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A PHENOMENOLOGICAL STUDY OF THE PERCEPTIONS AND EXPERIENCES OF
SEVEN URBAN MIDDLE SCHOOL SCIENCE TEACHERS RELATED TO RETENTION

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Education in Curriculum and Instruction
in the Department of Teaching and Learning
in the College of Education
at the University of Central Florida
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ABSTRACT

Background: Job satisfaction is essential to retain teachers in classrooms. Increased challenges in today's classrooms discourage many teachers from reaching veteran status. Teachers with a perception that they are making a difference appear to have more resilience in the difficult times in their classrooms.

Purpose: To investigate the experiences of middle school science teachers. This study explored the influence of perceptions, beliefs, and experiences on job attrition and teacher satisfaction; and helps explain the cumulative effects that contributed to teachers' dissatisfaction. This study analyzed the intensification of the teaching profession and the increased emotional stress this causes for teachers.

Setting: Five public middle schools in a large urban school district in central Florida. A total of seven teachers participated in the study.

Subjects: Seven middle school science teachers were selected based on their years of experience, method of teacher training, and ability to participate in the entire study.

Research Design: Phenomenological.

Data Collection and Analysis: The data were collected through focus groups, interviews, journals, and classroom observations. The audio-taped portions were transcribed then

analyzed with NVivo/NUD*IST, Revision 1.2 to find common themes. The initial themes were subsequently reduced for manageability. The teachers stories were separated to provide support as the themes emerged.

Findings: Teachers who were more experienced by years on the job or more extensive initial training appeared to have more resilience for the difficulties in their job. Satisfaction with their job seemed to be influenced by professional identity, teacher preparation, personal experiences, curriculum policy, and cultural diversity.

Conclusions: Analyzing the perceptions and beliefs of teachers who are in classrooms can provide insights to improve conditions to encourage teachers to stay. The analysis strongly suggests that teachers who feel supported and valued are more likely to remain in the classroom in spite of the challenges they encounter.

This study is dedicated to my children, Miranda and Tyler, who give me encouragement and inspiration. They remind me to play so the work is more enjoyable.

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LIST OF ACRONYMS/ABBREVIATIONS

- ACP- Alternative Certification Preparation
- ADHD- Attention Deficit Hyperactivity Disorder
- BLOG- World Wide Web log, journal
- CEP- Community Education Partner
- CRT- Critical Race Theory
- DHH- Deaf, Hard of Hearing
- ELL- English Language Learner
- ESE- Exceptional Education Student
- ESOL- English as a Second Language
- FCAT- Florida Comprehensive Assessment Test
- IDEA- Individuals with Disability Education Act
- IRB- Internal Review Board
- NCLB- No Child Left Behind
- NVIVO- NUD*IST Software for qualitative data analysis
- QDA- Qualitative Data Analysis
- SCAT- Science Comprehensive Assessment Test
- SSS- Sunshine State Standards
- TCP- Traditional Certification Preparation
- TIMSS- Third International Math and Science Study
- TPPI- Teachers' Pedagogical Philosophy Interview

CHAPTER 1: INTRODUCTION

Job satisfaction is essential to retain teachers in classrooms. Increased challenges in today's classrooms discourage many teachers from reaching veteran status. In recent years, keeping science educators in classrooms has become increasingly difficult. Ingersoll (2001) concluded from the Schools and Staffing Survey, and its supplement, Teacher Follow-up Statistics (National Center for Educational Statistics [NCES], 1996), which were both administered to teachers who were leaving the classroom, that there were increased challenges in classrooms that many teachers had not been trained to address. Finding out the experiences and perceptions of teachers while they remain teaching helped reveal the changes needed to create positive perceptions of their classroom practice and satisfaction with their education career (Ingersoll, 2001).

The information from surveys provided information for Ingersoll's (2001) research. The detailed explanations of what teachers experience within their classrooms could not be understood from quantitative studies. Using the phenomenological methodology provided understanding of the participant within their surroundings (Moustakas, 1994). To grasp the reasons for teachers' determination to continue teaching required insight into their everyday lives. The perceptions and experiences from their daily successes and challenges impacted teachers' decisions to stay in their classrooms (Valli & Buese, 2007).

Understanding the reasons for the overwhelming difficulties faced by middle school science teachers was essential in order to find ways to give support and encouragement (Keys, 2005). Teachers' personal backgrounds, experiences, and beliefs during preparation for teaching as well as the daily events in their lives, influenced their classroom practice (Smith, 2005). The way teachers regard their experiences forms the basis for their teaching practice (Goodson,

Moore, & Hargreaves, 2006). Some veteran teachers expressed a deep sense of instability similar to grief as they coped with significant changes in education (Fullan, 1991). Teachers equate increased diversity in students with more challenges in the classroom (Goodson et al., 2006).

More students come from single-parent homes, have less support, need to learn English as their second language, and struggle with attention and behavior issues (Goodson, Moore, & Hargreaves, 2006). Teachers' experiences have been influenced by these changes in the student body. Ultimately, they have forced changes in instructional practices and resulted in increased stress on teachers (Lumpe, Haney, & Czerniak, 1998).

Statement of the Problem

The shortage of science teachers in schools is the result of the cumulative difficulties teachers face on a daily basis. Many teachers perceive they will enter their classroom and help their students be successful. However, when teachers face constant roadblocks, they become discouraged and leave the profession (Ingersoll, 2002).

Teachers in each subject area experience challenges to be effective. However, science teachers have added pressure for success. Conducting inquiry labs is required by curriculum policy yet the situations within classrooms can create insurmountable challenges for even the most experienced teachers (Stephenson, West, Westerlund, & Nelson, 2003). A classroom may appear to be adequate for optimal learning to occur but science classrooms need special equipment in addition to the general class configuration. Specific desks or tables, sinks or hoods, safety goggles, showers and fire blankets help complete a safe science classroom.

Providing an atmosphere where every student can learn is the goal of teachers. Every teacher enters the profession with preconceived ideas that form her initial perceptions about

learning (Watters & Ginns, 1995). As teachers gained experience their perception changed. The epistemological beliefs permeate teachers' practice on a subconscious level (Schommer-Aikins, 2004). Professional identity, teacher preparation, personal experiences of vulnerability, curriculum policy influences and cultural diversity have a significant impact on the perceptions of teachers' beliefs about teaching. The perceptions lead to modification in their teaching practice (Goodson et al., 2006). As a result, many teachers enter classrooms each year but not many stay to transition through the stages of novice, mid-career and veteran teacher (National Science Teachers Association, 2000).

Purpose of the Study

The purpose of this phenomenological study was to investigate the experiences of middle school science teachers. This study built on and contributed to earlier studies on job attrition and teacher satisfaction (Ingersoll, 2002; Gu & Day, 2007). Although earlier studies have examined teacher attrition, they did not explain the cumulative effects that contributed to teachers' dissatisfaction (Darling-Hammond, 2007). As such, this study provided additional insight into the daily experiences of teachers. This study analyzed the intensification of the teaching profession and the increased emotional stress this causes for teachers.

Conceptual Framework

The conceptual framework of quantitative research is determined prior to the study. In the current study the basis for the framework emerged as data was collected. The goal of the study was to understand the experiences of teachers. Prior to hearing their perceptions and explanations of why they remain in classrooms there was no way to clearly define the conceptual framework.

