaching include more than emotional support and classroom management and should include deep professional dialogues regarding curriculum needs, assessment, and the involvement of parents. Luft et al. (2007) classified support for new science teachers into five distinct categories. First, securing supplies and resources as well as following procedures falls under logistical support. Instructional support relates to lessons and classroom management, while conceptual support focuses on helping with the lesson content. The lending of emotional and empathetic support falls into the psychological support category. Finally, supporting teachers in the areas of accepted methodologies and teaching practices or standards is considered philosophical support (Luft et al., 2007).

**Uniqueness of needs.**

Novice teacher needs are likely to differ substantially from one individual to another as demonstrated by two examples. It is possible for alternatively certified teachers to perceive
different needs versus traditionally certified peers. Specifically, they may feel limited regarding classroom management strategies and understanding district policies (Roychoudhury & Rice, 2013). Additionally, the skills a new teacher needs to develop include the ability to adapt to unique needs with a type of improvisation through reflection on their teaching and learning from experience within a context at any moment (Feiman-Nemser, 2003).

**Emotional needs and self-doubt.**

Beginning teachers experience a steep learning curve during their entry into teaching where emotions are often high and teacher’s concerns center on survival (Feiman-Nemser, 2003). Beginning teachers are concerned with issues of their own competence and must work through issues of self-identity before they can focus on their own development and student performance (Feiman-Nemser et al., 1999). Brooks (1987) states working conditions must bring pride to the surface among teachers and allow them to experience positive feelings toward their chosen occupation. Disgruntled, demoralized, and dissatisfied teachers, especially those whose feelings are communicated by experienced employees to the entering teachers, will not support desires to remain in the profession (Brooks, 1987). Common themes attributed to early teacher development include individual survival, feelings of isolation, the shock of reality, and a loss of beginner idealism (Feiman-Nemser, 2003).

Emotional needs experienced by those new to science teaching include the need to be heard and understood, the need to have an empathetic person by their side who is familiar with the problems the novice faces, the need to know their efforts are of value, and the need to feel a sense of belonging (Luft et al., 2007). Although support from discussions with novice teachers using similar content can assist with many challenges and help generate ideas, the beginner may find emotional support through discussions with other beginning teachers outside the science
area (Friedrichsen et al., 2007). With this in mind, teachers in the United States tend to view teaching as an independent journey, and those new to teaching tend to avoid seeking assistance from others fearing that by doing so they may signal weakness as a teacher (Feiman-Nemser et al., 1999).

**Joining a community of practice.**

Two contrasting views regarding the needs of teachers during induction are forwarded by Feiman-Nemser et al. (1999). The first looks to the teacher as an individual and focuses on helping develop professional constructs of craft where teaching is a "highly personal activity" (p. 16), and where what works for one may not necessarily work for others. The second view places the teacher within a community of practice where guidance toward continual collaboration takes precedence (Feiman-Nemser et al., 1999).

Novice teachers may recognize their own need for teaching skill and strategy improvement (Roychoudhury & Rice, 2013) or they may need assistance in developing their knowledge for incorporating practices that work best within particular contexts (Feldman, 2000). Support for beginning teachers ranges from direct observation with weakness identification followed by modification strategies to a more hands-off approach where only suggestions are provided upon specific requests made by the beginner (Brooks, 1987). New teachers benefit from the opportunity to talk about and reflect upon substantive teaching, or teaching deemed to matter most (Feiman-Nemser, 2003). Time reflecting on the sensible and beneficial aspects of a current practical theory helps new teachers understand how their practice might be expanded through adopting these aspects as described by Feldman (2000).

Beginning teachers need to develop situational instructional skills so they might best instruct the individual students under their care. An example of this is a novice teacher learning
to take complicated standards and district mandated curriculum and personally manipulating them into a lesson from which children can grasp meaning (Feiman-Nemser, 2003). Another example would be a novice teacher attempting to fit a lesson into the prescribed available time often seen as limiting by newer teachers (Roychoudhury & Rice, 2013).

According to Brooks (1987), teacher developmental theorists propose experienced teachers possess a more conceptual development and can call on a broader range of strategies within their instruction. Stages of concern theory holds that novice teachers differ from experienced teachers, and the effectiveness of the individual teacher progresses as the teacher moves through various stages of development. Induction should be geared toward assisting teachers’ progress through these stages (Brooks, 1987).

Schools historically do not facilitate professional learning explicitly for novice teachers but rather function in a manner encouraging teacher isolation and independence (Feiman-Nemser, 2003). Preparing students for future schooling such as college is a perceived goal common to beginning teachers (Roychoudhury & Rice, 2013). Two-way communication between rookie and veteran teachers assists new teachers as they contemplate various teaching lessons or strategies (Luft et al., 2007). Support provided by peers within the science department is a critical factor related to the success of novice science teachers (Luft et al., 2007).

Beginning teachers enter specific organizational culture as they take their first science teaching position (Feiman-Nemser, 2003). Novice teachers may need assistance entering the community of practice particularly as this move is accompanied by philosophical pedagogical changes or modifications (Feldman, 2000). Working through their initial year learning to teach, novice teachers are exposed to constant influence from others in their new environment. Some influence is implicit, unspoken, or understood, and other influence is explicit, and unambiguous.
Either way, influential messages are given off by others in the culture of the beginner’s school (Feiman-Nemser, 2003).

Valuable induction programs are designed to help teachers survive their initial exposure to the profession, and to help progress the teacher’s level of instruction (Feiman-Nemser, 2003). Research data indicates science teacher participation in professional development has a positive impact on student performance in science (NSF, 2014). What Feiman-Nemser et al. (2003) call for in mentoring is a sort of “bifocal vision” assisting with the immediate needs of the novice as well as the long-term goals associated with schooling.

Howe (2013) calls for providing novice teachers with a gradual acculturation into the profession accompanied by organized, supervised, and growth-oriented induction programs. In this type of induction program, mentors and mentees both hold reduced workloads to provide for observations of and chances to interact with colleagues. Additionally, time is set aside for the novice and mentor to review and discuss professional practice (Howe, 2013). Many researchers have found becoming competent as a teacher can take up to four years and additional years are needed to achieve a higher level of proficiency. During this time, if new teachers only focus on survival, there is a fear that learning to advance their instruction will be compromised (Feiman-Nemser, 2003).

**Support.**

Support for new science teachers can take many forms and serve a variety of purposes. Helping novices prepare for the long-term, improving their quality as teachers and overall retention rates, reducing novice workload, communicating formative ideas, and building networks of assistance are areas in which support may be provided to novice science teachers.
Per Feiman-Nemser (2003), policy addressing the long-term learning needs of beginning teachers is poorly understood, as policy mandates regarding support programs demonstrate this with emphasis typically aimed at immediate concerns such as teacher survival. Improving teacher quality and retention is a more likely outcome if learning needs of the beginning teacher are addressed (Feiman-Nemser, 2003). Friedrichsen et al. (2007) emphasized the need to assist new teachers in developing networks of support to increase the potential for teacher retention. Feiman-Nemser et al. (1999) makes a further point, reducing novice teacher workload should be supplemented regularly with meetings involving a more experienced staff member for advice and formative feedback (Feiman-Nemser et al., 1999). The greater the number of support networks new teachers identified using, the more likely those teachers were to express an intent to return to teaching the following year (Friedrichsen et al., 2007).

The novice’s yearning for support can be seen in a case study by Cooper and He (2011) where although feeling more confident toward issues of classroom management than they had felt as pre-service teachers, first-year teachers expressed a desire for more administrative support with discipline. This yearning for administrative support appears as a common need among novice teachers (Cooper & He, 2011; Eick, 2002; Ingersoll, 2012; Ingersoll & Strong, 2011; Kearney, 2014; Ng & Peter, 2010; Roychoudhury & Rice, 2013). Considering the importance of support provided to teachers as they take that initial step, the following quote from Feiman-Nemser et al. (1999) seems most appropriate: “Providing induction support to beginning teachers is a humane response to the trials and tribulations associated with the first year of teaching” (p. 9). Assisting novice teachers through various lines of support appears quite critical.
Needs summary.

Stresses begin almost immediately for many beginning science teachers. Entry teachers often start just before the students arrive at school, and beginning teachers must use their limited time to prepare for their students and classrooms (Feiman-Nemser, 2003). Novice science teachers can benefit from efforts to reduce inevitable challenges and stresses teachers face. Reducing stress for beginning teachers as an isolated act during initial teaching may ignore longer term needs associated with more advanced professional development (Feiman-Nemser et al., 1999), but support for beginning teachers undertaking challenges set before them may assist in preventing the adverse effects leading to teacher attrition and through this fact, help build successful teachers (Friedrichsen et al., 2007).

The Beginning Teacher Support and Assessment Program (BTSA) started in California and placed a priority on trying to meet the unique needs of beginning teachers. This involved a two-year time frame for induction and the development of Individual Induction Plans (IIP) centered on individual goals, strategies for meeting goals, developmental activities, and assessments toward meeting the goals (Howe, 2013). According to Feiman-Nemser (2003), questions of concern to the novice teacher indicate "a major learning agenda" (p. 26) and goals around this include curricular, instructional, assessment, management, community, and culture issues.

For novice teachers to meet these goals, they should not be assigned to difficult teaching preparations or classes, and they should be permitted leeway with respect to responsibilities upon initial exposure to the profession (Feiman-Nemser, 2003). Feiman-Nemser et al. (2003) points to examples in Asian and European countries where novices are provided with less challenging course loads, provided specific professional development, regular consultation with experienced
teachers, given formative observations and opportunities to observe experienced teachers. The needs of the novice teacher are varied and include specialized assistance addressing individual needs, emotional support, assistance with routine and process, as well as cooperative times with more experienced staff (Feiman-Nemser et al., 1999).

Beliefs and values.

The thoughts and behavior patterns governing how a science teacher operates in the classroom define orientations toward teaching and learning science (Friedrichsen, Van Driel, & Abell, 2011). Science teaching orientations result from the combination of a science teacher’s beliefs and knowledge around the purposes held by teachers for teaching science at specific grade levels (Brown et al., 2012). Having an appreciation for various orientations previously used by researchers lends insight into understanding novice teacher perceptions, beliefs, and ideas.

A science teacher’s beliefs are substantially influenced by their past experiences as a student of science, and these beliefs can be quite robust with respect to change (Brown et al., 2012). The paths molding beliefs include formal learning experiences such as those presented in college courses, personal experiences, and the strongly held beliefs stemming from the “apprenticeship of observation” (DiCicco et al., 2014). Beliefs based on life-long observations of teachers are likely to inspire lesson development based on what is believed by the individual to be most beneficial for student learning (DiCicco et al., 2014). Past experiences as a student are strong enough not only to impact the prospective teacher’s willingness to accept teacher preparation course curriculum, but also, they impact the novice’s decisions regarding instruction (DiCicco et al., 2014).
Brown et al. (2012) points out the goals identified by pre-service, graduate student teachers included preparing students for the future both in and out of schooling. This includes helping students learn to apply science concepts and ideas in their everyday lives. Teachers operate as direct deliverers of knowledge with students focused on listening. Teachers providing guided discovery and leading student participation in discussion, are beliefs commonly held by new teachers as to what an effective teacher should do. Science teacher beliefs have been shown to serve as a reflexive guide for teacher decisions related to instruction and practices within the classroom (Brown et al., 2012).

The beliefs novice teachers enter the profession with can produce a degree of internal conflict and angst as beliefs contradict the realities of a teaching position (Cooper & He, 2011). One area of conflict in which these beliefs may be challenged—by students, parents, or educators—is exemplified by the various degrees to which it is felt students need to develop an understanding and appreciation for science. This is often contested, and the teacher’s personal beliefs about students’ curricular needs concerning science may be an area of conflict (Danielsson & Warwick, 2014). When there is a mismatch between beliefs of a novice teacher’s teaching ideal and their actual teaching performance, negative responses such as crying, nervousness, and depression may be experienced (DiCicco et al., 2014).

Friedrichsen et al. (2011) indicate the teacher's beliefs about teaching a subject such as Earth Space or Biology at an identified level influence—and are in turn influenced by—the subject matter knowledge, curricular knowledge, and knowledge of instructional strategies held by the teacher. Pedagogical Content Knowledge (PCK) research has examined a teacher's knowledge of their subject and its influence upon their teaching of a specific subjects; and the interaction of a teacher's subject knowledge mastery and of general pedagogy is complex.
However, the goal of science instruction and characteristics of teacher delivered instruction can serve to shine light on the purpose or orientation owned by a science teacher (Friedrichsen et al., 2011; Gess-Newsome, & Lederman, 1999).

Two main orientation categories have been forwarded by Friedrichsen: teacher-centered and reform-oriented (Friedrichsen et al., 2011). According to Brown et al. (2012), some teachers who ascribe to the teacher-centered orientation will feel teaching equates with the teacher’s delivery of lessons, and students are assigned the role of listening to and taking in the material; other teachers who ascribe to the student-centered orientation believe students can be expected to learn content with minimal guidance coming from the teacher (Brown et al., 2012). Two further proposals have been forwarded as somewhat more descriptive of science teaching orientations. In the first, four orientation refinements included: 1) activity-driven teaching, 2) didactic teaching, 3) discovery teaching, and 4) conceptual-change teaching. In the second, five additional orientations were added later and include: 5) process, 6) academic rigor, 7) project-based, 8) inquiry, and 9) guided inquiry (Friedrichsen et al., 2011). These are briefly described in the following paragraph.

Friedrichsen et al. (2011) indicates within teacher-centered orientations there are two classifications: didactic and academic rigor. Teachers with the didactic orientation practice lecture, discussion, and questioning aimed at transmitting known scientific facts. The most frequently researcher-observed orientation appears to be the didactic orientation, even though the supporting documentation appears to have a limited history. This holds at all levels of instruction (Friedrichsen et al., 2011).

Friedrichsen et al. (2011) also describes the academic rigor orientation as focusing on a body of scientific knowledge and knowledge verification based on the teacher's beliefs of
relative importance. These researchers also describe how reform efforts from historical movements in science education include process, activity-driven, and discovery orientations. The concept of a process—orientation, helping students develop process skills—includes examples such as observation, classifying, predicting, and measuring. Within this orientation, the memorization of science facts is downplayed (Friedrichsen et al., 2011). The activity-driven orientation of reformed efforts references those teachers who hold the goal of having students work with hands-on learning experiences in which the learners take an active role in learning directly from the materials being studied. A discovery orientation as student-centered calls for student opportunities to discover science topics on their own as they pursue internally motivated interests. Finally, teachers looking to develop conceptual changes present students with situations challenging naively held science misconceptions and look to further develop more scientific understandings (Friedrichsen et al., 2011).

Looking deeper, Feldman (1997) identifies “teaching as a way of being” (p. 757), and as an extended perspective for considering what it means to be a teacher within the teacher’s social, contextual, and spatial setting. Science teacher practices are influenced by the uniqueness of each setting (Friedrichsen et al., 2011). Beginning teachers continuously mold their state of being; within their school’s environment, they shape and reshape who and what they are as teachers (Craig, 2013). Brown et al. (2012) calls for considering the teacher’s perceived beliefs regarding the role of the teacher, role of the student, views regarding science, and the reason for teaching science. It is further pointed out how the development of a teacher’s wisdom takes reflection on the lived-experiences of a teacher (Feldman, 1997). The earnest growth in wisdom starts with the first steps into the actual world of teaching science.
Motivation and satisfaction.

As Lortie (1975) outlined, the personal considerations associated with choices for becoming a teacher are complex. Dispositions and unique circumstances vary greatly within individuals, and the advantages and disadvantages from a career in education will encourage some while at the same time discourage others from becoming a teacher (Lortie, 1975).

Social status, career fit, time for family, prior consideration, and financial reward are possible motivating factors attributed to pursuit of a teaching career (Rahmawati & Taylor, 2015), and a teacher’s job satisfaction plays an important role in preventing burnout and ultimately flight from the profession (Grayson & Alvarez, 2008).

Lortie (1975) outlined five areas which serve to attract individuals into the field of teaching: the opportunity to work with young people (interpersonal), to provide a moral service (service), to remain in a setting of familiarity which is perceived as positive (continuation), to gain economic security (material), and to take advantage of a favorable working schedule (time compatibility). The following looks briefly into these motivators affecting teachers.

There is a degree of esteem or status associated with helping students (Lortie, 1975; Rahmawati & Taylor, 2015). Many teachers derive motivation for their jobs and workplace as they develop positive relationships with the students and parents (Grayson & Alvarez, 2008). Teachers’ internal motivations associated with helping students succeed may evoke strong emotional commitments (Latterell, 2009).

Feelings related to “making a difference” in the lives of children or for society create job satisfaction for teachers (Ng & Peter, 2010). Vows to help students, provide them with agency, or keep students engaged with learning are motivators for some, and they are powerful enough to
positively impact teacher retention (Roychoudhury & Rice, 2013). Teachers have also expressed joy in watching students learn skills necessary for developing as good citizens (Eick, 2002).

Whether delight in watching students learn or providing them with a podium to voice their inner thoughts, beliefs, or feelings, interpersonal motivators can be powerful to those in teaching. The increased feelings of esteem may evoke strong emotions from teachers as they are motivated to help their students.

The moral aspects associated with teaching hold worthiness stemming back to secular and sacred aspects of American culture (Lortie, 1975). Specific stimuli trigger motivation or satisfaction for beginning science teachers. When a science teacher can meet the goals outlined in class objectives, feelings of satisfaction or job-well-done surface (Ng & Peter, 2010). A teacher may see motivating students to learn as a challenge, and this creates motivation driving the teacher. In other words, a teacher may receive motivation through the challenge of interacting successfully with the students (Rahmawati & Taylor, 2015). Motivation may come from successfully working with students and/or teacher efforts to ensure fair opportunities for all students. Some teachers are motivated not only to cover the material they believe necessary, but also to ensure it is covered for all students (Roychoudhury & Rice, 2013).

Grayson and Alvarez (2008) indicate students expressing a desire to learn and reflecting a responsible character toward schooling serve as teacher motivators. To the degree teachers see their jobs as making a difference in the lives of their students, expressed joy clearly indicates satisfaction (Grayson & Alvarez, 2008). Teaching positive behaviors, appropriate social skills, and increasing academic performance are examples were teachers find satisfaction in their jobs (Eick, 2002). Nieto (2003) identifies a strong magnet for keeping teachers in education as the
combination of a profound belief in education, political activism, and a “fundamental belief in students” (p. 52).

Although the financial rewards associated with a teaching career are typically considered lower than deserved, there is a degree of financial security associated with a teaching job (Lortie, 1975). The overall safety of the teaching environment is given credit for attracting some individuals to the field (NSF, 2014). Specific benefits associated with teaching such as health insurance or retirement plans fit individuals uniquely, and still others perceive a degree of financial/security reward associated with teaching (Rahmawati & Taylor, 2015).

Even with having to work beyond the eight-hour workday, having summers off and other extended vacations found in education settings are also attractive to those interested in teaching (Lortie, 1975). Similarly, extended time off for family is seen as an attraction to a teaching career (Rahmawati & Taylor, 2015) and specifically the lengthy summer vacation (Luft et al., 2011).

As teachers yearn for pride in their profession, comments from disgruntled, demoralized, and dissatisfied veteran teachers do not support the desires of beginning teachers to remain in the profession (Brooks, 1987). Science and mathematics teachers appear more likely to express job dissatisfaction as a reason for leaving the profession than colleagues teaching in other subject areas. Lack of administrative support, low parent involvement, and student behavioral issues are detractors from their job satisfaction (NSF, 2014).

Jackson and Talbert (2012) show how a novice teacher’s motivation and commitment to the profession may take an abrupt 180-degree turn during the initial professional experience. In a study following science and mathematics graduate students placed for ten hours per week as teachers, Latterell (2009) commented on their self-perceptions regarding perceived inabilities to handle unruly students producing depression severe enough in 100 percent of their subjects to
necessitate implementation of unplanned developmental activities targeting classroom management techniques and motivation. Despite a financial incentive identified as three times a regular university assistantship, none of the study’s participants wanted to renew nor did they feel they could support recruitment efforts looking for additional subjects as the perceived benefits were not worth the negative aspects associated with their limited teaching (Latterell, 2009).

Although positive experiences and memories of school can work to guide individuals into a teaching career (Lortie, 1975; Worsham et al., 2013), as discussed in a study by Rahmawati and Taylor (2015), it is possible for a teacher to enter the profession completely lacking but eventually developing motivation to teach. Grayson and Alvarez (2008) point out the motivation of teachers toward their jobs and workplace develops as positive relationships with the students, parents, and the community form. As positive experiences within the schooling environment build, feelings of teacher satisfaction have an impact on overall school climate. As satisfaction in a teacher’s job increases, stress levels may also fall thereby strengthening an optimistic image of teaching (Grayson & Alvarez, 2008).

Career components attributed to increasing job satisfaction and school commitment among science teachers include a safe environment, strong administrative leadership, cooperation among teachers, high levels of parent involvement, and sufficient learning resources. These components also improve the overall effectiveness of teachers (NSF, 2014). Induction program availability is associated with increasing job satisfaction, commitment, retention, and encourages beginning teachers to remain in the profession (Ingersoll & Strong, 2011).
Stress/resilience.

The most common concern voiced by beginning teachers is of survival during their first year as professionals (Brooks, 1987). Stressors common to the first year manifested as severe anxiety, emotional distress, lack of self-care, and a desire to quit teaching, but the degree to which each is expressed varies greatly among novices (DiCicco et al., 2014). Struggles with curriculum implementation or coverage choice can develop stress in beginning teachers (Feldman, 2000). Brooks (1987) indicates new teachers typically express attitudes questioning their own ability to endure through the first year. Concerns they have stem from their individual job stamina to their overall effectiveness, with self-doubt arising as a common theme (Brooks, 1987).

Doney (2012) describes two major categories classifying stresses on novice teachers: personal (illness, relationship, isolation, etc.) and professional (multiple courses taught, extra activity involvement, inability to control personal time, etc.). The way stress is dealt with also classifies into two categories, palliative and direct. Palliative references those actions taken to control stress. Examples include exercise or hobbies. Direct actions are efforts looking to alter the source of the stress itself; identification of the problem and a subsequent action designed to mitigate or remove the source. Finding an alternative funding source for class supplies when budgets have been depleted is an example of a direct action (Doney, 2012).

As described by DiCicco et al. (2014), areas such as instructional planning, classroom management, and differentiation instruction tend to be stressors for entry-level teachers. If the teacher obtained certification through an accelerated alternative route, this stress is more likely to surface. Guiding novice teachers toward more appropriate and less idealistic expectations related
to classroom environmental conditions could positively increase retention rates (DiCicco et al., 2014).

Frequently, those new to teaching are just entering the adult financial world, which is often in stark contrast to the security and expected regularity of student life to which they have become accustomed (Brooks, 1987). Better financial incentives and more limited degrees of stress appear in positions outside of teaching science; however, it is possible that they view the rewards of working in education as more personally fulfilling despite the stressors (Ng & Peter, 2010). Beginning teachers become overwhelmed with the change in experiences, and may leave the profession before having an opportunity to develop necessary skills for coping with the day-to-day tasks expected of teachers (Brooks, 1987). Traianou (2007) indicated frequent classroom interruptions disrupt the planned teaching routine and stress levels of even the most experienced teachers. A concern voiced by Brooks (1987) is the impact of placing a novice teacher into a role typical of, or more challenging than, that of more experienced teachers. The novice may develop anxiety from developing a feeling their performance is less than expected, when the differences stem from a mitigating lack of experience (Brooks, 1987).

A variety of experiences directly associated with students may cause stress for beginning science teachers. Unmotivated and misbehaving students, and students holding on to misinformation regarding scientific concepts are recognized as placing stress on those new to teaching. Interview data from Barmby (2006) indicates beginning teachers experience stressful interactions related to unruly students and students overall lack of desire toward learning. Attempting to manage students’ behavior can be quite stressful for beginning teachers (Rahmawati & Taylor, 2015). Low-achieving students accompanied by difficult teaching assignments compounds issues of teacher stress (Koballa et al., 2005). Determining the best way
to address student misconceptions related to science is challenging (Koballa et al., 2005). A novice science teacher’s pedagogical content knowledge comes into play in the design of effective lessons to correct student understandings (Boesdorfer & Lorsbach, 2014), and as previously indicated, this can increase stress.

Veteran teachers can unfairly criticize beginner’s ideas as naïve, idealistic, and not fit for the realities within the school (Brooks, 1987). Barmby (2006) indicates to make positive impacts on teacher retention, novice perspectives must be considered as a starting point. A misalignment between the novice science teacher’s philosophy and that of the school may cause stress perceived by the beginning teacher as related to inability to enact or act upon personal beliefs regarding teaching of science (Danielsson & Warwick, 2014). To the extent a novice teacher is troubled by conflicting aspects of professional practice, stress may be found in the novice’s resistance toward altering held theories of practice (Feldman, 2000). Transitioning from learning theories of teaching to practicing can be stressful for those new to teaching (Rahmawati & Taylor, 2015).

Brooks (1987) indicates when beginning teachers are given more difficult and challenging workloads immediately, the stresses placed on those teachers are compounded. A variety of ways to increase difficulties in teaching assignments exist. Teaching outside their area of expertise, working challenging students, having to alter classroom use and between multiple subjects, and being given additional non-curricular responsibilities all increase the challenges facing novice teachers (Brooks, 1987). Barmby (2006) indicates considerable stress, long hours, excessive paperwork, low remuneration, and reports of becoming physically ill and working numerous hours until reaching a point of “sheer exhaustion” as characteristic of teaching (p,
Feelings of stress reach limits where general health and well-being become compromised (Ng & Peter, 2010).

According to Doney (2012), the stressors impacting beginning science teachers are dynamic, and protective factors originate from a variety of places: personal, social, and institutional safety nets. These factors help novice science teachers combat stress and develop resilience. Families are also seen as valuable outlets and sources of resilience, helpful in bearing the burdens of stress placed upon teachers (Doney, 2012; Ng & Peter, 2010).

Three ways teachers develop resilience and coping strategy toward stresses are enumerated by Doney (2012). Behaviors to change the situation from which stress originates allow a teacher to not only take on stress successfully, but also recover from the effects of stress. Teachers can manipulate the impact of a stressor through making positive comparisons, ignoring parts, or considering the stressor in a manner to reduce its overall relevance in life. Finally, ways of controlling stress levels, such as taking up exercise, pursuing a hobby, or even experiencing a group intervention are found as helpful (Doney, 2012).

Brooks (1987) points out not only must the concerns of novice teachers be identified; they should guide the development of induction programs. As concerns of beginning teachers change over time and between individuals, the induction program must adjust to address new concerns (Brooks, 1987). Additionally, Doney (2012) indicates new teachers must have some experiences with stressors if they are to develop coping techniques, resilience. Understanding the stories behind stressors and how teachers respond is important (Doney, 2012). As novice science teachers experience different stressors, they will need assistance (Friedrichsen et al., 2007).

Doney (2012) explains how interactions that foster cooperation and professional growth may assist novice teachers in developing resilience to stress. She further indicates, “efficacious
teachers see stressors as challenges rather than threats” (p. 648). Teacher perceptions of stress are complex, and result from the interaction of many factors, and a novice teacher’s ability and efforts to deal with stress is also unique (Doney, 2012). When helping beginning teachers, Feiman-Nemser et al. (1999) express concern for taking the individual development of teachers into account, their ability to learn as a professional, while addressing issues which create stress.

**Complex contextual surroundings.**

The classrooms and schools interact with beginning science teachers to build the context in which the neophyte must function (Strom, 2015). Informal (informal friendly alliances) and formal mentoring, colleagues, and students impact the socialization of new teachers as each adjusts to their individual niche (Tan, 2015). Strom (2015) points out how science teachers operate with many elements impacting the educative environment of students. The totality of these classroom elements, factors such as the presence of standardized assessments, the teacher's pedagogical content knowledge, and classroom size are components forming the contextual learning environment around the teacher. Strom (2015) uses the framework of "rhizomatics" to represent the numerous branches emanating from an asymmetric, dynamic and growing complex as a way of looking at the developing teacher and classroom activity within a context of numerous elements.

Teacher communities found in various schools differ in relation to their cultural settings (Craig, 2013). Tan (2015), defines teacher socialization as the "process by which teachers selectively acquire the knowledge, skills, values and norms, not only peculiar to the teaching profession, but also idiosyncratic to the prevailing culture of the school" (p. 178). Feiman-Nemser (2003) further identifies a school’s openness to experimentation and innovation, professional curriculum and assessment collaboration, and feelings toward common and
critiqued curriculum as areas in which school cultures differ. Assignments for entering teachers should fit the individual’s background (Feiman-Nemser, 2003). One possible cultural expected norm that often goes unstated is the expectation that novice teachers possess an ability to effectively manage a classroom (Tan, 2015). This and other beliefs held by teachers within an educational setting mold the teacher community (Craig, 2013). Descriptions of three such school cultural contexts impacting a beginning teacher follow.

Tan (2015) describes the veteran-oriented, novice-oriented, and integrated-orientation cultures as they relate to the neophyte teacher. A school culture dominated by habits and interactions of those with the most experience is termed a "veteran-oriented professional culture" (Tan, 2015, p. 178). Relatively high numbers of experienced teachers set the cultural norms in a veteran-oriented professional culture. Professional practice is typically well established, and independent work is prevalent in this cultural setting. Teachers see little need to work in groups and are confident of their actions. A lack of interaction, assistance or support, from experienced colleagues impacts the novice teachers in a veteran-oriented professional culture (Tan, 2015).

The "novice-oriented professional culture" (p. 178) is characterized by younger and more inexperienced teachers with more idealistic views of their profession. The working environment found in such a culture is filled with cooperative efforts, but those efforts are between novices with limited experience. There is a lack of expertise and wisdom typical of experienced cultures (Tan, 2015).

A third professional culture described by Tan (2015) encourages a continual dialogue between experienced and novice teachers. This "integrated professional culture" (p. 178) does not separate teachers by experience. In this culture, novice teachers benefit more through work with experienced teachers on curriculum and teaching. In this environment beginning teachers
are more likely to understand expectations, meet expectations, solve problems, and understand where or how to get support (Tan, 2015).

The socialization of new teachers is impacted by beliefs, attitudes, and behaviors found within the school setting. Treatment from others, traditions, and degrees of collegiality and appreciation are unique settings and norms of socialization into which the green teacher must grow (Tan, 2015). New teachers bring individual histories and experiences, unique differences, various professional preparations, beliefs, and needs into special work settings (Strom, 2015). Divergent contexts impact individuals differently with respect to retention and overall attitudes toward teaching (Wang et al., 2008). Tan (2015) indicates teachers within the same school setting do not necessarily socialize in the same manner. Each individual constructs narratives influenced by their personal perceptions and experiences (Tan, 2015). Contextual experiences include those within the individual classroom as well as the greater department or school community.

A new science teacher faces a unique group of students with diverse needs operating in a dynamic environment. Strom (2015) points out how these components work together with the teacher to influence professional practice within the classroom. Beginning teachers negotiate with students as they develop a classroom practice. This practice results from mixed theoretical and practical experiences and is aimed at maintaining an environment perceived by the teacher as conducive to learning (Strom, 2015).

Philosophical norms guide different teacher communities, and new teachers joining a group are subject to unique community situations and can come face-to-face with pre-existent communal conflict (Craig, 2013). In response to administrative guidance or direction, beginning teachers may alter their perceived ideal form of lesson delivery to build foundational knowledge
for students (Strom, 2015). Teachers must interact within a school environment that includes components such as: other teachers, administrators, parents, school culture, policies, and schedules. Various interactions hold potential to mold teacher practice and resilience as when the perceived support or lack of support provided regarding classroom management issues with unruly students impacts teacher retention decisions (Strom, 2015).

The students, teacher, content, physical space, and numerous other elements found within a classroom interact in complex and dynamic ways to provide a learning environment and curriculum for the students (Strom, 2015). Assumptions that mentorship and teaming programs adequately address the various novice teacher’s needs are ill advised, and without specifics guiding induction support and providing for appropriate placement of beginning teachers into a school setting, these ideas cannot be more than a temporary assistance to entry teachers (Feiman-Nemser, 2003).

In a review of literature focused on induction and beginning teachers, Wang et al. (2008) indicates the importance of experienced teachers in guiding the beginning teacher. Various contextual settings including unique school demographics affect teacher decisions to accept particular jobs (Ng & Peter, 2010). Persons, ideas, objects, and institutional structures must be negotiated by the novice science teacher to teach (Strom, 2015). Those new to teaching benefit from procuring the acceptance of not only their peers, but also their students. Students may serve as a valuable source of affirmation, acceptance, and respect to the neophyte practitioner (Tan, 2015).

**Internal and external support systems.**

A lack of support can discourage rookies as they first start to teach science (Brooks, 1987). Multiple forms of support increase a teacher’s desire to persevere through hardships
(Abell et al., 2006) and are derived from people or programs aiding beginning teachers (Friedrichsen et al., 2007). Extensive support networks are powerful tools and increase resilience for those new to teaching (Doney, 2012). Support as part of a formal induction program is focused on elsewhere in this paper; whereas, at this point, direct human connection is the focus.

A supportive team providing content assistance for science teachers is an example of direct human involvement (Hutchison, 2012). Students, school staff, and other beginning teachers also provide support for new teachers (Friedrichsen et al., 2007). Internal support systems involving human interaction are available within schools. Talking with other teachers and participating in a mentorship program are supportive links within the educational setting. Those within the school setting likely to provide support include administrators, teachers, students, parents, and counselors (Doney, 2012; Friedrichsen et al., 2007).

Friedrichsen et al. (2007) indicates a common path for novices seeking support is through nearby fellow teachers. Teachers are identified as providers of emotional support. When the support relates to the classroom content such as science laboratory concerns, teachers assigned similar courses are identified as most apt at providing valuable support (Doney, 2012; Friedrichsen et al., 2007). Brooks (1987) identifies the assignment of a mentor or support teacher to those entering the field as perhaps the most important decision made on behalf of the new teacher. Finally, although unable to provide content support, other beginning teachers were valuable providers of emotional and social support (Friedrichsen et al., 2007). Support with individual students could be obtained from parents, counselors, and special education staff, while students themselves were credited with lending a degree of moral support as teachers perceived a degree of joy or satisfaction through student excitement over success (Friedrichsen et al., 2007).
Family and friends are support systems removed from the school environment and unique to each teacher. These offer a more humanistic side to support compared with other external supports such as professional organizations or conferences. People external to the school setting offering support include family, friends, and experienced teachers outside of the school such as a retired acquaintance (Doney, 2012; Friedrichsen et al., 2007). Moral support, ideas for lessons, distraction from the stress of work are valuable forms of support from family and significant others (Doney, 2012).

Social and personal support systems increase resistance to stressors, positively impact self-esteem, and increase perceptions of internal locus of control (Doney, 2012). An empathetic and developmentally supportive support network is a necessity for neophyte teacher success (Doney, 2012).

Conclusion

Examining the formation or “becoming” of a science teacher side-by-side with various factors and related contexts impacting this formation can assist in designing professional development for the novice science teacher (Avraamidou, 2014). How experiences and perceptions present themselves in the stories novice teachers relate after initial teaching experiences is of interest (Wang et al., 2008). Just how does the earliest experiences impact stories and perceptions of beginning science teachers? When studying the human experience such as the transformation of beginning science teachers, understanding and clearly documenting the context is vital (Lawrence-Lightfoot, 2005; Lawrence-Lightfoot & Hoffman Davis, 1997).

In conclusion, this literature review looks at common experiences impacting those beginning a career teaching science. As is seen above, the contextual setting surrounding beginning teachers is dynamic and multifaceted. Novice science teacher perceptions are guided
by beliefs forged through observations and experiences. While as a student, these observations
began shaping the eventual science teacher in a variety of ways and formed in them potentially
strong beliefs regarding the eventual chosen profession. Attitudes, personal philosophies, and
numerous experiences melt together further developing and impacting young science teachers.
Observed actions of a beginning professional help create a window into better understanding the
neophyte science teacher.
Chapter 3: Methodology

In this chapter on methodology, I first explain this study’s classification as qualitative and multi-case. The overall design of the research is provided (Figure 2), followed by a discussion of the identification of the collective cases within this study. Then the specifics regarding the selection and descriptions of participants and accompanying sites are provided. The collection of data and its analysis are elaborated upon. Credibility, validity, and reliability are discussed followed by a look at the advantages of the approach taken. This chapter ends with an inclusion of the ethical considerations attached to this study.

Purpose of the Study

With a heavy push coming from around the world to improve the quality of science education, understanding the factors affecting the development of beginning science teachers, the contextual settings in which these factors operate (professional and personal), and their influence on teacher perceptions, beliefs, attitudes toward teaching science, and actions is vital (Avraamidou, 2014). Although seeing induction as an extended time taking up to several years in which developing highly trained and qualified teachers is valuable (Feiman-Nemser et al., 1999), for novice teachers to step successfully over the initial year’s experiences of teaching science and remain in teaching is a prerequisite and considered “induction” for this study. As reported by the National Science Foundation (2014), if new teachers leave the profession at an increased rate while numbers retiring from the profession increases at the same time, a crisis is quite likely on its way. The questions posed by this research explore these experiences through the eyes of the participants:
1. How do today’s novice science teachers describe their first-year teaching experiences?
2. How do novice teachers’ feelings about being science teachers change during their first year of teaching?
3. How do beginning science teachers describe their successes?
4. What challenges do today’s beginning science teachers face?

Why a qualitative study.

As indicated by Leavy (2014), qualitative research is described as research that can seize and document the various components, which, together, provide an understanding for the “social life” (p. 1) from the ordinary to the extraordinary. Qualitative studies can look inward at the self or, as in the case of this study, outward to understand others and their realities. The induction of novice science teachers is an experience had by a specified population in this study, and as such qualitative research offers a way of developing an understanding for this human experience (Leavy, 2014). Merriam (1998) opines qualitative research focuses on “discovery, insight, and understanding from the perspectives of those being studied” (p. 1). It offers the potential for making ultimate gains in building the knowledge base in the field of education studies. Stake (1995) agrees with the value of qualitative methods for education research. Interviews, observations, and analyses conducted by the researcher are considered hallmarks of qualitative investigations looking to understand the meanings placed by people on experiences in the world (Merriam, 1998). Investigating the individual novice science teacher helped develop a clearer picture for the collective experience of induction common to beginning science teachers (Stake, 1995). As this study investigates and develops a stronger understanding for meanings within specific contexts surrounding the beginning science teacher, a qualitative research model was most appropriate (Merriam, 2014).
Why a multiple-case study.

Case study research examines experiences in real-life context, and case study is identified as a qualitative approach or methodology for research (Creswell, 2013; Merriam, 1998; Yin, 2009; Stake, 2006). By looking at the purpose, unit of analysis, and data sources of case study, the degree to which this methodology was appropriate is clarified. The purpose of a case study calls for an in-depth description and analysis of a situation (Pearson, Albon, & Hubball, 2015). In this study, the case was the experience of high school novice science teacher induction. The unit of analysis in a case study can be a person, event, or program (Pearson, Albon, & Hubball, 2015). In this study, the unit of analysis was the multiple-case, or collective cases, of experiences had by four beginning science teachers.

Stake (2006) indicates case study researchers “generate a picture of the case and then produce a portrayal of the case for others to see” (p. 3). Creswell (2013) explains how case and multi-case investigators examine defined human experiences through collection of data typically from multiple sources while looking to produce an in-depth understanding for the case. Interviews, observations, and artifact collection are multiple sources of data for case study (Pearson, Albon, & Hubball, 2015). My research collected data from all these sources. A multiple-case study takes individual cases and compiles these for a collective analysis (Creswell, 2013). Per Merriam (1998) Lawrence-Lightfoot’s 1983 publication of The Good High School serves as an example where individual cases (deemed portraits by Lightfoot) came from six individual high schools. A collective analysis or cross case analysis then was produced to portray the makings of a good high school (Merriam, 1998).
My study has similarities to the portraiture of Lawrence-Lightfoot (1997). This multiple case study looked first to “document the actors’ (p. 9) perspectives,” and my aim was to “capture the attention of a broad and eclectic audience” (Lawrence-Lightfoot, 1997, p. xvi). The selection of multiple participants allowed me to show differing perspectives along with commonalities (Creswell, 2013, Lawrence-Lightfoot, 1997).

As the research questions of this study looked to develop an in-depth understanding for the real-life experience of novice science teacher induction, case study was an appropriate methodology. The purpose of this multiple-case study was to develop a better understanding for the experiences of today’s novice science teacher (Lichtman, 2011; Seidman, 2013). Influential experiences start well before an individual considers entering a career teaching science, and then these are followed with experiences involved with purposeful professional preparations (Lortie, 1975; Shulman, 1986; Brown, 2012; DiCicco et al., 2014). To appreciate evolving perceptions and development during the lived-experiences that accompany the initial year’s entry into teaching science, this study began by considering the beliefs four teachers bring to their first teaching experience. The examination of common experiences between novice science teachers and unique individual experiences was appropriate. Through investigating the experiences related to the science teacher induction period, a better understanding for experiential impact on entry-level science teachers was constructed. The stories communicated regarding the lived-experiences provided a degree of agency to the individual novice and served to build a better understanding for factors impacting successful entry into the education profession as a science teacher (Seidman, 2013). Understanding the meanings novice science teachers associate with experienced induction activities, situations, and events helped develop a better appreciation for this social activity (Leavy, 2014).
Science teacher beliefs, thoughts, and actions during induction, or entry into the profession, have been neglected or ignored by researchers. Focus has been on perspectives held by others (such as mentors, principal) (Abell et al., 2006; Wang et al., 2008), protective responses to stressors (Doney, 2012), or the value of subject-specific knowledge as identified by the novice science teacher (McConnell, Parker, & Eberhardt, 2013; Wang et al., 2008). This study considers the time of entry into the profession, induction, a necessary step for the novice to remain in teaching, and looks through the eyes of the novice science teachers.

Studies looking to understand the induction experiences and associated perceptions of the novice science teacher are limited and not typically designed to concentrate on the novice’s understanding. With environments being dynamic, the contexts surrounding novice teachers as they develop professional skills differ by individual, setting, and temporally. Typical studies examine the experiences of beginning science teachers generally framed against a predetermined philosophical orientation toward teaching, a preparation program, or are concentrated on elementary level teachers as they look to provide their students with science instruction. This study limited understandings to the perceptions of high school novice science teachers.

Case Identification

The unit of analysis defined for this study was the multiple-case, or collective cases of experiences had by four beginning science teachers. The participants existed within a bounded context, time, location, and situation (Baxter & Jack, 2008; Creswell, 2013; Stake, 1995). The experience under investigation was the induction year of teaching high school science.

Multiple-case study.

According to Baxter and Jack (2008), case study analysis allows researchers the ability to examine individuals (four novice science teachers) and experience (the induction year of
teaching). Looking at more than one case sharing a defined experience allows for a multiple-case study of the shared experience (Stake, 2006). The use of qualitative methodology is valuable for examining and describing a given experience (the induction year) within context (teaching high school science) (Baxter & Jack, 2008; Creswell, 2013). Researchers forward the use of case study to reveal meanings associated with the experience (Baxter & Jack, 2008; Merriam, 1998; Stake, 1995; Yin, 2003). Using case study allows researchers to benefit from collaboration with participants describing their experienced and perceived realities (Baxter & Jack, 2008).

The case is the unit of analysis. In this study, the case was the novice's perceptions and experiences during the time of induction to teaching science (Baxter & Jack, 2008). The component generated by the collection of the individual cases around the shared experience was the chief interest in this multiple-case study, and what Stake refers to as the “quintain” (2006). Case study is appropriate for a study when the research questions posed are of a "how" or "why" nature, the behavior of the participants cannot be manipulated, and considering contextual conditions is considered important to the experience (Yin, 2003; Baxter & Jack, 2008).

**Constructing the multiple-case.**

This research study initially obtained data from participants just before they began teaching high school science, during their initial year of teaching, and concluded as their novice experience neared its end. As the participants experienced this induction period, changes in their perceptions were recorded and analyzed along with how they related successes and challenges.

As indicated by Merriam (1998), the journal assisted in sorting out my “ideas, fears, mistakes, confusion, and reactions to the experience and can include thoughts about the research methodology itself” (p. 110). I kept and used a researcher journal.
In constructing meanings and perceptions of the induction process, commonly communicated understandings were identified. I used participant generated data to describe the essence of the induction experience. In this study, four participants subjectively elaborated on their perceptions of induction experiences. These perceptions, based on relatively narrow units of analysis, were brought together in analysis to uncover the common and broader objective induction experience.

The purpose of this study called for an in-depth description of the collective cases which reflects the experience of science teacher induction. Secondly, this multiple-case induction experience provides the analyzed unit. Finally, I gathered data from a variety of sources for this study. Interviews, observations, and artifact collection all contributed contextually-based data.

The case data gathered and analyzed for this study was used to develop a picture of the induction experience as seen by novice science teachers. In turn, this picture will assist in portraying the induction experience in a manner that others–outsiders–might better appreciate this experience. To accomplish this, first I analyzed the individual cases of each participant. Then, the collection of these analyzed cases came together for further analysis considering commonalities and differences as well as possible nuances associated with each case.

I gathered and analyzed data related to influential experiences brought by the science teacher into their initial year teaching. This was used to help understand the impact of the induction experiences on the participants. Data related to preparations for becoming a teacher is included.

To assist school districts in their attempts to retain science teachers, this study looks to better understand the induction experience particularly as seen by the novice science teacher. To see science teaching professionals hold onto their teaching positions, understanding how
induction is perceived and how it impacts these vital members of our educational systems is a necessary starting point. Through conducting a collective analysis of induction, associated experiences and their impact on the novice teacher can be better understood. In this study, perception of the induction experiences will be limited to those held by the novice high school science teachers in their current contextual settings.

**Participants**

Selection of cases for inclusion in this study was based on the representativeness of the case, and how well the case met the selection criteria (Stake, 1995). According to Stake (2006), when the selection of cases is tailored to fit the needs of the investigation and generate an in-depth appreciation for the experience, purposeful sampling is appropriate and was therefore the method of participant selection for this study. The purposeful selection of participants allowed for the sharing of “critical similarities” (p. 317) necessary to address the research questions (DiCicco-Bloom & Crabtree, 2006).

The purpose of the study called for the identification of high school science teachers with no previous professional teaching experience. Participant selection was based on classification as a novice high school science teacher. Participants were employed full-time for their first year at a high school, where subject content was limited to teaching Earth Space, Biology, Chemistry, or Physics. According to Stake (1995), additional considerations included not only a willingness to participate in the study and being located within James County, but acquired cases also needed to have an ease of access, and be “hospitable” to this research. (The James County School District is elaborated upon in the upcoming description of the setting.) To the degree possible, attempts were made to obtain participants with diverse backgrounds from multiple school settings within James County School District. A sample of four secondary high school science teachers that
would begin teaching in fall 2016 were asked to participate in the study. As indicated by Creswell (2013), researchers typically limit the number of cases to no greater than four or five representative cases to allow for in-depth analysis and understanding of each case. Four novice science teachers fitting the delimitations in place for the study were identified through their response to an emailed invitation (Appendix B).

As I was a full time employed science teacher within the district, all communications toward district personnel regarding meeting of potential subjects were initiated through me and appropriate district personnel, typically the head building level administrators and district office personnel. A flyer/email asking for volunteer participants was sent to all identified potential participants (Appendix B). District approval for conducting a study was obtained through completing and submitting an “Application to Conduct Research” form. A second form, “Conclusion of Research Activities Report,” was completed and submitted after the study. The University of South Florida’s Institutional Review Board (IRB) approval for studies involving human subjects was granted.

After the identification of potential subjects was made, I initiated an informal meeting with the prospective participants at which time the purpose, basic design, expectations, and initial request based on best fit for the study’s design was presented to elicit participation in the research. Informed consent was communicated verbally, and a signed form (Appendix A) was obtained. The participants were provided with a copy during the first scheduled interview.

The four novice science teachers provided data on their experiences and perceptions throughout their initial year of professional instruction. This multiple-case study was designed to examine the teacher’s first-year teaching experiences and changing perceptions, as communicated by entering high school science teachers (Lichtman, 2011, Stake, 2006).
All participants involved in this study shared the common characteristic of being novice high school science teachers entering their first year of teaching in a public high school, the common condition (Stake, 2006). The unique, intrinsic, cases brought from each of the individual participants contributed to the overall portrait of the experience—first year’s induction (Lawrence-Lightfoot, 1983) —to expose the instrumental case or induction period as experienced by the novice (Creswell, 2013). The point of view directly from the novice was of interest to this study. This research benefited from collaboration with participants as they described their experienced reality and as they perceived the world of their induction year teaching high school science (Creswell, 2013; Baxter & Jack, 2008; Stake, 1995; Seidman, 2013).

Setting

The James County School District is the eighth largest school district in Florida and thirtieth largest in the United States. The overall student enrollment for the 2016-2017 school year neared 100,000 in pre-kindergarten through twelfth grade.

Out of the 150 James County schools, 34 were high schools, which were home to a diverse student body. The student body was 43.9 percent white, 20.7 percent black, 30.2 percent Hispanic, 1.6 percent Asian, 0.5 percent American Indian or Alaskan Native, 3 percent two or more races and 0.1 percent native Hawaiian or other Pacific Islander. There were more than 10,600 students with a first language other than English.

Of the more than 13,000 employees, over half were teachers, and the district served as the largest overall employer in the county. All newly hired teachers were expected to attend the Teacher Induction Program Seminar (TIPS). This district-provided three-day workshop was
designed to serve new teachers as well as assist teachers who may have experienced a break in professional service (James County Public Schools, 2016).

Three schools, (pseudonyms provided) Splinter High School, History High School, and Eastside High School were the locations at which the novice science teacher participants worked. Splinter High School housed slightly over 1,600 high school students in grades nine through twelve. This school was strategically located in a smaller town between two more highly populated towns, each with its own high school. Splinter takes students from each town as well as the area between them. Splinter, a relatively young school, was first in operation for the 1995-1996 school year. Splinter High ran their class schedule on a modified block plan with classes alternating every other day. The teachers taught three classes per day on days with a planning period, and four on days without planning. All classes ran for approximately 90 minutes except for period one, which was the only class offered for 50 minutes every day. It is notable that if a teacher at Splinter was scheduled for their planning during first period, they had a planning time every day.

History High School was the smallest of the schools at which the participants were located. This school held just over 1,400 high school students in grades nine through twelve. The teacher schedule followed the modified block schedule as seen at Splinter with one notable exception. The fifth period at History High was the one class that repeated each day. Unless teachers had their plan during fifth period, they again alternated days with and without a planning time. This school is the oldest school building in operation within the James County School District.

Eastside High School housed just over 2,000 high school students in grades nine through twelve. The teacher schedule started at 6:40 a. m. with actual class time starting at 7:00. The
student schedule at Eastside followed the traditional seven periods each day with all classes taking 49 minutes. The teachers at this school were provided one class as planning time each day. The students completed their days at 2:00 p.m., and teachers were required to remain until 2:45.

Data Collection

Participants’ interviews included a sharing of participant beliefs regarding science, teaching, and teaching science. Data were sought to develop an understanding and appreciation of their perceptions related to the experience of early induction, and of becoming a professional science teacher.

Observations and artifact collection added to the data collection. Qualitative analysis using interviews, observations, and the collection of artifacts, helped examine and understand the initial year of teaching science in today’s contextual setting (Baxter & Jack, 2008; Creswell, 2013; Janesick, 2016; Lawrence-Lightfoot & Davis, 1997; Stake, 2006; Yin, 2003). A portrayal for better understanding the essence of today’s science teacher induction was created by attempting to better understand the way novice science teachers describe successes, what they regard as challenges during this time of professional induction, and their changing views associated with science teaching and teaching in general (Lawrence-Lightfoot & Davis, 1997; Merriam, 1998; Creswell, 2013) or Stake’s “quintain” (2006) was created.

Timeline.

A timeline (figure 2) designed to meet the above expectations placed the series of initial interviews in early August. The second interviews fell in December, and the final interviews were conducted toward the end of March to coincide with the district’s offer of a second year’s science teaching position. This timeline was designed to coincide with the timing of the school
district’s issuance of letters of intent for returning teachers. At this point in time, the novice teachers were requested to indicate their desire to return to teaching for the district.

![Figure 2 Project Timeline](image)

**Interviews.**

Various data were collected for the study through interviews, observations, follow-up interviews, and artifact collection. The major form of data collection was a series of three participant interviews roughly dividing the academic year into trimesters. Seidman (2013) suggests the idea of conducting three interviews per participant. He indicates the set of three interviews allow for a greater depth of understanding toward the participant’s intended meanings. Three interviews allowed the participants and me an increased opportunity for reflection and interactive exploration on communicated experiences and associated meanings (Seidman, 2013). The division of the school year into trimesters met this idea.

As called for by several researchers, interviews were cooperatively scheduled between the participants and me. The initial interviews took place prior to the official first day of student contact in order to provide data that more clearly shows changes experienced during the first year of teaching (DiCicco et al., 2014; Ingersoll, 2012; Wang et al., 2008; Kang, Bianchini, & Kelli, 2013; Feiman-Nemser, et al., 1999; Luft, 2012). The initial interview was followed up
during the year with two additional interviews spaced temporally, again, with coordination between the participants and myself. These interviews were developed with the intent of gaining data representative of the participants’ experiences within the context encountered throughout the year (Seidman, 2013). To best accomplish this, interviews were conducted within the trimester timeline, with the interview as close to the beginning of each period as possible.

Preceding or in conjunction with the first interview, a meeting of introduction was conducted. At this time, a form (Appendix G) for collecting basic participant identification and logistic information was provided to each subject. I scheduled all interviews and observations, which were conducted at the convenience of the participants. Participant feelings/perception as to which activity would best reflect their overall induction experience was weighed heavily in choosing observation activity. A series of three semi-structured interviews with sample questions (Appendices: C, D, and E) was conducted with each participant (Seidman, 2013). Although the initial interviews collected some participant background data, all interviews gathered data related to the participants’ experiences, perceptions, and expectations as novice science teachers. The participants provided information based on their beliefs, thoughts, and activities within the induction period. The interviews were guided to obtain data reflecting participant perceptions or understandings for science, teaching, and teaching science. Additionally, interviews asked participants to elaborate on their personal interpretations of the induction experiences.

The first interview (Appendix C) focused on gaining data regarding the participants’ unique histories related to science, teaching, and teaching science; feelings about science teaching and learning; preparations to become a teacher and self-confidence regarding perceived ability, socialization, and expectations for the year (Seidman, 2013). The second interview revisited some topics, but focused on issues related to context such as workload, descriptions of
the participants’ days, and provided participants with increased opportunity to expand on their experiences (Appendix D). Although data regarding context was included in the third interview, the third interview’s gathering of data was intended to grab the participants’ reflections on the meanings of their induction experiences (Appendix E) (Seidman, 2013).

I wove in questions clarifying previous data and pursuing emergent concepts during the second and third interviews as appropriate. During both the second and third interviews, I composed brief, individual notes to assist in revisiting areas needing clarification or that, upon reflection, appeared to hold possible emergent themes. Participants were encouraged to expand on meaningful experiences, and other experiences they viewed as challenging or difficult, or incidents perceived as personal successes. Additionally, in the final interview, participants were asked about their future plans as science educators. I attempted to limit all interviews to one hour or less, with the expected total study interview time for any one participant approximating three hours.

Member-checks were conducted for each interview. This was accomplished through providing a hard copy of the transcribed, verbatim interview to the participants and asking them to review the transcripts for accuracy. Transcripts were provided to each participant. Member-checks build trustworthiness and lend credibility to research (Seidman, 2013).

**Construction of sample question lists.**

Kang, Bianchini, and Kelly (2013) call for research into experiences specific and unique from the novice science teacher perspective to better understand the “myriad of factors” impacting the teachers (p. 445). Such factors include: requirements dictated by bureaucratic control over the taught curriculum, supplies and equipment available to the teacher, and the teacher’s feelings or beliefs toward unmentioned curricular needs such as developing social and
thinking skills (Koballa et al., 2005). Factors affecting emotions (dealing with confrontation, feelings of power limitations, self-image, and personal beliefs) can restrict a teacher’s ability to perform as they feel necessary (Morrissey, 2014). Additionally, Kang et al. (2013) point out, many early teachers find difficulty incorporating their subject matter into pedagogical lessons. They particularly observed this in varying degrees dependent on the contextual setting surrounding the novice.

As interviews were semi-structured, questions designed to examine the impact of various factors upon participants were included. Data regarding participant feelings, beliefs, and emotions related to the factors were sought. Examples of such questions include: “What does teaching science mean to you?” (Appendix C), “Can you tell me some of the highs and lows of teaching for the past weeks?” (Appendix D), and “Have your feelings regarding teaching in this school changed? In what ways?” (Appendix E).

As described by Lortie’s “apprenticeship of observation,” a widely discussed and acknowledged experience, which is cited as responsible for holding influence upon novice teachers, is that of lasting impressions and beliefs generated from years living as a student and observing teachers perform in their role (Brown, Friedrichsen, & Abell, 2012; Cooper & He, 2011; DiCicco et al., 2014; Howey & Grossman, 1989; Lortie, 1975). Additionally, the pursuit of a science teaching career involves various personal considerations stemming from unique histories, backgrounds with science, and any accompanying emotions (Avraamidou, 2014). Financial needs related to schooling and certification, affinity for science content area, preferred age or level of students taught, and a willingness to work with high-needs schools and/or students are examples (Yang et al., 2015). Questions designed to examine the unique histories of the participants were included. Examples include: “Explain the program you followed to become
a certified teacher,” “Did you like science in school? Why/why not?,” and “What or who first drove you to consider teaching science as a career?” (see Appendix C).

Researcher identified factors for potential candidates choosing to avoid entry into teaching science may become adopted as rationale for others choosing to leave the profession. Such reasons are various and may include concerns about teachers’ pay, classroom management (Worsham et al., 2013), interests in other fields, development of self-doubt (overall teaching ability, ability to speak in public, and patience), and losing interest in teaching science (Yang et al., 2015). Are these factors valid concerns impacting novice science teachers?

Again, interviews sought data related to these specific factors. Examples include: “Are you currently interested in continuing to teach science next year?,” “Describe how classroom management and discipline now impact your job,” and “How comfortable/confident do you feel with your abilities to plan and teach?” (Appendix E).

A characteristic of the qualitative research process is one including “emergent” data and design (Creswell, 2013; Leavy, 2014; Merriam, 1998). Referenced by Stake (1995), “emic” issues are those issues coming from within the study that may not fit the original data collection plan. As I conducted the interviews, coded, analyzed, and reflected upon data, I remained attentive for emergent themes (Rubin & Rubin, 2005; Lichtman, 2011; Janesick, 2016). Rather than tightly defining all phases of the research, as the investigator, I was open to data uncovered during the investigation but not specifically included in the original design (Creswell, 2013). Qualitative researchers do not control the message delivered in an interview and must be able to adapt to unpredicted information relevant to the study (Rubin & Rubin, 2005; Merriam, 1998; Yin, 2003).
Throughout the study, I reflected on interviews, emergent data, and looked to include questions in interviews as appropriate (Merriam, 1998; Stake, 1995). I kept a researcher reflective journal to assist in and strengthen data collection and analysis (Janesick, 2016). As I proceeded through the ongoing collection and analysis, I strove to maintain a balance between “underanticipating and overanticipating” (p. 13) the meanings and perspectives communicated by the participants (Stake, 2006).

Included in the sample questions in the interview protocol were opportunities for addressing emergent themes, clarifying meanings, and expanding on previous participant thinking. Questions specific to each participant were entered here for use in the following interview. Planning for emergent issues was evident in the second and third interviews with spaces on the protocols dedicated to follow-up, clarification, and emergent data (Appendix D and Appendix E).

**Multiple sources of data.**

In addition to the member-checks performed on all transcriptions, the series of interviews also benefited from artifactual data collected throughout the study. This included at least one observation of the participants functioning in a professional role as a teacher, delivering a lesson, attending a staff or department meeting, participating in a school activity, etc. This additional collection of data provided support for interpretive analysis.

**Analysis**

This study was designed to better understand the induction experience, or “quintain” (Stake, 2006, p. 40). The cases selected for my study were not selected for comparison, but rather to yield a better understanding for the initial year of teaching high school science. Although comparisons are made between the cases, the individual cases are reported on a case-
by-case basis and the collective case exists as its own report. This multi-case is the study of the
induction period having “its own life” with the “observation of that life in multiple situations”
(Stake, 2006, p. 83). Of importance to my study were the “stories” told by the participants. How
did they describe their experiences? The participants’ own wordings guided analysis (Merriam,
1998, p. 157). Analysis of the data was strengthened through the collection of data from multiple
sources. Multiple subjects, a series of interviews, artifact collection, observations, and a
prolonged study all served to assist triangulation of findings (Merriam, 1998; R. Stake, 1995;
Yin, 2003). As indicated by Stake (2006), observation and artifact data hold potential to provide
stronger interpretations and were analyzed in juxtaposition with the interview data. The process
of analysis cannot always be explained and is highly “intuitive.” As such, a variety of analysis
techniques were used to assist in the overall process (Merriam, 1998, p. 156). As the interviews
progressed through coding and analysis, all previous interviews were reexamined considering
any additional data (Merriam, 1998; Seidman, 2013; Stake, 2006).

A digital recorder was used for each interview to help ensure accuracy (Yin, 2003).
During interviews, it was unobtrusively placed near the participant (Seidman, 2013). I recorded
field notes reflecting items related to the interview, but which were not obvious through recorded
audio (Leavy, 2014; Seidman, 2013). Afterward, as soon as was practical, each digitally recorded
interview was transcribed (Rubin & Rubin, 2005; Yin, 2003) and entered in MAXQDA 12
software. As indicated by Seidman (2013), maintaining confidentiality for the participants is
important. In addition to the participants’ copies, the recorded audio and verbatim transcripts
were kept in a locked and secured file within my home office (Seidman, 2013). Qualitative
research can benefit in both data collection and analysis through incorporating the use of
computer and software technology (Leavy, 2014) Data were analyzed with the assistance of
MAXQDA 12 software, which served as the case study database (Merriam, 1998; Yin, 2003). Verbatim transcripts of participant interviews along with their digital audio recordings were entered in the analysis software on my personal computer. Data from all forms of collection were entered in the software for coding and analysis purposes.

As suggested by Merriam (1998), I used ten helpful suggestions for analyzing case study data. I attempted to limit the study’s focus and realized not every bit of data could be represented in my study. Data I did follow, I attempted to follow in-depth. I made decisions based on the study’s research. As appropriate, I looked to develop analytical questions focusing the collection and organization of data. This included analyzing the questions brought as guidance to successive interviews.

I planned the collection of data based on previous interviews and observations. In this way, I was able to follow up on leads or emergent data as necessary (Janesick, 2016; Merriam, 1998). Follow-up questions regarding observations and collected artifacts were included in successive interviews as necessary for clarification and increased understanding of the novice perception (Stake, 2006). Throughout the study, the collection of data and its analysis were simultaneous activities (Stake, 1995; Rubin & Rubin, 2005). Themes and data collection faced modification as new information emerged (Lawrence-Lightfoot & Davis, 1997; Stake, 1995; Rubin & Rubin, 2005). As emergent themes developed appropriate to the study, they became issues for further examination (Merriam, 1998). To this end, I operated with care and attention directed at spotting novel data groupings and modifying the collection of data (Rubin & Rubin, 2005). I used memos and my researcher journal to record reflective thoughts on the data and issues surrounding the data (Janesick, 2016; Merriam, 1998). Periodically, I would direct ideas or themes directly to the attention of the participants for their feedback. To enhance the analysis,
I continued to familiarize myself with related literature throughout data collection. I experimented with and considered various metaphors, analogies, and concepts in relation to their appropriateness for communicating the data and its analysis. Finally, I made various attempts to visualize my learning related to novice science teacher induction through drawing possible models of data and their relationships (Merriam, 1998). The within-case triangulation of data not only serves to clarify meanings, but also helps verify observations or interpretations (Stake, 2006).

Stake (2006) indicates that the activities within each case are expected to have been influenced by the individual contexts; the contexts warrant study and description. I looked to include data related to the context surrounding the participants. Information gathered related to the district’s induction training, possible political or union activity, participant’s previous relations to district employees, local education news stories, internal school communications, and the participant’s perceived classroom budget was actively sought for inclusion into this study. This appreciation for the context at each site helped develop an understanding for the individual settings of each participant (Stake, 2006).

The “case-quintain dilemma,” (p. 1), coined by Stake, is the competition for attention between the individual cases and the collection of cases. This dilemma is a “rhetorical, adversarial procedure” (p. 46) where attention between individual local situations and the experience of induction vie for focused attention. To do justice to hearing the individual cases, these were analyzed first while I developed an appreciation for the particular situations (Stake, 2006). To make meanings/findings from the data, I placed effort into consolidating, reducing, and interpreting the data (Merriam, 1998). Only after the unique nature of individual situations
began to clarify did I begin the collective analysis (Stake, 2006). I conducted both within-case and cross-case analysis (Merriam, 1998).

Stake (2006) indicates analysis involves looking for patterns in the data collected. I sought to interpret these patterns first within the individual cases, and then via cross-case findings. It is from these cross-case findings I developed assertions. By considering regularity and inconsistencies within cases, analysis considered the context surrounding induction (Stake, 2006). The findings of each case were applied to a collective, theme-based description of novice science teacher induction (Stake, 2006). Analysis was conducted with critical assistance as needed and sought from the dissertation committee members.

Using only my field notes, the transcript, and digital recording of the initial interview, I reflected on the purpose of this study, as suggested by Merriam (1998). I recorded notes as memos in the software program corresponding to my reflection and review of the data. From the initial analysis of the data, additional questions for following interviews were composed. These corresponded often uniquely to each participant as well as generated common lines of questioning. This process of transcription, reflection, and analysis continued throughout the gathering of data. Tentative themes and categories were developed and modified or dropped as the study continued. Merriam describes this method of data collection as “parsimonious and illuminating” (p. 162) drawing attention to the budgeted and purposeful nature of the data collection (Merriam, 1998).

Merriam (1998) identifies three areas that typify the genesis of category names. The researcher can identify names based on reflection of what is seen in the data. Data can be organized to reflect participant thoughts. Outside sources can contribute to category naming (Merriam, 1998). My initial coding strategies reflected my review of literature. These codes,
such as “workload,” “financial,” “motivation,” “teaching science,” and “values and beliefs” are listed as an initial coding list (Appendix N). As this study involved an iterative process between data collection and analysis, these codes evolved over time, and a finalized coding list is included as well (Appendix O). The analysis software MAXQDA 12 was used to facilitate the grouping, coding, and categorizing of interviews, observations, and artifacts. Notes, memos, and any data that share common themes, fit particular categories, or serve to provide insight to the overall study were coded as well (Merriam, 1998; Seidman, 2013; Stake, 1995; Yin, 2003). The list of groupings and recurring data was developed and updated throughout the study as patterns or regularities took a more defined shape (Seidman, 2013).

I assigned codes, as suggested by Merriam (1998), to the data as a “short-hand” representation for ease of recall. These codes were designed to both identify the data and promote the development of interpretive constructs. Constructed categories were those designed to capture recurring patterns found in the data (Merriam, 1998). Merriam describes a coded “unit of data” as “any meaningful (or potentially meaningful) segment of data” (p. 179). There are two criteria used to define units of data: heuristic use and interpretable. The heuristic use criteria relate to the unit’s ability to “reveal information relevant to the study and stimulate the reader to think beyond the particular bit of information” (p. 179). I attempted to keep unit names small yet able to stand on their own or, as Merriam states, “interpretable in the absence of any additional information” (Merriam, 1998, p. 180). As redundancy was discovered in the data analyzed, more secure representations of the participants’ perceptions were developed (Stake, 2006). As indicated by Merriam (1998), “category construction is data analysis” (p. 180).

Commonalities and differences are found across individual cases (Baxter & Jack, 2008; Stake, 2006), and the management of data in a multiple case study is a daunting affair (Merriam,
1998). It was with these concerns in mind, I adopted the MAXQDA 12 qualitative software and supplemented this with worksheets/forms suggested by Stake in *Multiple Case Study Analysis*. Researcher notes, code identifiers, and overall coding process was done on the computer software. The worksheets assisted me in organizing thoughts and in reflecting on various relationships and patterns within the data; however, as indicated by Stake, I depended “as much as possible on keeping everything in mind, relying on the worksheet as little as possible” (p. 78) and making changes as needed (2006). Before proceeding with more discussion on the cross-case analysis, the following paragraph describes the way the worksheets were implemented.

Because the primary focus of my multiple case study was to develop a better description or characterization of the induction experience, the appearance of induction in each of the individual cases or contexts was of primary importance. These differences allowed me to provide a better description for the induction experience. Stake’s (2006) worksheets were not designed to be comprehensive, but rather served as guides for the coordinated use of the data software and assisted in locating specific data within the study. The first worksheet, “The Themes” (Research Questions) (Appendix P), was used to indicate where the Themes appeared in each individual case. The second, titled “Analyst’s Notes While Reading a Case Report” (Appendix Q), recorded my notes while reading individual cases. I used this to help visualize any prominence of Themes in any individual case. This worksheet also allowed notation for the uniqueness of each case among the other cases as related to the induction experience. The third, titled “Ratings of Expected Utility of Each Case for Each Theme” (Appendix R), I used to rate the case’s Theme contribution utility as either high, medium, or low. All Themes received such a utility contribution ranking. The fourth, titled “A Matrix for Generating Theme-Based Assertions from Merged Findings” (Appendix S), was used to note the collectively generated Findings I
considered of top importance. The “Findings” were “based on the Cases rather than on cross-case themes” (p. 58). The Merged Findings were entered in this worksheet. The fifth, titled “Multicase Assertions for the Final Report” (Appendix T), was used to keep a list of potential cross-case assertions. This was done with continued reference back to the Themes (Research Questions). Assertions were based on evidence generated from the case reports (Stake, 2006). Although Stake provides a form for planning the final report, this was not used.

The selection of cases from different schools allowed me to gain insight for this experience in a diversity of contexts (Stake, 2006). This diversity assisted in my appreciation for the complex nature of the induction experience (Stake, 2006). After analyzing and determining the findings for the individual cases, I compared findings (collectively) across cases looking for similarities, differences, and contradictions all-the-while considering the individual context around each case. I grouped similar findings into clusters and provided a name for groupings, and continuing to follow the advice of Stake, I worked to limit the number of Merged Finding groups. Stake calls for the limit to be between four and eight of the most appropriate findings.

By comparing the relative contributions of each case to a Merged Finding (Appendix S) and the Theme’s relative prominence rating (Appendix Q), as suggested by Stake (2006), I could weigh the entry’s value in lending support for Assertions. After completely filling in the columns to indicate the relative importance of the Merged Findings (Appendix S), individual columns for each Theme (Research Question) were arranged in descending order. Those with the highest ratings for each Theme were at the top of the column. This provided me with guidance while composing the assertions. Tentative Assertions based upon reflection over the preceding were entered in Worksheet: Multi-case Assertions for the Final Report (Appendix T). Assertions were considered as for singularity in focus, orientation toward understanding novice science teacher
induction, and overall availability of supporting evidence. The Merged Findings (Appendix S) were reflected upon. This included reflection on the atypical findings, tagged ATYP, for consideration as developing Assertions. Reflection advancing the understanding the research questions based on individual cases versus commonality across cases assisted in my overall development of the Findings. This process was conducted for each Theme on the Matrix for Generating Theme-Based Assertions (Appendix S) (Stake, 2006). A researcher journal was employed to keep track of “thoughts, musings, speculations, and hunches” during the analysis (Janesick, 2016; Merriam, 1998). Triangulation in multiple case studies is also gained through analysis across cases. This triangulation adds credibility to the study (Stake, 2006).

Each individual case report is included in my analysis, and although abbreviated, allows readers to gain a better understanding for the collective case (Stake, 2006). Multiple case study analysis is inductive as it “seeks to build abstractions across cases” (Merriam, 1998, p. 195). This is seen in my attempts to construct general explanations across cases that fit each individual case (Merriam, 1998). As suggested by Stake (2006), my cross-case findings are reported as “assertions” of the induction experience (p. 41). The evidence supporting each assertion is provided along with the analyzed data. As my study is of a social-educational nature, the authenticated findings are accompanied by opinion (Stake, 2006). As a researcher, I was instrumental in selecting the themes used to relate this research, exercised strategy when determining points of focus and emphasis, and defined the sequence and rhythm of the overall narrative (Lawrence-Lightfoot & Davis, 1997).

Lightfoot and Davis (1997) provide five essential elements, context, voice, relationship, emergent themes, and aesthetic whole, for work designed to “capture the complexity, dynamics, and subtlety of human experience and organizational life” (p. xv). The experience, novice
science teacher induction, takes place within a context including physical setting, cultural rituals, norms values, and historical periods. These contexts are viewed as valuable in gaining understanding for the participants’ perspectives. The participants’ perspectives within a setting are valued. The concern for voice includes not only the participant’s perspectives, but admits my influence as researcher/author for this study. I entered this research with a background (described in Chapter One, The Researcher) holding my own influential history. This history includes insights from life experiences. I attempted to use these as “sources of connection and identification” (p. 95) with the participants without allowing them to “obscure and overwhelm the inquiry” (p. 95). The relationship between researcher and participant is seen as holding ethical ramifications. Member-checking and fair, contextual reporting of collected data were helpful in maintaining the relationship between myself and the participants. Emergent themes reflect the researcher’s “efforts to bring about interpretive insight, analytical scrutiny, and aesthetic order to the collection of data” (p. 185). As I analyzed the data, I put effort into “searching for convergent threads, illuminating metaphors, and overarching symbols” (p. 185) as I looked to identify the consistency within themes. Finally, I was concerned with the aesthetic whole, as I looked to bring out an understanding for the gestalt, in the case of this study, a portrayal of novice high school science teacher induction. I worked to bring “pieces of evidence” (p. 245) together in validation of the assertions and description of novice science teacher induction (Lawrence-Lightfoot & Davis, 1997).

My multiple case study is helpful for those who look to set policy and can serve as a vicarious entry into the initial year for novice high school science teachers (Stake, 2006). “The scientist and the artist are both claiming that in the particular resides the general” (Lightfoot & Davis, 1997, p. 14).
In addition to the interviews, one observation was implemented between the second and last interview. Observations took place in the participant’s professional setting (Merriam, 1998). These served as an additional sources of valuable case study data (Yin, 2003). Observations allowed me to develop a more intimate understanding for the participant’s experiences (Stake, 2006) and the context in which their experiences played out (Yin, 2003). These observations were again coordinated with the novice teacher and appropriate district/building personnel. Observations reflected a professional activity such as a taught class, scheduled activity, department or school meeting, professional work day, etc. An observation template was used as a general guide to record data during the observation (Appendix F) (Janesick, 2016).

Each participant was asked to schedule one observation related to a professional activity or experience identified by the participant and me as having potential for triangulation of data emerging as relevant and reflecting the participant’s ranking as important to the study. Priority was given based on the observation’s potential to clarify and support interview data directly related to the research questions (Merriam, 1998). A variety of considerations within observations include building an understanding for: 1) the physical setting, 2) individuals interacting with the participant, 3) specific activities, 4) participant interaction with others, and 5) subtle, not immediately obvious, factors. While being attentive to these, I remained cognizant of my own impact on the setting (Merriam, 1998). Eisner (1991) indicates data not originally sought but emerging during observations may hold potentially valuable information. This is what Eisner terms “emergent focus” (p. 176). As I conducted observations and reflected upon the data, I attempted to maintain such an emergent focus.

During the observations, the I attempted to self-position in an area least likely to impact the activity yet one that allowed for an unobscured observation. Dependent on the activity, I
secured appropriate permissions prior to the observation. I recorded field notes during the observation (Appendix, F) which were entered in the MAXQDA software and an additional hard-copy was kept. These were available to assist in analysis (Merriam, 1998).

Public records, personal documents, and physical materials are examples of artifacts I collected in pursuit of additional data (Merriam, 1998). Throughout the study, I attempted to secure/record related artifactual data, which included documentation regarding induction programs or support systems available to the novice science teachers. Artifactual data related to physical, temporal, social and other contextual surroundings were sought. Data related to mandated student assessments, teacher workload, lesson plans, teacher’s schedule, state certifications, faculty and department meetings, and related news stories were collected when available.

During the initial and final interviews, the participants were asked to develop a concept map (Appendix I) indicating their professional and personal support systems (who or what provides support or motivation and to what degree). These served to provide clarity to the participants’ perceptions of support, and to “their stories.” To the degree possible, pictures, figures, textual data, or some representation of the artifactual data was entered in MAXQDA 12. All artifactual data was coded and analyzed in conjunction with the interview data.

**Credibility, Validity, and Reliability**

Case study credibility and validity is enhanced using multiple sources of data collection, interviews, observations, and artifacts (Baxter & Jack, 2008). Verbatim transcripts were made available to participants as soon as possible after each interview for member-checking. This added to the trustworthiness and credibility of my study (Seidman, 2013; Yin, 2003). Although the participants held a valuable contribution to verifying the accuracy of the interviews, I
maintained final say on how the study was written (Seidman, 2013). As this study is a multiple-case study, pattern-matching between cases lent additional validity (Yin, 2003).

According to Yin (2003), the reliability of case studies is enhanced through the development of a database and the use of case study protocol. This study benefited from the use of software to develop and store the data, and the steps I implemented for conducting this study were outlined and scrutinized by my doctoral committee. Additionally, serving to ensure reliability I maintained accurate records related for all data collection and analysis (Yin, 2003).

**Advantages and Disadvantages**

Seidman (2013) opines for the power of interviews; they are seen as a path to the “inner voice” (p. 82) of the participant. Other advantages found in digitally recording the interviews included the increased freedom to focus on the participant’s story and take valuable notes on non-verbal interview aspects (Seidman, 2013). This focus not only helped me hear the participant, but it also facilitated the preparation for further interviews (Rubin & Rubin, 2005).

Baxter and Jack (2008) point out how a multiple-case design holds advantages and disadvantages. As a multiple-case design looks at multiple cases, its analysis is from data considered relatively robust and reliable. Drawbacks in multiple-case studies can be found in the time required and expenses encountered. Multiple-case studies, depending on various sources of data collection, typically include vast amounts of data. To keep from getting overwhelmed by the amount of data, the data analysis and storage software MAXQDA was used. A concern associated with the use of data software is the potential for distancing the researcher from the data (Baxter & Jack, 2008). I immersed myself in the data personally transcribed and analyzed all interviews, which helped me to avoid such distancing (Seidman, 2013).
Another strength of my study is indicated by Stake through his comments on multiple case study: “If the study is done without external requirements from a central office or funding source, it almost can be assumed that the program is healthy and will be shown to advantage” (2006, p. 84).

**Ethical Considerations**

According to Merriam (1998) and Stake (1995), as I conducted qualitative case study, I entered the participant’s world as a guest. The participant’s role was strictly voluntary and continually dependent on their willingness to be involved. This was communicated not only upon my introduction, but also at the beginning of each interview (Seidman, 2013). A benefit for the participants included the development of a degree of self-awareness (Merriam, 1998) which came about through reflecting on their experiences and talking at times about personally difficult experiences (Wolgemuth, Erdil-Moody, Opsal, Cross, Kaanta, Dickmann, & Colomer, 2015). Member checks not only served to support study credibility; they also provided an ethical role ensuring clear communication of participant views (Merriam, 1998). Informed consent was obtained for each participant in conjunction with the University of South Florida’s Institutional Review Board (Appendix K) and the James County research approval (Appendix J), and a signed copy of the informed consent (Appendix A) was provided to each participant (Seidman, 2013).

As data from the interviews was kept, both paper copies and digital data received protection (Merriam, 1998; Seidman, 2013). Data stored on my personal computer is accessed only through password protection.

**Summary of Methodology**

To answer the questions posed by this study, a multiple-case study approach was appropriate. Individuals new to teaching high school science in today’s world not only bring with
them unique histories, but also will live through various experiences related to their new profession. Similarities and differences in both the first-year experiences and accompanied perceptions were evidenced between participants. How these were described by the novice and how changes in their views of teaching and teaching science are described was examined through a cross-case analysis. This study additionally looked to understand descriptions novice science teachers provide related to their successes and how they viewed challenges.

Looking through novice science teacher eyes and building a better understanding for the lived experiences of induction served as the goal for this study. Furthermore, looking at four individuals traveling through the induction experience set the stage for a multiple-case design. The individual cases exist with inherent perceptions and experiences, and taken together they provided an individual picture for the novice’s perceptions of induction.

Individually, the induction experience of four distinct science teachers was examined and analyzed. Participant selection for this study was purposeful with stated criteria. The setting encompasses three high schools within the James County School District. Each school, as each participant, brings unique features, and all participants were novice high school science teachers.

Data collection depended most heavily on a series of three semi-structured interviews. Each interview received general direction from a bank of sample questions (identified in the interview protocol) based on the literature review. I took general direction from these sample questions, but allowed for the development of emergent data, clarification, or more in-depth questioning throughout each interview. Modifications were made individually as guided by my reflection on the iterative data gathering and analysis process.

The above general questioning directions related to each interview are provided in the appendices (C, D, and E). The rationale for the use of three interviews and rationale behind the
development of the semi-structured question protocol was discussed above. Observations and artifact collection were built in as additional methods for producing valuable data strengthening the overall study.

The analysis of data was discussed. Coding and revisiting coded data follows guidelines while maintaining focus on answering the research questions. An attentive eye was kept toward emergent yet enlightening data. The use of software aided in the storage and analysis of the data, and was guided by Stake’s forms suggested for multiple case study.

The credibility, validity, and reliability of this research was laid out along with a discussion of the advantages and disadvantages related to this study. Finally, the ethical considerations related to the study were reviewed.
Chapter 4. Individual Participant Sketches

Abby Sciuto - Eastside High School

I first interviewed novice science teacher, Abby Sciuto, at a coffee shop in her home town just days before she would start working with ninth-grade Earth Science classes. The interview was on the weekend before students would show up for classes. Abby’s eyes sparkled as she explained how her own high school science classes brought joy into her life. She was clear about wanting to share this passion with her students. “I love science! So, I’m hoping that, I hope they do too.”