The daily experiences of seven middle school science teachers were explained through multiple methodologies. The teachers selected for study ranged from first year novice to tenth year veteran in the classroom. Participants shared their perceptions of their past and current teaching experiences. The stories they shared revealed that experiences and beliefs influenced their perceptions and their teaching practice.

Research Question

The qualitative phenomenological research question guiding the study was: How do middle school science teachers in a large urban school district perceive and describe their teaching experiences related to retention?

Design of the Study

The design of the qualitative phenomenological research study utilized techniques to describe the experiences of seven middle school science teachers and their classroom practices impact on retention. The perceptions of individual teachers described through focus groups, interviews, journals, and observations were designed to give details and expand on the claims found in prior literature about teacher experiences.

Justification

Qualified science teachers appeared to be in short supply, but in reality, they may have left jobs because they were dissatisfied with the working conditions in schools (Ingersoll, 2002). Ingersoll completed extensive research utilizing the Schools and Staffing Survey and its supplement, Teacher Follow-up Statistics (NCES, 1996). Ingersoll's work scrutinized the reports teachers gave when they exited the teaching profession. Although there were rich insights about trends in the field of education provided in the Schools and Staffing Survey,

qualitative studies were needed to explain why individual teachers left the classroom (Ingersoll, 2002).

The advantage of qualitative phenomenological research was the ability to add to the description of the complete picture of a situation (Moustakas, 1994). Since each individual teacher's stories were complex, it was essential to look at their overall experiences as a group. Unlike the broad generalizations that could be made based on responses from a large population, qualitative research was designed to focus on individuals. The comprehensive descriptions of individual teachers with unique challenges provided a rich data set which was best explained by qualitative methods. The focus was on the differences and the uniqueness of each classroom. After contemplating the choices of experimental, survey and other types of data gathering, it became clear that in an effort to get the true stories of today's science educators the qualitative phenomenological approach would prove most effective.

Phenomenological research methods regard perceptions as the primary source of knowledge (Moustakas, 1994). Listening to the voices of teachers in the classroom provided significant data to understand the broad range of experiences found in many classrooms. Improving the situations which science educators find difficult will lead to increased retention of teachers and improved school performance (Ingersoll, 2002).

Assumptions of Study

The current study assumed that the seven teachers would be comfortable using electronic communication (i.e. e-mail) to share their thoughts and perceptions about their jobs. Presumably, the information in their interviews, journals and the classrooms observed, were similar to a typical day. The teachers shared authentic experiences that were common to their encounters on a daily basis.

Limitations of the Study

The teachers in the study were not representative of all central Florida middle school science teachers within one Florida school district. However, their stories added to the theoretical understanding of what teachers' today experience. The teachers were selected based on their willingness to share their stories and remain contributors to the study until the end. The participants were all middle school science teachers. High school teachers were invited to participate but most were not willing to commit their time to what they perceived as a long-term project. Teachers had issues with computers and scheduling conflicts for the interviews. For some, maintaining a journal meant limited responses. The focus group format posed some limitations for some teachers who were insecure about sharing their thoughts in a group.

The interviews were semi-structured, with forty (40) questions but it was hard to know which questions would inspire the teachers to tell their stories. Time limitations were needed to avoid undue stress on working teachers, but the attempt to elicit deep responses from the teachers with only one hour often seemed rushed.

Individual phone interviews were audio-taped, and subsequently transcribed and interpreted by the researcher. The researcher worked to accommodate the teachers' schedules, but there were still interruptions from children at home or someone needing to use the phone. The teachers' honesty was assumed. The population of the study was small so it may not be generalized to other teachers.

Definition of Key Terms

Through the use of focus groups, interviews, journals and classroom observations, the researcher created a detailed picture of the phenomenon of a select group of science educators. The teachers were identified based on their level of experience and a pseudonym.

Novice teachers: Novice teachers were new to the field of teaching. They were ready to begin their first to third year of teaching. They may or may not have had student internship experience.

Mid-career teachers: Mid-career teachers were experienced, having taught for four to six years.

Veteran teachers: Veteran teachers were experienced in the classroom. For the study, any teacher who had completed seven years of teaching was considered to be a veteran.

Traditional Certification Preparation (TCP): Teachers with the college education courses and a formal internship prior to their first year of classroom teaching.

Alternative Certification Preparation (ACP): Teachers who taught with a college degree, not in education, and a temporary certificate. They were enrolled in education courses while they were teaching.

Overview of Dissertation

Chapter one established the need for qualitative phenomenological research to reveal the experiences of middle school science teachers and their practice. An introduction, a statement of the problem, purpose of the study, research question, research design, justification, assumptions, limitations, and definitions of terms used throughout the dissertation was provided. In chapter two, a review of the literature and research in the field was stated. Chapter three presented the methodology as well as the rationale for the choice of method, data collection process, instruments used, and a summary of data analysis procedures. Chapter four described the teachers' perceptions of their experiences. Chapter five gave the implications of the study and recommendations for future research.

CHAPTER 2: REVIEW OF LITERATURE

Introduction

Institutes of higher education are preparing students to become K-12 teachers in a variety of disciplines and at a variety of grade-levels, but the greatest challenge may be in their retention. Today's teacher shortage is often blamed on colleges of education but there is inadequate attention given to teachers' experiences in schools. According to Brunetti (2001), the trend for 25 to 50% of novice teachers is to resign during the first three years of teaching. One area of greatest need in K-12 teaching is science (NSTA, 2000). Since the demand for science teachers has increased, the process for recruitment has been modified to expedite preparation to fill every opening. Many of today's teachers are being recruited out of the workforce (Suell & Piotrowski, 2006). In this chapter the connection will be made between recruiting teachers of both TCP and ACP training and their subsequent experiences.

This study builds on and contributes to earlier studies on job attrition and teacher satisfaction (Ingersoll, 2002; Gu & Day, 2007). The theoretical insights from Apple and Hargreaves provide underpinnings for the current study's examination of the intensification of the teaching profession and the increased emotional stress this causes teachers. Studies in teacher attrition have identified some of the reasons teachers leave the profession, but little analytic attention has been paid to the underlying daily experiences with which teachers cope. I address this issue by studying the cumulative effects of the stress, particularly on teachers' beliefs about their ability to find satisfaction in their career.

Professional identity

All teachers, but especially novice teachers have huge demands, and too little support. Experienced teachers have increased expectations and extensive professional development, but their expertise is ignored. When teachers walk into a classroom for the first time they bring their own history and culture from past classrooms. They also bring the memories of their days spent as students, which provide the foundation for what novice teachers expect to experience as classroom teachers (Smith, 2005). Gradually, the novice teachers recognize the school where they teach is very different than the ones they attended. Their schema impacts their perceptions of the situation. Also, adding to the complexity of understanding teaching is the influence brought about by the federal, state, and local reform policies.

Teachers' complaints from the Schools and Staffing Survey and its supplement, the Teacher Follow-up Statistics (NCES, 1996), show that teachers who leave the profession do so primarily because of low pay, student behavior problems, the lack of teacher input, and poor support from administration. Thus again it is evident that the climate in schools has a significant impact on teachers (Day, Kingston, Stobart & Sammons, 2006).

The role of teachers' "capacities to sustain their commitment (i.e. resilience)" was examined (Gu & Day, 2007, p.1306). A study with 300 teachers, of varying years of experience, over a four year period, found a connection between teachers' personal and professional identities. Teachers were subject to a variety of challenges from personal health, family demands, policy changes, and social influences; this also led to their relative stability/instability of their identities (Gu & Day).