James County’s Eastside High School offered Abby a long-term substitute position teaching Earth Space Science as she continued to pursue alternative certification. This school appears as a clean set of buildings located on the east side of the easternmost town in James county. The town cemetery serves as a border between the school and houses on the west, and catty-corner just northeast is the town’s middle school. All other sides of the school are surrounded by orange orchards. During one of my visits to EHS, I became curious about the school’s demographics as I noticed it appeared different than what it was at the James County school where I taught. So, just before leaving the school, I made an inquiry of the principal’s secretary. She informed me EHS was a high minority school, and most students at this school are classified as either Hispanic or Black (African American). As I left the parking lot, I noticed a handful of middle school students stop at the corner of their school’s campus just catty-corner to EHS and exchange marijuana blunts before proceeding to their classes. I have heard many
county teachers complain about a drug problem throughout the schools. As I drove home, I couldn’t help but wonder how this year would go for an ex-crime scene officer.

When we first met, I asked to identify her favorite subject while she was a student. Abby did not hesitate, “Science. I hate Math so it’s never been Math. [I like] Reading, Language Arts ... I’ve never been a sports person. So, PE was not my favorite ... I would say like Reading and Science.” Abby later became even more specific, “I always enjoyed school, I always enjoyed science. My favorite, favorite, favorite science class in school was, by far ... Anatomy and Physiology class.” Her bachelor’s degree was also science related, “Bachelor of Arts in Interdisciplinary Social Sciences [and] Criminology and International Studies” (High schools in James County periodically offer a forensics course to students through the science departments). Her college training had prepared her for working to interpret Crime Scenes with the James County Sheriff’s Office. She left her job at the James County Sheriff’s Office where she started as a 911 dispatcher, then moved to service operator, and ended after five years in the Crime Scene unit.

Abby’s goals in life had changed, “I lost my passion for Crime Scene.” She said, “I’ve seen a lot of dead people,” and later added, “I touched a lot of dead people!” What Abby wanted out of life changed. “So, seeing the blood and the guts and the gore, it wasn’t fun anymore ... I started putting the wheels in motion of changing over to teaching.” Abby wanted to be close to her home and more available for her young family. Her “husband was completely supportive ...”

While she was working in the sheriff’s Crime Scene unit, Abby and her husband were hoping to expand their family. “We were trying to have a baby and, it a took us about three years to have our daughter, but in the three years, um, in the summer of 2013 we lost a baby and
(extended pause as her eyes teared). My very first, I was off for two weeks ... the very first case I went back to, I had to go to an autopsy for a three-year-old, that was a high school friend of mine’s son who had had drowned ...” I felt my heart drop at her words, and, seeing her expression, I began to tear. Although I voiced sympathy, it felt inadequate. Abby insisted on continuing our interview, “That was actually the point when I decided – I can’t do this anymore.”

Abby then expressed what happened, finalizing the desire to change her life, “We got pregnant with our daughter ... I went back to work after my maternity leave ... and my very first day back I was in tears. So, I called my husband and said I want to quit. I don’t want to be here anymore; I don’t want to be away from my baby.” She continued, “… once I had lost a baby and then I had a baby and I knew…”

With a young child at home, Abby Sciuto felt motivated to change her career choice. “I would be gone for two days, away from my, my kid. It was those days it was like, ok I really got to get this. I gotta get this done. You know, I gotta, and I’d push myself harder because I just knew I couldn’t keep on. It wasn’t, it wasn’t fair to her, and it’s not fair to any of our future kids, for my husband and I both to be gone, for days at a time.”

This career-changing 29-year-old now had a young toddler at home, and her husband was just out of the hospital. Although her, working-class family were close and able to help, I could see the desire she held inside to be with them. Through all our discussions, family was important and inspired her.

The more I would learn about the support Abby derived from her husband, the more I was impressed. He provided both emotional assurance and played a valuable role in raising their child. This became obvious during our first interview. “This week ... it was hectic, and, you
know, my husband got put in the hospital, and I was wondering how I was gonna survive. I completely applaud the single parents because I did not sign up for that.” In a later interview, Abby again recalled how his absence was stressful just before she would face classrooms full of students, and his return helped bolster her spirits. “Maybe him being home is helping my confidence a little bit.” When the hospital “was keeping him prisoner ... I was worried.”

Abby indicated, “My parents are both very inspirational to me.” Both parents held a value for education which was obvious in their working to attend college. “My mom ... put herself through college [working as a hairdresser] and, now, she is a volunteer coordinator for a, assisted living, nursing home ... and she’s working on her, Psychology ... [to] be a counselor. She wants to be a grief counselor.” Abby indicated her mother enjoyed serving others in the community. Abby’s father as well “put himself through school [and he] grew up very poor ... [In the district orientation] training where they talked about like poverty and stuff, and I did not fit into the ‘generational of poverty norm.’ Because my dad grew up extremely poor, so poor they didn’t have shoes. And he’s, he put himself through college. He’s now an engineer. He builds the systems, the huge phone systems, for like the Navy and stuff like that. So, he started out a tech in a phone company and worked his way up, and now he sells the systems.” Abby’s pride in her parents’ accomplishments and work ethic was evident. She followed their lead by working at the Sherriff’s Office to put herself through college.

As Abby entered her first year teaching high school science, stresses and challenges were plenty including the death of her grandfather. “The stuff going on in my personal life ... trying to get through [the certification exam], trying to get through all these [mandated assessments] ... breaking into a new career ... I honestly have no idea what I’m getting myself into!” Starting to work without having passed the certification exam compounded stressors. This not only
produced a degree of insecurity toward officially becoming “highly qualified” and receiving certification, but also impacted her family’s budget. “I’m making $12 an hour (the rate she would work at until passing the certification exam), which, so I’ve taken a significant pay cut while we’re building a house.” Abby even admitted a degree of challenge would come from having to be up in front of a class talking. “I’m not particularly excited about standing up in front of ... twenty to thirty people ... kids or not. You know. Talking about it is one thing,” Abby also expressed a degree of intimidation toward the autonomous nature of the classroom. “I can also mess up and nobody’s really gonna know. So, it’s good and it’s bad ... at the same time. It’s scary.”

She was not without pedagogical training. Before working with the sheriff’s office, Abby had started classwork to become a history teacher. That subject fell short when it came to holding her interest, “Originally I wanted to be a History teacher, and because I was working full time, I was falling asleep in my classes.” However, she always did enjoy science, she saw teaching as an opportunity to spend more time with her child, so through combining these passions she applied for a science teaching position.

Abby entered teaching with high ideals for what she would like to accomplish. She expressed a desire to share her love for learning with her students, “I’m hoping that, it will just, give them more of a foundation that school is a good thing, learning is a good thing.” Her thoughts for what science teachers might accomplish with their students were shared, “I feel like as a Science teacher, you can really help kids to realize that, we have an opportunity, as human being to take care of what was given to us and make it better.” Feelings about how through teaching science Abby had the opportunity to help guide students toward building a better future
were evident, “it all goes together to me, [teaching] Earth Science ... if [students] can understand that.”

Abby admitted content and pedagogical shortcomings, “I’m definitely in a ... different boat than most of the new teachers ... [who] went to school for education ... They’ve passed their topic test. I haven’t done that” She understood this as a weakness, “I’ve already taken it three times and failed,” but she kept a strength in mind, “I bring something different to the table which is practical knowledge of science, but I don’t bring the education side of it.” She also looked forward to, “learning alongside my students.” There was excitement in her voice as she laughed and claimed, “I wanna go on a field trip!” Abby’s enthusiasm for working with students was apparent. “I’m looking forward to seeing them being excited about, Science.” Abby also looked with amazement at her more experienced colleagues’ preparations before the opening day of school. [Another teacher] writes what state standard they’re ... hitting that week. I’m like, ‘That is amazing.’ I don’t even think I can make it that far.” Abby looked forward to learning throughout the year. “I expect to learn a lot.”

Abby recalled as a student, “Something I experienced in school, was, I didn’t see science as practical ... even with [a father that loved science], I never saw science in a [practical way] ... So, that’s what I want to bring to the classroom. I want these kids to realize that, you don’t have to be a science teacher to use science every day. So, whatever it is that you want to do, if you want to go into the military? Um, if you want to go into law enforcement, if you want to be a surveyor ... you’re gonna use science. So, I want to bring it to a more practical, because I didn’t get that, when I was in school.” This attitude helped express her motivation toward teaching science. She made a point to stress her belief that science was valuable for all students not just limited to academic elites such as those typified in a current day science sitcom, The Big Bang
Theory. “... like Sheldon and Leonard, ... their characters are so smart, you couldn’t even have a conversation with them. I do not want my students to keep thinking that that’s what science is about.” Abby indicated, “science is, every day. It’s practical. So, everyone should be a scientist.”

Abby wanted to build on the natural curiosity of her students. “If a kid is curious about something, wants to know how it works, [teachers can help them] figure out how it works and not just wonder.” Abby further expressed the belief science education was more than teaching a single topic. She felt science teachers should help students “to mature, and, become vital parts of society. I think ... that’s a huge part of education, because ... you’re with these kids ... many hours a day. Sometimes they’re gonna see you more than they see their parents.” She voiced the opinion science education serves as a vital link for students with learning. “I feel like every subject is intertwined. So, they need to learn to read, right? So, that they can read the papers and see what’s going on today and ... why is this happening ... I feel like it all goes together. So, I feel like science is kind of a catalyst for keeping them curious, keeping them wanting to learn.”

Even while she expressed desires to make an important difference in the lives of her students, she also included a down-to-earth thought, “I’m kinda hopin’ to get through this year.” She was concerned with her own survival as a science teacher. This survival instinct was present in Abby’s comments throughout the year as she looked forward to getting through the steep learning curve of the novice year. “I am a planner, and I like to know what I'm going to be doing two weeks from now. And, I'm not there yet. So definitely, I'm hoping [to] ... just survive this first year, and get into next year ... if this subject is what I'm going to teach, then, I can know from this year, what worked and what didn't work. So, I could plan accordingly.”
Thinking it would be of value, Abby Sciuto asked the administration for a department mentor in and was informed this might not be possible as the tutor had to meet certain district requirements. “I do want one. I’ve been told that I should have one. I asked if [the mentor is] going to be in my department. I was told they would like to do that but it’s not necessarily going to happen.”

During a science component of the three-day formal district induction training, Teacher Induction Program Seminar (TIPS), Abby used the terms “new, excited, learning a lot,” and “interested” as self-descriptive. Abby was excited “to get to know more people … and build relationships” with all the people she was expecting to meet in her new job.

Before actually teaching, Abby mentioned characteristics she felt were necessary for science teachers to possess. Along with her ability to admit teachers do not have all the answers, “patience,” a “sense of humor,” “basic [subject] knowledge,” and “compassion” were included. When comparing her own experiences with both good and bad science teachers, an attitude toward building relationships with students became evident. “My Chemistry teacher, she yelled a lot. She was very rigid. She didn’t have a sense of humor, and you couldn’t relate to her at all. She kept [to] herself … she was the type of person that, as soon as you let your guard down a little bit, if a student thinks that you’re friends, then things can get out of hand. That’s just something she wanted to avoid completely … On the other hand, my Anatomy and Physiology teacher … we probably all thought we were friends with him, you know, even though we weren’t. But, he was just a great guy. That, it was fun to go in his class and, but at the same time, you respected him. We never wanted to do anything wrong. We respected him, and we didn’t want to disappoint him. So, we all did our best, and yes, we … cut up and all that junk, but at the same time, we always got our work done. We always did our best. And I say ‘we’ because I
don’t think there was one person who didn’t enjoy ... being in his class ... He is definitely the type of teacher I want to be. I want the, the kids to like me, but I want them to know that I’m the adult, they’re the kid. So, you respect me, and [you] won’t want to disappoint me.” Abby realized how previous experience molded her beliefs, and she questioned whether this would actually play out, “Right? ’Cuz that’s how I felt.” She expressed wanting her classes to enjoy themselves. “I expect ... they are going to love Earth Space Science, and ... I’m just expecting to have a lot of fun while we’re learning, ’cuz this is, Earth Space is, is just fun, you know. There’s just so, so many things that you can do with it. Um, I think that we’re just gonna have a lot of fun.”

However, Abby expressed a negative coping mechanism when being forced to deal with stress. “Having failed the test for the third time, my confidence was quickly dwindling down ... I was nervous about Monday, to the point where I couldn’t sleep. My stomach was hurting.” Yet, she still realized the positive aspects from helpful coworkers. “I went to my, to my first day on Monday, met people and they were just great from the get go.”

Abby was glad to find additional support amongst her new coworkers, “but you know, the people I’ve met already this week ... just building relationships, even just over a week.” She referenced this as she explained how tiring the three-hour orientation for meeting with parents and student was after an already full day of preparing and planning. “I was exhausted by the end of the day!” In another early experience, Abby expressed benefitting from their support. At the beginning of the year, new teachers “had to go to a, a technology meeting ... to learn how to use, well, I didn’t even have a computer yet ... one of the other [English] teachers gave up her computer” so that she could learn the grading software.
One of the first-year challenges Abby would have to deal with was being placed into a room designed specifically for laboratories (figure 3) and not for lecture or discussion.

“I’m in the room that nobody wants ... nobody that I work with in Earth Space has a [room] like mine.” Although she physically attempted to laugh this off, being assigned this room carried concerns for Abby and allowed her to communicate some of the confusion that comes with entering a new job. “It’s a lab ... I’ve already ... [had to clean] out the drawers ... they were disgusting. Disgusting! One of them had something growing in a Kleenex box ... one of the first things I did was, I marched myself down to the front office. And I told my, my accountability person, who I guess is my boss – that’s another thing. I don’t really understand who my boss is. I even asked, ‘Who’s my boss?’ I’m used to, this is your, your supervisor. This is who you answer to. Not quite so much with schools.” The different lines of communication would be something Abby needed to learn. Abby did succeed in getting the cleanliness issue resolved. “Guess what? Friday, they drilled all the drawers shut, so I don’t even have worry about it.” On my visits to her lab/room, everything appeared clean and organized, and student work was neatly displayed around a large, wall-mounted model of the solar system (figure 4).
When acknowledging EHS’s poor academic reputation, Abby preferred to focus on what she felt was positive and overlooked about the school. “They showed [students’] test scores on Monday, and the test scores were surprising to me ... in Reading and Algebra I, they weren’t good. But, Geometry, U.S. History ... they were great! The, it was surprising how well they did ... the school has a bad reputation, but [there are] some things going right. Something is not as bad as, the rest of the county thinks it is.”

“My greatest challenge would probably be, um, well probably a couple of ‘em. Probably the kids that, don’t really want to be there. They’ve already, they’re past the wanting to be at school, you know. They’re either hurting, or they’re mad, or whatever’s going on with them, they just don’t want to be there anymore. So, I think that’s going to be a challenge.” Abby additionally saw a challenge in the low level of reading performance, “especially with their reading issues, like almost all of my kids are in an intensive reading.” Abby exclaimed, “What!
You're taking the fun out of Earth Space. To, to kids who struggle to have any interest in this anyways.” Administrative and political interventions to cover specified content for mandated assessments added to the concerns Abby held for her students.

Abby’s approach to helping students included a desire to get to work immediately upon their arrival. She was disappointed with the first week’s expectations. “We’re pretty much being told you don’t do lesson plans, you’re really not going to be teaching anything for the first week. And, I really don’t like that because I feel like it’s just a waste of time.”

Being forced to work with large numbers of students in any one class was a concern and challenge to Abby as well, a challenge she would rather not face during an evaluative visit. The size of classes Abby was given were a concern from the beginning of the year on. “My biggest class is thirty, and I have two ... at the first of the year when they were still balancing and putting the kids [in] ... my classes were, between twenty-five and thirty.” Abby compared her class size to that of her new co-workers. “Every [other] class was like, ‘oh, my goodness.’ ... we wondered if guidance put students into classes based on [some arbitrary reason] ... I was getting every [student] ... The other Earth Space teachers, their smallest classes are like fourteen. And my smallest class is twenty. And it seemed like every day I was getting a new kid and [the other experienced teachers] had multiple classes that were in the teens.” Even though these classes were offered at the same time and level, and Abby along with the other teachers approached administration requesting a change, nothing was done to alleviate this inequity. “[The other teachers and I] actually went down there and asked, and, [the administrators] were like we'll look into it, and [changes] never happened.” No co-teachers were available to assist with her overloaded classes either. “I was wondering ... what is going on here?” Abby never got an answer.
Early in the year, Abby advantaged her past experiences with the sheriff’s office for her new job. “The second week [the other science teachers and I taught the] scientific method, and we set up a Crime Scene. We borrowed ... Drop-Dead-Fred, the big, the body, from [the sheriff’s] Crime Scene [unit]. And, we set up the whole murder scenario, and ... all the Earth Space classes participated. And ... in here would be the scene. And then, the next place they would interview witnesses, and then the next place they would, you know, look at their evidence and stuff like that. So, [the students] use the scientific method.” She admitted feeling like a leader. “I got to use my background to bring that in, which was nice, and it made me fill at home ... some of the kids, even from the other classes, would come in, they would be like, ‘You're the one that came from Crime Scene?’ ... They would ask, ‘Is this what it really looks like?’ And I'm like, ‘Yeah, only you know it smells a little bit more.’”

Discussing discipline referrals, Abby shared, “Now my fifth period, which looking at the statistics, the discipline statistics, I was just looking at them. Everyone has more referrals during fifth period ... Right after lunch, the lunch period. So, definitely kids are hyped up.” She indicated being exhausted from the combination of this and other stresses, “Yeah, well yeah, you know, I'm tired. I'm definitely looking forward to a break.” and “I think that's not just, teaching, I think that's, just you know my life has been, so hectic, in the last six months. So, we're finally into our new house and we're getting settled in.”

When Abby spoke about successfully getting through her first formal evaluation, she indirectly shared a challenge and a positive aspect of her experience. “I just had my formal observation, my first formal observation, and it went really well. [The administrator] picked seventh period ... I'm like, ‘these kids are great though.’ You know ... I think it definitely helps ending the day with a class that [I] enjoy. And It's a smaller class too! So, it's not like I'm having,
“having to wrangle in thirty kids.” Abby communicated a positive and constructive attitude toward administrative observations and evaluations. “One of my informal walk-throughs ... this administrator, I love her ... she's a new teacher, supporter. So, she's done, she stays after [with] me and goes through things that she saw, or things that she was a fan of [or] thought I needed to change. [During an observed reading activity,] she was here ... and she's like, ‘So, these kids, they're not reading it, and you know they're not going to. So, instead [try this]. We actually did a class reading on Monday. And, I'm surprised! And, how many kids actually want to read aloud. That does surprise me!’”

Abby mentioned how many teachers used EHS as an entry-way into teaching. She added, “I'm in the same boat. This is a place to get your start. This is a, they open the door, you take the opportunity, and then you wait for another school to open.” Abby’s comments halfway through the year demonstrated her interest in and reasons for wanting a transfer to a different school, one closer to her home. “I would like to go to a different school, [one] that's closer to home.” Abby pointedly separated her reasoning from those she felt the other teachers held. She took care to indicate her concern for the students. “The kids are great! The parents can be frustrating. It's definitely a culture shock. But, I guess if you're not, ... coming from or where I did, where I came in contact with a lot of different types of people. And, as long as you show [the students] respect and expect respect [in turn]. You can go along just fine, no matter who they are or what situation you're in.” Having acknowledged this, Abby still expressed confusion as to why the other teachers did not feel this way, “I don't really know why there's a lot of turnover.”

Abby’s building appointed mentor, a man who taught in a different building on the campus (International Baccalaureate branch) was kind and helpful, but a separate informal friendly alliance with similar courses and students ended up being of much more assistance for
this novice science teacher. "She's not actually my mentor. Uhm, according to the district. Which my mentor is great, and... but he's ... on the big campus ... we're not in the same building. But [this other teacher] is right across the hall, and she helps me a lot, and she suffers some of what I'm [facing]." The formal assigned mentor “teaches Biology and something else. He also teaches IB students. So, they are upper, upper classmen and all that.” Abby appreciated the assistance from both but clearly preferred getting assistance from someone in the same boat as she. “We're actually teaching the same thing so I ... I can actually bounce ideas off of her and you know ... we are not in Biology.” The support provided by the informal friendly alliance was appreciated and depended upon. Abby reflected on the progress she had made and the assistance she had received. “Looking back now, I'm thinking how, how did I get everything done? But ... she's been like a lifesaver. Because on the days that I woke up and had no idea what I was going to be doing, she’d be like, ‘So, I'm doing this today. So, you can do it too, and I already made you coffee.’”

Abby voiced concerns about attempting to work with uncooperative students. “Some of these kids, they refuse to read directions.” She felt the need to specifically design lessons toward changing this type of student behavior. “[I sometimes plan] specifically so that I can tell them no you have to read directions, because at some point you're going to bake brownies, and you're going to have to read directions.” Frustration was evident in Abby’s communication regarding students’ efforts toward reading. “They just, they won't do it!”

Abby coped by developing an acceptance that not everything will go the way she would like or feels best. She indicated this will not stop her. “[Somedays have] gone really well and other days it hasn’t.” Abby then relayed a specific example. “It was one of those days where nothing was working out, and I should have known it was just gonna keep getting worse. But,
nothing’s working out. The technology in my classroom wasn’t working, so I couldn’t do the stuff I wanted to do. The copy machine was broken. So, I couldn’t make any copies for worksheets ... I don’t have anything else to do.” Abby then wanted to take the students outside to observe some of what they had been learning during the year, cloud types and land surfaces like erosion and weathering. “We went out there and all [the students] did was complain about being outside ... it made me so mad.” She expressed frustration at the students’ lack of appreciation for the change, one they had even previously requested. She then responded as numerous other teachers in similar situations have. She directed them back into the room and said, “Open the book ... go to this page. Read this. Answer these questions.”

She described positive experiences appearance as scattered throughout the year and random in occurrence. “The highs have been peppered throughout the year.” As an example, she enjoyed watching the students learn and have fun doing it. “We did a sinkhole lab, and a lot of [the students] were like, ‘Miss, this is so cool!’ You know, stuff like that is really fun.”

Her concerns for the bureaucratic management of learning continued throughout the year. “… The district, I'm told the district, I don't know for sure because I don't know these people, but they've taken out a lot of the fun of Earth Space. So, we don't get to do the things that would [make learning] fun ... we don't get to spend a lot of time on volcanoes. Well they're are not going to making a volcano, because we don't have time ... [The students are] constantly asking, ‘When are we going to do this, and when are we're going to do that?’ I'm like, ‘We're not doing it because we can't.’ It's definitely the teaching to the test.” She expressed how even with materials already present, the teachers were not supposed to use them due to time constraints. “We have all these rocks in a closet, [but] the district has written the [curriculum] map now to where we don’t even look at rocks, at all. So, we’ve got all these rocks ...” Additionally, Abby
indicated her students expressed interest in examining the rock displays. “The kids were asking me, ‘When are we gonna look at rocks? In Earth Space science...when are we gonna look at the rocks?’” Abby admitted she and one other teacher used the rock displays anyway. “I did several ... lesson plans where I got the rocks out.”

Abby also expressed finding beautiful support from her students. This was seen more than once. When her grandfather passed, “I came in Monday, and you know you just feel, you just feel down. ... I'm not a crier ... especially in front of the kids. [A student] said, ‘miss, you look real tired’ ... and somebody said, ‘Are you alright?’ ... I started to tell them my grandfather died yesterday ... I started to tear up, and one of my kids ... he says, ‘it's ok to cry Miss’ ... That was like a hug for my heart. Sometimes these kids they just hit the nail on the head.”

Interruptions to the classroom were referenced by Abby. These were seen during an observation and others were brought up directly by Abby. Each interruption was different. Due to the assignment of classes, Abby taught in a room with a shared storage closet. “I had a couple issues where one teacher in particular was either himself coming or sending students in the middle of my classes to come get stuff.” Abby addressed this with her colleagues at the next department meeting. “If you all need to come get something, send me an email, come before or after school. You coming during a power point, with my ninth graders, who are barely hanging on to writing these notes that they need, and you're sending ... three or four kids to come in and get the beakers. Because you weren't prepared for your next class, that can't happen.” She stood her ground with this concern when another teacher attempted to make light of the situation. Abby insisted, “I don't care. It is my classroom ... yes this is a shared closet, but it is within my classroom.” During the meeting, she received strong verbal support from the department head, and it never was a concern again.
Abby shared a coping lesson she valued from her grandfather, “I say something that my grandpa said to me so many times when I was growin up, and that is ‘be like a duck and let it roll off your back.’” She said this idea helped her with a few individuals at work. “When it comes to dealing with my colleagues, I’ve always been one to stay out of drama, and I connect with just a very few people at work, and I like it that way. That’s how I’ve kept it.”

During one of my trips to EHS, I was taken aback by an administrator who had selected the same time for an evaluative visit of Abby’s teaching. I have over ten years’ experience as a school administrator and have conducted numerous evaluations during that time; I hold specific beliefs on how new teacher evaluations should be performed. This administrator did not appear to hold my beliefs. I have always believed accurate observations of teacher performance are best obtained by evaluators assuming as nonchalant presence as possible. I arrived between classes as students were making their way to their next class. Abby was standing akimbo at the door greeting students with a smile and “hello.” Just standing across the hall from Abby, an administrator stood taking notes. Before the bell started class, Abby reminded her students, “please get your notebooks out and start your work.” Although one student at the back of the class commented to those around him, “I’m going to wait for the bell,” most of the students appeared to follow Mrs. Sciuto’s directions which also included a request for students to ready the room. “If you have a chair up in your area, please put it down.” As Abby taught out of a laboratory rather than a regular class, stools were located around four large rectangular lab tables. A few stools still stood on the tables and needed to come down. Positioning myself to be a nonchalant observer was not difficult. Ample room with chairs and toward the rear of the class was available. The administrator chose to stand on the edge of the classroom near the middle of the students. I later found out the administrator’s visit was an unplanned formative evaluation.
On this same day, singing telegrams were making their way around the school. Near the beginning of the class, singers knocked and entered through a back door. These students performed a song and presented flowers to one student in the class. Many students used their phones to film the singers. When they finished, Abby redirected students to the lesson.

While explaining a high and low which occurred near the end of the school year, Abby Sciuto teared slightly as she shared a stack of student letters written to her. “A big high and a low was this past week. I don’t know why, but Wednesday I just was in a funk ... not normal for me, and I couldn’t quite put my finger on it ... as the day progressed, it just got worse, and worse, and worse ... I’m sitting in third period, and they’re working on ... group posters ... at their tables and ... all of a sudden [the thought] hits me, ‘Why am I here, and why am I doing this? I should have stayed at the sheriff’s office. I knew my job. I knew my people. I could communicate with people. They knew what I was talking about. I don’t know why I’m here.’ And, I turned around...I put my back to the kids, and I started crying, and I’m [thinking], ‘What is going on right now? I need to go home’ ... I went over to my box and I got my teacher appreciation letters from my kids. So, I went home, and I was reading them with my husband, and I’m in tears telling him I just miss Crime Scene. I feel like I’m not at home ... He reads one of the letters which is from a girl who says in the letter that she was being picked on throughout the year and I asked her every day how she was doing, if she was all right, and if she needed anything. And, she says that meant everything to her. And, my husband’s reading the letter ... he holds it up and he says, ‘Really, Abby? Really? You miss Crime Scene? Really?’” Her husband continued as tears streamed down her face, “‘You didn’t make a mistake. You’re where you’re supposed to be. You made the right decision. You’re making an impact way bigger than you even know. Just keep doing what you’re doing, stay on this path.’ And, I guess that’s what I needed to hear, cause the
next day, I went to work and I felt much better ... I don’t know if it was just cause of the end of the year and I’m just ... tired.”

Although planning took additional effort, Abby did realize the extra time she sought with her family. “I have a lot more time at home. Which at first, I was like, I don't know how I'm going to do this. I'm doing my lesson plans at home ... but it's ... evened out a little bit. I definitely, [compared with] my old career, I have a lot more time with my family.” She also saw the career change as offering a better fit with her family dynamics, “My husband is actually about to change units, and he's going back to the road ... on day shift. So, he'll be up really early in the morning, and then he won't get off until like six o'clock at night. That wouldn't work if I was in my old job. I couldn't do it because I also had to be at work.” Abby also enjoyed a commonly discussed perk of the profession. “It's definitely working out, and I'm also knowing that I don't have to work holidays. It’s great!” Although she did find additional time for her family, after the year of teaching, Abby was a bit surprised. “I haven’t had as much time as I thought I would.”

When Abby reflected on her preparations for teaching high school science, she felt her past career most valuable. “Teaching is like being the lead Crime Scene on a homicide. So, if you’re the lead Crime Scene on a homicide, you’re being pulled in about 16 different ways.” She relayed how people were constantly pulling her in different directions on Crime Scene. “You know you have to do these things or you can’t leave. So, 16 hours later you’re checking your list off ... Did I get this done? I haven’t got that done. I gotta go back and do this. So, teaching is just like that. You’re being pulled in all these different directions, but you know that you have these, this list of things that you have to get through. So, when you work your first homicide in Crime Scene as the lead, you’re like, ‘I’ve got no idea ... what the hell is happening right now?
And, I think I’m gonna die. I can’t survive this and I can’t do it’ ... learning how to keep your mind together, keep calm, not freak out whenever everybody else is ...that has really helped. Really, really helped.”

Abby’s confidence with teaching science grew throughout the year. “Teaching [Earth] Space was a little touch and go [at first]. I’ve spent a lot of time watching YouTube videos and trying to wrap my mind around things that don’t really make a lot of sense to me. How am I supposed to get a 15-year-old to understand it? But, I will say [the students and I] learned it alongside each other.” The appreciation she held for the subject grew as she taught it. “I am really loving the subject ... I am really enjoying it.” As her offer for a returning science teaching position included a change in preparation, Abby was also enthusiastic for a new opportunity. “I am looking forward to teaching Environmental next year.”

Her confidence was boosted again as another district high school, one closer to home, approached her about a transfer to their facility. “[The closer school wants] me to come over and teach half Forensics and half Environmental.” Abby was told the James County District Administration appeared to be throwing a wrench in this possible transfer. “The county took their forensics science away.” The transfer school’s administration still expressed a desire to get around this blocking of the Forensics class. “What [the principal is] trying to do is add [Forensics] ... to their medical ... [Academy].” The possibility of a school offering a Forensics class for Abby to teach made quite an attractive offer to Abby Sciuto. “That’s ... only thing I think I would change is teaching a subject that I would be more comfortable in, and be happier in.” Abby did voice one drawback even with this possibility. “Although, I read the Forensic science learning map, and I can tell that whoever wrote it, had no idea about anything about Forensics.”
When Abby referenced the status of teachers her disappointment was evident. “It seems like, the most respected people in society are the ones that don’t get the most appreciation.” She also considered the lack of financial support that was provided to help teachers in their classrooms. “I was taken off guard by how much stuff a teacher has to supply themselves ... if you run out of paper, you have to go get more, on your own. That’s. Wow!” She indicated how her ineligibility for participation in the district’s new teacher reimbursement program caused colleagues to offer support. “That has not made things easy ... a lot of teachers [were] very willing to step up and lend me stuff, give me anything I needed for my classroom. I ran out of paper right before Christmas Break.” She indicated her total paper use was about one ream per week and she felt it minimal. This directly impacted Abby’s thoughts about the sufficiency of a teacher’s salary, “The supplies and the money ... if a teacher has to supply all this stuff, you know because the school doesn’t, the district or whoever doesn’t supply it, then the pay needs to be higher. Definitely.”

During our final interview, Abby’s heart poured out for her students. “I didn’t realize how broken these kids are and how they’re looking for something, somebody, any kind of relationship that they can have.” She saw her students desiring a relationship stronger than that of a simple student-teacher. “I don’t remember ever being interested in my teachers ... their personal lives, and their spouses, and their kids. I don’t remember that. But, these kids are so looking for a personal connection with somebody.” She saw students on this quest throughout the school. “Every teacher they have, they want to know personal stuff about them, and they want to connect with them in a relationship.” Abby indicated, “I have [students] that ... call me their ‘white mom’ ... They tell me about like their home lives, it breaks my heart. Because, they’re much less focused on education than they are on just having a personal connection with
somebody who they feel cares about them. That’s what I’ve learned is a major part of teaching now.”

At the end of the year, Abby felt her placement teaching Earth Space science served to shelter her from a lot of the stresses felt by other science teachers who were open to mandated, End of Course Assessments. “I don’t teach Biology. So, the district doesn’t have a lot of fingers in my pie.” She was thankful not to be a Biology teacher. “The Biology teachers are ... stressed because [district] people are constantly in their classrooms, people are constantly questioning what they’re doing.” Abby’s perception of stresses faced by some colleagues influenced her attitude about what subjects she might consider teaching. “When the kids have asked me to go take my Biology test and teach Biology, I say no!”

During the year, a change in the way Abby felt about contacting parents also occurred. Abby mentioned an expected challenge after her initial meetings with parents and students during the student orientation. “I met a lot of great kids, and great parents ... some parents that I can tell are gonna be a thorn in my side, and some kids that are gonna be a thorn in my side ... the principal’s coming’ through and waving ... he went to every single classroom to see, that everything’s goin’ alright.” As the year progressed, Abby felt parent communication lost much of its value and ceased being a challenge. “The parents don’t really respond much. They don’t have a lot of parental interaction any more ... They don’t call back. They don’t email back ... I’ve got no problem picking up that phone and leaving a voicemail. I was a little bit more timid about that at first.”

The stresses experienced by Abby were wide-ranging and appeared in internal and external aspects of her first-year while teaching science. Although she passed the certification exam in October, Abby was initially hired without having passed the Subject Area Exam (SAE)
for Earth Space Science. Along with this stress, changing jobs, a husband coming home from the hospital and later needing surgery, and a toddler needing attention added stress. Abby had to face these from the beginning of the year and substantially throughout her first year teaching science. Abby acknowledged this, “It’s been one of those years where it’s gone like ‘Bam! Bam! Bam!’ … that has caused me some stress, and you know whenever you have so much in your brain that things just fall out, and you can’t remember exactly what you’re supposed to be doing. I would, it would be Sunday night, and I would be like, ‘Oh my word, I have to go to work tomorrow, and I don’t even know what I’m teaching!’”

Once at the beginning of the year, Abby shared a developing concern over mandated assessments from her interactions with the other science teachers. “From what, just what I’ve seen with interactions with my department just this week … [teachers] want science to be fun, [we] want it to be practical, but you have these standards that the state says you have to meet. Which I’m finding out seems to be a problem with the topic test because I may be … [teaching correctly] but that may not be the state standard … they want me to pick the state standard answer … I feel like, the state and the district may get in the way, of educating.” During the year, Abby developed her thoughts on mandated assessments. “I personally feel like testing … is way too emphasized.” Reflecting on what she thought might make the job better, her comments were directed at the state and district management of the classroom. “It’s difficult to understand exactly what [the district is] talking about on the learning map … what exactly it is that [they] want me to teach here?” It appeared “vague” to Abby, “and because you know that they’re going to have something ridiculous on the test, that’s probably my biggest irritation with the standards … these tests are not written for my students.” Abby did feel there was a problem getting students instruction they needed, but was frustrated at what she felt were misguided
bureaucratic directives. “You have these kids with double blocks of math and reading, and they are in, like eleventh grade. Why? What? What’s? Where? Where is the failure? Obviously, something’s not working, but [those in charge are] continuing it.” Abby felt political and administrative directions were taking the fun out of learning and teaching. “I just feel like when all you do is push kids who [are] born naturally curious ... when you take that away, and you take away recess, and you push them ... to pass the test, it’s all about passing the test, you take the fun out of learning ... I think that’s a huge challenge for teachers. How do they keep their spirits up? How do they keep wanting to go to work every day? And, be an educator whenever they’re just being told to just get [students] ready for the test.”

Victor Escalante - History High School

My first interview with Victor Escalante took place in his classroom at History High School (HHS) where he was assigned to teach Biology. History High School evolved from an 1858 fort-based school and has adapted several times under the pressure of natural selective environments ranging from the Civil War, a railroad boom, segregation, and desegregation. Presently, an International Baccalaureate program and a military preparation school share the facilities with HHS. The school today is an amalgamation of buildings of various ages and numerous on-campus portables that hold the ever-growing student populace. The school houses over 2,000 students in grades nine through twelve, and is surrounded by residential houses of the town of History.

Victor Escalante was athletic and had his long dark hair neatly pulled back and tied off behind his head. From the time we first spoke and throughout all his interviews, Victor presented
himself as a serious individual. He carried himself professionally and would laugh at jokes, but he appeared to have internalized some heavy responsibilities.

Victor was born 1987 in Miami, Florida where he attended school. He explained he was raised in “poverty” in a rough neighborhood, and described the school he attended as “tough.” “I didn’t enjoy the structure of school,” he added. “I really didn’t ... [Not that] I wasn’t intelligent ... I didn’t find [school] very interesting.” When I asked him about his favorite subject, his first response was “math,” but he changed it to art, saying, “I was a pretty good artist.” He felt he was by no means the “poster child” of a good student. During this brief description of his childhood, I got the sense that art was a good escape for him, a way of dealing with negatives in his life.

He later proudly proclaimed his father was a retired lieutenant firefighter. He was less sure of his mother’s current occupation, but believed she was working in a warehouse. His parents had divorced when he was two. I asked him to describe his current family dynamic, and he explained he now lived in Swan City with his girlfriend, and they considered the town their home. They had two young daughters together and a fourteen-year-old stepdaughter. He admitted the children added excitement to his life, but I sensed a challenge that came with rearing children in his comment: “It’s hard to get things done sometimes, but we make it.”

Before going to college, Victor “was in the Navy for four years” where he trained with the Navy Seals. He was hit with “Pneumonia ... three to four days before ‘Hell Week’” and that cost him the possibility of becoming a Seal. He attended a small private college in Swan City where he earned a degree in Biology and a minor in Chemistry. During college, he “painted and ... pressure washed [as a private business].” He had additional short stints with “sales” and as
an “Admissions Representative” for a trade school. He appeared to me as a hard-working individual in search of an appropriate job.

As for obtaining a science teaching position, his girlfriend, a teacher herself, had encouraged him to look at teaching as a possibility. “Especially Biology ... [the district is in] desperate need ... [Although] I was working, ... [I thought after] I finish with that job ... I would apply] ... They called me back a week later. I interviewed and got the job.” Victor was not sure it would make a long-term occupation, but thought with the ease of landing a position he would give it a try. He believed it would allow him an opportunity to use his degree in Biology, at least until a better opportunity came along. He shared how easily he qualified for his present position: “You apply, put in an application, submit your transcripts. They review them ... They will give you a temporary certification as long as you pass the background check.” Victor explained he was operating with a temporary certification. “I haven’t taken the actual ... subject area [exam] ... they automatically give you a ‘temp cert.’ They allow you to get some experience, and then you can take the test whenever you want.”

Victor had no previous teaching experience other than teaching an assigned unit on evolution in college, and working with his own children at home. He exclaimed how he was “following an actual curriculum ... online,” teaching homeschool kindergarten to his daughter.

Victor had been hired strictly to teach Honors and Regular Biology. He entered with a degree of uncertainty toward his exact role. “[I am not sure I understand] the boundaries ... that allow me to do my own thing ... I see ... all [these plans in the filing cabinet], and I’m like, ‘Wow! I don’t even know why I would need all that stuff.’ ... I don’t know where to start.” He also expressed a little intimidation toward knowing the administrative procedures to follow, but
stated, “I’m really tech savvy … I’m really confident at being able to organize things quickly and deliver the content in an exciting way.”

The large classroom Victor was given had separate lab and lecture areas (figure 5). “I love my room. It’s really nice [and] … gives me enough leg room to walk around. The labs are right there. So, [that makes set up and movement between classes easy] … it’s just real spacious.” On top of being excited about his room, the fact it shared an office (figure 6) with the teacher next door was perceived as a bonus to Victor. “To have somebody that’s sharing the office with me … [with] forty plus years of [experience]…that’s invaluable, it’s … that backbone, that foundation that you … [can] lean on.” He was, however, palpably nervous. “I … feel like I’m just thrown into the fire.” He thought that was alright, though. “I’m confident enough to know I’ll work it out,” he shared.
Victor indicated it could be difficult to get things done with a growing family depending on him, but he seemed to accept the challenge. Contributing to his family appeared Victor’s main stress not related directly to his job. Challenges related to teaching, however, appeared to Victor to go on and on. “[It] seems like [science teachers] have to do everything [like a] Swiss Army Knife ... The amount of paperwork ... they expect you to manage ... You gotta ... advocate for these students, take money out of your own pocket to either give them paper, or pen, ... you have to account for [everything] ... [It] seems like you have to do pretty much everything. Be the motivator for these kids ... Sometimes you have to be a counselor. Some of these kids ... have so many problems ... That’s why [the students] don’t care ... they have such huge problems at home, [and when they come] here they’re like, ‘You’re handing me a paper ... This isn’t very important.”

What appeared to be contributing most to Victor’s job stress was what he believed to be an unacceptable income. He compared all the responsibilities and duties to what he made. “They expect you to do these convoluted ... super-detailed lesson plans in the [time] you have after school. [This time is interfered with already as] they call you down for parent teacher conference ... Time set aside for planning ... they take away for testing. They want ... these wonderful (sarcastically said) lesson plans ... the only way to do lesson plans like that is [by] working hours outside of the job. [All this] lowers your [pay] rate. [Which initially sounds] good, but [with] what they
expect.” He again began to list various teacher responsibilities. “You ... grade ... between two class periods, [while] keeping parent contacts. If I was to do [everything] they want me to, I would ... make close to minimum wage [considering] the hours ... worked.”