Teacher resilience may play a role "in enabling teachers to respond positively to challenging circumstances which they may meet over the course of a career" (Gu & Day, 2007,

p.1302). The three areas influencing teacher resilience were: 1.) personal (related to their lives outside school; 2.) situated (related to their lives in school); and 3.) professional (related to their values, beliefs and the interaction between these and external policy agendas). Teachers experienced constant change as the events of one area of their lives impacted the others. Using interviews and performance tests for students enabled Gu and Day to gather extensive data.

Researchers (Valli & Buese, 2007) also found teachers have a more intensified workload than ever before because of the demands of new policies and student diversity. Daily experiences with co-workers, students, and administrators also influence the beliefs of teachers; novices who have positive experiences are more likely to remain in teaching (Darling-Hammond, 2007, Ware & Kitsantas, 2007). Teachers desire to make a difference in society, a concept Erikson (1963) termed generativity (Newman & Newman, 1995).

According to the 2000 National Science Teachers Association (NSTA) study, teachers would be more likely to stay in education if working conditions such as intense regulations and lack of teacher input on decisions improved. Science educators who are committed to helping provide a caring, safe, and stimulating environment for students have reported they cannot continue to stay in education because the working conditions are too difficult for them (Mangrubang, 2005).

Science teachers in Florida have been forced to give up teaching time for additional curricula that are valuable for students but shortchange the science instruction, which poses another potential setback for teachers (Weaver, 2007). In the early days of the Florida Comprehensive Assessment Test (FCAT), only reading, writing, and mathematics were tested, resulting in a curriculum that excluded science education entirely in lower grades (Dillon, 2007). Middle and high school science teachers were required to incorporate reading lessons and math

reviews into their class schedule (Weaver). Science is now included in the testing cycle, (the Science Comprehensive Assessment Test or SCAT), so science teachers spend time creating and conducting review lessons to prepare students for the actual test. Again, while the curricula are beneficial for the students who are required to pass these tests for graduation, teachers are pressured to juxtapose this instruction in addition to their regular lesson plans, all without much outside guidance and support.

Teachers have also regularly cited difficulty finding the supplies and equipment needed for conducting science classes (Keys, 2005). One study showed that teachers claimed their lessons were modified to include less hands-on activities because of a lack of time and resources for planning and carrying out the lessons (Keys). However, as Keys analyzed primary and secondary science teachers in Australia, he focused on the teachers' expressed beliefs and their practices. Since teachers' beliefs are reinforced by experiences, Keys found that teachers tended to validate their actions within their classroom and blame systemic issues for their practice not matching their expressed beliefs. Although teachers claimed they lacked resources for lessons, the materials were available on campus but had never been sought out. Failure to consider all the elements that factor into what a science teacher does creates obstacles in being able to address the actual problems (Odom, Stoddard, & LaNasa, 2007).

A science classroom requires specific tools to engage learning (Hoff, 2003). Since these tools are generally expensive, schools often modify classrooms that have previously been used for teaching another subject instead of beginning construction on a new building. While classrooms can pass code regulations, the often makeshift adjustments do not provide the same ease with which to teach that a classroom designed with science courses in mind would. Sometimes classrooms operate without the proper safety equipment (Hoff). Middle school

science teachers teach a broad spectrum of subjects from life science to physical science. Each science classroom needs specific equipment designed for each type of science. Some need dissecting kits, Bunsen burners, scales, and lab tables, rather than individual desks.

Science classrooms must also be adapted for physically impaired students. Along the same lines, students with behavior issues can cause more than distractions; in less than ideal classroom setups, they can cause injury to themselves or other students (Stephenson et al., 2003). Classrooms at new schools or new teachers at an established school are often without needed equipment and supplies which diminish their ability to conduct certain lab experiences (Stephenson et al.).

Teacher preparation

Teaching is a profession that requires considerable apprenticeship and learned skill to perform well (Darling-Hammond & Berry, 2006). It takes more than “someone with a bachelor’s degree, a high SAT verbal score, and a clean arrest record” (Ferrero, 2005). Good teachers need content knowledge and an ability to manage a classroom and design lessons that promote learning for a diverse mix of students (Darling-Hammond, 2007).

The preparation methods of teachers impact their success in the many challenges they face (Darling-Hammond, 2007). The novice teacher’s struggle to maintain a productive classroom environment is heightened in science classes and impacts the science teacher’s effectiveness. Even if a teacher believes in collaboration and constructive learning, chaos and dysfunction often results from the stress of managing the complex dynamics of large numbers of students moving in multiple directions with constant talking and potentially dangerous materials (Stephenson et al., 2003). The ability to cope with these challenges can be the determining factor of why some teachers are successful (Cochran-Smith, 2004).

The traditional certification preparation (TCP) includes teachers who have taken the required college courses in education and have participated in a supervised internship. During these experiences, a foundation begins to form which influence beliefs of novice educators (Watters & Ginns, 1995). The TCP curriculum is designed to nurture and support beginning teachers as they gain historical background of teaching along with the current research on best practices (Keys, 2005). In the absence of these preparations, teachers who are hired to teach will walk into the classroom with perceptions based on their experience as students or helpers in a classroom (Humphrey & Wechsler, 2007). Alternative Certification Preparation (ACP) teachers have beliefs based on little understanding of historical foundations of education principles (Darling-Hammond, 1990). ACP teachers may lack the basic understanding of pedagogy and curriculum (Darling-Hammond).

Some researchers argue that the content knowledge of ACP is not as extensive as one from the traditional preparation (Miller, McKenna, & McKenna, 1998). However, some studies show that ACP teachers are more diverse in age and background experiences and bring a different kind of expertise to the classroom (Barnes, Salmon, & Wale, 1989). Researchers (Andrew & Schwab, 1995; Lutz & Hutton, 1989 and Stoddart, 1992) conclude that traditionally trained teachers are more likely to stay in teaching than the ACP teachers. The type of preparation for ACP teachers may influence the success of these teachers; those with good support and staff development opportunities may eventually equal the traditional teacher in effectiveness (Miller et al., 1998). Some programs include various forms of mentoring to support new teachers (Loeb, Darling-Hammond, & Luczak, 2005).

The certification method of teachers, TCP or ACP, influences the beliefs they currently have entering the classroom and the experiences they will have (Darling-Hammond, 2007). For

TCP teachers there are education courses prior to taking jobs as full-time teachers. ACP science teachers begin teaching before they start the district program developed to help accelerate the process of getting teachers into classrooms (Suell & Piotrowski, 2006). The school district programs are designed to help novice teachers in classroom management and the creation of lesson plans (Suell & Piotrowski).

Most teachers who participate in these ACP programs already have a bachelor's degree and a teaching job within a school district. They are a unique kind of beginning teacher (Humphrey & Wechsler, 2007) as they may have diverse life experience but usually possess limited understanding of pedagogy or curriculum (Darling-Hammond, 2007). Although ACP teachers will, in many cases, eventually be taught the fundamentals of pedagogy and curriculum, they will begin their careers without the knowledge (Darling-Hammond, 2007). Designing a curriculum to meet the needs of all students requires the experience of high quality teachers; novice teachers cannot ask for something they do not know they lack (Ball, 2000).