Victor originally voiced a concern for student discipline, saying, “I expect the kids to be ... difficult to deal with.” He shared the advice he heard in his building, the same advice I have also heard ever since I got into teaching: “Don’t smile until December.” He said, “It is a little scary.” I later believed, after observing him teach, this comment must have indicated nervousness on his part, as he was about to enter a new job. For, when I observed Victor teaching a group of Regular Biology students, the classroom ran like a well-oiled machine. Victor proceeded clearly through his personalized lecture plans, and the students seemed quite attentive asking questions along the way. These questions were quickly addressed. He assisted them with in their efforts to create a cladogram after the lecture, and other than one female student sitting furthest toward the back of the class sneaking a brief text, the students appeared on task and involved in the learning process.

I was not the only one who noticed Victor’s classroom control. At one point, Victor shared comments made to him by the veteran teacher who shared his office and had seen many of his lessons. Victor indicated she told him, “‘You walk in, and you drop a pin, and you could hear it ... You manage your class good, and you’re not supposed to because it’s your first year.’”

Victor shared expectations he held for the class. “I try to be rigid ... real stern. If they cross the line, ... they all know ... we’re actually learning new content ... I don’t want to see [students in a] sidebar conversation ... They all know I [will] get upset and [send them out.]” He expressed how he would not let any student interfere with the education of others. “‘If [they]
don’t want to learn … I’m not [going to let them ruin] it for everybody else … That attitude works … Whenever I do put up a presentation [the students] all … know they’re taking notes … they ask pertinent questions … They know not to deviate too far because … there is that boundary … I already set … high.”

He did admit to developing a slightly different relationship with the Honors Biology students. Expressing their different approach to learning, he said, “My honors classes … [are] able to have really deep conversations. So, they tend to … ping me all the time … They think I’m Wikipedia … I … [engage with their questions] … even though it, like, throws me off my timing … They’re engaged with learning, and they want to learn more.” Although Victor took pride in maintaining a disciplined class, he shared one challenge. “It’s kind of the balancing act between … restraint … [and] too much … A lot of times teachers get frustrated with kids interrupting them when they’re talking. But, [when they are asking questions] about the topic area, I don’t mind it.”

Victor also commented on how he believed building relationships with his students was important. He provided an example. “A girl … went off the rails, and most teachers … [would even] not look at [her]. Before [she walked] in my class, [I called her aside and asked], ‘What happened?’ … It was one day. We all have those days.” Victor told the student, “‘[Let’s] put it behind us.’”

Early in the year, Victor felt the challenge of educating his students two-fold. He believed getting students ready for exams, to “absorb the content” was important in preparation for mandated exams. Yet, “You can spend a whole year in class, do well on exams and still, a week later, not understand a single thing … you study specifically for that test. I see really getting the
students to ... understand the concepts ... [is my] main role.” But, he again stated, “And, [getting them to] absorb the content.”

Victor initially believed he could keep most students interested in the topics he covered. “I really go into detail, like ... [when] we talked about photosynthesis ... properties ... [we covered topics other teachers] didn’t really touch ... at all. But I went into it.” He did not want his students to miss out on something he believed was interesting. “It’s the only Biology class [they’re] gonna get. [They] need to know this. We talked about wave lengths, and they loved it. I found this video about light painting ... a new media he was actually at the [James County] Museum of Art for a little bit, ... they were into it.” He shared how this enthusiasm for the content he shared seemed to work with all his students. “Even [students with] IEP’s (Individualized Education Plans) ... [who] were a little bit slower, [were] talking about genes [and other interesting topics] ... One thing I learned is that as long as I have ... something ... interesting that they’ve never seen before, they usually ... enjoy that, and they want to have a conversation.”

In the middle of the year, Victor commented on the number of students he believed apathetic toward their schooling. “I would say the majority of [students] do not care ... [They might] show up eventually and ... turn in late work. But, that’s not the idea. They care ... they don’t get their phone taken away [by their parents] for having a bad grade. They don’t care about ... education and learning ... I think 80% don’t care about learning.”

The challenge of student apathy touched Victor. “My teaching has kind of been impacted. Sometimes ... at nighttime ... [looking for other ways, I wanted to] be creative for [the students]. But they [would] give me nothing.” He expressed wanting to carp to his students, “[Only] a giant X-Box, that’s the only way you’re going to be motivated to do something in this class.” The
apathy made Victor “not want to do ... activities that are creative, [or] to even try.” He wondered, “Why waste my hours ... to come up with [involved lessons] when I could just make a PowerPoint and be done?

He wondered about the parents’ commitment to education as well. “Some of the parents seem to ...[not] understand ... that kids are [going to make mistakes] and ... forget to turn in [assignments on time. The student will forgo an assignment] ... I’ll get emails from parents about how their [child] said they turned it in. And I’m like, ‘Wait, I don’t have a record [of that].’” Then he indicated the parents would question him rather than confront or question their child. “‘You don’t have a record.’” Victor explained how he felt pressure to give undeserved grades. “Do I just give [the student] an ‘A?’ ... We have no proof [the student] did [the assignment]. [I] can’t do that ... [a huge portion of the parents don’t ... care.]

Victor identified a problem of improper preparation for high school. He saw this in the students. “There [were] so many gaps when [the students] got to me. A lot of it ... [is from] outside of [science] like reading comprehension ... There’s no way to learn [high school] Biology without being able to comprehend abstract things or big-picture items. If you can’t put things together, it’s very difficult to understand science in general.”

He shared how a limited number of parents appeared concerned about their student’s work. “You don’t hear much [from others, but] maybe there’s three or four, maybe five that constantly are contacting me [with concerns about their child] missing [an] assignment or [asking], ‘What happened?’” Victor used this as leverage with those students. “When [parents] do [consider their child is likely at fault], I actually understand ... I’ll say, ‘It’s your son’s fault.’ ... [I explain their child] didn’t turn [the assignment] in. Even though it’s late, and it’s past my due date ... [as long as] the parent cares enough. I’m going to ... help [the parent] out.” Victor
demonstrated his approach toward a child when the parent made efforts to do their part. “[I said] ‘Your mom contacted me three times. She loves you. So, hey, make sure you get this to me next class.’ … I’ll be understanding like that.”

Toward the end of the school year, Victor had developed what he believed to be an effective disciplinary tool. “When [students are] done with their work, I ... allow them to get on their cell phones.” He admitted this was bucking against the school’s policy. “[This] is a no-no [in this] school, but ... I am not one to give busy work. So, ... [after students get] their [work] done. They go get their cell phones in the back of the classroom.”

Victor shared his thoughts about the school’s disciplinary procedures, saying, “My discipline, I [feel] was more effective than the school’s.” He tried the suggested methods. “I gave discipline cards ... and I quickly learned that referrals were pretty much a joke.” He said, “Kids that walk out of my class ... end up ... [without any obvious consequences].” When referring to the administration’s follow-through, Victor believed there was a lack of support. “I didn't see anything happen. Kids can just walk out of class and be [back] the next day. [Nothing happens, no] indoor suspension or ... some type of Saturday work detail, nothing. There's no feedback as to what was done ... I don't think ... discipline [exists] at [this] school.”

Victor expressed limited benefit from attending the three-day Teacher Induction Program Seminar (TIPS) two weeks before the school year started. At this seminar, he had been provided with a three-ring binder in which a section provided hints for the novice teachers. “I use discipline cards which I found in [the TIPS] book. ... [and] ... I showed [other teachers].” This was the only positive comment Victor made about the required three-day training. As he continued, thoughts on the cooperative planning time mandated by the district administration blended with the induction training. “[TIPS] doesn’t deal [well] with lesson plans ... [We go to
TIPS and learn] how do we fill out this template that goes to the district to say ... we collaboratively planned ... [lessons for] this week.” Lessons to which Victor admitted not sticking. “I usually change even after I [prepare for] the day ... I might change ... what I ... don’t like ... [So, I] do something else, constantly ... I don’t think the planning part helps out at all.” He then shared the actions of a more veteran teacher. “She sends me ... handouts.” What he said next expressed how valuable cooperative planning time appeared to him. “I think she’s usually that one who handles most of the planning [for] our group. But, it’s usually outside of the actual cooperative planning ... She just sends me an email with an attachment, that helps out more than when we go to planning.”

At the beginning of the year, Victor did not even have access to the district’s store of canned lessons. “I didn’t have access to, like, [the web site] so those lesson plans, I had to make all my stuff from scratch.” After he eventually did try the district lessons, Victor believed something was missing. “It went okay at first ... I started to realize ... I didn’t like the [lessons] I was teaching.” He then explained that he took lesson design back into his own hands. “[I started to] do my own thing. We’ve kind of gotten away from the [district lessons].”

At our initial interview, Victor could not identify exactly what he believed was missing from the public-school system of education, but he believed something was not right. “There’s something in the system that’s failing, because [students are] not coming out as prepared as [they] should.” As explained earlier, Victor wanted to provide his students with an understanding and appreciation for science over just preparing them for an exam. One problem he pointed out immediately: “[In the] handbook for school ... [students considered] ESOL ... can’t get lower than a ‘C’ unless they refuse to do [their] work. I find that ... insane ... It didn’t make any sense. Why have somebody in class?” He placed blame on the school district’s
manipulation of reported data. “You use data to improve classrooms. But, the data’s [manipulated because] people are passing because … [teachers] have to pass them.”

Victor sensed those in charge at HHS and the district did not want to hear how things were going in the trenches with the teachers. He believed they acted as if they cared but hid behind surveys and did nothing to address teacher concerns. “[The administrators] constantly harp on the teacher, ‘Where is the [student’s chance to get] late work?’” In turn, he would remind the administration, “‘Your own policy [indicates students] have one day to request [makeup work. If the students make this] request they’re given one … day added … If [they’re] absent two days, [they] get three days [upon] returning … [The administration] don’t even adhere to [their own policy].’” Victor then gave an example that clearly frustrated him. “I got principals emailing me, asking me … ‘Can you get such-and-such make up work … [They are] not even specific assignments.’” Becoming more disappointed, Victor continued, “Excuse me. This kid hasn't done anything all semester … [Now the principal] just randomly asks me [about make-up work] … For what reason? and stuff like that.” Victor believed there was “no standard for accountability in any shape or form” and that this was “just toxic for a learning environment.”

Victor also spoke briefly about the teacher evaluations performed by the building administrators. “I don’t see how you can put a dog and pony show for one day, which is … what I’m seeing happens in education …” he said, describing what he believed the teachers were doing at his school whenever they received an evaluative visit. “Teachers … [they] know what and … when [principals are] coming … the kids know and [together they] play off … through the whole thing.” Victor verified with me his anonymity related to the interviews and then continued. “Everyone tells me I’m doing [well]. I’m trying to be not biased. I just think it’s a
stupid system. Why have [a staged act] in place ... It does nothing ... You can look at teachers, and you know the ones that come late.” He communicated feeling those teachers who were neglect in their duties should be dealt with. “[Administrations] should have the authority to fire somebody or ... call [violators] out.” Victor explained he felt the current teacher evaluation system was a system of box checks with an “exact numbering of [administrators] who walk into your classroom and come here for two seconds.” To the latter two words, he added exaggerated emphasis. “And [then they] tell you that you’re doing a good job,” Victor added. “What happens the other ninety-eight percent of the time? If I’m doing [a] horrible [job], you would never know ... Maybe it’s just me, but how about ... the end product? How are the kids doing?”

Midway through the year, Victor began to question the efforts of some of his colleagues. “One trend I [see] with other teachers is ... they’re dumbing [the curriculum] down to the point where ... it’s not even about the content. It’s ... related to the topic, but we’re not getting to the meat and potatoes.” He felt teachers “were just skimming the surface and doing [fun] activities.” He believed this was done by the teachers as they attempted to use the district’s science lesson plan format and just get through evaluations with a “dog and pony” show.” He said, “[These district lesson plans] I’m not trying ... I don’t know much about [them] besides the fact that we have to do some of them ... I feel like sometimes it’s more ... bells and whistles and not what [the students are] supposed to be learning.”

When it came down to assessing the students’ performance in his classes, Victor initially expressed a desire to maintain high academic standards. “I want to have my test average be ... seventy ... That might sound low, but I don’t want to skew any of the data.” Victor was quite adamant as he made this statement. His commitment to hold all students to high standards was made clear. “I am ... going to standardize how I teach everything ... Honors [will be] more
independent and a little more in depth [than Regular], but ... as far as the, the actual content on the test [it will be the same].” When Victor made this comment, I recalled how I expressed a similar belief when I first taught.

Before school started, Victor requested a mentor teacher be assigned to him. “I asked [for a mentor]. His request went without effect. He sounded dumbfounded as he indicated, “Nobody said anything about it.” He then being a bit persistent, inquired, “Do you guys have a mentor program?” Victor felt relieved when the head of the department indicated she could be his mentor. He said, “Great! She’s got forty-five years of [experience]! Awesome!” Later though, things changed. “This [veteran] was supposed to be my mentor, but I guess her certification lapsed.” She did not meet the district’s guidelines for mentors. “They assigned me to somebody else.” He was assigned a different mentor, a mentor that met the guidelines, but one that never contacted him. “I don’t even know who [the mentor is] ... I don’t even talk to whoever is my mentor.” I had trouble believing what he said and asked if the assigned mentor ever tried to open lines of communication. His response a succinct, “No.” No mentor or other school employee informed Victor about the school credit card for teachers, “I didn’t know that was something that was available to every department,” he said. But he did use the new district system for teacher reimbursement after he first covered the costs for some laboratory materials. Victor could not even tell me if his official mentor was based at his high school. His final words about the district mentor program hit me hard. “To call it a mentor program is a joke ... honestly, there's no point in having a program that, that's not working.”

Victor was clear on his relationship with the students, “I have my own kids. I love my kids. I don’t love these kids. I like them, and I want them to learn. That’s our relationship ... This is not a personal relationship.” However, some students did provide this novice science teacher
with a little supportive motivation. Victor indicated how the period he started each day with helped him maintain a more positive attitude. “My first period I would say ... they’re probably the most amazing class ... [Anybody could] teach it. It doesn’t matter what you’re teaching, for some reason that group, ... together is amazing.” He added, “A lot of the kids ... thank me ...

They enjoyed that I knew the content. Whenever they asked me a question, I think maybe I [got] stumped once or twice ... It was rewarding, knowing ... [the students] felt comfortable [asking] me anything about science ... They felt I was going to give them a valid answer.”

Victor also received support from three of his colleagues. Three science teachers in his department each provided him with assistance in different areas. Alice served a bit as an unofficial mentor and provided thoughts and feedback for the lessons she could observe. Another relatively new teacher, three years a veteran, gave her thoughts on what he might expect as a first-year science teacher. The final teacher, Tim, was Victor’s primary source of support. He provided emotional support and gave pedagogical advice. Victor appreciated his experience.

“He's been teaching sixteen years, and he really helped out with ... expectations ... telling me ... don’t worry about that. You just gotta do this ... [That helped me] release some stress [while I was working extra] ... trying to meet the standards.”

A serious situation occurred because of Victor’s work with the HHS after-school, grade-recovery tutoring where he was putting in extra effort to supplement his salary. Victor provided this example to show a lack of administrative support as evidenced through the silence from the administration as they investigated a student complaint. “[The principal] pulled me in the office. I didn’t ... know I was getting investigated ... They didn't explain ... I just sat down. I gave ... statements ... After this, ... I found out it's an investigation ... Nobody explicitly said that or explained it ... [The administrators] just came to me and said I was done.” Victor indicated he
did not understand what was going on. He was informed a student complaint about his actions was being investigated. A young male student participating in the grade recovery program did not appreciate Victor’s rules and had mumbled something inappropriate while he stormed out of the room. The student accused Victor of being overly physical with him as he attempted to leave. “I didn’t touch him … I walked outside [the room] I was trying to get him to … [calm] back down” Victor indicated he asked the boy to repeat what he had said and “[When] I … touched his bookbag. [The student] flipped out.” Victor indicated the administrators said they confirmed Victor’s story. “They zoomed in on the [monitoring] camera. They saw I never touched [the student], I just touched his book bag … [The student] pulled back and spun in the opposite direction … I wasn’t even aware [of any accusation].”

Victor realized the need for coping strategies to get through the year. “I used to work out a lot more, and I was lifting a lot more with [a different job].” He described how teaching with extra time requirements outside of the school day, interfered, saying “I [feel] overwhelmed every Sunday, I [worked on] plans over the week … [With] two little girls.” Victor expressed a dedication to spend time with his daughters. Through our interactions, Victor appeared to me as benefiting from his family interaction, but he was also a bit taxed from the responsibilities he self-imposed. He said, “It did help out to work out.” He also appeared to experiment in another hobby, “I invest in stocks.”

Victor also expressed a desire to avoid the drama that sometimes accompanies interacting with others. “I socialize with … individuals, but I … stick to myself.” He believed in keeping himself in check. He additionally felt, “self-discipline” was important, along with the need to remain “even keeled … You can’t get too hard [on yourself] and too low … You [are going to] have … battles.” He provided an example. “[Student behavior] depends on [the time of the year.]”
So, at Christmas break ... you know ... to ... expect ... a little more irrational [student behavior] than normal ... So, don't freak out that [students are] not acting like [I want them too]. It's not [me] ... [I] have to ... expect ... a little more irrational [student behavior] than normal.”

Once, Victor shared how he ignored a stressful situation, and it disappeared. One student’s mother was an Assistant Principal at a different James County High School. Through a series of emails, she appeared to be “telling” Victor “to [bump] ... up [her son’s grade], for no reason whatsoever.” Victor added, “I [had] given ... him weeks to turn in [assignments] ... [and it] shouldn't [have been] a lot of trouble. And now, [she is] telling me it's my fault [her son has an] 89.” Victor said he just ignored the emails and they just seemed to stop.

The previously mentioned student apathy brought out a negative coping mechanism, as Victor admitted not always preparing what would have been otherwise more demandingly planned lessons. “It’s impacted how I actually prepare ... sometimes ... [I wonder], ‘Is it worth being this creative? When [the students don’t] care ... anyways?’” When these feelings got to Victor, he worked not to internalize their apathy and assign the lack of effort to a high schooler’s lack of maturity. “[I] can think [the students are] trying to be cool, [I then try to] take it with a grain of salt.”

When I pushed Victor as to what preparations facilitated his resilience, what helped him hang on, he drew a telling comparison. “Oh, this has been a cake-walk to me. As tough as [teaching] is, I been through so much in my life ... This is a joke! I trained [as a] Navy Seal. I used to have a five-hundred-pound block on my head with five other individuals ... [for] three hours.” That comment hit me hard as I tried to compare my more difficult days with the Seal Training Victor described.
When Victor was contacted by a student’s parent—an assistant principal at a different school in the same county—he perceived her not only as a parent, but also as an administrator. He perceived her email for him to “fudge grades” for her son as request from an administrator. Not willing to take an assertive stance, he said, “[I] never responded.” He indicated just waiting “for a serious email” that never came.

Assertive behavior from Victor appeared limited. He did not follow other teachers’ acceptance of cell phone use in class. “[Look] how much we let these kids get away with, especially ... cell phones,” he said. Rather than overlook cell use, he backed his expectations with consequences. Victor stood on his rules forbidding cell use during lessons and exclaimed how he would not take part in “lowering the standard.”

Victor maintained the confidence he had in his own ability with Biology, but he was less sure how to share his knowledge and understandings with students who operated from a lower level of academic skill. “I'm confident [in] the material, knowing it … how [to] convey that to somebody that doesn't understand … [somebody] at a lower level … is something [I’m not confident with]. He thought students would have better reading skills. “I expected [students] to be have higher reading comprehension … [I am] not confident in the ability… [of the students] to understand.”

Disappointment seemed evident in Victor’s attitude toward what teaching science meant. He wished to prepare students for later success in life, but seemed to acknowledge that challenges such as dealing with student apathy, bureaucratic interference, and a lack of administrative support were getting in the way of realizing this reality. In our final interview, I asked if Victor had modified his expectations for his students, and he said, “Drastically! ... My expectation this year [was] that [students already] know how to read. I learned quickly that the
majority of them cannot read.” He elaborated on this. “When I [say students] cannot read, [I mean] they do not comprehend … [or] process more than one [bit of] information at [a time] … These kids, while they are processing information on Biology in text … their mind … doesn't … react … I have gradually brought my expectations [down] and [they are] still going down … I am … [now where] … I should have been at the beginning [of the year].” Victor finished with disappointment by saying, “[My expectations] were lowered drastically, and [I have to use] shorter words.”

Originally Victor believed all his students could perform at a higher level. However, by midway through the year his beliefs on what constituted success were changing. This could be seen as he addressed the mandated Biology assessments. “Whatever percent [pass] the EOC … I personally don’t care … I just [changed my thinking] … If they do really well on the EOC, that just says … they knew [what] … was on the EOC, [that specific] content … It doesn’t mean I taught all the content.” He believed how the mandated assessment was an imperfect snap shot of what students might need from his Biology class. “From what I’m seeing, based on the standards, [students going to college] … will be behind … [Professors] are going to ask the question, ‘Well, why didn’t you learn this?’ So, I teach the standards, but … go in depth on whatever I [believe is appropriate].” He gave an example. “The electronic transport chain. [Students] ask [me] about it. And, a lot of teachers say … ‘Just stay away from that’ … But, I made an activity … from scratch. [My classes] modeled the electronic transport chain physically … [using candy, and water, and paper balls] as hydrogen ions.” He said his students learned from this, but did not feel the EOC could assess the students’ understanding for the material he taught. In our final interview, Victor shared what he believed was a truer measure of his teaching Biology. “I'm not really basing success on [the EOC] … Kids did enjoy [my class]. We had …
good discussions this year. [The students commented], ‘You're a better science teacher’ ... And ... kids were switching to my class ... They felt I taught them.”

There were several words Victor recorded as a self-descriptive during the district’s induction training. He was “anxious” and “excited” as he entered the science teaching position in James County. He was “passionate” about his topic and believed he could serve as an effective “motivator” for all his students. He believed he remained “focused” during the year, and was “determined” to see his way through the challenges of his first-year teaching science.

Although Victor was asked to provide his thoughts on characteristics a new science teacher should possess, thoughts on his future began to show. Victor demonstrated an inner drive to achieve more with his life and to climb a career ladder. “I've always [been] goal-setting [for my] life.” He expressed feeling a teaching position may not allow him to advance. “[I feel] like there [is] no upward trajectory from this job.” Victor looked at his teaching job as so many males before him have done, as a temporary step toward something financially more lucrative (Lortie, 1975). “If I felt ... I could feel positive about [increasing my financial situation], that [teaching was] leading to somewhere else, [then it would be more attractive]. In our final interview, Victor continued to doubt the permanency of his science teaching career. “I already [invested in] my third house ... I'm going to drive Uber over the summer, I bought a brand-new car for that. Not brand new but ... I can make money.” Not wanting to put words in his mouth, I asked if he saw science teaching as a long-term career. His response was a straightforward and clear, “No.”
Shelia Bones - Splinter High School

Shelia was hired to teach Honors Biology and Biology at Splinter High School, a school demographically minority-majority. Shelia graduated with two bachelor’s degrees, Biology and Education. This 22-year-old woman was returning to her home county in Florida after receiving her education at a New York private Christian college. Although she considered obtaining a position teaching in New York, but “to actually be a qualified Biology teacher in the state of Florida is not that hard. Yeah. I just took the test and passed it.” Teaching at SHS was her first job and, Shelia was excited to come home and obtain a position within 30 minutes and in the same county in which she grew up. Although she had attended a well-respected county private school where her mother still teaches, Shelia was eager to learn, and said, “Now, I really want the public school experience.” Until this point, all Shelia’s education experiences had all been private. She felt her “ultimate goal would be to go back to [her alma mater] and teach.”

Shelia asked for Orange Grove High School in Swan City to be the site of our first interview. This James County school, where I work, was closer to where she lived with her parents than Splinter High. I was relocating into a new room, and being empty, it easily served the purpose for our first interview. I met Shelia, a relatively tall, academic/athletic woman sporting dark-rimmed glasses at the front doors to the school. From there I proceeded to take her through the campus, which was designed like the one in which she would soon be teaching. Our respective rooms were both on the second floor of building four.

Splinter High was built to fill the needs of a growing county. Its location between two county towns allows SHS to draw students from both directions, and lightens the load placed on other district schools. Four two-story buildings form a two-story square around a large open commons area; many schools in James County have been built on this design. Although open
stairways located at each corner connect the buildings, the doors to the individual buildings are kept strategically locked to prevent outsiders from wandering the campus. When I visited Shelia’s school for our future interviews, this strategic door locking forced me to backtrack and gain entry from someone on the inside.

Shelia appeared to have very specific ideas about how a classroom should appear. During every visit to her room, there were two things I noticed. First, she created a unique atmosphere. All around the room there were artsy decorations of various bones (figure 7). As a hobby, Shelia collected bones and used them in art. “In my spare time, I like walking in the woods, finding bones ...,” she said. “Like raccoon bones or something. I like to bleach them and clean them up. And now, they are in my classroom on display.” She also admitted to shopping for such items. “I like to go antique shopping specifically to find bones. I just have this weird thing with bones. So, I'd say that's my only related out-of-school ... science passion that I have.” She had many such displays around her classroom. “For my classroom, I try to make it look as welcome as I can. So, I think that'll be good.” Shelia was conscientious about students feeling as if they belonged.
“This is gonna be an environment that welcomes everybody ... I think my classroom is one of those that does.” The second thing I noticed was order. Everything appeared neatly ordered in her room, bones and all (figure 8).

Shelia felt comfortable with her assigned schedule. “I’m just doing Biology,” she said. I’m teaching two periods of regular Biology and four periods of Honor’s Biology ...

As a first-year teacher, I think it’s perfect.” She indicated additional preparations could serve to over-tax her. “I’m not over-loaded with planning. I don’t have four different classes ... Right now I’m extremely excited.” She also felt that with more experience, she could expand and teach what appeared to be the passion spread around the room. “In the future, I would love to teach Anatomy and Physiology, or AP Biology.”

Although Shelia always enjoyed natural science, her decision to teach science was not automatic. “At first, I was just a Biology major. I wasn’t ... sure. I knew I wanted to do something in science, but I wasn’t sure if I wanted to be a teacher. [Teaching was] in the back of my head.” It was not until her second year in college she acted to enter teaching science as a career. “My sophomore year of college I became an education major. [The college] made us ... double major in our specialty. I was already [in] Biology, so I just added on the Education.”

When Shelia attended college, she found herself mentally competing with her professors’ instruction and indicated how this made her look more seriously at teaching. “I think I really just want to be a teacher. Cause, like in the back of my head, even when professors would teach
something, I would think, ‘Oh if I was up there, this is how I would teach it.’” She felt teaching pulling at her. “Whenever me and my friends would study for a test. I’d be like, ‘If I was a teacher, I would ask this as a question. And, then it would be on the test.’ So … those things in my head lead me to decide to be a teacher.”

When Shelia spoke about her college education preparations, she explained the rigor. “We had … our normal classes … from freshman year, so freshman and sophomore classes, [which I had to catch up on],” she said. Our junior year, we had to do practicum, which [included] observation. So, once a week we would go in for five hours, into a nearby high school … [During] senior year I did student teaching for 14 weeks, at two different placements … middle school … [and] high school stuff. And, that was really difficult because I taught seventh grade life science, eighth grade physical science, tenth grade Biology, and tenth grade Biology lab.” I asked if this was all at one time or not. Shelia emphasized, “All in one day! The teachers there teach multiple subjects. That was extremely difficult for me to do because I’m a brand-new student teacher, and [I was] having to prep for four lessons every night. [I was] prepping for four lessons for the next day. Well, actually, I would do them ahead of time, but still, it was a lot of work.”

She shared how originally, she thought of pursuing middle school, but that the student teaching experience changed her mind. “I went in thinking: I am going to be a middle school teacher. I love middle schoolers. And I came out thinking, I am definitely going to be a high school teacher.” Shelia told of her experience with the middle school that had helped change her mind. “[My cooperating seventh-grade teacher] said that in the history of the time that he has been there, he has never had a class that bad. And so, so it was very, very bad. I went home many times crying … not knowing how to handle students. They were truly awful.” She
expressed the variety of things she would try, and that she would only realize limited success. “It was really difficult, like, learning how to control them. And, every day [my cooperating teacher] would stay afterwards and would try to give me … a new thing to try the next day … Some of the things worked … like the proximity control, like standing close to a kid’s desk … I was really bad at first at, like, arguing back with a student. Because I like to be right. And that was a real challenge … Middle schoolers, they, will just keep going.” Despite the challenges she faced, she felt the overall experience was valuable. “I really learned a lot from that placement, and now I am not afraid of a bad class because I’ve been through that. It prepared me so much. I am so thankful for that experience … even though it was so hard … I learned so much.”

Shelia expressed wanting her classes to benefit from the teaching experience she gained as a student-teacher. During her middle school “student teaching experience … I argued back with the students. I didn’t respect them as much, because they didn’t respect me. So, learning from that experience, I want to build, an atmosphere where we can all respect each other, and be kind to each other. [I want to better] handle situations, like that.”

When I inquired as to how she felt about teaching science, her eyes lit up, and she stated, “I feel like it’s an honor that I get to do it. I don’t know. It’s so special to me. It’s been a life-long dream to do something in science, and now I’m finally getting to do it. I’m extremely excited!” This excitement was something she wanted to share with her new students. “My motivation to pursue this position … I just find science so fun, and I want other kids to find it fun too.” Shelia wanted her students to experience the joy she had while in school. “[Making science fun is] how I felt my teacher was in high school, and I [want] to be the same.”

Shelia based how she wanted to teach on her favorite teacher from high school. “I had this one science teacher, Mr. Note. He is about 120 years old. He was actually 65 when I had
him. But he still teaches there. I had him for Latin ... for two years. And I had him for Marine Biology and for Anatomy and Physiology ... Everything about him makes you want to love science. He is so weird and quirky, but he just makes it sound so much fun.”

Shelia shared thoughts about what makes good teaching and what does not. “I think, for some of the teachers ... that I really loved, [they] didn’t have power points already prepared. And so, like Mr. [Note], he used an overhead projector, and he wrote the notes with us ... He would draw pictures, and he would make us draw the pictures ... something about the way he taught was just so interesting and fun. And, like, every single student loved him. So, I think that is why, for me, I don’t like to make power points. I like to stay away from that. And, I like to make guided notes with pictures on them.” The teachers that “made a negative impact on me were just the ones who sat at their desks to move the power point.” She explained how she wanted to be as a teacher. “I always thought, ‘Man, if I’m a teacher, I’m never going to do that. I’m never going to be boring and sit at my desk and read off the slide.”

Shelia felt up for the challenge of exciting her students. “I said to a parent at orientation, I was like, ‘Yeah, we’re gonna have fun this year.’ And the parent was like, ‘What do you mean by fun?’ ... ‘Hands on activities, groups that are talking ..., students who are doing the talking are doing the learning ..., [and me] not sitting in front of the class lecturing about something ... Getting the students involved, getting them to discuss something ... That’s what I constitute as fun.” She wanted to make “labs interesting and making labs connect to [the students’] lives.”

Shelia exclaimed how she also felt she would not be totally alone as a first-year teacher. She had picked up an informal friendly alliance at SHS. “I already feel like I have [a mentor in] Ms. [Ding], head of the Biology Department ... She’s like a motherly figure to me, and I feel like
I’m one of her children. And, she’s just teaching me so much.” She indicated an additional teacher next door also had indicated a willingness to assist her during the year.

Shelia shared goals she wanted to reach teaching science. “If kids want to go into nursing or something … I wanna make it important to them … [I want my students to] learn from here and take it to … next year’s class and take it to college, and use it as a foundation for what [they are] going to learn … even learning, like, how to write a lab report, [and not] just science. [Writing labs] helps the kids learn how to write in the correct way … Certain skills that you learn, that you need for college … Though I know not all the kids are gonna go to college, I still want to give ‘em that, foundation.” When it came to Biology, she wanted to share the wonderful feelings the study of life gave to her. “[I want to give] the kids my passion for Biology … I love it so much, I want them to love it. And, I know there’s gonna be some kids [that] hate science … If I can just make them have a little bit of fun.” She was looking forward to showing all students the things that excited her about Biology.

Shelia was not content with only sharing her joy of Biology; she explained how she also wanted to raise the performance of her students on their mandated assessments. “I definitely did set a goal for myself a few weeks into school … I would like at least 50% or 60% passing grade on my kids’ EOC tests.” She had found out what the other teachers’ classes scored and based her expectations on that. “[I look at [other teachers’] different teaching styles, and I know that I teach more like Ms. [Ding].” This comparison was used by Shelia to hypothesize about her students’ scores. “[I know that my kids’ test scores when they take my tests. So, I feel like I will get 50 to 60% passing grade on the EOC.”

I then asked why she felt it was important for her students to learn science. “I feel like there’s science in everything. Like, you walk outside and you’re in nature, you’re in science. I
feel [it is important to be] aware of our surroundings.” She wanted her students to be able to call upon their knowledge. “If you go outside, and you can identify that tree, like, ‘Hey! That’s a, oak tree! …’ I feel like that is so much more special that just sayin’ … ‘There’s different kinds of trees outside …’ It makes it so much special when you can go outside and know what you’re looking at. Or, maybe … if you get sick and the lymph node on the back of your neck is swollen. And you’re like, ‘Hmm? I probably have an infection …’ little things like that.”

She also expressed a desire to demonstrate” interest in her students. “[I want to show an interest] in what they’re interested in …,” she said. “Some kids … play Pokémon. I don’t know anything about Pokémon, and I don’t care about it, but I’ll probably ask them, ‘How many points did you get on ‘Pokémon Go’? … to build some sort of rapport with the students … If they care about it, I’m gonna try.” She wanted to be a teacher interested “in their lives. So, just one person … interested in them I think can make a huge difference.”

As for expectations from her new job, Shelia aimed to not expect too much. “I’ve learned through life not to have high expectations, because people will let you down.” She attempted to laugh this off, and then explained, “It’s not like they mean to, it’s just, it happens. So, I’m trying to go in with, medium expectations, not super high, not super low. Just because I don’t want my feelings to get hurt.” Her thoughts continued to come out. “I’m excited but at the same time, I’m nervous ‘cause during student teaching it’s so easy. Your teacher is right there, and you can just ask them a question right then and there … not be embarrassed to ask too many questions. Now, I have to go across the hall to the other teachers’ rooms and ask them questions … I don’t want to overload them with questions. They have to teach too. It’s a whole different experience. But, I am glad to take all the experiences that I’ve had and … make it my own philosophy.”
When I asked her what she thought her greatest challenge might be for the year, her answer reflected a common concern for new teachers. “Classroom disciple,” she said. “I think just because, I don’t know, like, I am … a fun person, and I don’t like to disciple kids, like, I don’t like to send them to the office … I think it can create problems in the classroom. So just knowing when is the appropriate time to send a kid to the office if I have to.” Another area she felt would be challenging included teaching students with limited English proficiency. “I’m a lot nervous about [having] so many kids that are non-English speaking. English is not their first language.” She could even provide an example. “At orientation, I had a girl … just moved from Mexico, and she barely knows English … I’m nervous … I barely speak Spanish … I’m worried about that.”

With the challenges on her mind, Shelia looked forward to learning new skills. She described as “a huge goal” learning the district’s “lesson format and try to write a couple of those.” As James County Schools have struggled with low mandated assessment scores, efforts were underway at the administrative level to improve learning. Shelia continued, “Because when we were with [the district science coordinator] and she showed us that, I was, like, ‘Wow! This is incredible! I want to do that.’” At second thought, she shared a concern about thinking it might be too difficult. “This is impossible! This is so detailed.” She then spoke about offered support that made her feel good. “The other Biology teachers in my Department [indicated], ‘Let’s work together as a team. We’re gonna figure this out together. [The two district science coordinators] are more than … willing to come and help us … They’re making it very possible for us to do.’” She continued, “I want to learn how to write [those] lessons. And, actually do it and implement it and have it work.”
During the year, our conversations continued, and one challenge Shelia addressed was that of improving for the following year. “[I want to] take away everything I can from this first year of teaching. Right now, I’m like a sponge, absorbing ... so much information ... [I am keeping notes] changes for next year. So, little tiny goals that I think could just make me a better teacher in the future. I just want to learn from any mistakes ... or learn from anything good that happens this year. So, anything I can do to ... make me a better teacher in the future.” She related this to the high school teacher whom she admired so much. “I always remember Mr. Note in high school, he said, ‘I would find it embarrassing if a student asked me a question that I can’t answer it.’ He says he would be embarrassed ... I right now, I can’t answer all the questions they ask ‘cuz I’m still am learning.” Even with her first-year insecurities, Shelia expressed confidence. “My hope is that I can be set apart from those other teachers. Like, wow! Miss [Bones] really knows her Biology! Because I majored in it, you know.”

At midway through the year and looking a bit exhausted after a long day, Shelia described a change to her goals for the year. This change included an adjustment toward what she expected to accomplish with this first-year teaching. “[I just want to make it ... through this year so that I can no longer be a first-year teacher. And so, that I can go through, and when I teach it next year I’m like, ‘Okay yes, this worked, this did not.’ So, I guess goals for the rest of this year ... I just want to finish this year strong. I don’t want to burn out or anything.”

Shelia appeared comfortable in her room setting when I entered for the observation and for the second interview. “I’m doing great! I am enjoying this year a lot. Um, not as stressed as I was at the beginning.” She added, “Still stressed, but not as stressed ... I don’t feel like a first-year teacher anymore.” She continued discussing her adjustment to the job. “I think it took me like two months to really just get settled in here, [get to] know where everything is, and just feel
absolutely comfortable, [and be] myself.” She then explained, “I came in here thinking ‘I have to be confident. I cannot let these students run over me. I have to do everything perfectly’ And then, I realized I can’t do everything perfectly ... I have to sort of just go with the flow. And so I think once I learned that, it was so much easier transition into this. It’s very fun, very exciting.”

She spoke about her relationships with the students. “I feel like as the year goes on, I’m lightening up. On purpose. You know how everybody says you don’t smile until Thanksgiving Break.” Shelia felt as if she had initiated an appropriate relationship with her students. “[That] was my plan from the beginning. So, I’m glad that it worked out.”

Shelia then told me of a major challenge she inherited after the first nine weeks. Her classed were reassigned so that she could pick up the Advance Placement Biology and the Advance Placement environmental science. “I talked to ... the principal, and she said it’s because the past four years or so they haven’t really had a steady teacher teaching those courses. And those teachers would leave halfway throughout the year. So, she told me ... ‘You can build this program here.’ And so, now I’m really excited, because I definitely want to stay for the next like, at least five years.” She again expressed her confidence. “Because I can build those programs and make them really good ... I’m going to make this so much better next year.” She believed it was early for her. “I just am finding out how to teach it ...” she said. “Hopefully next year I’ll have bigger numbers because I’m trying to like recruit students.”

Another challenge did take root in the middle of the year. This was a challenge over which earlier she had expressed some concern. “My first period class, I have ... four Haitian students two are brother and [sisters] ... The brother speaks English a lot better than the sister. And then two other girls that came in halfway through the semester. So, that was difficult
because they’re coming in in the middle of a semester ... I’m having to catch them up, and ... I can’t communicate with them.”

When the administration decided to rearrange student schedules, Shelia was provided with a new concern. “I know that my seventh period class is my hardest, because they are my lowest learners. [They don’t operate at the same] level that the rest of my students ... It’s very hard classroom-management wise ... I didn’t have them at the beginning of the year either. I originally had seventh period Honors, and that was my class of five students.” She was excited about the potential in such a small class, “but then the third of fourth week of school administration decided to merge that class with a different honors class, and give me, like, all the overflow kids. [I got] kids that weren’t in Biology at all for the first three weeks of school ... They were three weeks behind. So, I had to catch them up. And then they didn’t get my whole like, very strict, first week of school Miss Bones. And, I think because of that ... they’re very bad behavior wise.” Shelia admitted having to enlist support with this class. “I’ve definitely gone home and [I’ve called] my mom, because she’s a teacher and she’s like, ‘You know what you should try with them?’ ... Or I’ll call the volleyball coach, and she’s like, ‘you know what you should try with them? You should try putting them in teams ...’ I’m definitely going to start doing that soon. Seventh period has been a huge challenge, just taming them ... They’ll just get up and walk around, or like they’ll shout across the room, or I’m in the middle of teaching something and they’re just like all talking. And phones are a huge issue.”

She was not without tricks of the trade when dealing with the discipline of this class. “So, I have come up with a system for them. Since it is seventh period and it’s a longer period, I ... write the word phone on the board. And each letter represents a minute at the end of class that they can be on their phone. So, like, if I see someone’s phone and I take it away, then I erase a
letter and that’s one less minute … That worked really well for a long time, and then now they’re not on their phone as much anymore. But yeah, that class is hard.”