Research of the Florida Model for ACP programs revealed that regardless of the preparation track, TCP or ACP, first year teachers evaluated their comfort level the same as related to the 12 areas of accomplished practices (Suell & Piotrowski, 2006). The study (Suell & Piotrowski) does not consider the true abilities of the teachers; merely their feelings of efficacy. Darling-Hammond (2006) concludes that teachers who are fully prepared are better able to promote student achievement than teachers who are not fully prepared whether it be formal training or having the proper resources for the particular job. The clinical experience included in TCP provides a supportive environment for teachers to see what they can expect from a real classroom (Stoughton, 2007). ACP teachers may have some understanding of the classroom

environment but lack the understanding of how to properly develop lessons for students to be successful (Humphrey & Wechsler, 2007).

Personal Experiences of Vulnerability

Teachers care about their students and it is costly. Hargreaves & Fullan (1998) stated that “teaching draws on every ounce of emotion teachers have.” Teachers form their identities through gradual changes as a result of their experiences (Day et al., 2006). Hargreaves (2004) points out the difficulty in separating change and emotions. Teachers are subject to painful experiences as changes take place in schools such as more regulations and increased responsibility making and documenting interventions for diverse student needs. Learning to find satisfaction within their limits can be the difference in job satisfaction and frustration (Day et al., 2006).

Researchers (Day et al., 2006) point out the emotional investment teachers have in their practice. The classroom can often be a place of contrasting emotions; love, care, surprise, anger, fear, excitement and pleasure at students’ progress are among the most commonly cited responses from teachers (Sutton, 2006). Teachers’ professional identities are impacted by their feelings of vulnerability (Kelchtermans, 1996). Reports of frustration and anger associated with students’ misbehavior and anxiety caused by the stress of the complexity of the job both play a role in the teachers’ perception of effectiveness and satisfaction with their job (Day et al., 2006). The constant ebb and flow of emotions and demands creates an environment where teachers need support if they are to sustain their practice over time (Day et al., 2006).

A study of teachers in the United Kingdom examined the interconnection between teachers’ professional and personal identities (Day et al., 2006). Teachers start off with one identity but it changes over time (Cooper & Olson, 1996). Teachers are continually

reconstructing their identity through historical and cultural experiences (Day et al., 2006). Each teacher learns from her experiences, “They are creating their world while also being shaped by it” (Cooper & Olson, 1996).

Professional and personal identities start to bleed into each other as teachers do simple things like invest their personal resources into the classroom. As they recognize the needs of their classroom and students, they often begin to want to give more than they are able (Day et al., 2006). When teachers begin to feel they are unable to meet the needs of their students it causes frustration and they become dissatisfied not only with their jobs professionally, but also with themselves personally (Day et al., 2006).

Other areas teachers described as cause for negative perceptions included their subject area not being valued, being forced to teach students with whom they have poor rapport, and working at a school where the organization structure is closed, encouraging no input from teachers (Day et al., 2006).

Teachers did cite positive perceptions such as: a student centered philosophy by the school, counseling for student improvement, cooperative relationships with colleagues, variety in their jobs, and input on school policies (Day et al., 2006). Teachers who lacked the ability to reconcile their personal identity with their job, suffered poor health and stress related illnesses, and some even decided to retire early to escape the turmoil (Day et al., 2006).

The phases of teachers’ personal lives also have an effect on their practice (Day et al., 2006). Young teachers with no family will respond differently to challenges in a classroom than older teachers with young children or a veteran teacher with health issues or family obligations requiring her attention outside of school. The study concludes that the pressure inside the

classroom can have detrimental effects on teachers' personal lives thus leading them to look for a different career with less emotional investment (Day et al., 2006).

Teachers often enter teaching with a model of their role in the classroom. New teachers often perceive their role as being a hero or savior for their students. In daily dilemmas, the need to 'save' the students may pose an overwhelming challenge as it is frequently an unattainable goal. Munby and Russell (2001) added to the work of Schon (1983, 1987) in looking at metaphors as a way of setting a 'frame' for a problem. When teachers examine difficulties as situations outside their control they perceive helplessness. As teachers reflect and 'reframe' a situation they often find they possess the power to help students make changes to improve learning environments. A teacher who sees classroom chaos as a management problem in the initial frame, but with a 'reframing' begins to see the chaos as a learning problem and becomes empowered to help students learn how to conduct activities in an organized manner. The teacher went from helpless to powerful with the act of 'reframing' the situation as one within her expertise (Munby & Russell, 2001).

Curriculum policy influences

Citing global demands as the motivating factor, legislative bodies have directed curriculum writers to develop human capital in such a way as to keep the United States competing on the world market (Collin & Apple, 2007). Teachers are urged to produce producers (Collin & Apple). Utilizing both testing and formula curriculum are expected to improve student performance. However, implementing more standardized tests and increasing the regulation of teaching practices produces more tension for teachers.

A recently published study focused on the changing roles of teachers (Valli & Buese, 2007). Increased pressures of the high-stakes testing and subsequent accountability were cited as

key factors impacting the teaching profession. Researchers ultimately concluded that teachers are “pressured to enact pedagogies that are often at odds with their vision of best practice” (Valli & Buese, 2007, p.520). Beginning in 2001, Valli and Buese conducted a study at a large school district in a mid-Atlantic state. They gathered data before and after the No Child Left Behind Act (NCLB) (2001) was implemented. The multiple guidelines from the national level had a variety of impacts on the state and local education organizations. The changes, both good and bad, were perceived as negative experiences that teachers preferred to avoid because of increased stress. Teachers recognized the value of certain policies, but the inadequate preparation and assistance caused skepticism about the sustainability of some measures (Valli & Buese, 2007).

National policies

There are national, state, and local reform guidelines which are designed to provide all students with an equitable education. The NCLB Act (2001), Individuals with Disabilities Education Act (IDEA) (2004), and the Third International Math and Science Study (TIMSS) (2003) are three key influences on education from a national perspective. National guidelines for schools are not a new concept, but the renewed concern for the quality of U.S. education has resulted in new policies and accountability.

As NCLB was interpreted from the national to state level and then to local school districts, it took a different form. According to Apple (2007), it became a case of “the tail of the test wags the dog of the teacher.” Ligas (2002) stated that accountability through uniform curriculum treats teachers as robots. Schools are evaluated in many ways; in Florida factors such as improved performance in reading, improvement of the lowest 25% in reading and math, and even how many students show up for testing are figured into the formula to determine the success of a school (Florida School Indicators Report, n.d.). Apple (2007) is concerned that this

much regulation indicates a basic mistrust of teachers and lack of reliance on their creative expertise. The experience of building curriculum around testing can stifle creativity and influence the beliefs of novice teachers (Fendrich, 2007). According to Butzin (2007), the current regulations must be fixed or all creative teachers will leave the profession in disgust.

Another policy teachers work with is IDEA regulation. IDEA was designed to bring a national focus on providing a free, quality education for all students, including those with disabilities. There are also appropriate alternate placement options for special needs students so they can continue their education without hampering the education of others (National Education Association [NEA], 2007). IDEA was reauthorized on November 19, 2004. The updated version made provisions for professional development to help teachers gain the knowledge needed to work with special needs students. However, the cost of providing teachers with the training needed makes it unlikely that all teachers will receive that training and be prepared (NEA, 2007). Assessments of special needs students brings further complications because these students should be given accurate and appropriate assessment of their progress (Aguilar, Morocco, Parker & Zigmond, 2006). The challenge for teachers in regular education classes is meeting the needs of both high achievers and students with disabilities. To help teachers meet the goals set forth by IDEA, the process of differentiation has been introduced (Valli & Buese, 2007). Tomlinson (2004), a leader in the area of differentiated curriculum, recommended ways for teachers to modify assignments and assessments to create a level playing field for all students. Students should be receiving the best lesson for their learning needs and be assessed on their learning gains with their limitations in mind (Aguilar et al., 2006).

The TIMSS further expands the demands of science teachers (Kastberg, D., Rory, S., Williams, T. & Gonzalez, P., 2006). In the past, science teachers considered teaching science

content their main job, but with today's policies, science teachers must also emphasize reading, math, and writing (Holbrook & Rannikmae, 2007; Odum, Stoddard & LaNasa, 2007). The TIMSS data gives a global perspective of students in math and science which shows other countries outperforming the United States in both subjects (Mullins, Martin, Gonzalez, & Chrostowski, 2004). With the current shortage of math and science teachers in U.S. schools, there is reason to take notice of this study (Larocque, 2007). The new reform for test performance adds more accountability and higher demands for teachers, especially novice teachers who are formulating ideas about curriculum and pedagogy (Butzin, 2007).

State policies

Local school systems have implemented guidelines for curriculum to promote uniformity throughout the districts (Larocque, 2007). The NCLB Act of 2001 was designed to extend and amend the Elementary and Secondary Education Act of 1965 and to provide standards, accountability, and choice (Butzin, 2007). Ultimately, the aim of the government is to set minimum standards of education for all children, hold schools accountable for meeting those standards, and give educators the flexibility as to how they helped students achieve their goals (Butzin).

In Florida, the Sunshine State Standards [SSS], 1996 were designed to clarify school reform and align the curriculum, instruction, and assessment. The intention was for schools to establish the SSS as what students should know and be able to do for the 21st century. The SSS have guidelines for content in classes and the performance of students (Butzin, 2007). The state also mandates that publishers correlate instructional materials for state textbook adoptions with the SSS (Porter, Smithson, Blank, & Zeidner, 2007). The intention is to increase rigor and

uniformity within schools and ultimately elevate the value of a diploma from a Florida high school (Guskey, 2007).

The state of Florida monitors schools using the FCAT. The FCAT was developed to determine the effectiveness of Florida schools at grade levels 3–11. However, student performance in only 3rd, 8th, 10th, and 11th grades is strategic for school evaluation. Initially, the FCAT included only reading, writing, and math, but science was recently added to the 11th grade test (Vogler, 2006). The result of all the testing was that students grew tired of spending hours of class time preparing and taking practice tests, which unfortunately affects more than just the students (Black, 2007).

Florida schools test their students' abilities and assign a school achievement grade based on how well the students perform each year (Cawthon, 2007; Chapman, 2004). The federal government will withhold funding if states fail to achieve the national standards; businesses will also be less likely to establish themselves where they cannot find a well-educated workforce (Butzin, 2007).

Local policies

Local education systems have introduced policies including benchmarks tests and district curriculum guides to ensure that schools are equipping students to be successful on state and national tests. Scorecards are used to determine school achievement grades and calculate the amount of money given to schools, which ultimately impacts teachers' salaries. School districts demand that schools develop standardized subject exams, align scope and sequence of course materials (Valli & Buese, 2007), purchase only county approved textbooks, and use scripted instruction in some reading courses. Teachers in Florida are required to spend a specified number of minutes on reading daily and prescribed textbooks must be used (Butzin, 2007). In

science classrooms, teachers include reading time in their class to boost student reading scores. School administrators enforce these rules because they know they are subject to firing if their schools fail to achieve (Sunderman, Orfield, & Kim, 2006). There is no special exemption if the students are from a high poverty neighborhood or if English is the second language (Darling-Hammond, 2007). All students, teachers, administrators, and school systems must find a way to demonstrate achievement or they will lose federal funding (Frost, 2003).

Some policies that began with the intent to improve education equality have brought about some improvements, but also many unwanted regulations (Honowar, 2007). Teachers with good teaching skills look for ways to continue good teaching in spite of the regulations, and teachers with poor teaching skills supposedly get help to improve (Darling-Hammond & Berry, 2006). For new teachers, finding the way to carry out the mission that motivated them to start teaching is challenging. The experiences teachers have play a large role in how they develop their beliefs about teaching (Darling-Hammond, 2006).

Cultural diversity

General classrooms today include many students who were housed in special schools or special classes a few years ago. The populations of rural, suburban, and urban classrooms have been modified. As early as 1993, researchers wrote about the importance of preparing pre-service teachers for the cultural diversity in their classrooms (Tabachnick & Zeichner, 1993). According to researchers (Cartledge & Kourea, 2008) the student body of many schools is a 'mosaic of ethnicities and cultures' (p.351). Today, certified teachers must have more than just an understanding of the curriculum to be considered 'highly qualified.'

Teaching English language learners (ELLs) requires specific modifications to curriculum and lesson plans, as well as job training for teachers. Science teachers are required to obtain

ESOL (English for Speakers of Other Languages) training. This is offered free of charge by school districts. Teachers must be trained, but they receive no extra pay and they are expected to complete the training on their personal time. This training is necessary for teachers whose jobs require them to make more accommodations for more challenged students.

For some classes, teachers could be dealing with many different languages. One district in Arkansas has over 16 different languages and Houston, Texas reports over 80 languages are spoken by their students (Weaver, 2006). In Columbus, Ohio city schools there are four times the number of ELLs as they had ten years ago (Candisky, 2007). Many of the ELL students are labeled with learning disabilities because they are not able to perform adequately on standardized tests. Cartledge and Kourea (2008) report the ELL population as having the highest drop out rate of all students. The immigrant families also show a high level of poverty and a large mobility rate, which seem to correspond with their educational performance (Cartledge & Kourea, 2008).

Students from some cultures are more successful when cooperative learning groups are used for instruction (Cartledge & Kourea, 2008). Combine this need for interaction with students who are from other low socio-economic groups and the interactions may bring hostility and antisocial behavior. The best way to bridge these cultural divides is with teachers who are 'culturally responsive' (Brown, 2007). One more way teachers need to do more to meet the challenges of the classroom.

Research indicates students who are not at grade level in reading by the completion of the third grade will likely never catch up (Juel, 1988). ELL students in particular need intensive instruction by exceptional literacy instructors (Cartledge & Kourea, 2008). While this strategy may be effective for students immigrating in the beginning of their education, working with students who enter U.S. schools in the sixth grade is much more difficult. Students who enter in

middle school may have poor performance in their native language and already be frustrated by standardized education. They are placed in U.S. schools and expected to have the needed foundation for science. English is taught through their second language classes but they are placed in a general science class.

Along with different languages are different cultures, religions, and social rules, which add further pressures to teaching. According to Ladson-Billings (2005), less than 50% of the school population in California and Texas is white. As the diversity increases in student population, the teaching force is becoming less ethnically and culturally diverse (Ladson-Billings, 2005).

With current trends it is also unlikely that teachers of color will increase when high school graduation rates are not improving (Ladson-Billings, 2005). If students of color cannot complete high school, they will not be able to pursue a college degree in teaching. Further, the teacher education classes are filled with white teacher educators “preparing white teachers who teach children of color who fail to achieve success in schools and are unable to pursue post secondary education where they might become teachers”(Ladson-Billings, 2005, p.237).