I wanted to learn about Shelia’s systems of school-based support; she provided, “Mrs. [Ding] who’s the other Biology teacher. She’s been here for 21 years … One when I came in, any question I had she answered it. Any work, [she provided it].” Mrs. Ding] offered to let Shelia look through her filing cabinets. She said, “Whatever you want, whatever is mine is yours.’ … I really like her a lot. And she’s talking about retiring next year … I would really like her to be here another year. Just for me to … get my feet on the ground … I never had an official mentor, they used to do that … but then they stopped … I feel like Miss [Ding] … here at Splinter High, she’s been my mentor … without her … I would not be where I am … emotional support and support with science, and helping me [with] labs … worksheets. Then also, a woman named [Alice] who teaches AP Bio at [History] High School, I go and meet with her every month and she helps me with AP Bio … there’s usually me, her, and another woman. I mean, it’s not like super popular but … I really enjoy going, because she’s just like 35 years of knowledge.”

She had some positive comments on the administration as well. “I feel like we don’t really, I don’t get too much flak from them. I know, like, [the assistant principal], he’s really nice, so when he heard about [a confrontation with the district science coordinator] he came to me and talked to me. He was like, “You know … you’re a great teacher. You keep doing you, because what you’re doing is just fine.’ And, so, to me that’s support.” Initially, the head principal had not been as open to Shelia’s desire to veer from the district’s science plan format, but, as Shelia stood her ground, the principal relented as well. “[The principal and I] have had a couple of awkward interactions … but I like [the principal]. I think she’s fine.”
In an earlier interview, Shelia had mentioned another teacher who was going to help with AP environmental science. I asked how that worked out. “We had a conversation ... He shared his Google drive with me. I looked through it, but a lot of the stuff I was just kind of like, Eehhh,’ I wasn’t really [wanting to do what I saw with my students] ... The entire year I ... was ... on my toes with that class all the time. Never really totally sure of myself. Because, I don’t really know environmental science all that well ... I would always prepare the lesson the night before.” She explained how the low number of students in that class helped her survive. “It was good ... I only had ... eight students, I never really had a kid question my abilities to do environmental science. I’m very good at faking I know everything ... but I don’t ... I think ‘fake it till you make it’ is ... a very real term because that’s what I did for ... the entire year.”

When we discussed how she previously handled difficult times, she shared, “Every little thing bothered me here and there ... [things] would fester inside ... I would get so upset.” The teacher Shelia claimed as an informal mentor (professional friendly alliance), Ms. Ding, had offered her some advice for coping with situations beyond her control. Shelia shared this advice, “‘Be flexible’ ... I came in here with a plan, and I was gonna stick to my plan ... The third week of school I got a whole new seventh period class ... The second quarter of the school year, I got rid of my fourth and fifth periods so that I could take on the AP classes ... This year has constantly been juggling random stuff and just learning how to be flexible and go with the flow ... I was getting so frustrated at the beginning of the year, and [Ms Ding] said, ‘Just be like a palm tree and sway in the wind, sway back and forth ... go with the wind. Go with the flow. Just calm down ... Nothing is ever going to go perfectly as you planned it ... Face the facts, and get over it.’ Ever since she said that, I [concentrated on going] with the flow. So, that was my hardest thing at the beginning of the year. Getting through it. And then once I got through that,
then I felt fine.” Shelia finished with, “[Now] I enjoy my life. And I was like you know what [Shelia]? You are not going to let little things affect you anymore. And I said that to myself, and I stuck to it and it has made my life so much better” Shelia, without boasting, expressed pride in getting the opportunity to teach AP classes and hoped her Cooperating Teachers were proud as well. “[I would hope that they would be proud of me. I feel like it’s a pretty big deal to teach AP. I mean ... I feel like it’s a pretty big accomplishment, a first-year teacher teaching AP.”

Shelia smiled as she told about the positive aspects of her first-year teaching science.

“When kids finally get it, and the light bulb comes on and they go, ‘Ohhhh,’ It makes me ... smile.” As an example, she described the teaching that occurred because of her constant efforts to have students keep good notebooks. “For instance, I have notebook checks every quarter ... I make my kids keep [organized] notebooks ... they can refer back to their notes to study ... One kid ... said, ‘Miss Bones, I don’t know why I didn’t listen to you all year long ... I have absolutely nothing to study for my test ... I don’t keep a notebook like you kept telling me to do ... I’m sorry, Miss Bones. I should have listened to you all along.’” She had mixed feelings though, not wanting the student to fail, yet pleased that learning had occurred. “[That is] satisfying to me, because I know I was right, but at the same time, it’s like, that kid finally learned.” Through her eyes, Shelia was seeing her efforts as important with more than science. “[And it’s not just in Biology. [Students] need to be somewhat organized. [They] can’t just be mindless about everything in life ... How are you going to ... get a job and earn money? [They] can’t just blow all [their] money. [They] have to be organized with how they’re going to live their life ... It’s so much a bigger picture than just a notebook check. It’s teaching ... what you have to do in order to succeed.” Along with this addition to how Shelia felt about teaching science, she still wanted share to her love for the subject with her students. A serendipitous event gave her an idea. “The
other day in AP Biology lab, I had [an extra] hour at the end of the day [with the students]. [I told the students we will] go outside and get pond water, and I’ll show [them] how to make a wet mount. And, we’ll put it under a microscope and look at it. And, they found so many cool microorganisms.” Her students were excited and surprised about what they had found. “They had no clue that you could look at pond water under a microscope and see things.” Shelia was surprised at their amazement. “‘You didn’t know that?’” she’d said. And they were so excited and, like, taking pictures through the microscope. And, one girl said, ‘this is the most fun I’ve ever had in science, ever!’ And, I thought to myself, ‘This is a lab that I just threw together ... before you guys walked into my classroom, and it’s the most fun [they have] ever had in science.’” Shelia was at a loss for words to describe how this made her feel.

Shelia explained a valuable lesson obtained during her student teaching preparations. “I went to my high school placement thinking, I am not going to argue with the students any more. I am going to ... calm myself down. If a student makes me angry, I am just going to take a second and breathe, and think ... about [what] to say to this student ... Going into my second student teaching experience, [was] so much easier, because I already knew what to do.” She added to this, explaining how her busy student teaching helped prepare her for an unexpected change during her first year. “I am super glad [student teaching was so demanding],” she said. “Because, now I teach two different AP classes along with regular bio and honors bio.” She shared a coping method for this: “I technically have four preps, but I treat honors and regular bio pretty similar. So, I basically just have 3 preps.” She added how her involvement in coaching added to the stress. The added stress of Shelia’s coaching volleyball was high during the season, and ebbed slightly in the offseason. “At the beginning of the year, I [helped coach]
volleyball, and so that took up all my time. And then, right after volleyball ended is when I [was assigned] AP environmental and the AP bio, because [Phil Osopher] left.

Shelia explained how a loss of support from the English as a Second Language Department midway through the year impacted the stress she felt. “I kind of feel bad ... I’m not very good at communicating with them ... I just kind of use the brother and sister to translate for me. But, I feel ... there’s only so much I can do ... I haven’t been taught how to teach English as a second language. I’m just not very good at it.” This beginning teacher was not giving up hope, “I’m slowly getting the hang of it.”

After picking up the two AP classes, a loss of weekend time was a struggle for Shelia. “I normally don’t do anything fun on Sundays. Because ... I work all day for AP Environmental. I will plan that lesson the night before. Which, I hate doing ... but I do it ... I do it every single time ... I don’t like that class, because I don’t put in enough thought and enough planning.” Shelia admitted letting a lack of knowledge in environmental science and the impact on her personal time impact her attitude toward this class.

Throughout our interviews, Shelia expressed strong feelings about her abilities to teach and her mastery of the content. When the district science administrators attempted to direct her teaching, this conflict caused her discomfort. She felt it was not fair to receive remediation based on her predecessors’ performance, and the district level interference was not appreciated. “Last year ... Biology ... test scores were so low that this year ... it almost feels like we’re being punished. [A district science coach comes] every single week and sits down, and she ... takes up our planning period, and ... talks us through how are we going to teach the next lesson ... To me, it’s a waste of time ... I’m not going to teach her ... lesson anyways.” Shelia indicated other teachers felt the same. “[All the Biology teachers are] in agreement that we don’t particularly
enjoy her visits.” Shelia explained discussing her differing thoughts with the district coach, and admitted, “We’re like five weeks behind, according to [the district] learning maps. There are four or five weeks to review at the end of the year, and ... I said, ‘I don’t need four weeks to review material. That’s way too much time. Because if I teach it right the first time, I’m not going to have to go back and teach it again. Yes, I can spend a week reviewing. I’m fine with that, but I don’t need a month.’... If you teach it right the first time, they’re going to remember it.” With a degree of assertiveness, Shelia approached being challenged about her teaching. “It’s been ... a struggle for a very long time. I think [the district science coach has] definitely laid off since ... We had a conversation ... it was very awkward. But, I just told her ... ‘I know that you’re trying to help, and I know that you’re doing your job, but I got this. And, I’m very confident ...’ I promised her my kids will do good on the EOC exam ... I’m confident in the way that I’m teaching them ... I don’t think she really liked it.”

When Shelia revisited losing communications with the English as a Second Language department, she shared how it helped her reconsider actual student needs over their assumed needs. “During ... stressful times ... I would forget to give [a student labeled for special accommodations] support, or forget to translate something into Spanish, like a handout of something. And then, I realized she could do it on her own.” This, Shelia discussed during multiple interviews. “I know that a couple of [the classified English Learners] can speak English fluently, but they try to pretend with me that they can’t ... I haven’t really addressed [this] with them.” She further explained how this was an area in which she felt, as a new teacher, a bit awkward. “I still don’t feel super comfortable with [the English Learners] ... I don’t want to go up to [the student] and be like, 'I know you can speak English, so just speak it.' That’s how I want to be in my head.” Shelia admitted questioning her own thoughts as she continued, “Maybe
she’s not that good at English.” But, Shelia continued by providing evidence for the feeling she had. “All the other kids are like, ‘Miss, she knows how to speak English. I’ve heard her talk English all the time.’”

Shelia’s desire to have continued support was obvious, “I feel like at the beginning ... I got a lot of support with the Haitian immigrants, but now I don’t know ... We lost communication ... I feel kind of bad. And, the four kids in my first period class, I felt like they felt defeated too. I think ... they just lost the drive to put the effort in, because [the loss of support part way through the year was] unfortunate. [These students] have to work extra hard. But I think they gave up on themselves. I still ... help them out, and I still want them to succeed, but um.” She quieted with what appeared to me as regret, as her thoughts began searching her mind for an explanation, “I don't know. They just they’ve lost all ....” Shelia trailed off.

When Shelia shared experiences she felt were the most difficult for the year, and their impact on her, a concern for students in her regular Biology became evident. “I don’t think that [the regular Biology students] ever learned ... to try hard ... to be intrinsically motivated.” Her concerns for these students went into their free time and home life. She wanted them to “go home and read the chapters, go home and do the homework.” She expressed frustration, “They don’t do anything outside of the class. So, that class, for me, is a little bit of a struggle ... I don’t enjoy the students.” Shelia expressed an internal conflict as those words left her mouth, and she immediately followed with, “That kind of sounds mean, but I don’t enjoy, they’re not very fun, they’re ... boring, and it’s very hard to motivate them.” As she expressed those thoughts, I couldn’t help but recall how excited she was at the beginning of the year to share her love of Biology with her students. Her thoughts also seemed to follow a similar direction. “I’ve been used to [higher expectations] my entire life, and then getting here, and like, ‘Wow! These kids
they don’t know anything.’ … they don’t know that a snake has a backbone, and they think that a
butterfly does have a backbone. And, it just to me it blows my mind, how little these kids know.”
Shelia shared some of her questions that echoed this frustration. “I asked [the students] ‘Do you
kids not watch the Discovery Channel? Do you not go outside and look at nature and use
common sense?’” As she continued expressing her heart wrenching disappointment, she saw a
link with the students’ homes. “I really think [with] cell phones nowadays … kids [put] their
faces in their phones, [and with] social media, that they could absolutely care less about the
world around them … Yes, I’ve seen it in my honors classes too, but it’s really just my regular
Biology kids. And to me, I just want to shake them and be like, ‘Who raised you? How do you not
know … something?’” She did not place all the blame on her students, “It’s not their fault. It’s
just they don’t know.”

Shelia was able to draw a contrast between her regular Biology students and those in her
Advanced Placement Biology. As she spoke … her eyes seemed to reflect the excitement which
she demonstrated at the beginning of the year. “My AP Biology class, all-time favorite class.
Love the kids in there. There’s 14 of them … they all have, like, big personalities, and I can
totally be myself.” This comment again made me recall how much she loved Biology. “[With
these students] I love to tell stories, and draw pictures, and just be goofy, and then they feed off
of that. And, they’re goofy back! … They remember it … when it comes time for the quiz.” Shelia
smiled with pride as she stated, “They’re like, ‘I remember that because you told that story.’”

Interactions with her veteran, professional friendly alliance at the SHS delighted Shelia.
“We joke around and I call her Mama [D] like, Mama [Ding] … She’s … the mother of the
science department. I feel like she just took me right under her wing … our personalities ...
meshed really well together.” Although she felt unfamiliar with other departments, she addressed
the culture of the science department and felt it was similar with others. “So, us science teachers we’re all weird, and we are ... science nerds ... weird and funny ... we get along together ... The math teachers ... hang out with each other, and then the English teachers [as well] ... you can just see little personalities in each subject.” Then, she got a bit excited as she exclaimed, “Recently we’ve been doing something called the thunder games, like staff versus students. We just had a volleyball game last week! ... Unfortunately, the seniors beat our teachers’ team.” She smiled as she added thoughts of revenge: “It was very heartbreaking, but ... we are ... a staff versus students softball game [next]. So, it’s fun ... a lot of the same teachers ... I’ve gotten to know a bunch of other people and ... I feel like it’s brought a lot of us staff together.”

When I asked about any confrontations Shelia had during the year, she forced a little smile and commented, “I could tell stories all day.” I then asked if she would provide me with one that stuck out to her. “Okay. Um I had a student that skipped my class for literally half of the school year. And, I just figured he wasn’t coming back ... I would catch him skipping class every ... and I’d write him up ... I emailed the administration a couple of times [asking if he was] still coming to school ... He’s still on my roster?” After being informed he was, “I contacted his mom [who indicated], ‘Yes, we know about this. This is an issue we’re trying to work out, at home.’ I ... just left it at that.” That was much earlier in the school year. Then, toward the end of the year, “he started coming back to class ... I was like, ‘Are you here for good or are you just here for today?’” The student said he was there for good. Then Shelia got a communication from home. “His mother [indicated] he wants to do grade recovery for the two quarters of school that he missed, and [I informed the boy], ‘You are not doing grade recovery in my classroom ... I give you a chance all quarter long to make up your work ... anything that's late you can still make it up [during the quarter]. I hate putting zeros in the grade book. But grade recovery? [Not
once the] quarter is finished, there’s no going back.’” The communications with the boy’s mom continued. “The mother emailed me, and I emailed her back.” Shelia reminded the mother, “He chose to skip my class.” Then Shelia found the mother become confrontational. “She found my email very rude … she was … offended by it … She wanted to meet with me.” Shelia was unnerved by this and responded, “If we meet together, I would like to meet with … his counselor … The entire time was her telling me that I was rude, and insincere, and inconsiderate, and that she had to come talk to me because her son is too afraid of me. And, it turned into a meeting … about why everything was my fault.” Shelia appeared dumbfounded and indicated the counselor “did not say a word. She just sat there. She didn’t help me out at all.” She added how “an administrator [was supposed to be] in the meeting with us, but she never showed up.” Not only did the lack of support confound this new science teacher, it was clear how the lack of support had taken her by surprise. “Before the mother came, I talked to the counselor, and the counselor was like, ‘I’m totally on your side Shelia. You stick to your guns.’ And then, in the meeting, when the mother got there, the counselor kept her mouth shut and said nothing … I felt totally alone and stranded. But, I did stick to my guns, and I told the mother there was absolutely no way I was going to let him do this.” Shelia believed to do elsewise was “just not fair.”

Shelia believed the young man described above had to repeat the class. “He just had to take the course over again.” However, she did express a concern this might not happen. “I hope so, unless [the mother] gets more people involved, because I would not be surprised if our principal waved it on.” Shelia finished with why she felt this might occur. “[I hear] stories from other teachers that our principal has let that happen … It’s all about [mandated] test scores … almost like nothing else matters.”
When I asked about what Shelia would like to see changed for next year, she quickly responded with what looked like concerns about her own consistency. “Discipline ... I say something, I am gonna follow through with it.” She did clarify how, by this, she wanted to make sure the school was consistent, “The school as a whole, [discipline] just doesn’t happen.” She also wanted to reap benefits from her first year. “I [want to look] back next year when we’re on certain topics and [realize] ... this did not work. I need to do it a different way.” I could sense excitement emanating from her to apply what she had learned during the year. “Even though next year I’m going to be a second-year teacher, I still feel like I almost have to work just as hard ... I can’t just rely on everything I did this year ... because a lot of the stuff just flopped ... Next year, I want to be a better teacher overall.” Shelia again expressed her competitiveness, “It bothers me if everything [was the same] ... I’m a perfectionist.”

Shelia’s expectations for student success on the mandated assessments changed during the year, and she added thoughts about what a science teacher should do for her students. Originally along with specifics of how well she wanted them to perform, she expressed, “I really want to give students the opportunity to approach the EOC exam and not be scared. Like, I want to prepare them enough, like, they can go in and take it, and give them, like, test taking strategies, so that, they’re not, like, I don’t know how to read this question.” This changed noticeably as Shelia later explained, “The students ... are just not good test takers at all, and ... throwing this huge test at them with like [a difficult degree of] reading [makes them feel] defeated the second that they walk in the door ... The test is not it’s not Biology, it’s just a standardized test. If you are an excellent standardized test taker and you know how to beat the test ... you don’t even need to know Biology ... A good reader ... can pick out key words ... and figure out what the answer is ... [Students] can beat a test without knowing the subject. I think,
and to me, that’s not evaluating how well they know Biology … I know my students know Biology. But they don’t know [mandated] standardized tests.”

Another change for Shelia came about in her design for the future. Originally, she wanted “the public school experience” and had expressed a desire to “go back [to the private school she graduated from] and teach.” When we met for our final interview, and I asked how she was doing, Shelia responded enthusiastically, “I’m great! [12 more days … I definitely feel like I want to stay here at [Splinter] for at least, like, five years … Maybe this is where I stay … maybe I’m called to be here … I really do enjoy it … Overall, I feel really good here. So, as far as [Splinter] goes, that’s my plan … I’m already, like, writing down … things here and there … for next year.”

While Shelia began the year wanting to learn and use the district’s lesson format, as time progressed, her enthusiasm for the district’s format and being told how to teach wore thin. She even felt pushed to the point of having to take a stand for what she felt was best for her students. “I definitely learned what how I’m supposed to teach … and to be honest, I hate the thought of [the district] lessons. I think any good teacher does [the same] without even thinking about it … I hate the way that the county is trying to make us teach … I don’t want to read a script to my students … I’m a good teacher … I don’t need … this … that’s what I went to college for.” She felt good about standing up for herself earlier. “So, I did get a little bit of trouble with that lady from the county, because I don’t teach her [district] lessons … I believe there’s … different ways of teaching science. If you’re a good teacher, you’re going to do it … anyways.” In our final interview, Shelia was pleased that the district coach had not returned. “I haven’t seen her again … My hope is that she realized I didn’t need for my hand to be held, and I think she just wanted to help out too much.” I asked to clarify that district coach just stopped coming, and Shelia
responded, “Yeah, she just quit coming ... We haven’t collaborated ... in months ... It’s been nice to have actually have a planning period. Where before I spent, like, every single planning period in meetings [with the district coach]. So, it’s been good. At the beginning of the year, I did not feel free at all ... then once she left ... I [could] finally teach how I want to teach ... I’ve had so much more [freedom] this second half of the school year than I did the first half. Whenever an administrator walks in here I always know that I’m okay. I know that they’re never gonna be upset with what they see ... I still know what I can do and what I can’t do. But, no one really bothers me anymore.”

A major change in Shelia’s thoughts involved a priority on what she felt was needed for her students. She originally wanted the kids to love science as she did. “I want my kids to leave enjoying Biology ... I know there’s a science nerd deep down inside [each student],” she’d said. She admitted mixed success with that goal. “I think a lot of them have developed that love for science ... I’m still working on a few of them.” Overall though, she felt good about her success with this. “I think it’s worked for a lot of them. I don’t know.” Instead of developing a love for science, Shelia felt the students needed a positive and caring role model. Shelia now described her changing thoughts about what it meant to be a successful science teacher. “I feel like I’m constantly having to set an example for the kids ... I want to save every child, and even though I can’t do that I still want to ... I think that’s ... my mission ... these kids need somebody in their life. [Somebody] that is living a steady life.” She explained how her role related to that of a parent. “I like to hold my students responsible. I like to push them very hard. Because I know that they can do it. and I would hate to let them ... breeze on by. So, Miss [Bone’s] Biology class is also Miss [Bone’s] life lessons slash Biology class ... if I can share a little bit of life knowledge with them I think it will help. and then what I think it means to teach Biology, I think
is just giving kids a passion outside of this artificial world that the phones have ... I think that’s kind of my mission in Biology.”

Two weeks before classes began, the James County new teacher induction, Teacher Induction Program Seminar (TIPS), provided to Shelia had included a 3-day mandatory seminar. I asked Shelia what she thought about the value of this training. “I thought it was a waste of time ... We’re all adults. I hate [not being treated] as adults ... The TIPS training ... could be really good but I think in [James] County, maybe, maybe not.”

Although she remained proud regarding her college training, Shelia admitted learning a great deal and growing in confidence through the year’s experience teaching. “I feel so much smarter in Biology now. [Compared with college] I’ve been looking at such fine and intense details, like memorizing the Krebs cycle, that you forget what the overall purpose of the Krebs cycle is. So, I think teaching high school Biology [helped me] see the big picture ... I’m finally fitting all the puzzle pieces.”

Shelia’s preparations had provided her with confidence, and by the end of the year she valued her college Biology preparations even more. She emphatically claimed, “I definitely feel like a new Biology teacher needs to know Biology.” However, she still expressed a degree of discomfort having to teach AP Biology. “One side of me, I feel really confident, thinking ... I got this, and another part of me [worries] if these kids knew how bad this is, it could be so much better.” She hadn’t felt there was time to teach the many AP laboratory lessons, and lacked in confidence to try them. “I just don’t understand them ... I’m afraid to go into lab ... I’m not going to know how to tell them what to do.”

Shelia provided a thought that summed her feelings about teaching after half of the year. “Here I am challenged every single day and I like the challenge. Like it’s fun to me. To figure
out different ways to tackle something you know. So, it’s fine, I enjoy it. I definitely don’t love …

Shelia was not acting Pollyanna about the year. She admitted there were problems, but she felt those were problems could be overcome. Such was demonstrated when she spoke about an apparent administrative overlooked training, emergency lock-down procedures.

“We have not done a lockdown this year, which I think is a requirement … [what we did] lasted for about 30 seconds. It was very strange … [Then] we ended up having a meeting with our deputy on campus. And, she told us ... how things should go.” Although Shelia did not receive required safety training, she felt it was not a problem. “If was a real-life situation, like a lockdown, I think I could handle it. But, I know for a while there, I was like, ‘I have no clue what to do at all.’ But, I think now it’s [better].”

When I asked Shelia if she found teaching science rewarding, her response was provided with a broad smile. “Yes ... I’m even more of a science nerd now than I was last year. So, yeah.”

When asked about her plans for the following year, “I know that I’m doing AP Biology. I think I am getting rid of the AP environmental. There’s another teacher here who wants to teach it, and I thought, oh, this is way too much on my plate this year. So, I was like, 'yes please take it' and because AP Environmental is not my passion. I wasn’t sad giving it up. [I still should have] honors and regular Biology, but then there’s also the new ninth grade environmental science.”

When asked to sum up the first years’ experience her eyes lit up, and her face took on a smile as she responded. “Awesome! Stressful! (extended pause) I felt like I became an adult this year. I’ve always been the student, but now it’s ... fun ... I get to be in charge now, and make the rules, and be creative on my own terms.” When she said this, I quickly remembered to her experience with the district coach. “I just felt like I grew up this year ... the most stressful year of my entire life ... but it was a very fun year.” Shelia’s description of her first year teaching high
school science delivered her feelings of success. “I feel very proud of myself … but I’m just proud that I did it, I was able to get through it … I don’t feel like I’m ever gonna quit teaching.” She added emphasis: “I feel like this is definitely my career. This is what I want to do for the rest of my life.”

When I asked Shelia to discuss how she felt about her systems of support, she said, “I feel comfortable. I feel really good at [Splinter]. I came in and I was very nervous, because I’ve never been in a public school … I was always in private school … I was really worried at first, but now I’m, like, ‘These [teachers] are great. They really do care!’”

Phil Osopher - Splinter High School

This participant, Phil Osopher, left his position teaching science after the first quarter, nine weeks. Numerous attempts, several emails and numerous phone calls, were made to reach Phil for a follow-up interview, but no further contact was made. Information from this participant’s 67-minute interview related to the challenges facing today’s novice science teacher; whereas, information on the first three themes was not gathered. Interesting emergent data from this initial interview is provided and stimulating as food-for-thought. Specific concerns were voiced by Phil as an individual granted alternative certification by the State of Florida to operate with the title of a “highly qualified” Biology science teacher. Phil obtained this classification by passing the state administered Subject Area Exam (SAE) for high school Biology, an exam “identified and validated by committees of content specialists” and for “persons making a career change to public school teaching” just as Phil Osopher was doing (Florida Department of Education, 2017, p. 1).

Phil’s introduction includes a glance at the school for which he was hired to teach. Along with his assigned teaching load, Phil provided a look at his qualifications and preparations for
teaching science. He discussed the ease of both certifying as a high school science teacher and obtaining a science teaching position. He referenced his limited personal Biology content knowledge and an unfamiliarity or discomfort with entering a culture mainly occupied by younger students. He found it strange the parents of his students were close to his own age. He questioned the genuineness of support voiced by the building administration. Phil communicated a disregard in his attitude toward many education professionals. His past experiences as a student within a public-school setting were not positive. Phil expressed confidence in his personal abilities to be a successful science teacher. Phil spoke with ambivalence or no real commitment toward teaching science, and he shared his lack of science experience both in and outside of school.

Phil Osopher, wore a wrinkled t-shirt and jeans with his long brown hair pulled roughly back looked as if he had been hard at work organizing his classroom. With the quick and recent hiring, only limited time was available before students would enter for the first day of classes. Phil met me in the front office to Splinter High School.

This school, built to fill the needs of a growing county student population, is located between two county towns. Splinter High gets its students from both directions, thus serving to lighten the load on two older schools. Although I had previously visited this school as a parent of opposing student-athletes, I never previously noticed the similarity of this building to others found in James County. Four main buildings form the outline of a two-storied square which surrounds a sizable grassy commons area. Open stairways are located at each corner connecting the buildings. A curiosity, shared with the other schools built in this design, relates to the buildings assigned numbers. After numbering the front building as building one and rather than chronologically following either clockwise or vice versa with two, three, and four, the building
numbers appear shuffled, one, two, four, followed by three. This confuses all students new to the school for several weeks upon their entry and continues to haunt many throughout their entire four years of high school. As Phil Osopher guided me to his room, he performed an obvious double-take considering the path we would take to his room. He commented on this confusing arrangement. After his bearings returned, I was led to the science teacher lounge on the second floor of building four.

Phil entered teaching with previous work experience “preaching, and pastoring” and had obtained both bachelor’s and master’s degrees in “Church Leadership.” His previous work experience included teaching as an Adjunct Professor at a local religious college where he also oversaw “Student Development” and served as a “Resident Director.” Phil indicated he began looking for a new career after resigning from his college position the previous spring. While expressing uncertainty about his future, he had heard getting hired as a James County science teacher was relatively easy if not a sure-shot for any who could pass the Subject Area Exam (SAE) and would bother to apply. “I was told that math and science were an almost certainty to get hired in [James] County, if you had certification in that. [I was told there was] a lot of need [for science teachers]. So, … I studied for a couple of weeks, took the Biology SAE, and passed it … So, when I passed the test there were approximately 12 to 15 openings in the county for someone who had my needs, and I inquired, and I did the things that I did.” Phil expressed how science was not even his subject of choice, “Literature is my, i’s my jam.” When I expressed surprise that his favorite subject was not science, Phil simply stated, “Nope.”

Although technological glitches occurred in making teacher certification test results available to schools, Phil still quickly secured a science teaching position. The time between Phil’s expressed interest in the Splinter High vacancy and his hiring was brief, very brief. “So, I
called the administration. They brought me in the next day, interviewed at 11, and they offered the job at 1:30 (laughing).” Phil reported this timeline included contacting his references. The apparent demand for science teachers was so great, even after being hired by Splinter, other county principals continued to contact Phil hoping to set up an interview for positions at different schools.

I soon discovered Phil Osopher was hired by Splinter High to teach Biology 1, Advance Placement Biology, and Advance Placement Environmental Science. Even though he would express some reservations, Phil Osopher believed he was qualified to teach high school Biology I, Advance Placement Biology, and Advance Placement Environmental Science. Phil relayed how he easily passed the State of Florida’s subject area exam, a test used to categorize high school teachers as “highly qualified” in the content area of Biology. Continuously and throughout the interview, Phil highlighted his personal abilities.

AP Biology focuses on the following topics: evolution, cellular energy and communications processes, genetics, information transfer, ecology, and interactions (College Board, 2017), and AP Environmental Science course combines topics from Earth Space science, Biology, ecology, land and water use, energy resources and use, pollution, and global changes such as in biodiversity and global warming (College Board, 2017). Both courses have the expectation that entering students have met successful completion of prerequisite Biology, chemistry, and algebra classes before enrolling (College Board, 2017). These classes, taught at a college level, culminate with an opportunity for students to pass an exam and earn college credit. Phil’s science education was one basic university level zoology course. This course was offered through a private religious university and provided no instruction on evolution. The university did not allow the teaching of evolution, and in it he “was not allowed to discuss faith and the
All the courses Phil was hired to teach at SHS deliver and build a strong understanding and appreciation for the concepts of evolution.

Phil was informed his four immediate predecessors left this science teaching position each with less than one year employment. He found himself questioning administrative comments of support. “I’m also wondering how much of [administrative support] is because of the seeming failures of my predecessors and [the school’s] wanting to keep somebody in that spot. Phil elaborated on the comments made during his initial meetings with the building level administration, “I was told when I came in [for a building] orientation ... two rules. One, don't become a headline. And two, don’t die. (laughs) and by die, [they must have been referring to the] four predecessors in the last three years, in this particular position.” Phil added, “there has been a lot of wonderful concern for me and caretaking on behalf of my new colleagues.”

The fourth theme of this study looks to identify challenges the novice science teacher experiences. The concerns expressed by Phil just days before he began teaching, reflect a limited concern for being unprepared. In addition to this, Phil commented on the school culture which mystified him.

Three days before entering a full class room, Phil was asked what he felt the challenges of his teaching position would be. His responses indicated a lack of comfort toward understanding the science content he was expected to teach. “I want to have a mastery of the material.” A “most challenging [component] is going to be knowing the material ... to be an expert on it as much as I can.” Phil spoke this in relation to his own lack of knowledge as it related to Biology, while he relayed a desire to learn the material along with the students. “It’s going to take me a little bit to get DNA. (laughing) and to understand ... even though I’ve read ... it’s not to the degree I feel ... prepared.”
Phil’s acknowledgment for a lack of Biology content knowledge was in addition to an admitted unfamiliarity with the cultural surroundings he was about to enter. Although he had experience with college level instruction, Phil expressed a concern for his lack of “understanding [for] this particular culture, … high school kids are different than college kids, … kids at Splinter High School are coming from different communities. What are the interactions there?” Hesitation appeared as Phil considered the difference he was about to encounter as it related to the age or maturity of his students, “I’m noticing that at the student orientation yesterday, that [students] just came in and got their schedules, with their parents … I don’t have kids. And, the majority of parents were my age or younger (laughs). So, I don’t … know how that’s all gonna relate.” For Phil, this was spoken while he indicated what he felt would be one of the greatest challenges placed on him during the upcoming year.

Parent involvement causing discomfort, Phil saw this as one of the top challenges he would likely have to face, but he clearly seemed to admit there would be more challenges which were currently unknown to him. “I don’t know … I’m also quite certain that I’m not even fully cognizant or aware of the demands that are going to hit me.” Phil continued, “It's exciting.”

Although he initially stated, “I was a horrible student in the classroom, a wonderful student of life,” Phil quickly follows this with comments pointing his finger at how the educational establishment failed to meet his needs. “I was tested very early and became the youngest person in the state in the exceptional education gifted program. So, no one had been admitted before sixth grade. I was admitted in second grade. They didn’t know what to do with me. So, starting in second grade, I was taught like a gifted sixth grader. Uh, while they tried to figure out how to do exceptional education for the younger group … So, the school became very
boring for me, very fast ... When I got out of high school, they didn’t have an exceptional education program for that ... I was rarely in the classroom.”

He was asked to expand on his experiences in high school, specifically those with science teachers. Phil first stated, “My experience in high school was, I liked science in spite of the teachers.” Rather than elaborate on specific characteristics of any one teacher, Phil’s focus turned and focused on his self-directed educational efforts as he listed authors with whom he claimed familiarity. “I was a voracious reader at an early age and had read a lot of primary scientific texts. So, middle school I’d read Darwin. I’d read E. O. Wilson. I’d read these kinda pieces, even Freud, different folks if we want to expand it to that way. And that continued through. I was always reading Brian Green, or Stephen Hawking, or Feynman, or those kinda folks. The philosophical aspect, you gonna do Hegel, then you need to look at Schrodinger and all these kinda deals.” Upon returning to commenting on his teachers, dissatisfaction again evidenced itself. “So anyway, I felt that high school science, in some ways to me, my professors, were on the older side, kinda on the, if not retiring while I was in school, shortly thereafter. And they were, their method and style had pretty much frozen.” Phil then elaborated on how he possessed a greater knowledge base than that held by his teachers. “It was a sad thing because often I would read and be ahead of where they were. So, what do you mean you don't know who Stephen Hawking is?”

Phil justified his own missing classes as a student indicating how the behavior was facilitated by the adults responsible for educating him. “Uh, I was really good at something called, they called it scholars bowl, quiz bowl, jeopardy for kids, and set a lot of records in middle school. And when I got to high school, they basically bribed me, to be on the team. We were a very low academic scoring team, but we would win if I was on the team. So, it was a way
of the principal getting some recognition. So, I skipped classes. I literally got answer keys and teacher reference books.” Following this exchange, Phil indicated how and why he was responsible for his own learning. “So, I was pretty much a self-motivated, self-directed student at that point ... I was reading beyond [everyone else], and I was nice in the class, I was very civil and kind. I just wasn’t in there much, cause there wasn’t much that captured my interest.”

When Phil was asked to expand on the out-of-school science experiences, museums, zoos, or even walks in the park which he enjoyed, he appeared to struggle in describing enjoyed science experiences. “All of those things, nature uhhh, the scientific enterprise is fascinating to me. Uhm, just reality itself, and how that works. Uh, so everything from, I, I, I love plants, uh, I love, uhm all things, (short pause) having to do with food and that prep. I come from an agrarian kinda stronghold, uh, still farms and cows and those things, butchers, and where I’m at. Uhm, uh, so it’s pretty wide. everything from string uh, theory and particle physics, to uh, E. O. Wilson uh, is uh, is a hero of mine. Uh, you know, talking about super organisms, and ant colonies as a way of kinda talking about how we live and do life as humans in societies. And so, for me most everything is connected and science really explores those connected pieces in a beautiful way. And uh, it always points to there is something behind something. In other words, you just keep going deeper, and deeper, and deeper. Nothing is as it appears. Uh, it is in an empirical sense, except for this table (knocks on the table). It’s you know it’s more hologram than it is solid. So (laughs), those things just uh, awaken curiosity in me. And I think that’s the chief; I think that's the chief goal of life. If you can (short pause) remain child-like without being childish, then the world's a more harmonious place.”

When Phil was pressed to explain exactly what drove him to pursue a secondary science position in his unique situation, he provided, “There is the pragmatic side, of I need a job and I
need to support my family, while we're figuring out what we're going to do with the rest of our life … Science was … a pragmatic decision because it seemed to be more possibility of me landing a job with that … and so yeah science was just fascinating to me.” Phil then expanded on his choice of Biology. “It wasn't going to be chemistry. It wasn’t going to be math. It wasn't going to be any of those things. But uh life, I can do life. We all do life. That was it.” Phil followed this with a relaxed air of indifference to the grade level he expected. “And uh, didn’t know if it would be middle school or high school. But, I was glad it was high school. Uh and I’m excited about that.”

When I inquired into Phil’s possible career choices other than education, he indicated not wanting to pursue additional education in preparation for a different career; even a career which would build on his expressed past experiences. “I’ve done relationships and conflict management, and counseling and guidance, and [related] areas … I didn't want to go back down the road and get all the education it would require to be a practicing counselor. I wasn't interested [in] going through and getting all of those [classes] again.”

He successfully and rapidly studied for and passed the SAE for Biology. Although getting these results available to interested schools was a bit bumpy, the time between the interview until getting a job offer to teach AP Biology, AP Environmental Science, and Biology at Splinter High School was short. Phil needed a job, and what he had heard about the availability and ease or even assuredness of getting a science teaching position played out. He became a high school science teacher. He did not claim to know everything and even commented on challenges he expected. “Those will be the three things,” acclimatizing to the world of a public high school, knowing the material as an “expert,” and working with young students, “that I think are going to be the greatest demand on me. I don’t know … I’m also quite certain that I’m
not even fully cognizant or aware of the demands that are going to hit me.” Yet, Phil appeared undeterred, and his self-perception of personal abilities was justification for his readiness to accomplish the job of teaching, “to be an expert on it as much as I can.”
Chapter 5. Analysis

Individual analyses are presented first: Abby Sciuto, Victor Escalante, Shelia Bones, and Phil Osopher. Participant generated concept maps showing their perceived systems of support. There are two such maps from each participant, one from the beginning of the year and the other near the year’s end. Participant Phil Osopher only produced one concept map as he left his teaching position and was not available after the first interview. Individual rhizomes representing the initial year’s experiences are presented. The multiple case analysis, which includes discussion over unexpected findings, metaphorically described as stolons (root-stems which lead to new plants) follows. Finally, further discussion and a look at propositions for future study are provided.

Abby Sciuto

Data collected on Abby comes from three, hour-long, interviews; two concept maps (beginning and end of year); a classroom observation of her teaching; four pictures/artifacts from her classroom; informal communications, a general information form, and a sticky note she produced during district formal induction training. All four research questions were addressed through these interactions with Abby. Information from this case is of value for policy makers, administrators, those working with beginning science teachers, and novice science teachers. Experiences and descriptions from Abby addressed her influence and values, stresses, job associated and bureaucratic challenges, support structures, coping, preparations, assertiveness, and impacted changes with respect to the role of a science teacher in today’s schools.
**Abby’s Concept Maps.**

The below concept maps were generated by Abby Sciuto. Where appropriate, names have been overlaid with pseudonyms or descriptions, to maintain confidentiality.

Twice, at the beginning and end of the study, Abby was asked to complete a concept map related to her personal systems of support. Before Abby entered a classroom with students, she listed six separate sources of support: her husband, parents and in-laws, ex-coworkers, Carmen (a new coworker), EHS administration, and EHS science department. The only differentiation between the various supports listed at the beginning of the school year was the identification of Carmen as a teacher of Earth/Space Science, the same course Abby would be teaching.
The final concept map contained reference to eight separated supports, and the type of support was listed along with an ascribed relative importance. Leading in importance were two identified “emotional” groupings, one familial and the other religious. The former support included Abby’s husband, daughter, and parents. The latter included “God, church/small group.” Three groups followed these in credited relative importance. “Other family/friends” and ex-coworkers were identified as two sources providing emotional support, and Carmen was again listed but was joined this time by Emilia as current co-workers providing “emotional and procedural” support. Three final groups, “other co-workers,” “new teacher group,” and “admin.” were identified as providing limited procedural support.
Abby’s parents served as role models and were sources of inspiration, and as discussed by Doney (2012), family provided emotional support. They instilled a value for education and appreciation for science into Abby. She relayed positive school experiences, and her favorite subject was science. She was motivated by a want for increased family time.

Abby’s descriptions included stress from outside her teaching position. Experiences from her personal life relate to both research questions one and four as they posed heavy challenges. The personal stress included concern for her husband’s health and raising a young toddler, the purchase of a new home, a reduced family budget, and changing careers.

Challenges of her teaching position were many and related to my fourth research question. Passing the Subject Area Exam carried palpable stress. This stress could be minimized by using the performance on the assessment for formative purposes as stated by (Feiman-Nemser, Schwille, Carver, & Yusko; 1999). Admitting academic weaknesses served her well as
she sought and accepted support from veteran educators. Embracing the opportunity to learn along with her students and calling upon a variety of coping mechanisms, Abby overcame these.

Many novice science teachers share concerns over discipline (Cooper & He 2011; Grayson & Alvarez, 2008; National Science Foundation, 2014). Abby briefly addressed this as a challenge, but successfully used coping strategies and reduced the severity of this stressor (Doney, 2012). Discipline issues were not a major concern for this novice science teacher. Concerns for Abby during her initial year teaching science included student discipline and ability, uncooperative or apathetic attitudes, and students with needs superseding a science education. Her beliefs toward teaching science were impacted by a perceived lack of concern from parents toward their children’s progress.