Critical race theory (CRT) is one way Ladson-Billings (2003) has explained the complex race relationships within education. Using research methods that examine the context of social settings enables more understanding of the racial influences in education. Even the notion of desegregation has diminished the number of teachers and administrators of color (Ladson-Billings). Establishing equality in education, from students to teachers and administrators, remains a challenge.

The retention of teachers both African-American and European-American has been the subject of one study (Kearney, 2008). The 200 teachers reported dissatisfaction with public

attitudes about educators. The teachers were recruited in a Midwest urban school district and their job satisfaction was similar regardless of race. Both races recognize the importance of strong support networks for teachers to succeed. Kearney (2008) explained the program for recruitment included competitive salaries as well as incentives for higher education for teachers. The voices of teachers in the field are also cited as strong motivation for teacher satisfaction and are important in order to keep building the diversity of the teaching force (Kearney, 2008).

In addition to all the cultural diversity changes in today's classrooms it is imperative for schools to meet the needs of all the challenged students. The increase in diverse students, whether that diversity is from nationality, physical or mental disability, or low socio-economic status still requires the student outcomes to be measured by the adequate yearly progress (AYP); (NCLB, 2001). School funding and teachers' employment are closely tied to how well teachers learn to meet the needs of these students (Cartledge & Kourea, 2008). Training and experience are essential for teachers since "no one-stop shop can teach an educator what type of curriculum is needed in a diverse classroom" (Block, 2007, p. 58).

Perceptions of Beliefs

Expectations

Teachers formulate beliefs based on experiences as learners as well as preferred learning methods (Glazer & Hannafin, 2006). Smith (2005) concluded the beliefs and values individuals hold are a combination of countless life experiences. Beliefs of teachers are founded, shaped, and reinforced through their personal experiences from early days as students, formal teacher training, teaching experiences, and cultural backgrounds (Watters & Ginns, 1995; Keys, 2005). The beliefs held by teachers have thus been shown to have a considerable impact on how they implement science curriculum (Lumpe, Haney & Czerniak, 1998).

When prospective teachers enter a training program, the beliefs they bring influence how they respond to ideas and strategies taught in the class (Day et al., 2006). After teachers have been teaching, their initial beliefs may be modified by the experiences they have in the field. Beliefs are modified when new ideas about learning are introduced. However, moving from novice to mid-career to veteran is a gradual process. In order for the growth and development to continue, supportive peers and positive experiences must take place in order to move teachers along.

Modifying teaching methods, pedagogical understanding, and curriculum direction is most effective when teachers decide to make changes in order to improve student performance (Black, 2007). However, rather than waiting for teachers to change directions, the local, state, and national level education organizations often seek to bring about sustained change in their own time to achieve school reform (Smith, 2005). Today, the organizations advocating change in science instruction, such as the NSTA, National Science Foundation (NSF), and the National Research Council (NRC), believe inquiry lessons should be used as they encourage students to problem solve and think critically. While these organizations are targeting changes that will have positive influences on the students, teachers are also affected and not always in positive ways.

Some teachers may want to make changes in their teaching practices but lack the confidence to take the necessary steps (Keys, 2005). In order to effect long-term changes, it is vital that teachers perceive they have the ability to undertake the task (Bandura, 1997). The reform must be perceived as necessary if teachers are to be motivated to change their practices (Keys, 2005; Schommer-Aikins, 2004). Changing curriculum and pedagogy requires teachers to change their beliefs about the best way to educate children (Keys, 2005). Today's diverse

student population demands creativity and sensitivity in developing curriculum (Darling-Hammond, 2007). The perceptions of teachers raised in a rural, mostly homogeneous community may conflict with the expectations of minority students in urban classrooms. At the same time, teachers from a parochial background may find public school classrooms at odds with their expectations (Smith, 2005).

Individuals initially believe that knowledge is simple, but as experience increases, certain ideas and methods develop a more complex belief (Schommer-Aikins, 2004). Schommer-Aikins cites Abelson's (1986) description of beliefs as possessions, and the difficulty of letting go of things one has had for a long time. Thus, in order for teachers to change their thinking, it requires significant evidence that the change will bring improvements.

Schommer-Aikins (2004) declares the three main influences on learners are their families, peers, and teachers. Schommer-Aikins stated that these cultural and historical aspects set the stage for how successful their students will be. If their background supports learning as being challenging but attainable, they will achieve. However, if they feel learning should be easy and merely repeating facts, they will be less likely to keep trying when difficulty increases (Schommer-Aikins).

Schommer-Aikins (2004) did extensive quantitative research on teacher beliefs. However, she pointed out the need to utilize interviews and observations to get a clearer picture of teachers' true beliefs. Since beliefs are largely pervasive and illusive there are inherent challenges to having a questionnaire or survey instrument ferret out the true meanings of teachers' actions (Schommer-Aikins, 2004).

The method of preparation, whether it is TCP or ACP, impacts the experiences teachers have, thus influencing their beliefs. The first few years, both ACP and TCP teachers believe

they are inadequately prepared for their jobs (Miller, McKenna & McKenna, 1998). They report questions about whether they will remain in teaching as a career. The cultural and relational views of teachers impact their epistemological belief of how students obtain knowledge and what is expected in classroom performance (Valli & Buese, 2007).

Any new job requires time to adjust to routines and become comfortable with procedures. A study conducted with third year teachers found that regardless of their induction method, ACP or TCP, they felt they were not given sufficient preparation for their jobs (Miller et al., 1998). The TCP teachers felt inexperience led to many new teachers holding a similar view. However, the ACP teachers reported they had gaps in their understanding of how students learn and what they should expect in a classroom (Darling-Hammond & Berry, 2006).

Teacher training programs have utilized a variety of activities to simulate the role of a teacher. Experiences like mini-lessons taught to peers, economics lessons taught to fifth graders through Junior Achievement, and formal internships are some of the ways teachers practice for the real classroom. Once teachers enter the classroom the question of how long they intend to stay is met with differing responses. Andrew & Schwab (1995) found that TCP teachers reported a higher commitment to staying in the profession than ACP. A general lack of commitment was found among the ACP teachers (Shen, 2000). For urban teachers, there was a higher attrition rate of 90%; among the ACP teachers, 35% stated they think about quitting on a daily basis (Suell & Piotrowski, 2007).

Classroom management

Teachers with understanding of the culture and climate within schools are more likely to find ways to successfully manage their classrooms. A study was conducted of teachers' beliefs on classroom management strategies for students in urban high schools (Shin & Koh, 2007).

The study compared students from schools in the United States with those in Korea. The researchers found statistically significant differences in the two cultures' approach to classroom discipline (Shin & Koh).

Seven high schools were selected from both Midsouth US and urban Korea. The U.S. schools had a diverse student population with 87% African-American, 9% Caucasian-American, and 4% other ethnicities. The Korean schools were made up of all Korean students. The US schools had slightly larger class sizes but the underlying difference was the value of individuality and its impact on classroom behavior (Shin & Koh, 2007). U.S. culture empowers individuals so the idea of equality between teachers and students was inevitable (Shin & Koh, 2007). The Korean culture values tradition and hierarchy so the students do not need to see teachers control established because the norms of their society provide the power for teachers' authority (Shin & Koh, 2007).

Perhaps the greatest impact on teachers' performance is their epistemological beliefs. Teachers' beliefs about how students gain knowledge influences the methods they use to guide classroom experiences (Schommer-Aikins, 2004; Apple & Jungck, 1992). The ACP teachers, with limited knowledge of how the brain connects information, will likely construct classroom experiences similar to the ones they experienced as students (Cohen-Vogel & Smith, 2007). Cultural backgrounds influence teachers' perceptions of their expectations. The TCP teachers are more likely to enter the classroom with a broader picture of how students make connections with content, and structure lessons accordingly (Luft & Roehrig, 2005).

Perceptions of Practice

Expectations

A study of teachers' difficulties in the classroom describes the "bumpy moments" in teaching in detail (Romano, 2006). The participants reflected on the daily occurrences in their professional lives. The study involved four teachers in elementary grades. Over the 12 week period the teachers reflected on the problems with class management and time management (Romano, 2006). The teachers described the incidents in which they had engaged in immediate decisions after momentary reflection (Romano).

Romano (2006) explained that the thoughts, beliefs, and knowledge that these teachers brought to each situation had been embedded in their description of the situations. Each of them reflected on the "bumpy moment" and described the instinctive thinking they engaged in to determine their course of action (Romano, 2006). The insights the teachers gained from reflecting on the unplanned incidents helped them develop a greater understanding of their own teaching practices (Romano, 2006). The researcher concluded the use of reflection, combined with collaboration in professional development groups, could help teachers see their practice through another's eyes (Hiebert & Stigler, 2000; Loughran, 2002).

Understanding the process experienced teachers go through when unplanned events occur in classrooms could provide valuable knowledge for beginning and pre-service teachers (Romano, 2006). By recognizing the intentions of teachers and the flexibility in challenging moments, teachers with less experience gain insight about the practice of teaching. Rather than seeing the incidents as failures, they begin to understand they are normal occurrences and require quick thinking and the ability to change the direction of a lesson instantly in order to maintain an optimal learning environment (Romano, 2006).

Classroom management

Although Romano's (2006) study did not directly investigate classroom management, the teachers revealed the "bumpy moments" included times when students failed to remain on task. Recognizing ways to redirect a lesson, curb unwanted behavior, and optimize student performance require skills which develop over time (Romano, 2006).

Finding ways to design professional development to foster the maturing of teachers was discussed by Black (2007). Teachers need support from strong leadership that stems from collaborative perspective rather than a position of power and authority (Black, 2007). When schools develop communities, teachers tend to be receptive to ideas from others which help them improve classroom practice (Black, 2007). Implementing new policies was more effective when teachers were convinced of the benefits (Black, 2007). Rather than orders from higher ups, teachers were more supportive of changes they developed.

Lesson planning

Planning effective lessons is imperative for student achievement (Kelting-Gibson, 2005). Historically, teachers have followed guidelines set by Tyler (1950) and Taba (1962) to design lessons. Traditional templates for lesson plans started with defining the objective or goal, followed by listing the experiences related to the goal, organizing the experiences and activities, and then assessing the goal (Kelting-Gibson, 2005).

Teachers designed lessons with fun activities as the foundation rather than key concepts (Kelting-Gibson, 2005). Wiggins and McTighe (1998) developed the *Understanding by Design* (UbD) method of lesson planning to ensure teachers were making connection between the overall concept and the activities. Kelting-Gibson found pre-service elementary teachers who were trained using the UbD method were able to develop better lesson plans than other pre-

service elementary teachers trained in traditional lesson planning. In areas of understanding student need, establishing coherent goals, and finding resources, the UbD trained teachers were superior to the traditional method (Kelting-Gibson, 2005). However, both groups were low in the quality of their lesson planning ability. Creating lessons which meet the needs of students is difficult even with training (Kelting-Gibson, 2005).

A study by John (2006) addressed the fallacy that teachers who create elaborately designed lessons, are also able to execute these plans seamlessly in their classrooms. Even well designed lessons can be thwarted by time pressures, attitudes, moods, organizational issues, and emotions (John, 2006). Every classroom has unexpected events, and experienced teachers are aware that something can go in another direction at any moment (John, 2006). Designing lessons for specific outcomes requires planning in a linear fashion, but learning does not usually occur in a straight line (John, 2006). While it may seem easier to train all teachers in some universal lesson structure, teachers need flexibility and awareness to allow the dynamics of the learners to direct the process (John, 2006). Veteran teachers typically tend to plan broad ideas and wait to flesh out the details just hours before they implement the lesson (John, 2006). Novice teachers are likely to write elaborate plans with great detail only to find that they underestimated the time certain tasks would take (John, 2006).

John (2006) explained that lesson planning might be better served in context of a dialogue. Teachers working together in professional learning communities can help inexperienced teachers understand how to design a lesson (John, 2006). Most importantly, teachers need to recognize deviating from the template set forth may signify a better lesson than the one planned because it has changed to meet the dynamics of the situation and the students (John, 2006).

Summary

In Chapter Two, a review of the literature and research in the field was presented. Teachers' perceptions of their professional identities, teacher preparation, personal experiences of vulnerability, impact of curriculum policies, and cultural diversity were explained. Also, the perceptions of the experiences and beliefs of middle school science teachers, and how their teaching practices were impacted were described. Chapter Three explains the research methodology and rationale for the choice of methods, data collection procedure, instruments used, and a summary of data analysis procedures in the study.

CHAPTER 3: RESEARCH METHODS

Introduction

The purpose of this phenomenological study was to investigate the essential themes of the perception of the middle school science teachers' experiences, beliefs, and teaching practices. The goal of the study was to share the voices and stories of middle school teachers as they taught science. The complex issues teachers encountered in their field required the study to utilize specific research methodology to gain an in-depth understanding of the job. Included in chapter three is an overview of the research design, an explanation of the selection of participants, the study setting, and the timeline. The research methodology and rationale for the choice of methods was then delineated. The data collection procedure, instruments used, and a summary of data analysis procedures were given. Lastly, the trustworthiness of the data was explained.

Phenomenology

Phenomenological research is a qualitative method which aims to determine the whole experience (Moustakas, 1994). Phenomenology "focuses on the appearance of things" (Moustakas, 1994, p. 58). Studying descriptions with verbal pictures helps create an accurate understanding of the subject or event (Moustakas, 1994). Eliciting a verbal account of a phenomenon involves questioning in order to reveal the attitudes and perceptions of those involved. The phenomenological researcher has a personal interest in the phenomenon being studied (Moustakas, 1994).

The phenomenological approach also holds the data of experiences, reflecting, and judging as evidences of scientific investigation (Moustakas, 1994). The reality of experiences

was assimilated into an authentic picture of the lives of the subjects (Moustakas, 1994). Scientific evidence was the intent of the Salish I Research Project.

The Salish I Research Project

The Salish I Research Project was an attempt by ten universities to improve the effectiveness of their math and science teacher education programs (Brunkhorst, Yager, Brunkhorst, Apple, & Andrews, 1993). The data gathered in the study included information pertaining to the perceptions of new teachers' attitudes and beliefs (Tillotson, 1996). Previous research on the programs for training teachers had not been informed through scientific methods (Tillotson, 1996). The interview questions utilized for the Salish study were designed to elicit descriptions of the experiences of the new math and science teachers, thus they were appropriate for use in understanding the phenomenon of science teachers.