Abby expressed apprehension for her students’ reading and writing skills, and made efforts to help them. As Noddings argues, “both the carer and the cared-for contribute” to building a safe environment (Noddings, Kindle version, Introduction, 2005). Abby and her students formed such a reciprocal relationship. Abby took the initiative to share with her students, and they felt safe in expressing care for this new teacher.

Experiences with the bureaucracy of the school also affected Abby. These factors placed Abby in an unrelenting, challenge-filled position not recommended for beginning science teachers (Barmby, 2006; Britton et al. 2012; Brooks, 1987; Koballa et al. 2005; Strom, 2015). Challenges Abby faced related to the administration of the school system. She was assigned a room no one wanted and given larger than average class sizes. Her students had both academic and social needs. The district’s formal induction program (personal communications, July, 2017) was described as a waste of time by Abby. Howe (2013) suggested induction programs need careful planning and should be designed to build participant confidence. Abby’s needs with the
chain-of-command and the district curriculum were not addressed. As Kearney (2014) indicates, new teacher evaluations are instrumental in the success and retention of teachers, and Howe (2013) suggests that first year science teacher evaluations be implemented as formative to successfully guide new teacher development. Although benefiting from most evaluation visits, not all feedback was constructive (observation memo). Additionally, interruptions to Abby’s class lessons were unchecked by building administrators, and she would have preferred a more organized first week of school. Abby felt a bureaucratic obstacle was imposed by the vagueness offered by the district curriculum map. She was told to bypass using the rock collections, but her normally apathetic students showed interest in the rocks.

To realize successes from mentoring experiences, there must be a supportive school context favoring interaction between the novice and mentor (Bang & Luft; 2014). Abby experienced limited support from her official mentor. More benefit came from the formation of a professional friendly alliance with another teacher. Examples in which a trained mentor could have proven helpful included: fear of autonomy, enlisting parent support, and understanding the curriculum maps. However, with limited support from the official mentor, no help with parent communications was ever mentioned.

Abby benefited from a varied system of supports developed throughout the year (figures 9 and 10). Such a system is important for efficacious teacher development (Doney, 2012), and helped Abby face stresses and challenges. Her husband served as a sounding-board and helped Abby reflect on and find value in her choice to change careers. He provided positive energy as she studied to pass the SAE. Abby developed relationships with her students and received consolation from their letters of appreciation. I believe the compassion expressed by her students was instrumental as Abby pushed through the sheer exhaustion of being a novice science teacher.
Abby and Carmen, the professional friendly alliance, made a “good team.” They faced similar situations and both taught Earth Space. Assistance Carmen provided throughout the year included helping Abby reflect and maintain an open-mind toward controversial school situations.

Abby benefited from the support provided by both veteran and novice teachers as described by Tan (2015) referencing an “integrated professional culture” (p. 178). This was a nurturing environment, and included the head of the science department supporting Abby’s efforts to maintain the integrity of her classroom. Abby also expressed appreciation for the advice and guidance offered from an evaluator to develop student reading skills.

Abby did realize more time with her family than was provided by her previous career. This served as a factor increasing the level of support her family was available to provide, as evidenced by examining the changes made in her concept maps of support (figures 9 & 10). Abby noticeably added her daughter, and she indicated the link with family support was quite strong.

Along with a strong and developed system of support, Abby demonstrated abilities to employ a variety of coping mechanisms. These kept her in more positive spirits as she engaged in the stresses and challenges (Brooks, 1987; Doney, 2012). Numerous examples where Abby employed different coping mechanisms were evident.

Noticing other teachers had similar discipline issues with their classes after lunch, Abby could understand the energy level found in students just back from eating. This helped her maintain a presence of mind with that class. Abby demonstrated a healthy acceptance that not everything would work as she would have preferred, including her efforts toward passing the SAE, redirecting students after interruptions, and needing to alter unsuccessful plans. Her strategies included letting out frustrations to a supportive ear (her husband’s) and avoiding
fixation on aspects over which she had no control. She benefited from her grandfather’s advice to let the troubles others unload roll off her back, “like the water off of a duck’s back.” Abby’s ability to assertively act on what she felt was in the best needs of her students was evident. Rather than blindly follow curriculum maps, Abby and her professional friendly alliance (informal mentor) designed multiple lessons using stored rock displays. She saw the interest in her often-apathetic students and worked to build on this. She brought up the need to prevent classroom interruptions in a department meeting and demanded consideration. Assertiveness served Abby as she redirected students promptly to the lesson at hand through several interruptions.

I believe much of Abby Sciuto’s success with coping came from her experiences with the Sherriff’s Office. The expertise she brought from working crime scenes helped her start the year by demonstrating these skills as she took the lead role in a related unit designed to teach the scientific method. Her having to handle multiple tasks as a lead on the Sherriff’s Crime Scene unit was instrumental in Abby’s need to do the same as a teacher.

Changes in Abby’s perceptions or beliefs in relation to teaching high school science evolved over her first year. Such changes are discussed by Bang and Luft (2014). When Abby entered teaching, she believed science teachers should strive to impart an understanding and appreciation for science in their everyday lives. She wanted to see students develop a stewardship approach toward carrying for Earth. Throughout the year, her thoughts evolved as she saw students with needs different than what she expected. Her students desired to develop a relationship or connection to an adult figure, like that of a parent-child. She did not drop her initial beliefs, but the student needs tugged at Abby’s heart. Fulfilling this need became her primary belief about what a teacher’s role should be, and this included science teachers.
Another change during this initial year of teaching high school science was Abby’s development of strong concerns against state and district mandated science assessments given throughout and at the completion of science courses. As indicated by Cooper and He (2011), standardized assessments can serve to restrict science teacher efforts with their students. An unfamiliarity with these tests changed into a disdain for them as she felt the district exams were not designed for “her students.” Her students had needs outside of what the assessments addressed. Being ignored were needs related to the students’ ability to read and comprehend as well as their personal needs for compassion and safety. Abby questioned the value of putting such students and their teachers through such stressful assessments. Abby saw this as unfair and placed blame on those who designed and enforced such policy.

Initially, Abby was timid about contacting parents, although there is value in fostering parent involvement with educational endeavors (Oxley, 2013). While Abby placed efforts into making parent contacts, she felt the parents did not appear to care as much as she would have liked. This caused substantial frustration and disappointment for Abby. I believe an appropriately placed and experienced mentor could have assisted Abby in reaping more benefit from her home contacts.

A common misstatement made by individuals not familiar with the teaching profession relates to incorrect assumptions made about teaching (Lortie, 1975). Abby was perhaps guilty of such thinking before entering the profession. Although she realized increased family time, it was less than what she felt might be possible. Comments related to this indicated her underestimation for time needed to plan and prepare science classes. Similarly, Abby was a shocked to find out how much of her private funds would be called upon to meet supply needs in her classroom. This altered her thinking on teacher salaries.
Finally, confidence grew, as discussed by Britton, McCarthy, Ringstaff, and Allen, (2012), in this novice science teacher as she navigated stresses and challenges of the initial year teaching Earth Space. Overcoming her many stresses helped build her confidence. She began the year feeling insecure and humble, but as seen throughout her story, numerous experiences of the first year contributed to her growing confidence.

After analyzing the information collected on Abby, I could see her self-descriptive words (“new, excited, learning a lot,” and “interested”) play out and witnessed this development of confidence. Abby’s ability to exercise a degree of assertiveness was beneficial. The challenges experienced by Abby were centered around a high degree of stressors in her life and others accompanying her science teaching position. A strong support structure and her ability to maximize various coping strategies allowed her to successfully complete the first-year of teaching high school science and decide to continue this service in education. Abby remains excited for teaching, and is considering a transfer to a school nearer her home with fewer discipline/behavior issues.

**Victor Escalante**

With a Bachelor’s degree in Biology and a minor in Chemistry, Victor Escalante applied for a science position, knowing many vacancies for science teaching positions were available throughout James County. Victor quickly obtained a position at History High School. As a student, he had attended a “tough school” in Miami Florida and was raised by divorced parents. For the most part, Victor appeared to stand alone as he encountered the challenges of his first-year, although he did receive limited support from a few teachers around him. Information collected on Victor includes: three, hour-long, interviews; two concept maps (beginning and end
of year); an observation of his classroom teaching; six pictures from his classroom; a general form, and a sticky note produced during district formal induction training.

**Victor’s Concept Maps.**

At the beginning and end of the study, Victor was asked to complete a concept map related to his personal systems of support. Before Victor entered a classroom with students, he listed six separate sources of support. His live-in “girlfriend” was associated with providing “emotional support.” The five additional supports were individuals associated with Victor’s new job at History High School. Another first-year teacher was identified as providing “moral” support while Tim, a teacher new to HHS but with 20-years of experience, was looked to for assistance with “experiments and activity ideas.” Three teachers already working at the school were also individually identified as sources of support. Alice was identified as a source of support with “procedures.” The “department head” was indicated as a source of help with “day-to-day activities and paperwork.” Leah, another Biology teacher, was ascribed with providing help with “examples of lesson plans and other necessary documents.”
The final concept map contained reference to three previously mentioned individuals, and Victor provided specific support received from each of these three. Tim was again listed. Three areas in which Tim provided support were “emotional,” “professional guidance,” and “providing labs and handouts.” Victor identified Alice as his “unofficial mentor.” Alice was described as “providing advice.” Additionally, she “observed lessons” and provided “classroom feedback.” Leah continued to furnish lesson plan information, but also served to provide “some first-year expectations.”

Victor’s Rhizome in Context.

Figure 14. Victor’s rhizome in context.
Victor’s case study addresses all four research questions. The prominence of research question four (participant’s description of successes) is relatively low compared to the other questions, yet its expected utility is high. I believe this participant’s minimal focus on personal successes associated with the first-year teaching science, indicates the lack of satisfaction provided by the teacher’s salary for which he labored. Such a distribution of challenges with low salaries is discussed by Friedrichsen, Chval, and Teuscher, (2007). A high concentration of experiences centered on challenges/stresses originating from within the job. They appear compounded by bureaucratic circumstances, which played a significant role in Victor’s experience. I believe the information obtained from Victor’s case is of value for policy makers, administrators, people working with beginning science teachers, and other novice science teachers.

Appearing to have internalized heavy responsibility toward providing for his family, Victor appeared occupied with thoughts of how he might improve upon his station in life. Lacking pedagogical training, his nervousness about entering a teaching job was understandable. He likened teacher responsibilities to a “Swiss Army Knife,” which gives a glimpse as to the thoughts driving his stress before students arrived. He expressed doubts about the pay he would receive were central to his discussions. When he finished with his first year, he indicated his intention not to remain in teaching much longer.

Victor initially admitted being a bit intimidated about exactly what to expect, but noted he had attended a “rough” school when he was young, communicated intolerance for nonsense, and was not afraid of facing challenging situations. Discipline issues are common for novice teachers (DiCicco, Sabella, Jordan, Boney, and Jones, 2014; Feiman-Nemser, Schwille, Carver, and Yusko, 1999). Victor believed to meet the requirements for maintaining an environment
conducive to learning, he had to maintain classroom control starting at the beginning of the year. He maintained behavioral expectations throughout the year, yet shared a compassion for the students making academic efforts or those going through a difficult day. Victor felt success in handling discipline.

Discussed by DiCicco, Sabella, Jordan, Boney, and Jones, (2014) and Grayson and Alvarez (2008) are the impacts and challenges placed on novice teachers from experiences with students and parents. Believing his enthusiasm for science would motivate all students, Victor was challenged by those who expressed apathy toward class. He admitted listless students negatively impacted his lesson planning and caused him to struggle in designing lessons for them. A major challenge Victor faced came with students who lacked reading comprehension skills. This challenge shook and astonished Victor, but he continued with efforts to teach abstract Biology concepts. Victor’s comments also indicated how parents appeared more willing to approach him for extra opportunities for their child than they were willing to hold their own child accountable for earned grades. Of note, a parent serving as an administrator in the district seemingly pushed Victor to change her child’s earned grade.

Many challenges Victor faced emanated from the administrative ranks and included a perceived lack of support with efforts to maintain a disciplined classroom as has been found by other researchers (Cooper and He, 2011; Feiman-Nemser, Schwille, Carver, and Yusko, 1999). Students seemed to return immediately after being sent to the office, and there appeared no consequences for inappropriate behavior. He felt a lack of support from the building administration in several areas including disciplining, grading, starting without a school computer, and providing constructive evaluations.
Abandonment of the district science lesson plans was facilitated by the actions of his peers in the science department. This appeared the opposite of supporting peer culture discussed by Feiman-Nemser, Schwille, Carver, and Yusko (1999). Although the district science lesson plans were prioritized during induction training, and the district mandated a common planning time for academic departments, HHS’s science teachers found no benefit from the meetings or plans. They only met together early in the year, and then meetings ceased to continue. Victor saw a more experienced science teacher assume responsibility for producing and emailing documentation appearing to represent a common planning time. Victor perceived the district’s planned induction training as lacking in useful material. He further indicated giving up on using the district’s method for planning science lessons. He regularly had to alter or completely abandon the lesson just before they were taught as he worked to meet more pressing needs for his students.

Victor’s apprehensions included a perception the school and district leaders were more concerned with appearances than with actual student performance. Victor’s grading practices appeared guided in a similar nature to what Feldman (2000) referenced as “practical theory” as this novice grasped firmly to his beliefs on grading student work. He saw a school and district where grades appeared inflated, and teachers were pushed not only to pass everyone, but also to go to extremes to raise every grade below a “C.” He cited guidelines covering how students classified as non-English speaking students could not receive less than a “C.” As a teacher in the district, I am aware substantial paperwork for teachers looking to assign failing or unsatisfactory grades. Victor felt hounded by administrators to provide alternative assignments and allow late assignments even when doing so violated documented building policy. I have heard the similar comments from teachers throughout the district. Victor clearly perceived the administration as
facilitators of the overall school climate, a climate in which teachers would comply with directives and help administrators check the appropriate boxes for perception’s sake and reporting purposes. This was most evident in Victor’s amazed accounting of teachers conducting “dog and pony” shows whenever a principal came to conduct an evaluation.

Victor perceived a conflict of interest when as a parent, who happened to be an administrator at another school, attempted to influence Victor’s grades for her son. Victor’s method of coping was to let it alone, and do nothing. This novice teacher used the support of some parents as a self-motivator. After contacting a supportive parent, Victor indicated an increased willingness on his part to put in extra efforts or modify expectations in efforts to assist their children. I believe Victor missed an opportunity to build confidence through directly addressing the parent-principal pushing for a grade change.

A coping mechanism Victor valued was taking part in a regular physical workout to relieve stress; however, he allowed the time commitments involved with teaching intrude on his exercises. After our final interview, he indicated a desire to regain his gym time.

Victor brought three experiences which helped mold his beliefs on discipline (Lortie, 1975) with him into teaching. Part of Victor’s success, particularly given the low level of support he appeared to have received, should be attributed to his education, a degree in and love for Biology, his time spent in the Navy, and his own schooling at a “tough school.” Having attended a school with discipline issues more serious than those he found in History perhaps paved the way for having to face unruly students. The time Victor trained with the Navy was physically and mentally demanding. Though I would like to believe otherwise, there must be similarities in the mental states through which Victor had to navigate. Finally, by having been trained in and valuing Biology, Victor could confidently and comfortably deal with the class academic
material. Assertive behavior from Victor appeared limited to interactions with students. Refusing to accept the distractions caused by students using cell phones in class, he perceived a responsibility to not overlook what he believed inappropriate use of class time.

The most obvious change was in Victor’s beliefs and thoughts about what science teachers could or should accomplish with their students. Initially, believing his passion for Biology and Chemistry would help every child enjoy in their science studies, he ran head on and at full speed into a brick wall. Victor wondered how to teach complex and abstract scientific material to students who could not benefit from his planned readings. Several students expressed apathy to the science material he loved so much, and this caused disappointment for Victor as he changed what he believed a science teacher could accomplish with students. He believed he was lowering his academic expectations and using more basic communications, such as “shorter words,” as he attempted to share his knowledge with the students. Victor, reevaluated, reset, and continued efforts to share what he enjoyed with his students. Many students did appear to appreciate his efforts.

Bang and Luft (2014) indicate how collegial support is necessary to help novice science teachers develop. No individuals emerged as singularly influential in Victor’s life, but one colleague, Tim, stood out by providing more support to Victor than any other individual. Tim, provided limited emotional and pedagogical support. Although the district appointed a mentor, Victor never found out who the mentor was. Considering this, Victor alone faced the challenges the year would bring. As for a mentorship, Victor never benefited from input from an approved district mentor. Although he indicated one peer—Tim—offered limited support, I believe the relationship was more akin to a workplace friendship and not one with a major goal of assisting
the novice teacher learn a new craft. I assert Victor did not benefit from a mentorship, formal or informal. The lack of a mentor made for unfruitful soil as Victor attempted to grow.

Shelia Bones

Shelia, with degrees in both science and education, came to her position at Splinter High School (SHS) as a certified teacher with training in the subjects she was assigned to teach. Although her personal education had been one hundred percent private schooling, she claimed a desire to get the “public school experience,” not planning to stay in the public system. However, by the end of her initial year, she had changed her mind and now looked forward to retiring from Splinter High School.

The workload given to new teachers often serves as a main inducer of stress (Kearney, 2014,) and sometimes leads to teacher departure from education (Howe, 2013; Kearney, 2014). Shelia had two schedule changes and one included stepping in and filling the shoes of the person previously hired to teach two Advanced Placement classes. Data collected on Shelia included three, hour-long, interviews; two concept maps (beginning and end of year); an observation of her classroom teaching; pictures from her classroom; a general form; informal communications; and a sticky note produced during district formal induction training. The information gathered addresses all four research questions. Heavy information regarding research questions one, two, and three was obtained; however, a good amount of information related to the fourth question and emergent concepts developed during this study. I believe information from the case is valuable for public school policy makers, administrators, others working with novice science teachers, and for the novice teacher. Information collected on Shelia includes: three, hour-long, interviews; two concept maps (beginning and end of year); an observation of her classroom
teaching; pictures from her classroom; a general form, and a sticky note produced during district formal induction training.

**Shelia’s Concept Maps.**

At the beginning and end of the study, Shelia was asked to complete a concept map (figure 15) related to her personal systems of support. Before entering a classroom with students, she listed fourteen separate sources of support. Two best friends were combined as a source of limited “emotional” support. The remaining thirteen sources included her own mother (currently teaching at a private school and having over 30 years’ experience), three teachers under which Shelia had served as a student teacher, two of her university education professors, two new Biology teaching colleagues (Mr. Plant and Mrs. Ding), two of her own science teachers from high school (Mr. Note in Biology and Ms. Berg in Physical Science) were identified as offering limited support, two administrators at Splinter High School (Dr. Del and Mr. Vern), and a final source of limited support was seen in Alley, the head volleyball coach with whom Shelia would team.

![Figure 25 Shelia's initial concept map.](image)
At the end of her first year, Shelia described her support with noticeable differences (figure 16). Eleven groups were identified, seven as individuals and four as groups. Two sources of strong “emotional” support were Shelia’s mother and her boyfriend. Mrs. Ding was now listed as a strong “mentor” figure, and a veteran AP Biology teacher at nearby History High School was added as an additional strong “mentor.” Ms. Curie, a SHS Chemistry teacher had also been added as a limited source of support. Alley, identified previously as the head coach, was now labeled as a “co-volleyball coach” and offered strong support with “planning creative/engaging activities.” Shelia included the volleyball team itself and the Fellowship of Christian Athletes club (which she sponsored) as two limited sources of support. Shelia grouped the “staff volleyball and softball teams” as a limited source of “stress relief.” She and three roommates had moved in together to share living expenses. Two of Shelia’s roommates, previously identified as best friends, and the third (now all roommates) were listed as sources of limited “emotional” support. Only one teacher, Mr. Zalton, from her student teaching experiences remained as a contact of limited support.
Shelia’s Rhizome in Context.

As explained by Lortie (1975), educators and experiences from Shelia’s past were influential. Shelia’s past experiences with schooling were enjoyable. Previous teachers and professors influenced her teaching methods. Shelia felt teachers who just sat behind the desk and methodically proceeded through canned presentations were not providers of effective instruction. Having successfully completed rigorous student teaching placement set Shelia up with a level of confidence helpful for becoming a science teacher. Shelia felt that becoming certified to teach Biology in Florida was too easy and passing the state’s certification exam was an ineffective indicator of what it took to be a Biology teacher.

Shelia formed a strong professional friendly alliance during her first year. Feiman-Nemser, Schwille, Carver, and Yusko (1999) describe benefits like those Shelia achieved through this alliance. From the start of the school year until it finished, Shelia benefited from a professional friendly alliance with a long-time veteran science teacher. Ms. Ding shared her
experiences and provided Shelia with valued advice. The primary support for Shelia Bones was from her professional friendly alliance, Ms. Ding. The relationship between these two began immediately as Shelia reported to her new job. Shelia took advantage of the wisdom and guidance provided by this veteran with over twenty years of experience. Whatever was needed, Shelia felt free and welcome to approach Ms. Ding. Ms. Ding and all the veterans at SHS appeared to work well with the novice teachers. This emulates the constructive cultural atmosphere beneficial to novice science teachers referenced by researchers (Luft et al., 2007; Tan 2015). As I examined Shelia’s discussions regarding the support offered to her, I found her open and welcoming to the support, but critical as to what she might use and find beneficial for her students.

Shelia found some assistance through monthly meetings for the AP Biology and AP Environmental Science teachers. These meetings were not set up for Shelia as a novice teacher but rather as an opportunity for all district teachers responsible for those subjects. Shelia did reap a substantial benefit though from a more seasoned veteran who, provided one-on-one assistance in AP Biology. The environmental science meetings were not of value for Shelia.

Perhaps Shelia’s confidence throughout this study minimized her need to call upon emotional supports. Such support is indicated in her concept maps (figures 15 & 16) with her mother serving as the main source of emotional support.

The stressors Shelia encountered during her first-year teaching science were mainly of an extrinsic nature, and were imposed upon her by the job over which she had limited control. Stresses related to the bureaucracy of the school and system overshadowed others, and fears associated with taking on a new role impacted her. A few concerns were directly related to her students while her intrinsic stresses appeared limited.
A type of disagreement cited as responsible for increasing stress on new science teachers (Brown, Friedrichsen, & Abell, 2012) impacted Shelia. Initially feeling excitement for district lessons, Shelia and her colleagues came to find the district pushed science lesson plans complex and time consuming. Regular department meetings arranged with a district science coach, impinged substantially on Shelia’s planning time. Shelia developed disagreements with the input from the district coach. Shelia and her science department peers began to view the mandated plans and lessons as not in the best interests of their students, and as an impingement on their valued time. Shelia felt unfairly micromanaged by those who directed her to teach with the district’s science lesson plan format. Her beliefs in relation to this were strong, and she felt forced into confrontations with the district science coach and the building’s head principal. The district’s mandatory induction training (TIPS) was not helpful for Shelia. The time spent dedicating three days to this was time wasted for Shelia.

Shelia admitted a variety of stressors related to entering her initial year as a science teacher. Many of those she discussed were covered in research by Friedrichsen, Chval, and Teuscher (2007). The fear of being alone and the fear of being accepted by her new colleagues, appeared not to last long and are not uncommon amongst new teachers (Polizzi et al., 2015; Avraamidou, 2014). To a slightly greater degree, Shelia expressed concerns of not knowing the materials, and admitted revisiting her college texts for help. Always working late Sunday nights to prepare, was not something she enjoyed. She was also uncomfortable teaching students labeled as English Learners. When communications with the English as Second Language department stopped, Shelia feared the students’ needs were not being met. Two times after school began, the building administration juggled Shelia’s teaching schedule. This caused substantial stress. The first change added to her challenges with discipline. A second change
added two Advanced Placement classes, and required increased planning. The inherited students had not been properly introduced to the AP curriculum. Being assigned the AP courses was, however, a confidence booster for Shelia. To a lesser degree, stress accompanied the administration’s failure to provide training for lockdowns (procedures of emergency where traffic to and from campus is shut off). Eventually, she was provided with minimal and incomplete training. Stress also came from missed meetings due to coaching. Finally, Shelia did express stress related to student discipline with most concerns coming from a perceived lack of administrative support with disciplinary matters. She felt stranded as she stood her ground insisting a student participate in class before credit be given. A lack of support came from both the counselor and building principal. Shelia also wondered about the actual support she received with students sent from her room for discipline issues. Shelia absolutely loved the subject of Biology, and desired to share this love with all her students. When any student appeared not to care, the stress associated with sharing something she loved impacted her. At times, the students’ parents contributed to this stress. Her student teaching experiences assisted her in overcoming this stress, and she demonstrated a degree of assertiveness when dealing with a confrontational parent. Shelia took apathy for learning and lack of student previous knowledge related to Biology to heart. She blamed the students; she blamed the parents; she blamed cell phones and social media. The culture of Splinter High School was different from the private schools she had known her entire life. In the end though she felt it was a good fit for her. At first, Shelia looked forward to letting her students demonstrate mastery of Biology on the mandated assessments used to measure progress toward meeting state and federal standards. Her beliefs about the mandated assessments changed when she found many of her students struggling with reading skills.
Although exhausted from the workload, feelings about being an inexperienced teacher subsided. The level of exhaustion Shelia experienced, I believe was summed up during our final interview when she indicated she was well-aware there were only 12 days left in the school year. I asked if she was counting them down, and with great emphasis and an ear-to-ear smile, she said, “Yes, I am!”

A challenge she looked forward to was that of building relationships with the students so they would better respond to her guidance and be more willing to learn. Shelia shared a variety of ways she would reach out to the students. She believed athletic contests between the students and the staff helped build student and staff relationships. However, a challenge standing broadly in front of her, was the lack of previous academic knowledge possessed by her Regular and Honors Biology students. Shelia felt the students lacked an appreciation for the science of Biology and its application in day-to-day living.

Shelia did employ coping strategies as mentioned by Doney (2012). One method she employed was self-acknowledgement of her own successes while, at the same time, she drove to keep reachable goals front and center. She was active in sports (activity shown to relieve stress), she even coached volleyball. In addition to participating in sports, Shelia had the hobby of taking nature walks and producing art with collected bones. She credited the advice of her professional friendly alliance to bend as a tree with the wind and with helping her get through various minor challenges. Shelia mitigated student behavioral issues by beginning early to build relationships with her students. She implemented procedures to reduce disruptions in class.

Shelia experienced a growth in confidence with her understanding for the content knowledge and with feelings associated in becoming an adult. This growth is of the type discussed by Britton, McCarthy, Ringstaff, and Allen, (2012). She enjoyed the opportunity to
lead and make rules, and she realized a degree of personal satisfaction with overseeing her own class. Shelia benefited from her ability to exercise a degree of assertiveness. Two specific issues demonstrated this well. Firstly, Shelia did not back down when a parent challenged withholding credit from her child who “skipped class” missing most of the school year. Secondly, Shelia stood up to the district coach and building principal and, rather than accept micromanagement, insisted she knew how to teach Biology.

As all her previous experiences with education had been in private schools, the “Apprenticeship of Observation” (Lortie, 1975) was unique for Shelia. Shelia appears to have received a culture shock from her entry into public school education. This uniqueness possibly resulted in a rose tinting of the glasses she wore before having taught in one of the nation’s public schools. Shelia’s love for Biology increased while her attitude toward the mandated assessments took an abrupt 180-degree turn during the year. Shelia developed concerns the mandated exams were not appropriate for scoring her students. There were other needs that superseded these exams. Shelia developed concerns for the basic appreciation of education many of her students did not have. She wondered about their home lives and the lack of emphasis that appeared placed by parents on education. She was concerned about parents who appeared not to support the teacher efforts and would rather toil in attempts to help the child avoid consequences of neglecting classroom education. She wanted to serve ESOL children better. Shelia felt students lacked developmentally appropriate knowledge or skills necessary for learning in class. She believed these deficiencies should be addressed before the students were given a standardized Biology exam.

Looking back at the self-description generated before school commenced, various terms played out in their own ways. Shelia enjoyed serving as a volleyball “coach,” being a
“facilitator” for the Fellowship of Christian Athletes, and partaking in the staff-versus-students games. This demonstrated her selection of the word “active.” Shelia related “fun” and Biology; she worked to share science enjoyment with her students. As the year progressed, her “caring” spread as she desired to serve the students immediate needs before chasing mandates put in place by a bureaucratic system. Her dealings with parents and the students appeared “fair” as she expressed compassion yet held to her expectations.

**Phil Osopher**

As highlighted in the rationale for my study, keeping novice science teachers past their initial entry into the profession is vital. With the number of those new to teaching science fleeing, I was not surprised to see a participant leave the science teaching position after only nine weeks (the first quarter) (Doney, 2012; Lindqvist & Nordanger, 2016; National Science Foundation, 2014; Nieto, 2013; Worsham et al., 2013; Yang et al., 2015). As I reflected on and analyzed Phil’s interview, valuable information did present itself. Challenges Phil believed might accompany his new position were communicated and others he would face emerged. These addressed my fourth research question, the challenges today’s beginning science teachers face. Information collected on Phil comes from one, hour-long, interview and a general form.
Phil's Rhizome in Context.

Phil seemed to have a degree of confusion toward his life-goals and did not express a personal commitment toward education. Along with this, he lacked in content and pedagogical preparations for becoming a science teacher. Phil was not deterred by this. His personal decision seemed to him practical, not based on influences as mentioned by Tiala, and Harris, 2011). It was not only to accept a position as a high school science teacher, but indeed a teacher of two separate, challenging, Advance Placement science courses while entering a culture unfamiliar to him. I assert his self-confidence was overconfidence and likely reinforced from three factors: a perception built on his personal experiences in school, the ease of becoming “highly qualified” per the State of Florida, and by the reinforcement of administrators responsible for hiring him. Phil Osopher’s previous work and education was along theological lines. Phil held 20-years’ experience in this area. He did not want additional schooling required to expand upon this experience.
Phil’s justification to enter teaching science appears built on the ease with which he passed the certification exam and his understanding for teaching based on personal experiences as a student (Lortie, 1975). He understood there was a shortage of science teachers (NSF, 2014) thus creating his assuredness of landing a job. Having quit his previous job, Phil came to teaching with a practical goal, looking for employment. A professional path was not clear in his own mind.

Incorrectly assigning attributes to the profession of teaching based on experiences as a student is common and can form strongly held beliefs (Lortie, 1975). Phil seemed to see teaching high school science as something he could successfully accomplish with his current preparation and perhaps some additional reading. An example of this is evident in his belief that a little reading about DNA (deoxyribonucleic acid) would help him be expert enough on the subject to teach it. Phil did not communicate any concerns for his readiness to begin teaching. Throughout the interview, he elaborated on self-perceived personal skills as justification for not just teaching high school science, but teaching Advanced Placement science courses. Easily passing the State of Florida’s subject area test must have helped him validate these feeling of being qualified. Phil held a high opinion of his personal science knowledge when compared to educators he had known. Phil expressed an opinion placing his personal abilities above the educators responsible for his schooling. He recalled own independent reading placed him ahead of the teachers he had as a student. While discussing experiences in school, his elevated self-confidence and lack of admiration toward educators became more obvious. He was disillusioned with his own schooling. Phil believed he knew more about science than those responsible for his science education.
According to Phil, the school system failed to meet his needs, and he could circumvent the system as a student. Though he did not come right out and say so, he did relay a lack of respect for educators based on his previous experiences. This lack of respect is seen as he admits, “there has been a lot of wonderful concern for me and caretaking on behalf of my new colleagues,” he followed this with, “which I have found, I found nice. But goals, you know, I want to have a mastery of the material.” This was the sole comment made by Phil Osopher related to a potential source of available, experienced assistance. He viewed other teachers as incapable of offering the degree of support he desired.

This alternatively certified Biology teacher listed three areas he felt would hold challenge for him as he entered teaching high school science. Acclimatizing to the world of a public high school, developing a mastery of the subject, and working with young students were his greatest concerns. Phil was undeterred, and his self-perceived abilities provided justification for accepting the job. He accepted position at SHS, would require substantial science and math competence (College Board, 2017).

Researchers typically look for individuals expressing interests in any variety of science activities when considering recruits for potential science educators (Cerinsek, Hribara, Glodezrb, and Dolinsek, 2013; Händel, Duan, Sutherland, and Ziegler, 2014). While Phil describing his decision to teach science, Phil expressed a limited interest in science. When provided examples of visits to the zoo, museum, or simply walking in the park, Phil struggled to share any outside science experiences he enjoyed. Instead, Phil relayed vague, general interests stemming from his life in a rural community. The subject of Biology appeared to be his choice as a path-of-least-resistance. He did not specifically reference the subject of “Biology” when indicating what he felt he wanted to teach, Phil expresses confidence about his ability to “do life,” his indirect
reference to teaching Biology. He was not confident with either chemistry or math, and the Advance Placement classes he agreed to teach require students and teachers to have prerequisite knowledge of chemistry and algebra. Phil admitted no higher-level science preparation other than a single general zoology class. Perhaps he could not, envision a link between the prerequisites and the courses he agreed to teach. Phil’s introductory zoology class was taken at a private religious university where the topic of evolution was taboo. Evolution is a major component around which AP Biology and Biology topics are centered (College Board, 2017; James County Public Schools, 2016).

Phil did indicate a curiosity for science related reading. However, his interests seemed to bend along more philosophical lines and less toward science experiences. Phil additionally expressed pedagogical confusion toward working with students, parents, and within the culture of a public high school. The state classified him as “highly qualified,” and the hiring administrators appeared to down-played concerns regarding content knowledge. They instead focused concern of “putting a warm body” in charge of two challenging courses, courses carry a degree of prestige not only to the teacher teaching them, but to the school offering these courses.

His students were younger than the college level student to which he was accustomed, and their parents were either his age or younger, and Phil expressed amazement at this. Oxley (2013) indicates parent involvement in a secondary school setting can have a positive impact on student achievement. Parents typically are receptive to working together with the school community in educating their children, and when staff-led programs are in place, significant impacts are often witnessed around high school student improvement. The involvement of parents in a secondary school setting may help teachers guide improvements to better meet student needs. When parents directly communicate academic expectations and monitor grades,
improvements in student success are found. Collaborative efforts between teachers and parents related to monitoring grades, homework, and rules or goals of the class have been shown effective with high school classroom success (Oxley, 2013). Nel Noddings (2005) went further by encouraging educators to be more sympathetic to the needs and desires of the student and their parents served by our educating institutions. Phil did not grasp parent involvement in such a manner.

Although involving parents in their children’s education has been identified as a challenge to novice teachers, doing so can be helpful when dealing with struggling students (Cooper & He, 2011), and as Buck (2000) has indicated involving parents in their children’s education is important for increasing academic success. Phil expressed concerns for the culture into which he was just days away from entering, and he appeared pedagogically blind to a valuable resource, his students’ parents. The high school culture, the young students, and the fact that the parents would be involved confused Phil.

Phil’s communications contradicted what researchers have stated should be looked for in those seeking to be science educators. Worsham et al. (2013) recommend an emphasis should be placed on an individual’s commitment to education when considering recruiting future educators. They further indicated those most likely to remain in a teaching program expressed interests in working with children, a strong interest in or love for science, and positive past interactions with education (Worsham et al., 2013). Phil’s interest was in studying the public-school system, not in working directly with children. Many teachers enter the profession with the thought of making the system better (Lortie, 1975; Nieto, 2003), but Phil expressed no such desire. He appeared more interested in learning about the system of public education for curiosities sake. Could this have served as a warning? Did this teacher lack and could he have benefited from pedagogical
training? Is instructing advanced high school science classes, an appropriate place for a teacher looking to learn how the public-school system works?

When considering the whole of Phil Osopher’s story, four challenges novice science teachers may face appeared: first, a commitment toward working with high school students; second, the commitment toward a specific science; third, previous positive school experiences; and fourth, schools over-eager to place unqualified individuals into those positions.

Phil lacked a passion for education, teaching, or science. His attitude could be described as indifference or casual interest in these areas. He preferred literature, but went after a science teaching position as it appeared more promising for landing a position. With no specific science experiences and not particularly interested in working with young students, Phil was most interested in the school setting as a concept.

While a youth, Phil’s school experiences were not positive on which to build through observation. He expressed educators did not appear to know what to do with him, but rather helped him circumvent schooling by furnishing him with answer keys and reference books. Phil explained educators allowed him to skip school so he would participate on the academic team. Phil described himself as independent and ahead of other students and his teachers. Phil lacked respect for educators and the schooling system. I believe this helped block his development into a teacher.

A shortage of qualified high school science teachers, provided Phil a relatively easy entry to teaching science. I assert being “highly qualified” and passing a state subject area exam are not equivalent. Phil appeared set up for failure by administrators eager to fill a vacancy and by his own experiences. The offer to teach did not appear strange to Phil, rather it likely reinforced feelings he developed as a youth in school. There are lessons to be learned for those hiring new
science teachers from Phil Osofer’s story. These will be further elaborated upon in the cross-case analysis.

The Multiple Case Analysis

Who is Chris Kross? Chris is any beginning science teacher. She has never taught before. His first teaching position is in a public high school, teaching science. There are a variety of reasons she decided to teach science and possibly just as many different paths she could have taken to obtain the job. He may have taken a path requiring minimal training. Others are outlined through university programs and require a degree of rigor for prospective science teachers to gain certification. With demand being high to fill school science teacher vacancies and the supply narrowing with available candidates (Hutchison, 2012; Luft, Bang, & Roehrig, 2007; NSF, 2014; Strunk & Zeehandelaar, 2011), states have allowed the opening of multiple pathways granting “highly qualified” certification to interested individuals (Abell et al., 2006; Latterell, 2009). Chris’s experiences before entering a science teaching position set up powerful beliefs and produced changes in how Chris felt about being a science teacher and a teacher in general (Lortie, 1975). Challenges, like rocks, get in the way and can prevent Chris from fully developing as a science teacher, but successes such as overcoming obstacles are spread throughout the year. The successes help serve as nutrients for a growing career for Chris in our nation’s public schools. Below, I provide the analysis of the multiple case developed from four novice teachers attempting to enter the world of being a public high school science teacher. Each research question is independently analyzed with findings provided, and my thoughts or suggestions given as appropriate. Each teacher is part Chris Kross, and Chris is part of each participant in this study. I believe and hope the following can serve to benefit policy makers, school leaders, teacher educators, lead or mentor teachers, researchers, and Chris Kross.
Research Question 1. How do today’s novice science teachers describe their first year teaching experiences?

Participant descriptions shared positive experiences, included stories related to school governance, apathetic students and parents, the building administration, and missed communications. Experiences with students, peer interactions, mentorships, increased passion for science, and personal experiences were included as positive. Discussions related to the bureaucratic running of schools covered the mentor experience, mandated science lesson plans, mandated science assessments, certification, and unpreparedness for novice teacher enculturation. Other stories shared happenings with apathetic students, apathetic parents, the administration, and missed communication.

Positive experiences.

Many rewarding, enjoyable, and exciting experiences are described by new teachers. Positive interactions with students and peers were mentioned throughout the year. Substantial, professional friendly alliances formed were more meaningful and beneficial to the novice science teachers than the appointed district mentors. Increased passion for science was found in both student and novice teachers, and each participant enjoyed unique positive experiences of their own.

Positive experiences with students.

As relayed by Cooper and He (2011), positive experiences with students were valued by the novice science teachers. Abby had more than one experience in which the concerns, compassion, and comfort came through the comments of her students. The value of these was evident as she not only kept, but also carried with her a bundle of notes written by students in appreciation and acknowledgement for her efforts. Victor shared positive experiences of building
relationships with several students. When students came to his class burdened by obvious troubles, Victor expressed acknowledgement and understanding for the students and redirected their thoughts toward learning. Additionally, Victor received comments from students expressing appreciation for his understanding of Biology and his willingness to share this with them. He enjoyed those experiences. Shelia felt an outlet for stress and an opportunity to bond with both students and staff members during the “staff versus students” athletic competitions.

**Positive peer interactions.**

Positive peer interactions are important for the success of novice teachers (Bang and Luft, 2014; Feiman-Nemser, Schwille, Carver, and Yusko, 1999). Abby, Shelia, and Victor enjoyed the experienced support offered through many of their education colleagues during the first year. Assistance from Abby’s colleagues in the science department and most supervisors was welcomed and beneficial. Shelia’s colleagues provided similar assistance. In her case, the preparations with which she entered teaching allowed her to exercise more selectivity in determining the assistance she found valuable. Shelia experienced additional support from involvement in extracurricular activities. Victor’s experience offered more limited support from his peers. Victor welcomed advice and comments from experienced science teachers, and enjoyed a professional friendship, which he formed with a more experienced teacher.

**Positive mentorships.**

All official mentorships lacked attributes attributed to positive experiences for novice science teachers such as discussed by Howe (2013), Ingersoll and Strong (2011), or Kearney (2014), and none were successful. The development of professional friendly alliances proved positive for Abby, Shelia, and Victor. These relationships ranged from a simple friendship to more involved offerings of emotional and pedagogical support like that which a new family
member might provide. The two more beneficial alliances experienced by Abby and Shelia were additionally described with references to making a “good team” or having a fit that worked well. Shelia’s delighted in a professional friendly alliance with a seasoned veteran science teacher. This was so impactful for her that she already lamented another year down the road from the loss of this relationship due to the informal mentor’s retirement.

**Increased passion for science.**

Britton, McCarthy, Ringstaff, and Allen (2012) discussed developmental changes novice teachers experience as they successfully complete a year teaching. Abby experienced the development of a greater appreciation for Earth Space science. She enjoyed the increase in passion and looked forward to gaining a similar experience with Environmental science in the upcoming year. The thought of teaching a Forensics class also appealed to her like a wonderful dessert behind the glass display. This is due to the fact the enjoyment of the dessert will depend on a school’s ability to justify such an indulgence. Shelia enjoyed the experiences with her upper level students. With most of these, she believed they not only learned, but also shared in her enjoyment of the content. Shelia’s passion for the subject increased from teaching Biology, and she added a new passion for teaching her students “life lessons.”

**Personal positives.**

Shelia experienced the feeling of becoming an adult. Abby experienced an opportunity to play a leadership role in a cooperatively planned and run science lesson, and she realized an increase in her family time. Victor elected to experience teaching high school science for at least one more year. Shelia, Abby, and Victor all experienced an offer to return and teach at the same school for the upcoming year.
**Bureaucracy: mentor experience.**

An interesting experience facing new science teachers is likely found in the implementation of policies regulating official mentors. Factors attributed to successful mentorship programs (Howe, 2013) were absent. While the official mentor may be friendly and hold good intentions, the mentor’s availability or workload can limit when and how support is provided. Under ideal conditions, the mentor would be available at all times to assist with novice emotional and pedagogical needs. Without districts taking on extreme costs or measures, this can never be the case. The degree to which novice teachers are likely to receive mentors who can provide assistance is determined by the unique needs of the novice. Needs will vary among first year teachers and so will the dictates of district or building policy over mentor qualifications. New science teachers may not find a good alignment between the mentor availability, knowledge, and/or personal needs. A mentor may lack personal knowledge and have limited availability due to conflicts with his or her own schedule. The procedures governing qualifications of mentors may even force beginning science teachers to accept mentors who provide no assistance at all. The mentee may never meet or interact with the assigned mentor. A good term for such a mentor would be a “ghost mentor.” Under these conditions, the novice may be left alone to cope with all the challenges and stresses of the first-year teaching experience. Under slightly better conditions, a mentor may be available and willing to help; however, the available time and knowledge of the mentor may not fit with the mentee’s needs. Limited assistance in such cases is likely. The mentor may simply provide direction for where the novice may find answers or help. The aligning of the mentor’s qualifications, personality, district practices, and availability must work well with the interests of the mentee for the novice science teacher to adequately benefit from an official mentorship.
With or without a formal mentorship, the novice science teacher’s experience may include the formation of a more informal relationship. Based on similar factors to those discussed above, differing degrees of support are likely to serve as fertilizer for the developing novice. However, professional friendly alliances (or informal mentorships) develop through two-way communication and, therefore, enable the provision of both emotional support and pedagogical assistance. New teachers may experience the development of a robust, supportive relationship with a professional friendly alliance. The beginner may even consider more than one new colleague “informal mentors.” One informal mentor (professional friendly alliance) will not be the same as others. This alliance may prove more beneficial than single a mentor dictated by policy.

Support provided through effective mentorships can flow from a variety of sources and take different paths dependent on the novice’s needs. Some unique needs may develop from extracurricular responsibilities, such as missing department meetings due to coaching responsibilities. Participants expressed varying degrees of hesitation and confusion from their use of the district’s curriculum maps. Experiences linked to the process of enculturation (wondering if they will fit in) and stress stemming from having to prepare various assigned courses (Biology, Earth Space, Advanced Placement, etc.) face the novice’s entry into teaching science. When a new science teacher experiences a poor alignment with the mentor, these areas serve as challenges at best and likely elevate levels of stress which could otherwise be mitigated with mentors who “fit” the mentee’s needs.

**Bureaucracy: mandated science lesson plans.**

All three participants in successive interviews discussed experiences related to planning lessons, and as expressed by Nieto (2003), each felt a need to do other than the given curriculum.
Each commented on the mandated lesson plans forwarded by the school district. They began with the impression the district lesson format would be helpful and expressed a desire to implement the district’s format. Originally, Shelia even said implementation of the district lessons was “a huge goal.” By the second interview, and even more so afterward, all three remaining participants believed the district lesson plans were not useful. Comments reflecting a consensus included: “waste of time,” “convoluted,” “I didn’t like the [lessons],” and “I’m not going to teach [that] ... lesson.” Each participant perceived the needs of the children were not being met by the district format, and felt their own planning offered a better fit for the students’ needs. Conflicts were evident when the novice’s beliefs did not align with the district’s direction for the high school science courses. These effects felt by the novice teachers are further discussed in relation to each original research question presented in this study.

**Bureaucracy: mandated science assessments.**

Having their Biology students prepare for and take a bureaucratically mandated assessment was an experience shared by Shelia and Victor. Imposed policy beyond their ability to control this carried a degree of stress for the teachers (Friedrichsen, Dhval, and Teuscher, 2007). Assessed classes impact teacher evaluations. At the start of the year, both Shelia and Victor were eager to see how students exposed to impassioned science teaching would perform on the statewide Biology assessment. As the year progressed, both teachers developed different concerns for their students, which forced them to reconsider not only how they believed their students would perform, but if the assessments should be given at all.

Abby’s experience in this area was different. Her Earth Space students did not have to take a mandated assessment, but she still spoke with force about feeling the weight of the mandated implementation of student science assessments. Abby saw her colleagues deal with the
heightened associated stress. When her Earth Space students asked if Abby could be their teacher for the upcoming year in Biology, this novice responded with an apologetic but firm “no” as she did not want to face the stress associated with the mandated exam.

**Bureaucracy: certification.**

All participants in this study took different paths toward gaining science certification. This stood as a minimal challenge experienced by each. Shelia entered via what may be referenced as a more traditional method of preparation. She earned two degrees, her first in Biology and a second in Education. This experience included rigorous college coursework in both content and pedagogy. She perceived both as beneficial, with special attention focused on the time she spent in various student teaching assignments. Abby, meanwhile, had limited Education coursework and received a degree that combined Interdisciplinary Social Sciences, Criminology, and International Studies. She applied for a science teaching position while she worked to pass the state offered certification for Earth Space teachers. She started as a science teacher as a district long-term substitute teacher with the intention of eventually passing the subject area exam. She passed the exam toward the beginning of the academic year and gained certification as a “highly qualified” teacher for Earth Space science. Victor, on the other hand, had a degree in Biology with a minor in Chemistry. He was hired on a Temporary Certification issued through the district. This certification allowed Victor to serve as a science teacher for up to three years before having to take a subject area exam. Phil Osopher held a bachelor’s and a master’s in Church Leadership. He studied for a couple of weeks, took the Subject Area Exam for Biology, and passed it gaining certification as a “highly qualified” teacher for Biology.
**Bureaucratic unpreparedness.**

The novice science teachers in this study experienced interference to a smoother start for their first year. Missing electronic communications and much-needed emergency development, late schedule changes on top of already poorly assigned teaching schedules, and an apparent lack of administrative teaming for the formative growth of the novice teachers was evident in their experiences.

Abby and Victor began the year without district computer access and electronic district communications. New teachers throughout the district were assigned district emails and given access to electronic resources often weeks after the school year officially began. The novice teachers missed many communications during the initial weeks of school. As a teacher, I find receiving numerous electronic communications at the start of a new year challenging. Many important communications are randomly spread throughout greater numbers of less important communications. The time needed to read and prioritize each can be substantial, and vital communications can be lost.

Similarly, administrative failure to ensure necessary staff development can hinder the novice teacher. Shelia never received appropriate instruction on protocols essential for all teachers during emergencies.

A less than optimal start was experienced as Shelia and Victor received class schedule changes after the start of the year. Shelia had this happened twice. The second time was after one fourth of the academic year had passed. These challenges are included in the discussion of research question four. Phil began the year with only days to prepare for what I believe many consider a challenging assignment. There was no apparent administrative provision for helping Phil. Although Phil communicated minimal concern, Shelia, who later inherited Phil’s classes,
shared my belief in the difficulty of the assignment. I believe the principals exercised poor scheduling decisions.

Abby’s description of interactions with administrators evaluating novice teachers at her school provided a look at an apparent lack of coordinated effort from the administration toward the success of novice teachers. Abby discussed being evaluated by multiple evaluating principals during the year. Abby generally appreciated their constructive criticism and found success implementing suggestions to help involve students with reading. One administrator, however, was not described in the same light as the others. Serendipity found me observing Abby as this administrator conducted an official observation. With over ten years’ experience in administration myself, I have always felt teacher observations should be conducted from as unobtrusive a position as possible. I noticed the opposite from this evaluator. I felt his presence was overtly obvious from before the class started and lasting until he left in the middle of Abby’s instruction. Abby’s guarded comments about the feedback she obtained from this evaluator convinced me he was not as supportive and nurturing as the other evaluators had been.

**Apathetic students.**

Novice science teachers experience varying degrees of apathy from their students toward learning science content. Every participant expressed a heartfelt concern for the degree of apathy. From the start to finish, each novice teacher expressed a love for the science they were looking to share. Many of the students did not return this passion. Stress associated with failed attempts to build interest in these students developed, and each of the three participants took this as a challenge. The novice teachers made continual efforts, to varying degrees of success, to stimulate their students’ appreciation for science. This experience is appropriately described as disheartening and “painful” for the beginning science teacher.
Apathetic parents.

The participants perceived parent apathy as more troubling than that of the children. Unlike the helpful parent-teacher associations described by Oxley (2013), Abby felt parents did not appear concerned about their own children’s progress. This was noted as she repeatedly made home contacts in efforts to gain parent assistance but was unsuccessful. Victor’s concerns about parents’ apathy were made greater when some parents attempted to help their children side-step his academic expectations. Particularly noted was a parent, in a perceived position of authority, attempting to persuade Victor to change her child’s earned grade. Victor was shocked at the willingness of any parent to allow her child to avoid being held accountable, least of all a parent who was also a school administrator. Victor chose avoidance to cope with the situation as it involved a perceived authority figure. In a comparable situation, Shelia chose direct confrontation. Although she admitted feeling nervous when contacting parents, one situation stood out. An antagonistic parent expected Shelia to award credit to a child who missed most of the school year. The child’s only appearances to class were in the final weeks of school. Shelia believed this to be an attempt to receive credit without participating in the bulk of the class. The finale of Shelia’s experience included a meeting in the guidance counselor’s office with the parent but without the presence of an expected administrator. Not only did the administrator not show, the counselor, who minutes before assured Shelia of support, was silent throughout the meeting. The perception of parents enabling and modeling student apathy toward school made a profound impact on the novice science teachers. This is further addressed under research question two.
The administration.

A variety of experiences with building level administration were described by the novice science teachers. Victor and Shelia both expressed as concern the perceived lack of discipline support provided by the administrators. This experience is quite common in studies of novice teachers (Cooper & He, 2011; Eick, 2002; Ingersoll, 2012; Ingersoll & Strong, 2011; Kearney, 2014; Ng & Peter, 2010; Roychoudhury & Rice, 2013). Both novice teachers described with similarity how students sent to the office would often rapidly reappear in class with a lack of communication back from the office and no evident disciplinary action. This was bothersome for these novice teachers. They believed there were often no consequences for the unruly students.

Shelia expressed different feelings toward the assistant and head principal based on the experience she had after assertively refusing the use of district lesson plans. The head principal appeared to Shelia as less supportive than the assistant. When Shelia confronted the district science coach and asserted her unwillingness to teach from the district’s lesson plans, the head principal expressed hesitation and waivered in providing support for the novice teacher. The assistant principal acted differently. He reassured Shelia of his confidence in her knowledge and ability to teach her students. Although she remained positive about both school leaders, Shelia still experienced conflicting emotions regarding each administrator and their willingness to provide support.

Victor’s communicated experience detailed heavy pressure from the administrators to allow late work and provide additional assignments for students with low grades. This included an administrator from a nearby school appearing to ask for special considerations for her child. This appears to me as a violation of power exercised by an individual in charge. My experiences include times when my own children attended schools where I served as the principal. My firm
practice was to leave all decisions regarding my children to another administrator, the teacher, and/or my wife. This still carries potential conflicts, but administrators need to consider the ethical and moral implications of their actions in such cases. What Victor felt as pressure would have been unfair for any teacher, and Victor was a new teacher.

**Missed communication.**

Shelia and Victor experienced situations where a dropped or neglected communication occurred. Shelia’s involved a breakdown of communications with the English for Speakers of Other Languages department. Early in the year, Shelia had concerns about how to help students with such needs succeed. Initially, she received support from the department, but as time passed, there was a drop of communications. The students receiving such services continued to concern Shelia, but communications did not resume. Although Shelia admitted feeling partly responsible, I assert as she was new to teaching, procedures should have been in place for the department to regularly check on the needs of this teacher. Victor’s situation, though noticeably different, also includes a lack of communications on the part of the school. In this case, the school principal failed to provide communication. This was when a student claimed Victor had improperly acted during a disciplinary situation. Victor was directed by the principal to make statements regarding the incident that occurred during a tutoring program. Victor was eventually informed he had been cleared of any wrongdoing. Victor was never informed of the student’s claim against him, or of the principal’s decision to investigate Victor’s actions. When told he was clear of the accusations, the news blindsided this novice teacher. I believe any teacher, new or not, would have responded with similar feelings. The principal’s actions go against the district’s negotiated
agreement with the teaching staff. Below I provide the appropriate section taken from the district’s collective bargaining agreement; relevant parts are underlined:

4.4-3 A teacher shall have the right to have present a member representative of the Association and/or the Association staff during any disciplinary or investigatory conference with said teacher conducted by the principal or other designated County school official regarding the teacher’s infraction of rules or delinquency in the performance of his/her professional duties. Teachers shall be notified twenty-four (24) hours in advance of such conferences when possible. When the teacher requests such representation, no disciplinary action shall be taken until representation is present. If a teacher is called upon to assist in an investigation of a principal/immediate supervisor, which was initiated by administration, that teacher shall have the right to Association representation including staff (James County Public Schools, 2016).

The experience involving would-be science educator Phil Osopher’s perceptions of the building level administration’s communication during his expedient job interview and hiring was a concern. Phil shared two contradictory communications provided to him from the school principals. First, the administrators did not express any issues related to his lack of Biology or Education experience, training or otherwise. To Phil, the administration downplayed thoughts of him being unprepared. They offered encouragement rather than concern. When offered the position, these same administrators suggested two seemingly simple guidelines to Phil for his success. They told him not to make newspaper headlines and avoid “dying” (disappearing) on them. Phil was only lightly concerned the administrators might be looking to fill an empty seat. Phil had never taught before, and his own experiences in school made him doubt the actual
knowledge or preparations necessary to be an educator. Plus, he needed a job. He believed he could do “this,” teach high school Biology.

**Research Question 2. How do novice teachers’ feelings about being a science teacher change during their first year of teaching?**

The apprenticeship of observation appeared to hold strong influence over the thoughts of these novice science teachers (Lortie, 1975). The participants’ past enjoyment of science and participation in science activities outside of the learning environment appeared to foster a passion for science. The feelings of participants completing this study evolved as each discussed teaching science and teaching in general. Each participant experienced changes in perceptions as to just what a science teacher’s role should be. Some ideas were shared, and some were unique to the individual. Below I look to answer my second research question by considering the changes formed regarding: student needs, mandated Biology exams, district’s science lesson format, novice confidence, and unique individual participant changes.

**Changes toward student needs.**

As suggested by Bang and Luft (2014) the beliefs of the novice science teachers changed. Before working with the students, the novice teachers believed as science teachers they could lead all students toward the development of an understanding and appreciation for science. They expressed this could be done through opening students’ eyes to the importance of science in their everyday lives and by sharing their own enjoyment of science with their students. After the year began, all three participants commented on how many students had unfilled needs and abilities below what they expected. Abby, Shelia, and Victor expressed concerns over apathetic students and unsupportive or uninvolved parents. What might be considered a proper role model appeared absent in the children’s lives. Abby felt her students looking for a connection with an adult
figure. This experience altered all the novice science teachers’ beliefs about what a science teacher’s role should be. The novices looked to fill voids in the children’s lives by serving as role models for them.

The new teachers’ perceptions of student needs changed. Concern developed for the behavior of their students’ parents. The novice science teachers all saw many parents as enablers of the apathy expressed by students, and believed the parents modeled and accepted student apathy toward schoolwork. This had a profound impact on how novice science teachers’ beliefs on student needs changed.

All three participants formed similar beliefs regarding their science students’ needs. Each adapted by adding the belief students needed additional education in reading. The concerns over student home lives or parental example added to this. Parents modeling apathy and making efforts to enable children’s lack of responsibility took center stage in the minds of the novice science teachers. Concerns for student apathy and parent lack of involvement superseded any idealized thought that science should be front and center.

**Changes toward mandated exams.**

At the start of the year, Shelia and Victor were open to the challenge of assessing their students with mandated Biology exams. Abby believed her unfamiliarity with the exams prevented her from commenting one way or the other about these assessments. Soon after the year was underway, the opinions of all participants began to change, and by year’s end, strong opinions were held by all, as they shared concerns against mandated assessments. Shelia and Victor believed the exams were not appropriate for, nor in the best interest of, their students. Abby, witnessing the stress of the Biology assessments on colleagues in her school, was
impacted heavily, and she determined not to become certified in Biology and avoid the situation all together.

**Changes toward district’s lessons.**

The participants first felt eager toward the district’s push for specific procedures outlining science lessons. The novice science teachers expected implementation to be a bit challenging, but all expressed a willingness to try. As they experienced a misalignment between the lessons and needs of their students, these new science teachers dealt with an internal struggle (DiCicco et al., 2014). These participants changed with respect to how they found the district’s directions. Implementation was initially attempted by all novice teachers, but was soon dropped. The lessons were perceived as burdensome and not effective or appropriate for the students. The district’s science format did not align with the novice science teachers’ ideas, and feedback from peers did nothing to make the novice teachers feel otherwise. The overall perception provided by more veteran science teachers facilitated the abandonment of district lessons. Victor’s school covered up the abandonment of district lessons by continuing to provide documentation they were being implemented.

**Change regarding confidence.**

Unique changes in confidence are found among the novice science teachers as they successfully completed the first year (Britton, McCarthy, Ringstaff, and Allen, 2012). Shelia grew in her confidence related to the autonomous nature of leading a class of students. Feeling she became an adult, she looked forward to modifying her practice based on the first year’s experiences. Having performed well with Earth Space science, Abby looked eagerly forward to trying new subjects and growing her skills. Not expressing any real changes in confidence, Victor finished the year still harboring doubts about teaching high school science as a viable
career option. At the completion of this study, he planned to teach one more year, but doubted continuing afterward.

**Personal changes.**

Shelia initially believed she would only teach in public schools long enough to develop an appreciation for the experience. By the end of the year, Shelia’s desires changed from having thoughts of returning to the private school arena of her past, into what appeared a desire to retire from the public-school system. Shelia believed she could make positive impacts on the lives of her students and felt a calling to the public system. Abby was pleased with her experience overall and planned to return to teaching high school science, but is now seriously considering relocating to a school closer to her home, where there exists the added attraction of teaching Forensics. This other school also has fewer perceived discipline problems. Victor still felt teaching was not likely a long-term career, and was considering a different school. However, he was not sure about remaining in teaching after his second year. He appeared to fall into the category of those looking to try teaching as an "exploratory career" (p. 89) described by Lindqvist & Nordanger (2016).

**Research Question 3. How do beginning science teachers describe their successes?**

Each participant completing the study experienced unique feelings of success, and they shared in a variety of successes. Successes related to mentorships, students, district lesson plans, the building of confidence, and being reappointed for the following year are discussed in the following paragraphs.

**Mentorship success.**

In describing a successful mentorship, the participants in this study would insist mentorships of an informal nature, perhaps a “professional friendly alliance,” are more beneficial
than a formal mentorship sanctioned by the school district. These alliances held many of the qualities for successful peer interactions as provided by Bang and Luft (2014). The best experience with the district’s mentorship program was had by Abby. She explained her official mentor was friendly and willing to assist. He even provided limited guidance at times. However, Abby’s official mentor was housed in a separate building across the campus. He taught advanced classes with older students in a different science discipline, and was only rarely available to Abby. He had no planning time. A professional friendly alliance, or informal mentorship, Abby formed with a colleague across the hall proved more beneficial. This teacher taught the same content, assisted with pedagogical and emotional needs, and understood many of the trials Abby faced. Shelia did not receive a formal mentor from the district, but she did develop perhaps the strongest professional friendly alliance compared to the other participants. On top of a willingness and ability to provide emotional and pedagogical support, the professional friendly alliance had years of experience. Shelia considered her mentor like a family member. Victor’s experience was much less beneficial than those of both Shelia and Abby. The district did assign a mentor, but Victor was never introduced and received no contacts from the mentor. Victor did form an alliance with another more veteran teacher, and the teacher was friendly and offered advice. This teacher was also new to History High and the assistance appeared more of a friendly nature than as pedagogically beneficial.

**Success with students.**

When students demonstrated interest in or appreciation for content above what the novice had previously noted, all teachers felt as if their efforts had proven successful. At times, the students’ expression of appreciation for the teacher’s efforts was counted as success. Students offered complements, which demonstrated their appreciation for the novice teachers’ shared
passion. When students asked if Abby could teach them again in the following year’s science course it was a compliment measuring the success of her efforts to teach and to build relationships. Victor’s students were a bit more direct. Students commented he was the best science teacher they had ever had. Victor found success in receiving this compliment. Victor also described success when he discussed how his students could demonstrate an understanding for abstract Biology concepts based on the activities he had used as teaching methods. He was proud of the accomplishments made with troubled students and others labeled as having special needs. Shelia expressed success from her efforts to maintain good classroom behavior. She credited the success with her decision to begin the year early, with clearly outlined classroom expectations and procedures. Several times Abby discussed how taking advice from others helped her succeed in improving lessons and student involvement. Most notable of the examples was her openness and willingness to apply advice given to increased classroom reading participation. The increase Abby attained in student reading participation delighted her.

**Success with dropping the district’s lessons.**

Not only did Victor experience comments from veteran teachers about how they were impressed at the classroom behavior he maintained, but the veterans also commented favorably on the content he covered with his Biology classes. This gave him a sense of pride and accomplishment with the directions and lessons he determined to take. Victor expressly believed the enthusiasm he shared for the material he enjoyed so much penetrated through to his students. In situations where Victor perceived parents were supportive of his efforts, he believed a joint success promoted more motivated students. Shelia achieved success by directly confronting the district’s science coach and the building administrators. She insisted she would not use the district’s lesson format and claimed confidence in her training and ability to teach Biology. As
the youngest participant in the study, Shelia expressed her cumulative successes by indicating that for the first time in her life, she felt like an adult. Abby also bucked the district lesson plans and teamed with a colleague to teach with materials stored in a closet. Rather than following others, she addressed the interests of her students and was pleased with their responses.

**Confidence: description of success.**

Abby experienced an increase in her confidence because of her experiences and accomplishments throughout the first year. Her confidence increased when she passed the state’s Subject Area Exam and earned certification. Other factors contributing to Abby’s growing self-esteem included hearing students express a desire to be taught by her the following year and receiving positive feedback from nurturing veteran educators. The strong emotional support provided by her husband and the appreciation given by her students appeared vital toward building excitement and confidence for Abby.

Shelia’s growth in confidence is most evident as she indicated the year’s experiences assisted her in becoming an adult. These included the assertiveness exercised in standing her ground with an antagonistic parent and against the district’s mandated science lessons. Also of note, Shelia was proud of the way she successfully navigated not only a stressful interruption to assigned classes, but also the added challenge of inheriting two Advanced Placement courses.

From Victor’s perspective, successes experienced during the year were rooted in two areas: his successful management of classroom discipline and his success in sharing a passion for Biology. He was proud of peer comments made regarding the management of class discipline. Victor also expressed pleasure when his students openly appreciated his passion for Biology. These existed as the sole source of Victor’s perceived successes. This minimal focus on personal
successes appeared overshadowed by the lack of satisfaction provided by the teacher’s salary for which he worked.

**Retention success.**

The retention of novice science teachers is a success on which this study is based. When comparing the three successful returning teachers to the one who abruptly left, expressed feelings of science enjoyment separate the participants in the same manner. All three participants, who remained the entire year and plan a return to teaching science for the following year, expressed a passion for science. They enthusiastically proclaimed and demonstrated with a variety of experiences how science was special to them. The sole participant who abandoned teaching science only communicated a casual interest in science and several science related readings.

**Research Question 4. What challenges do today’s beginning science teachers face?**

The challenges experienced by novice teachers directly relate to the first research question and include mandated assessments and lesson plans (micromanagement), support for maintaining classroom discipline, inadequately prepared students, apathetic students, questionable student home guidance, and failed communications and rookie insecurities. Each of these is discussed in the following paragraphs.

**Challenge of student and parent apathy.**

The challenge of facing student and parent apathy appears quite daunting. This was a central challenge faced by all novice teachers in this study who completed their first year. The positive school-parent interactions offered by Oxley (2012) were not attained. This challenge related in some manner to all my other research questions. The apathy expressed by the students made a strong impact on the teachers and their beliefs about teaching science and teaching in general. The challenge of apathetic students was compounded by the novice teachers’
perceptions that parents frequently appeared apathetic as well and even looked to circumvent the teachers’ educational expectations, thereby, enabling their children to advance through the educational system without first meeting teacher expectations. The example provided by Shelia’s interactions with such a parent is a good example. Although Shelia felt abandoned, she stuck to her principles and refused to allow any further considerations. She believed previous efforts offered to the student were already more than reasonable. Shelia ended the year standing firmly, but wondering in the back of her mind if the parent and child would find a way around the need to actively participate in a course to gain credit.

**The mandated assessment challenge takes a back-seat.**

At the onset of their science teaching jobs, the challenge posed by the thought of their students having to take a mandated Biology assessment was welcomed. Two participants, Shelia and Victor, expressed excitement for seeing how their students would perform. They believed they would have successes teaching science to their students, and this would be supported through the results of the mandated assessments.

As the year progressed, their thoughts about the appropriateness of this challenge changed. The teachers developed concerns for direction and motivation the students were receiving from home. The academic levels of performance in subjects such as reading overshadowed the intention to provide a high school level science education. Victor directly addressed students being not able to comprehend their texts or think abstractly. Abby realized a need to guide the development of reading skills within her classroom. Shelia commented on the apparent lack of initiative her students held to read independently. They felt their students’ preparation and readiness for high school Biology insufficient and lower than what they had expected.
The original enthusiasm these teachers had for proving they could teach high school science was not abandoned, but became secondary to a new challenge: the challenge of needing to teach missing prerequisite skills for participation in high school science classes. This challenge could not be ignored. By the end of the year, the assessment previously looked forward to as proof of the novice’s ability to teach, became a stressor. The novice teachers believed the assessment would be used to indicate a failure to teach science, but the reality these teachers pointed to was that of an invalid assessment. The assessment would show how their students struggled to read and comprehend. A similar result might be expected by measuring the absence of leaves and growth on a rhizome after planting it in a bed of concrete and claiming the rhizome initially lacked the potential to grow and must have therefore been a bad root. The need for nutrient soil, appropriate water, and available sunlight be damned.

**Mandated district lesson plans and associated novice fears.**

A challenge experienced by each novice science teacher was learning and implementing the district’s lesson plans. This challenge was originally accepted as something each was willing and even eager to attempt. By midway through the year, the challenge became a perceived obstacle for these novice teachers. Each had a different response, but none continued in their efforts to follow the district’s science plan format. The challenge for Abby and Victor disappeared as they simply followed what they believed best for their students, and Shelia directly confronted those in charge of overseeing the district lesson plan implementation. Shelia’s assertiveness allowed her the opportunity to prove herself as she believed best.

The perception of bureaucratic micromanagement over the science lessons taught in the classroom was unique to each novice teacher. The novices’ observations were guided by two factors: different lenses constructed by individual building cultures, and unique paths taken by
each novice to enter a science teaching career. Fear over not being able to apply skills and
knowledge gained through a rigorous preparation faced Shelia. Victor feared his science
knowledge and passion for the content were not respected. He felt efforts by the those around
him to produce documentation needed by bureaucracies undermining his ability to teach science.
Abby preferred to teach using the students’ expressed interests as motivators for science content
and lesson development. The common ground for Victor, Abby, and Shelia included
bureaucratic attempts to micromanage the classrooms given to the novice teachers and the
intention of the bureaucrats to hold the novice teachers accountable for bureaucratic
ideas/directives.

**Challenge of discipline.**

Challenge for the novice teachers was found in efforts to set and maintain student
discipline and keep the classroom environment conducive to learning. Feeling a need to clearly
and promptly set ground rules and expectations, Victor worked to clearly define the teacher-
student relationship and maintain consistency in efforts with each child. This was hampered
some as the classes assigned to him were altered within the initial two weeks of school. Shelia
was challenged to keep order in classes where an administrative decision altered her teaching
schedule more than one time during the year. She had to obtain student focus and set ground
rules not established by earlier teachers. And, as discussed elsewhere, her experience included
picking up Advanced Placement classes nine weeks into the school year.

The management of cell phone use in the classroom can serve as a timely example of
how a novice teacher might look differently at issues of discipline and classroom management.
Shelia and Victor were challenged when students used their cell phones during times otherwise
planned for instruction. Whereas Abby believed cell phone use was not as disruptive, and she
appeared to accept cell phones as minimal disruption to her teaching efforts. Many novice teachers must address this challenge.

**Challenge of abandonment.**

The idea of a novice having to work alone in the classroom poses challenges (Brooks, 1987; Lortie, 1975; Ingersoll and Strong, 2011; Roehrig and Luft, 2006). Support for discipline and grading standards, a unified and nurturing administration, and an appropriately matched mentorship are all factors that can facilitate the healthy growth of a novice science teacher. The challenge of perceived abandonment is encountered when such support is absent or minimal.

Both Shelia and Victor directly perceived a lack of disciplinary support from the administration. They indicated students sent out for behavioral issues would reappear promptly after being directed to the office. Rather than sensing accountability for unruly behavior, the students looked to incur no consequences other than a walk to and from the office. Both novice teachers expected some communication from administration regarding the disciplinary actions; however, this was not provided to these novice teachers.

A lack of support for the novice teachers’ grading standards was described by two participants, Shelia and Victor. Shelia faced this when she entered the arranged meeting with a parent and the child’s school guidance counselor. The anticipated support was absent when the administrator failed to show for the meeting. The lack of support amplified when the guidance counselor only sat in the room and said nothing. Victor found the behavior he observed from his administration troubling. Instead of support for this novice teacher’s grading procedures, the building administration appeared to place pressure on Victor to modify his expectations for students receiving less than a “B.” Victor discussed how the building’s own policies supported
his grading expectations and yet the administrators looked to him for alternatives. Shelia and Victor clearly communicated the administration in each building appeared to desire reporting higher student performances than what the new teachers believed existed.

The apparent lack of a unified administration committed to nurturing the novice was another factor challenging teachers in this study. Reflecting on the evaluators responsible for Abby Sciuto, all but one appeared to offer formative guidance. Abby typically expressed happiness with efforts provided to develop her teaching skills. As discussed in the Abby’s case analysis, one administrator was perceived as unsupportive, and I believe encroached on this novice teacher’s ability to maintain a classroom conducive to learning. Shelia experienced a like occurrence with the separation of support offered between the head and assistant principals. Even yielding there are bound to be differences of opinion between those charged with running our schools, within one school’s walls, a unified appearance is likely more comforting and offers clear direction for the staff. This is likely most important with new teachers. Although the challenge faced by confronting a mandated district science lesson format, was overcome by Shelia, a unified support behind this new teacher could have mitigated the stress she encountered.

Concerns related to the lack of support received from the district’s formal mentorship program were evident in Abby’s, Shelia’s, and Victor’s first year experiences. Each participant who successfully completed the first-year teaching science asked the administration if they could be teamed with a mentor. The mentorship procedures followed by the district limited mentor availability. Although she had hoped for a mentor with a similar assignment of classes and one nearby, Abby’s assigned mentor, who was in the science department, taught out of a different building on the same campus. He also taught advanced and older students in a different science
discipline. He had limited availability as he taught seven periods and had given up his planning time. Their communications were described by Abby as friendly and of limited assistance. Abby’s mentor met the district’s guidelines for mentors. Shelia had requested a mentor but her school did not provide one. Victor also requested a mentor and was told one was assigned, but Victor and the mentor never contacted each other. Victor explained he did not know the identity of his mentor. The mentorships provided by the district were utter failures. The most beneficial assistance each of the participants received from another staff member came in the form I previously described as a “professional friendly alliance” or may be considered “informal mentorships.” I believe a vital distinction exists in the difference found between such alliances and formal mentorships provided by school districts, and researchers need consider this as they reference teacher mentorships.

**Fears and development.**

Although Shelia entered as a high school science teacher having completed rigorous training, she acknowledged a degree of fear from having to step alone into the science classroom. This can be compared to participant Phil’s expression of casual interest in education and confusion about how to work with high school aged students. He had no preparations for teaching or in science. The more prepared participants admitted degrees of nervousness and intimidation. This is an interesting finding as the fears expressed by Shelia and Victor, the two novice teachers with degrees in Biology, were fears of not correctly teaching content. They admitted revisiting previous college coursework and texts to ensure they could accurately answer student questions. Abby, on the other hand, easily admitted she was forced to learn the content along with the students. Abby took it as an eagerly anticipated task, while both Shelia and Victor felt noticeable degrees of stress related to preparing lessons. Although Abby admitted stress in
preparing lessons as well, she communicated no fear for her lack of content knowledge. The final participant, Phil, who left teaching after the first nine weeks, never claimed to possess any substantial trepidation related to his knowledge for the content. The attitudes or emotions relating to content knowledge appeared to reflect in the appreciations each novice held at the end of the year as well. Shelia and Victor expressed their own development of a deeper understanding for the content due to their efforts throughout the year. Abby explained how her appreciation for and understanding of the content bloomed. She even expressed happiness at the possibility of teaching Environmental science classes in addition to Earth Space.

**Stolons: Unexpected sprouts.**

As I immersed myself in the continual and repetitive nature of collecting, analyzing, and reflecting on the information gathered during this study, branching concepts and themes developed. Questionable ethical administrative actions, conduct I felt not accepted as standard (merriam-webster.com, 2017) and poor administrative decisions appeared as major unexpected experiences facing new teachers.

**Questionable ethical administrative actions.**

I saw a continued reappearance of ethical challenges and dilemmas facing the novice science teachers. I found myself concerned at the sheer weight of questionable situations these novice teachers faced. I expected education leaders to shelter new teachers rather than allow additional challenges and stresses interfere with opportunities for novice teachers to develop as strong educators.

Victor and Shelia perceived the building level administrators as promoting incorrect representations of student performance data and allowing for erroneous production of documentation related to teacher activities within the school. Victor shared how veteran staff
members admitted to staging lessons during announced evaluator visits to the classrooms. Shelia believed the principal acted to make reports of Splinter High present a rosier picture of student performance than what was occurring. The impression Victor obtained was one of the teaching staff helping evaluators to check off boxes on a district evaluation form. This allowed principals the opportunity to provide each teacher with an acceptable evaluation, while the district was provided with evidence the expected teacher performance criteria were being monitored. The teachers informed Victor they only performed in this manner when the evaluators notified staff of upcoming visits. The questionable behavior around evaluations appears shared by administration and veteran teachers. Additionally, Victor and Shelia expressed concerns for administrative pressures to allow make-up and late work. The administrators appeared more interested in passing students and elevating grades than they did with supporting a teacher’s grading policy.

Considering the evaluation process in Victor’s building with the documentation generated by veteran science teachers allowing administrators to present a misleading paper trail of the actual happenings within the science department, actions of unethical administration are seen to impact novice science teachers. The district expectation was for teachers in academic departments to conduct weekly meetings. The assigned task was to develop shared lesson plans and exchange ideas. Abby’s department only met once a month, and not all science teachers attended. Abby’s formal mentor could not attend. In Eastside High School the regularity of meetings subsided rapidly as the year progressed. No mention of documentation was relayed by Abby. Shelia directly confronted the administration regarding the district’s science lesson format, which in her school was the topic of each cooperative science department meeting. The meetings centered around the district coach’s’ weekly visits to the school. Through Shelia’s
direct confrontation with administration and the district science coach, the coach stopped traveling to Splinter High School, and the science department’s cooperative meetings became infrequent. Victor relayed how a more veteran science teacher at History High submitted plans for documentation she alone produced and shared, via email, with the department. Science teachers at History High quit meeting together. As a teacher in this district, I noticed confusion and different perceptions forming when teachers complained about “cooperative planning.” As teachers drew comparisons among schools, I found “cooperative planning” had different meanings at each. Sometimes it referred to actual meetings held one a week within the department for planning. At other times, it simply meant a school’s science teachers all planned during a shared time and were available to assist each other as they saw fit. The distinction appeared unnoticed by most teachers. As the novice teachers discussed cooperative or common planning times, they all expressed pleasure in the disappearance of the mandated weekly meetings, which were not seen as helpful, but appeared intrusive on valuable time needed for individual planning efforts. From what I observed throughout the district, the veteran staff seemed to feel the same way.

The principal’s investigation of Victor appears to have violated the school district’s negotiated agreement with staff. The agreement calls for notification of any investigation twenty-four hours before any investigative action. Per the recorded agreement, the teacher must be given an opportunity to have representation present. I could not help but wonder how much more important having a representative present might be for a novice than for a more veteran educator during such an investigation. Although the principal’s investigation cleared Victor, and a video substantiated his account of the incident, Victor was never provided with the negotiated protection. The novice teacher never expressed knowledge of such an agreement but did express
concerns for the lack of communication as to what was being done. I found the situation disturbing. When I wondered, based on my past administrative experiences, if such expectations were in place, I found they were.

**Poor administrative decisions.**

A research journal entry made soon after Phil withdrew from his position from Splinter High’s science department partially recorded my reflections on what appeared as poor administrative decision making. He was hired and placed in a position for which he appeared to have no qualifications other than having passed a Biology Subject Area Exam. The principals who hired Phil expressed no concerns for content or experience, but voiced only thoughts related to the public perception Phil might make as a teacher. These concerns were not based on Phil, but on the predecessors who unsuccessfully attempted to fill the job. The building principals expressed a need to avoid negative press, and wished to present to their constituents with an Advanced Placement science teacher. Splinter High School was the school where Phil and Shelia were both hired. Phil had two degrees in Church Leadership and no science experience or education outside of an introductory Zoology class at a private university which forbade instruction related to evolution. All the courses Phil was assigned to teach were academically demanding from a science perspective. At this same school, the administrators had hired Shelia Bones, a double major in Biology and Education. Her class load at first was strictly Honors and Regular Biology. She did enjoy this workload, and Phil expressed confidence he could learn and teach Advanced Placement Biology and Advanced Placement Environmental Science at the same time. Based on my past experiences in administration and as an Advanced Placement Biology teacher, I reflected on my concerns for this arrangement. I repeated a question to myself many times, “Why did these administrators allow this assignment of classes to exist?” There
were various other more viable options which regularly visited my mind, but none placed Phil with the responsibility for such a demanding science workload. I feel the administrative decision to do so was quite poor and not only accelerated Phil toward his rapid departure from teaching science, but also forced extra stress upon Shelia during her initial year as she faced multiple changes to her assigned schedule.

Another poor decision made by administrators appears in the assigning of two mentor teachers to Abby and Victor. One mentor proved of limited use, and the other was of absolutely no use for their respective novice teacher. Abby did find her formal mentor kind and willing to assist, but any organized or planned time with the mentor was did not exist. Again, Victor never met his assigned mentor. The assignment of a formal mentor should be carefully thought through, and the fit with the needs of the novice and the mentor should dictate rather than restrict mentorships.

A lack of coordinated efforts in support of novice teaches also resulted from poor administrative direction. When novice teachers are evaluated, the input provided should be focused on the development of quality teachers (Brooks, 1987; Feiman-Nemser, Schwille, Carver, & Yusko, 1999; Howe, 2013). Abby’s experience with varied input from evaluators did not appear as effective as it might have been. Most of her evaluators appeared constructive and supportive, but one seemed to offer no support and appeared unconscious of or unconcerned about his interfering with Abby’s instructional efforts. Shelia’s experience with a non-supportive counselor and an absent administrator at a meeting with an antagonistic parent leaves at least the appearance of non-supportive administrative directions.
Suggestions, thoughts, and future study.

My thoughts and suggestions stemming from this study cover mandated assessments, district micromanagement of lessons and planning time, parental guidance, related ethics and educational administration, mentors, novice enculturation and teacher development, and state certification. Ideas for future study are also included in the following paragraphs.

On mandated assessments.

Based on my findings from this study, the use of state and district mandated assessments must be reevaluated and redesigned or removed entirely. If assuming the assessments have value for measuring teacher productivity and skills, maybe their use with more veteran science teachers might be justified. In an environment where there is a scarcity of science teachers, science teachers are leaving the field more rapidly than other related teachers (NSF, 2014). Because novice science teachers commonly flee the field within the initial three years, and numerous stresses and challenges face the beginning science teacher, backing off on an exam used to measure skills and success of rookies looking to develop the same appears to me as counterproductive. Removing the stresses associated with such mandated exams from impacting novice teachers to the degree in which they currently do would seem a way to foster developmental growth of the novice. However, the validity of exams must be considered from a variety of angles. One important angle is that of how appropriate the exam is for any one group of students. If some students cannot comprehend exam questions due to a lack of reading skills, how can the exam reflect the science teacher’s performance teaching science? It might reflect efforts of the science teacher to remediate reading skills, but this is not the rationale purported for these assessments (The Florida Legislature, 2017). If the exam scores are recorded on science teacher evaluations, how are the scores of different students accounted for when there are
numerous unique settings and backgrounds commonly found within different public school settings?

The above leads into one of my suggestions for further possible study. What exactly do the results of today’s mandated high school Biology assessments measure and how is this related to their purported use? Upon what factors do exam scores depend, and how do the exams impact novice and veteran teachers? As examples, does the experience of a teacher make a difference related to associated stress accompanying the exams, and how do students differ on exam scores when student background is taken into consideration, are offered?

**On district science lesson format and common planning.**

The degree to which school districts implement controls over pedagogical activities such as planning and teaching lessons impacts the experiences had by the novice science teacher (Danielsson & Warwick, 2014). Science, by its nature alone, can involve unique ways of learning and teaching. Professional opinions vary on what is best for student learning (Friedrichsen et al., 2011). Misalignment between novice and district direction is accompanied by increased stress placed on new science teachers (Danielsson & Warwick, 2014). When the demands of implementing specific lesson plans for science teachers appear complex and not helpful for students, the novice can experience conflict between the district’s perceived micromanagement and the teacher’s beliefs as to what is appropriate instruction for the students.

Shelia, while communicating her experiences confronting the attempted bureaucratic micromanagement of her science lessons, stood firm in the belief she knew how best how to teach her students. Through facing differing degrees of support from various administrators, Shelia proved her skills and abilities, and she offered a return for the following year in the face of noticeable interruption and challenges to her class schedule. As a veteran science teacher and
past administrator, I was impressed with Shelia’s assertiveness and ability to stand strong while facing confrontation. This was expressly impressive given Shelia’s relatively young age compared with the older participants. This novice openly relayed her concerns and differences from those around her. She judged her year as successful, as did the administrators who opened the doors for her return.

Through my position teaching science in this district and given my knowledge of the teachers at the district schools, I saw veteran and novice teachers form unified responses against imposed science lesson plans. The experience of having to document and attend mandated “common” planning meetings exposed novice science teachers to a variety of negative situations likely to create stress. Each novice was impacted by the district’s science lesson format. Results such as defying district direction, ignoring directions while implementing personal lessons, and masking non-compliance by submitting misleading documentation related to the district promoted direction were recorded. In an example of the latter, the novice joined a science department where documentation for activities that did not actually take place was generated.

I believe additional study could examine the perception of district and building micromanagement on science teacher feelings and enthusiasm toward the job. Such a study should also look for connections between perceived micromanagement and student performance in and enjoyment of science.

**On parental guidance.**

Considering a common thread from the novice science teachers’ experiences the novice teachers’ expressions of concern for their parental support and guidance stood out. Information provided by the new teachers in this study points to a missing role model or constructive adult influence in the lives of many students. Making parent contacts can be unsettling for the novice
teacher. As a cooperating teacher, I have witnessed student teachers cringe at my insistence they make regular contacts with the students’ homes. With minimal support from me with their efforts, I have never failed to see growth in each student teacher. Contacting home should be an expected part of student teaching, and I believe districts would be better off to provide support and guidance for novice teachers as they become accustomed to communicating with parents. A specifically trained lead teacher or mentor may work, but may not be necessary. Maybe the department head or another seasoned veteran teacher, one eager to help the developing rookie would be most appropriate. However, some support here appears necessary to lessen the stresses and instill a degree of confidence in the novice teacher.

I believe a study to determine the success of various forms of aid provided to novice teachers in contacting and involving parents may be useful. Maybe first identifying veteran teachers who are identified as successfully communicating with homes, and then involving their assistance with novice teachers would make for a good starting point. This could provide valuable tools for beginning teachers and potential mentors or those looking to help with communication efforts between students’ homes and the school.

**On related ethics.**

Victor was not treated in accordance with the district’s negotiated agreement which was put in place to serve as an acceptable manner of conduct (merriam-webster.com, 2017) as it relates to investigations of teacher conduct. Although he did not appear to know this, he did express discomfort with the way his situation was handled. As discussed throughout this study, the stresses and challenges facing novice teachers are immense. The principal’s investigation supported Victor. I assert Victor would have benefited more had the requirements for representation and a clear communication been provided to this novice teacher during the
process. I believe a degree of discomfort with the covert actions of the principal linger in the novice’s perceptions of trust toward those in charge of his school. Distrust feelings are increased by the covering-up of science teacher planning and pressure to elevate student grades for what appear to be reporting purposes.

Not just the hiring of Phil Osopher as a science teacher, but his assignment to multiple Advanced Placement courses, if not publicly misleading, appears to at least reflect poorly made administrative decisions. My continued reflection on this matter always provided me with an option I considered simple and readily evident. Phil Osopher and Shelia Bones should have been assigned each other’s starting schedules from the first day both were under contract. Only the building principals hold the knowledge as to why this did not occur.

My thoughts on future study along these lines are limited. I did not anticipate any unethical administrative actions to present themselves, but I am not completely surprised at their occurrence. It appears to me, studies looking at the impact of unethical activity and how it impacts any teacher, the school, or society would be of value.

On mentors.

If districts are entrusted to use public funds appropriately, then the use of funds for mentorship programs may need more guidelines of regular modification based on the needs of the novice teachers they are designed to support. Research points to specific factors that are included in successful mentorship programs (Bang and Luft, 2014; Feiman-Nemser, Schwille, Carver, Yusko, 1999; Howe, 2013). The needs and expertise of individual novice teachers are likely varied, particularly given today’s environment allowing for the numerous certification paths science teachers can take to gain employment. These needs should dictate the assigning of mentors. Previously considered appropriate guidelines may need modifications or substantial
alterations. The availability and accountability placed on any mentor should be appropriately aligned with and acceptable to the novice teacher. Mentors should be willing and able to ensure and assist novice teachers in receiving, understanding, and maintaining vital communications throughout the year. Mentors specific for novice science teachers should be carefully selected based, not only on individual needs, but also on the idea of not so strictly limiting possibilities as to ignore the needs unique to any one new science teacher. My study points to the matching of mentors with the novice teacher needs as of substantial vitality for the ultimate success of a mentorship. A new teacher must feel and possess a degree of agency. This alignment appears more important than having defined guidelines for the identification and appointment of mentors. I did not find official mentorship programs as a guarantee or as a promoter of a successful mentorship or even of desirable results.

Can a mentor double as an evaluator? Can mentors effectively be given authority and responsibility for providing novice teachers with formative evaluations during the initial year teaching science? Can the mentor serve as the sole, in-line chain-of-command contact for new science teachers? This might serve to streamline lines of communication, decrease confusion, and increase mentee success. Answers to the above questions would benefit efforts to grow effective science teachers.

Additionally, I believe school districts, building principals, and department heads would benefit from a clearer definition as to just who a mentor is and what a mentor does. Reflection on the findings of this study can prove beneficial for this purpose.

**On novice enculturation.**

Another recommendation I forward based on this study is for schools to careful undertake activities designed to encourage more experiences between students and staff. These can serve
several purposes. Increasing the comfort and trust between students and teachers, allowing
novice teachers to more easily adapt to the school’s culture, and providing a stress alleviating
activity were all noticed in the single case study involving Shelia Bones.

**On state certification.**

Having been an administrator looking for a qualified teacher candidate, I can appreciate
the availability of various paths available for granting certification. There is a benefit to opening
doors for possible quality candidates who might otherwise be prevented from becoming an
educator. The question of teacher quality and society’s need for more teachers can pull in
opposite directions. It is fitting I can end my study with this consideration. A judgement must be
made. This judgement is made every day. It is made around the world in all countries. What is
the value we place on education as a society? How willing are we to place resources into
providing the youth of the nation with “truly highly qualified and caring” teachers?
Investigations into teacher quality related to certification as “highly qualified” to teach a branch
of science would be of significance. Just as important is a call made by Lindqvist & Nordanger
(2016), for examining attrition and teacher quality. How successful is the current system at
eliminating teachers who are not benefiting children and attracting truly qualified science
teachers?

**On researcher bias.**

As called for by Stake (2006) and Lawrence-Lightfoot and Davis (1997), a case study
researcher holds an ethical responsibility to communicate personal identity. I served in the
primary role of data collection and analysis, and acknowledge all descriptions representing the
participant’s stories traveled through my reflections and interpretations before being relayed to
readers of this study (Lawrence-Lightfoot and Davis, 1997; Merriam, 1998). I made efforts to
provide ample materials through which any reader may make informed decisions regarding my work (Stake, 1995). In doing so I hoped to assist reader in the development of their own interpretations. Possible future researchers may wish to consider the role played by researcher gender, social background, or race while undertaking such a study.
References


Ng, J. C., & Peter, L. (2010). Should I stay or should I go? examining the career choices of alternatively licensed teachers in urban schools. *The Urban Review, 42*(2), 123-142.


Personal communications, email July 5, 2017, James County professional development administrator.


Appendices
Appendix A: Participant Consent Form

Template Consent Form

Informed Consent to Participate in Research Involving Minimal Risk

Pro # 00026562

You are being asked to take part in a research study. Research studies include only people who choose to take part. This document is called an informed consent form. Please read this information carefully and take your time making your decision. Ask the researcher or study staff to discuss this consent form with you, please ask him/her to explain any words or information you do not clearly understand. We encourage you to talk with your family and friends before you decide to take part in this research study]. The nature of the study, risks, inconveniences, discomforts, and other important information about the study are listed below.

We are asking you to take part in a research study called:

**Experience of the Neophyte Science Teachers**

The person who is in charge of this research study is David Thornton. This person is called the Principal Investigator. However, other research staff may be involved and can act on behalf of the person in charge. He is being guided in this research by Dr. Allen Feldman.

The research will be conducted in Polk County, Florida, Polk County Public School District.

Purpose of the study

The purpose of this study is to better understand and appreciate the novice science teacher’s view of science, teaching, and teaching science in today’s world and assist policy makers, administrators, and teacher-educators in efforts to better prepare science teachers for a successful entry into the world of public education.

**Why are you being asked to take part?**

We are asking you to take part in this research study because you are a novice teacher who is beginning to teach high school science professionally.

**Study Procedures:**

If you take part in this study, you will be asked to:

Participate in a series of three interviews (Seidman, 2013) that will take approximately one hour each. These interviews will be spread evenly during the school year and are to take place at a location, such as your classroom or other district building, and time of mutually agreed upon convenience. You will be asked questions about your educational background, your current teaching position, and your experiences and perceptions related to science, teaching, and
teaching science. In addition, you will be asked to allow at least one 20 to 30-minute direct observation of your teaching.

- The interview will be audio recorded. If you do not want the interview to be recorded, you should not participate in the study. The recordings will be stored on a password-protected computer and on a flash drive locked in a storage file of the Principal Investigator’s private office. The data will be kept for five years, after which the paper copies will be shredded and all electronic files and recordings erased.
- The approximate timeline for the interviews places the first interview in August, second in December or January, and third in March.
- The observation is to take place sometime of mutual arrangement between the first and last interview.
- Prior to the interviews you will be asked to complete a form for collecting basic participant identification and logistic information.
- You will be provided a copy of a written transcript of each interview so you may examine it for accuracy. You may strike or alter any component you feel necessary.
- During the initial and final interviews, you will be asked to develop a concept map indicating your professional and personal support systems, who or what provides you with support or motivation.

**Total Number of Participants**
A total of 4 to 6 individuals will participate in the study at all sites.

**Alternatives / Voluntary Participation / Withdrawal**
You do not have to participate in this research study. You should only take part in this study if you want to volunteer. You should not feel that there is any pressure to take part in the study. You are free to participate in this research or withdraw at any time. There will be no penalty or loss of benefits you are entitled to receive if you stop taking part in this study.

**Benefits**
The potential benefits of participating in this research study are reflection on your own teaching and the researcher may serve as a critical friend. Long-term benefits include the improvement of induction year experiences for new science teachers.

**Risks or Discomfort**
This research is considered to be minimal risk. That means that the risks associated with this study are the same as what you face every day. There are no known additional risks to those who take part in this study.

**Compensation**
You will receive no payment or other compensation for taking part in this study.

**Costs**
It will not cost you anything to take part in the study.
Privacy and Confidentiality

We will keep your study records private and confidential. Certain people may need to see your study records. Anyone who looks at your records must keep them confidential. These individuals include:

- The Principal Investigator
- Certain university professors who need to know more about the study, and individuals who provide oversight to ensure that we are doing the study in the right way.
- Any agency of the federal, state, or local government that regulates this research, i.e., the Office for Human Research Protection (OHRP)
- The USF Institutional Review Board (IRB) and related staff who have oversight responsibilities for this study, including staff in USF Research Integrity and Compliance.
- We may publish what we learn from this study. If we do, we will not include your name. We will not publish anything that would let people know who you are.

You can get the answers to your questions, concerns, or complaints

If you have any questions, concerns or complaints about this study, or experience an unanticipated problem, call David Thornton at 863.370.9966.

If you have questions about your rights as a participant in this study, or have complaints, concerns or issues you want to discuss with someone outside the research, call the USF IRB at (813) 974-5638.

Consent to Take Part in this Research Study

I freely give my consent to take part in this study. I understand that by signing this form I am agreeing to take part in research. I have received a copy of this form to take with me.

______________________________________________  __________________________
Signature of Person Taking Part in Study          Date

____________________________
Printed Name of Person Taking Part in Study

Statement of Person Obtaining Informed Consent

I have carefully explained to the person taking part in the study what he or she can expect from their participation. I confirm that this research subject speaks the language that was used to explain this research and is receiving an informed consent form in their primary language. This research subject has provided legally effective informed consent.

______________________________________________  __________________________
Signature of Person obtaining Informed Consent          Date

____________________________
Printed Name of Person Obtaining Informed Consent
Appendix B: Email Requesting Participants

Example Email

Research Participants Needed!
(Must be a full-time, first year science teacher within grades 7-12)
Curriculum and Instruction Study
University of South Florida

This research (IRB Pro# 00026562) aims to investigate the world of today’s novice secondary science teacher. Your experiences, perceptions, and beliefs regarding teaching, science, and teaching science are important to this research.

Your expected voluntary contribution will take approximately three total interviews spread evenly throughout your first year of teaching science. Each interview will take approximately one hour and includes a request for you to compose a simple concept map (less than five minutes) at the first and final interviews. All interviews will be conducted at a time and place mutually agreed upon by you and the researcher. The researcher will also request to observe you in action as a professional, again at a mutually agreed upon time. Continued participation in the study is at your discretion.

Please call at 863-370-9966 or email David Thornton at david78@mail.usf.edu for additional information.
Appendix C: Interview Protocol 1

Protocol 1: Sample Question List

1. When and where were you born?
2. Where do you come from/call home?
3. Parents'/Guardian’s occupations
4. Please describe your current family dynamics.
5. Favorite subject in school
6. Where did you go to secondary school?
7. Where did you go to college?
8. What degree did you earn?
9. Explain the program you followed to become a certified teacher. Are you currently enrolled in any courses of study?
10. Previous work experiences
11. Describe any experiences related to teaching or teaching science?
12. What Science-related out-of-school interests/experiences do you have?
13. Was your initial interest in teaching or science?
14. What or who first drove you to consider teaching science as a career? (family, teacher, others) Why did teaching secondary science attract you to it as a profession? (Tell me why you wanted to become a secondary science teacher? Explain how you initially decided to teach science. When did you make this decision?)
15. What if any other occupations did you consider seriously as possibilities?
16. Did you like science in school? Why/why not?
17. Can you tell me more about your own schooling experience?
   a) What were you like as a student?
   b) What is your general impression of your teachers?
   c) Which of your teachers made a good impression? Why? Who among them gave a bad impression and why?
18. What do you think are some of the demands of teaching?
19. Do you still keep in touch with any of your past teachers?
20. What does teaching mean to you?
21. What does teaching science mean to you?
22. As a secondary science teacher, what things do you consider to be the most important? What do you feel is the main role for a secondary science teacher?
23. Why is it important for students to learn science?
24. What qualities/characteristics/knowledges do you think are important in order to teach secondary science effectively?
25. Have you set any goal(s) for your first year of teaching? If yes, what?
27. What types of informal science activities (museums, zoo, science related jobs, documentaries, activities with others, etc.) have you experienced? Describe how these may have influenced you as a science teacher?
28. How do you feel about teaching science?
29. Do you consider yourself to have been a successful science learner in school? Why/why not? What do you think were the reasons for your success/lack of success? What parts of science do you consider most accessible to you?
30. Are there any current school, district, state, or national directions you feel will impact your job?
31. Previous studies; science background: When did you last study science? How much science preparation have you studied?
32. Can you tell me more about your qualifications as a teacher?
33. Describe the teacher preparation program you went through?
34. Where did you do your practicum? Can you tell me more about your practicum experience?
35. How many science (chemistry, Biology, etc.) classes did you take?
36. How confident are you with your preparations to teach secondary science?
37. What expectations do you have related to this job?
38. What kinds of support and assistance do you expect?
39. What kinds of support and assistance would you like to be given?
40. What is your definition of a mentor? How would you define the role of a mentor?
41. Discuss your thoughts on teacher’s salaries and benefits?
42. What do you expect to accomplish with your students this year?
43. What are you looking forward to experiencing as a science teacher?
44. What do you expect to be your greatest challenge and why?
45. How confident do you feel about teaching ___(subject)___ content?
46. How do you feel about working autonomously as a secondary science teacher?
47. What is your general impression of the school?
48. How do you find your room and the facilities?
49. How do you find your colleagues in your school?
Appendix D: Interview Protocol 2

Protocol 2: Sample Question List

1. What is your general impression of this school now that you have started working here?
2. Describe your weekly schedule/workload.
3. Can you tell me more about your current workload?
   a) Number of preparations, Number of classes/pupils
   b) The level of the classes
   c) Subjects you are teaching
   d) Extra-curricular activities
4. What do you like about your job? Why?
5. Can you tell me some of the highs and lows of teaching for the past weeks?
6. Is there something you dislike about your job? Why?
7. Can you describe your average day from arrival to departing school?
8. How often do you take work home? Describe the work you take home and amount of time you dedicate to this.
9. What do you feel you have accomplished with your students so far? What are your expectations related to student accomplishments from this point on?
10. How do you feel about your progression toward meeting the goal you set for yourself when we first met, ________________?
11. At this point in time, how comfortable/confident do you feel with your abilities to plan and teach?
12. Support orientation:
   a) Are you getting or not support (anyone or thing)?
   b) Explain your greatest challenge so far.
13. Describe interactions you have had with:
   a) parents,
   b) students,
   c) peers,
   d) administrators (principal, vice-principal, head of department),
   e) and others (specify).
14. How do you find and interact with your colleagues in general?
15. How do you find the pupils?
16. Describe your feelings regarding teaching in this school?
17. Do you personally interact with any other beginning teachers (0-3 years) in your school? If so, describe these interactions.
18. Do new teachers as a group meet often? If yes, what do you all normally talk about? If no, why not?
19. What kinds of support and assistance has the school/department/district given you?
20. Do you have a mentor teacher or is there an individual you would characterize as a mentor figure?
   a) How did this relationship develop?
   b) What kinds of support, assistance, interactions do you have with your mentor?
   c) What kinds of support and assistance would you like from your mentor?
21. How well-supported are new teachers in this school?
22. What kinds of support and assistance would you like to be given?

23. Are there external support structures and resources (outside of your district) you use?

24. Are you involved in activities (hobbies, meetings, free-time spent, etc.) not linked to school? What role do these play in your life?

25. How do you find each of the below impacting your teaching?
   a) Building
   b) District
   c) State
   d) National

26. Have you faced any difficulties (challenges or concerns) so far? If yes, can you elaborate? If no, what are some of the challenges that you foresee?
   a) How did you work through this situation?
   b) Who did you talk to about the situation?
   c) Do you seek help from or talk about this with another colleague, school management or another new teacher?
   d) If yes, what is the advice they give you? How do you find their advice?
   e) Did you use any other resources?
   f) Was the situation resolved?

27. What are difficulties you face every day? Are you working to resolve these ongoing difficulties? (If so, how?)

28. Does any difficulty disturb you more than others? Why?
   a) Have you tried to resolve it? If yes, how? If no, why not?
   b) Do you prefer to deal with it on your own?

29. Describe how classroom management and discipline impact your job.

30. What about secondary teaching science makes you as interested as you are? And what about secondary science teaching prevents you from being more interested?

31. Is there something that could change about teaching secondary science that would increase your interest level?

32. Do you see teaching science as a long-term career path? Explain.

33. Are you currently interested in continuing to teach science next year?

34. If there is anything you could change about your job, what would that be, and why?
Appendix E: Interview Protocol 3

Protocol 3: Sample Question List

1. What is your impression of this school at this time?
2. What at this time do you like about your job? Why?
3. Can you tell me some of the highs and lows of teaching for the past weeks?
4. Compared with our last meeting, there something you dislike about your job? Why?
5. Tell me about what you have accomplished with your students so far? In what way have your expectations related to student accomplishments changed or remained the same?
6. How do you feel about your progression toward meeting the goal you set for yourself when we first met, ______________________?
7. What qualities/characteristics/knowledges do you think are important in order to teach secondary science effectively?
8. How comfortable/confident do you feel with your abilities to plan and teach?
9. Continued examination of EXPECTATIONS QUESTIONS:
   a. Support (receiving or not; who, where, perceived value).
   b. How do you feel about Salary and benefits?
   c. Explain any new great challenge since last time we talked.
   d. How confident do you feel about teaching ___ (subject)___ content?
10. How have interactions with the following changed since you started school?
    a. parents,
    b. students,
    c. peers,
    d. administrators (principal, vice-principal, head of department),
    e. and others (specify).
11. Have your feelings regarding teaching in this school changed? (In what ways?)
12. Among your colleagues, to whom are you closest?
13. What kinds of support and assistance has the school/department/district given you?
14. If a mentor or mentor-type teacher was previously identified?
    a. Do you meet with a mentor or mentor-like teacher on a regular basis? If yes, how regular? If no, why not?
    b. Describe the support, assistance, interactions you have with your mentor?
    c. In what ways do you think the mentorship effects your teaching?
    d. What are your perceptions regarding the mentorship experience?
15. What kinds of support and assistance are you given? Please describe the nature and extent of how you used each one.
16. What aspects of these structures are helpful? How do they help you?
17. Which support structures did you not use? Why?
18. What kinds of support and assistance would you like to be given?
19. Have you interacted with any beginning teachers (0-3) outside of your school building, including online interactions? If so, describe your interactions. Helpful? How?
20. Have you added or are you continuing with activities (hobbies, meetings, free-time spent, etc.) not linked to school? What role do these play in your life?
21. How do you find each of the below impacting your teaching?
   a. Building
   b. District
   c. State
   d. National
22. Have you faced any new difficulties (challenges or concerns)? If yes, can you elaborate? If no, what are some of the challenges that you foresee?
   a. How did you work through this situation?
   b. Who did you talk to about the situation?
   c. Do you seek help from or talk about this with another colleague, school management or another new teacher?
   d. If yes, what is the advice they give you? How do you find their advice?
   e. Did you use any other resources?
   f. Was the situation resolved?
23. What difficulties do you continue to face every day? Are you working to resolve these ongoing difficulties? (If so, how?)
24. Does any difficulty or continue to disturb you more than others? Why?
   a. Have you tried to resolve it? If yes, how? If no, why not?
   b. Do you prefer to deal with it on your own?
25. If you face difficulties, in teaching, to whom would you go in this school?
26. If you face difficulties, in classroom management, to whom would you go in this school?
27. Describe how classroom management and discipline now impact your job.
28. Are there difficulties you did not anticipate?
29. Is there something you feel could have better prepared you or supported you regarding such difficulties?
30. Who did you talk to or what do you do when:
31. you have a bad day at school?
32. you need to solve a conflict at school?
33. you want help designing a math or science lesson?
34. you want to better understand subject matter?
35. you have a conflict with a parent?
36. How confident do you feel about teaching subject content?
37. Was it what you expected? Are you comfortable with your current workload?
38. How well did your preparation experiences work to set you up for success as a teacher?
39. What do you feel prepared you most for teaching secondary science and why was this helpful?
40. What does teaching mean to you?
41. What does teaching science mean to you?
42. What do you feel is the main role for a secondary science teacher?
43. What factors have facilitated your resilience as a first year teacher?
44. What about secondary science teaching makes you as interested as you are? And what about secondary science teaching prevents you from being more interested?
45. Is there something that could change about teaching secondary science that would increase your interest level?
46. As a secondary science teacher, what things do you consider to be the most important?
47. To what extent do you feel free to do (above) more-or-less as you think best?
48. How would you describe the social status of a secondary science teacher?
49. Do you feel teacher’s salaries and benefits are appropriate for their job?
   a. are you considering any major purchases or expenses (home, car, etc.)?
50. Do you see teaching science as a long-term career path? Explain
51. What did you learn about secondary science teaching as you have been teaching that you didn't already know?
52. What areas of teaching science provide you with satisfaction? Please describe this feeling and the thoughts that accompany it?
53. Are you currently interested in continuing to teach science next year?
54. If there is anything you could change about your job, what would that be, and why?
55. Where do you see yourself in 5, 10, and 15 years?
### Appendix F: Observation Protocol

**Observation Form**

**Map of Setting**

- **Field Notes**
  - Date: ________________
  - Time: ____________ to ____________
  - Observer: ________________
  - Participant: ________________
  - Setting/Location: ______________________
  - Type: ______________________
  - Issues: Mentorship, Induction, Challenges, Successes, Professional Development, Resilience, Retention

- **Emergent Issues:**
  - ________________________________
  - ______________________________________

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<th>Notes:</th>
<th>Observations:</th>
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Appendix G: General Participant Information Form

Please clearly print.

Name: ____________________________ School: ___________________________/Rm: ________

Best contact phone: ____________________ Best Time(s) to call: ____________________

Email: ______________________________ Planning time: ____________________

Subjects Assigned to Teach: ____________________

Schedule: block or traditional

1. What science courses did you take in high school?

2. What college or university science courses have you taken?

3. What informal science experiences have you had? (Examples: summer camps, work experience).
Appendix H: Between Interviews Protocol

A. _____ Organize **follow-up, clarifying, or emergent line questions** for each participant.  
   (date when done for interviews 1-3 and observation)

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B. _____ **Member Check** - Provide the interviewee with a copy of the transcript of previous interview.
   (date when done for interviews 1-3)

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C. _____ Gain data regarding any **induction program**
   a. _____ district
   b. _____ school building

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   c. _____ department

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D. _____ Are there any organized support structures available to beginning science teachers?
   a. _____ district
   b. _____ school building
      Name
      _____ Participant ____________
      _____ Participant ____________
      _____ Participant ____________
      _____ Participant ____________
      _____ Participant ____________
   c. _____ department
      Name
      _____ Participant ____________
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      _____ Participant ____________
      _____ Participant ____________

E. _____ Mandated assessments
   a. _____ state
   b. _____ district
   c. _____ school
      Name
      _____ Participant ____________
      _____ Participant ____________
      _____ Participant ____________
      _____ Participant ____________
      _____ Participant ____________

F. _____ Teacher’s schedule (preparations, level, and student numbers) and workload (extracurricular, outside employment).
      Name
      _____ Participant ____________
      _____ Participant ____________
      _____ Participant ____________
      _____ Participant ____________
      _____ Participant ____________
      _____ Participant ____________
G. ______ Education news (state, county, school newsletters)

   Name
   _____ Participant school’s newsletter mailing list ____________
   _____ Participant school’s newsletter mailing list ____________
   _____ Participant school’s newsletter mailing list ____________
   _____ Participant school’s newsletter mailing list ____________
   _____ Participant school’s newsletter mailing list ____________

H. ______ Observe faculty or department meeting, classroom, teaching, etc.

   Name
   _____ Participant ____________
   _____ Participant ____________
   _____ Participant ____________
   _____ Participant ____________
   _____ Participant ____________
   _____ Participant ____________
Appendix I: Concept Map

Name: ___________________________     Date: ______________

Design a concept map to indicate the people, groups, activities, or any areas from which you expect to draw support in your professional journey this year. You may wish to start by placing your circled name in the center of the paper. Link these to names, groups, or short descriptions of all people, activities, etc. you believe served a supporting role. If possible and in limited terms, describe the type of support from each (procedural, emotional, etc.). As well as those with whom you work, you may include family, friends, hobbies, etc. if they apply. Use lines to indicate the connection to support. Use a thick line to indicate a significant degree of support and a dotted line to indicate limited support.
Appendix J: School District Approval Letter

David Thornton

July 18, 2016

Re: Experience of the Neophyte Science Teachers: Through Their Eyes

Dear Mr. Thornton:

The Office of Assessment, Accountability, and Evaluation through the Research Review Board at the [School District Name] has approved your request to conduct research. Your research activities are effective from July 18, 2016 through May 31, 2017. Should you desire to continue your research efforts beyond the aforementioned period, you must submit a request for an extension and a written project update no later than April 30, 2017. Any significant changes or amendments to the procedures or design of this study must be approved by resubmitting a request for research that clearly identifies methodological changes.

In the interest of continued research benefits and the coordination of research interests, please mail one copy of your finalized research product and a one-page executive summary for our research webpage at the conclusion of your study. This information, and any other relevant information you may have, will be filed in our research library and added to the annotated listing of research projects. We look forward to reading the results of your study and any suggestions they may offer toward improving the educational process in our school district.

If you have any questions, or if I can be of any further assistance, please contact me at [Contact Information].

Best wishes on your research endeavors.

[Signature]

Office of Assessment, Accountability, and Evaluation, & Research

Our Mission: to provide a high quality education for all students
Appendix K: University Institutional Review Board

August 11, 2016

David Thornton
Teaching and
Learning Tampa, FL  33612

RE: Expedited Approval for Initial Review
IRB#: Pro00026562
Title: Experience of the Neophyte Science Teachers: Through Their Eyes

Study Approval Period: 8/11/2016 to 8/11/2017

Dear Mr. Thornton:

On 8/11/2016, the Institutional Review Board (IRB) reviewed and APPROVED the above application and all documents contained within, including those outlined below.

Approved Item(s):
Protocol Document(s):
IRB Research Protocol

Consent/Assent Document(s)*:
Consent Form Adult Minimal Risk.pdf

*Please use only the official IRB stamped informed consent/assent document(s) found under the "Attachments" tab. Please note, these consent/assent document(s) are only valid during the approval period indicated at the top of the form(s).

It was the determination of the IRB that your study qualified for expedited review which includes activities that (1) present no more than minimal risk to human subjects, and (2) involve only procedures listed in one or more of the categories outlined below. The IRB may
review research through the expedited review procedure authorized by 45CFR46.110. The research proposed in this study is categorized under the following expedited review category:

(5) Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis).

(6) Collection of data from voice, video, digital, or image recordings made for research purposes.

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval via an amendment. Additionally, all unanticipated problems must be reported to the USF IRB within five (5) calendar days.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

Kristen Salomon, Ph.D., Vice Chairperson
USF Institutional Review Board
Appendix L:

Certificate of Completion

David Thornton

Completed USF IRB Student Researcher Workshop

on Tuesday, September 01, 2015

USF
UNIVERSITY OF SOUTH FLORIDA
Certificate ID#: 60274
Appendix M: ETD Workshop Letter of Completion

OFFICE OF GRADUATE STUDIES

ELECTRONIC THESIS & DISSERTATION WORKSHOP

CERTIFICATE OF COMPLETION

Student Name: David Thornton

Date: February 1, 2017
Time: 2:00pm
Location: TECO Room

Thank you for attending the Office of Graduate Studies Electronic Thesis and Dissertation Workshop. This letter will serve as a Completion letter if your department or college requests proof of attendance.

Please be sure to bookmark the ETD Resource Center website (http://www.grad.usf.edu/ETD-req-main.php), as it has all of the information covered in the workshop along with the specific formatting requirements - complete with examples and instructions.

If you have any questions, feel free to email us at etd@grad.usf.edu.

Best,

Matthew Cordner
Administrative Specialist
Electronic Thesis & Dissertation
Appendix N: Initial Listing of Codes/Categories

Initial Listing Based on the Review of Literature

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<thead>
<tr>
<th>Code/Category</th>
<th>Qualifiers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal Induction Program</td>
<td>TIPS, Assigned Mentor (district or school)</td>
</tr>
<tr>
<td>Science Experience</td>
<td>Working in Science</td>
</tr>
<tr>
<td>Values Beliefs</td>
<td>Expressing values or beliefs</td>
</tr>
<tr>
<td>Stress</td>
<td>Concern regarding or actual, Workload</td>
</tr>
<tr>
<td>Teaching</td>
<td>The role of teaching should be____</td>
</tr>
<tr>
<td>Teaching Science</td>
<td>Beliefs about teaching science</td>
</tr>
<tr>
<td>Bureaucracy</td>
<td>State and District Level</td>
</tr>
<tr>
<td>Path to Teaching Science</td>
<td>Certification Path, Family Background, Influential others toward science</td>
</tr>
<tr>
<td>Financial</td>
<td>Going for a high need area in order to gain a position/job</td>
</tr>
<tr>
<td>Motivation</td>
<td>Enjoyment of students, teaching, and give back to society, Reason for teaching, Love for Science</td>
</tr>
<tr>
<td>Coping Strategy</td>
<td>Religion, Athletics/Hobbies</td>
</tr>
<tr>
<td>Support</td>
<td>Familial Support, Friends, Colleagues, Church, Those with whom participant experienced student teaching</td>
</tr>
</tbody>
</table>

Final Listing Based on the Iterative Study
## Appendix O: Final Listing of Codes/Categories

<table>
<thead>
<tr>
<th>Code System</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theme 1 description of 1st year exp</td>
<td>How do today's novice science teachers describe their first year teaching experiences?</td>
</tr>
<tr>
<td>Theme 2 first yr change in feelings</td>
<td>How do novice teacher's feelings about being science teachers change during their first year of teaching?</td>
</tr>
<tr>
<td>Theme 3 description of success</td>
<td>How do beginning science teachers describe their successes?</td>
</tr>
<tr>
<td>Theme 4 today's challenges</td>
<td>What challenges do today's beginning science teachers face?</td>
</tr>
<tr>
<td>Unique Emergent Lack of Respect for Schooling</td>
<td>Lack of Respect for Schooling?????</td>
</tr>
<tr>
<td>Bureaucracy</td>
<td>State and District Level Building Administration</td>
</tr>
<tr>
<td>Culture n Context</td>
<td>Department, School, District, or Community Culture</td>
</tr>
<tr>
<td>Coping Strategy</td>
<td>Religion, Athletics/Hobbies</td>
</tr>
<tr>
<td>Discipline</td>
<td>Classroom management, Discipline issues</td>
</tr>
<tr>
<td>favorite subject</td>
<td>Learning along the way. While teaching.</td>
</tr>
<tr>
<td>Filling the basket as you go</td>
<td>Going for a high need area in order to gain a position/job</td>
</tr>
<tr>
<td>Financial</td>
<td>TIPS Assigned Mentor (district or school)</td>
</tr>
<tr>
<td>Influential Other(s)</td>
<td>Admired, Respected or even negatively influential person(s)</td>
</tr>
<tr>
<td>Mentor</td>
<td>Informal or Formal</td>
</tr>
<tr>
<td>Motivation</td>
<td>Enjoyment of students, teaching, and give back to society Reason for teaching Love for Science</td>
</tr>
<tr>
<td>Path to Teaching Science</td>
<td>Certification Path, Family Background, Influential others toward science</td>
</tr>
<tr>
<td>Personality</td>
<td>type of person</td>
</tr>
<tr>
<td>Plans</td>
<td>Future Plans</td>
</tr>
<tr>
<td>Professional Development or Lack Of</td>
<td>Professional Development, Teacher expressed needs</td>
</tr>
<tr>
<td>Science Experience</td>
<td>Working in Science</td>
</tr>
<tr>
<td>Self-identification</td>
<td>Participant's focus on traits of self.</td>
</tr>
<tr>
<td>Stress</td>
<td>Concern regarding or actual Workload</td>
</tr>
<tr>
<td>Students</td>
<td>Relationships with Unique experiences with General comments on</td>
</tr>
<tr>
<td>Support</td>
<td>Familial Support, Friends, Colleagues, Church, Those with whom participant experienced student teaching OR a lack of support</td>
</tr>
<tr>
<td>Job support</td>
<td></td>
</tr>
<tr>
<td>Family/friends support</td>
<td></td>
</tr>
<tr>
<td>Teaching</td>
<td>The role of teaching should be</td>
</tr>
<tr>
<td>Teaching Science</td>
<td>Beliefs about teaching science</td>
</tr>
<tr>
<td>Values Beliefs</td>
<td>Expressing values or beliefs</td>
</tr>
<tr>
<td>Workload</td>
<td>Preparations, Amount of Planning Time,</td>
</tr>
</tbody>
</table>

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## Appendix P: Themes Worksheet

| Theme 1: How do today’s novice science teachers describe their first year teaching experiences? |
| Theme 2: How do novice teacher’s feelings about being science teachers change during their first year of teaching? |
| Theme 3: How do beginning science teachers describe their successes? |
| Theme 4: What challenges do today’s beginning science teachers face? |
Appendix Q: Analysis Notes Worksheet

Code Letters for This Case: _______
Case Study Report Title: ________________

Analyst’s Synopsis (possibly identifying the case, the sites, the activity, key information sources and contest information):

Situational Constraints:

Uniqueness among Other Cases:
Prominence of Theme 1 in This Case:
Prominence of Theme 2 in This Case:
Prominence of Theme 3 in This Case:
Prominence of Theme 4 in This Case:

Expected Utility of This Case for Developing Theme 1:
Expected Utility of This Case for Developing Theme 2:
Expected Utility of This Case for Developing Theme 3:
Expected Utility of This Case for Developing Theme 4:

Conceptual Factors (for Track III):

Findings:
I.
II.

Possible Excerpts for the Multicase Report (noting case report and page number):

Commentary (sometimes noting case report page number):
## Appendix R: Ratings of Expected Utility

<table>
<thead>
<tr>
<th>Utility of Cases</th>
<th>Case</th>
<th>Case</th>
<th>Case</th>
<th>Case</th>
<th>Case</th>
<th>Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Multicase Themes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theme 1: How do today’s novice science teachers describe their first year teaching experiences?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theme 2: How do novice teacher’s feelings about being science teachers change during their first year of teaching?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theme 3: How do beginning science teachers describe their successes?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theme 4: What challenges do today’s beginning science teachers face?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Added Multicase Themes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theme 5</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Theme 6</td>
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</tr>
</tbody>
</table>

H = high utility (case appears one of the most useful for developing this theme; M = medium utility; L = low utility; Themes can be added or modified as late as the beginning of the multicase analysis. Descriptions of each theme can be attached to this worksheet, so that the basis for estimates can be readily examined.
Appendix S: Matrix for Generating Theme-Based Assertions

<table>
<thead>
<tr>
<th>Merged Findings</th>
<th>From Which Cases?</th>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merged Finding I</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Merged Finding II</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Merged Finding III</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Merged Finding IV</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Merged Finding V</td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>Merged Finding VI</td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>Merged Finding VII</td>
<td></td>
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<tr>
<td>Merged Finding VIII</td>
<td></td>
<td></td>
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<tr>
<td>Merged Finding IX</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Finding I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Finding II</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Finding III</td>
<td></td>
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<tr>
<td>Etc.</td>
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<td></td>
</tr>
</tbody>
</table>

Findings are Case-Based, not Theme-Based. From an entry in a cell at the intersection of a Merged Finding with a Theme comes impetus to compose an Assertion. H = high importance; M = middling importance; L = low importance. A high mark means that for this Theme, the Merged Finding or Special Finding is of high importance. Parentheses around an entry means that it should carry extra weight when Assertions are being drafted. The notation “ATYP” (atypical) within a cell means that its situation warrants caution in drafting an Assertion as it may appear more unique to an individual case. The strength of relative case contribution to the merged finding can be indicated by increasing the repetition of the case identification in the second column. Special Findings are findings limited to appearance in one case but judged to be of importance. Columns for Themes allow for rating the relative importance for support to each Theme, Research Question.
## Appendix T: Multicase Assertions

<table>
<thead>
<tr>
<th>Designator</th>
<th>Assertions</th>
<th>Related to Which Themes of Factors?</th>
<th>Evidence, Pursuasions, Reference in Which Cases?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Commentary (other important points to make about the Quintain, possibly regarding a finding from a single case, possible speculations from insufficient evidence)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Assertions designated with simple numbers are direct (non-rating) entries by the analyst. Assertions designated with CCA are from the regular cross-case rating procedure. Assertions designated with BYP are from the special (“bypass”) cross-case rating procedure. The lower portion of this worksheet is used to note comments extending the understanding of novice science teacher induction.