Methodology and Rationale

The research question of the current study was designed to explicate the perceptions of the experiences and beliefs of seven middle school science teachers and the essence of their classroom practices. A qualitative phenomenological methodology enabled the middle school science teachers to share their perceived experiences and reveal perceived beliefs associated with their careers. In phenomenological research, participant perceptions are collected using qualitative research methods including focus groups, interviews, journal entries and observations, which allow the researcher to create a montage with multiple images of a situation (Denzin & Lincoln, 2005).

Maintaining the focus of the study, the individual teachers revealed aspects which might otherwise seem trivial but because it was part of other participants' experiences it became more

significant. Using multiple ways to gather data leads to the triangulation of data to support the researcher's attempt to be accurate (Denzin & Lincoln, 2005). What science teachers do and where they do it was inseparable. Therefore, the purpose of the study was best accomplished by using the phenomenological qualitative research approach.

Procedures

In August 2006, science teachers from several central Florida middle and high schools were invited via school e-mail (Appendix B) to participate in the study. Over 200 teachers were contacted, twelve of whom responded; ten middle school science teachers and two high school teachers. The researcher decided to make the final selections including only middle school teachers. The personal information was obtained in a follow-up e-mail requesting more background information from the teachers and answering their questions about the study.

The researcher gathered contact information and schedules of availability from the teachers in order to best determine the time and location for the first focus group meeting. The teachers provided their home and school contact information as well as their teaching assignments for the year. On September 27, 2006 the seven middle school science teachers gathered for a one hour focus group facilitated by the researcher. The teachers ate a light meal while everyone arrived and then began the audio-taped focus group. A second focus group meeting was held April 18, 2007 as a conclusion for the study. The researcher transcribed the initial meeting for analysis but a transcript was unavailable for the second meeting due to a tape recorder malfunction that prevented exact transcripts. However, since the teachers were asked to write down their lists, those were used with the researcher's field notes and recollections to recreate key points of the participants.

During the study, the researcher conducted individual interviews with all of the teachers by phone. All phone interviews were audio-taped and transcribed by the researcher. Five of the seven participants completed all six phone interviews; Margaret completed only five and Nancy completed only three. Although Margaret and Nancy were unavailable for interviews toward the close of the study, they were able to respond to the questions via e-mail. The responses provided by Nancy were for the last three interviews and her answers were included as journal entry information. The interview questions were from the Teachers' Pedagogical Philosophy Interview (TPPI) (Appendix E) developed by Richardson and Simmons (1994), which were used as part of the Salish I Research Study (1996). The forty questions were broken into groups of six to ten questions to attempt to remain within a one hour time frame for the interviews. During the phone interviews, all participants were asked the same set of questions. They were aware that their answers were only available to the researcher, not the entire study group.

In addition to the phone interviews, teachers were asked to e-mail the researcher a weekly journal of their experiences in order for the researcher to develop a richer understanding of individual experiences. There were times when the journals were submitted without prompting and other times when a message was sent from the researcher via e-mail or phone to encourage writing. If no response was received spontaneously, the prompt from the researcher was simply, "What happened while you were teaching science this week?" The prompt was an attempt to motivate and remind the teacher to send some type of update. Depending on the time of semester, the researcher sent prompts prior to the end of the quarter, near vacation, and after breaks. Usually only two or three participants were slow to submit their journals.

The researcher conducted two focus groups, six telephone interviews, weekly journals, and one classroom observation with each teacher between March and April, 2007 (Appendix F).

There was one teacher who was not observed because he was on medical leave until the end of the school year. The efforts were an attempt to determine an accurate picture of the middle school science teachers' experiences. After the focus groups, interviews, journals, and observations concluded, the researcher analyzed the data and presented the findings.

Selection of Participants and Study Setting

Prior to beginning the study, an application was made to the university internal review board (IRB) for research involving human subjects (Appendix A). In the application, details of the study objectives, selection of participants, research methods, informed consent and benefits of the research were provided. The application was accepted and the full IRB approval was granted on August 14, 2006. Participants were contacted after approval.

The participants were selected based on their method of certification, years of teaching experience, and their motivation to commit to the full length of the study. Also, in an effort to expand the study beyond one school, the teachers selected represented five different middle schools and grade levels. All of the participants were middle school science teachers in schools with diverse demographics which created a variety of experiences within the group. The teachers were selected from the science teachers in central Florida.

In August 2006, a blanket invitation to participate in the study was given to several middle and high school science departments in the central Florida area. The invitation was through an e-mail (Appendix B) and phone calls to the schools. The seven middle school science teachers were selected out of the twelve total respondents, based on their years of experience, motivation and availability to participate in all aspects of the study. The teachers' participation was entirely voluntary and without compensation.

The teachers were first given a copy of the research narrative (Appendix C) which outlined the specific purposes and expectations of the study. They were also asked to read and sign the consent form, and they were given a copy of the form for their records. They were encouraged to keep all conversations confidential when outside the focus groups.

The teachers were placed into categories based on their years of experience. The study included three novice teachers who were beginning their teaching careers. They were starting their first, second, or third year of teaching. One had student internship experience while the other two were experiencing their first year in a classroom. The two without experience were going to school for their education training courses in addition to teaching full-time. There were two mid-career teachers who were experienced by having taught for four to six years. One had been through the traditional internship program prior to her first year of teaching while the other had taken her education courses during her first two years of teaching. There were two veteran teachers who were also experienced in the classroom. Each of the veteran teachers had been teaching over nine years; one was TCP and the other was ACP.

The teachers with TCP backgrounds had been able to complete their student internships and attain certification while they were undergraduates in a college program. They entered their first teaching job having already experienced an internship with a supervising teacher and the support of the university setting to reflect on their methods of instruction. The ACP teachers had college degrees, but not in the education field. They decided to become teachers, attended classes in curriculum, behavior management, and other traditional areas. They finished their education courses while they were already teaching as temporarily certified teachers. The ACP teachers were attending school at night or on weekends in addition to their full-time jobs. The

ACP classes were geared toward practical strategies to help teachers manage their classes and plan lessons but did not include as much theory in the curriculum as TCP classes do.

Participants

Natasha (novice)

Natasha was a first year, alternatively certified, seventh grade physical science teacher at School C (see table 1). She had not previously taught in a classroom as a teacher or intern. She graduated with a Bachelor of Arts degree in Liberal Studies with minors in Criminal Justice and Women's Studies. While she was teaching her first year, Natasha was earning her Master of Arts in Science Education through a university program designed to certify math and science teachers from other fields of study. Prior to teaching, Natasha was a crisis counselor for hurricane victims through the Florida Department of Children and Families.

Nancy (novice)

Nancy was obtaining her alternative certification while teaching eighth grade physical science and math classes at School D (see table 1). Although Nancy had not interned as a student teacher, she had taught a semester of reading and a semester of science during the previous year at the same school. Nancy was very busy, working with the science Pre-IB program, tutoring students after school, and teaching a class during her planning period.

Noel (novice)

Noel was a traditionally certified sixth grade life science middle school teacher. She was starting her third year teaching at School A (see table 1). During her internship in Pennsylvania her experiences were primarily with Euro-American middle-class students. Noel had a degree in

biology and was certified in science education through her college. She taught at the same school for three years and was selected for a “looping” team that started with earth science in seventh grade and then moved her to eighth grade physical science to teach the same students.

Margaret (mid-career)

Margaret was an ACP teacher. She taught sixth grade life science at School E (see table 1). Previously, Margaret taught two years at another middle school and one year at a senior high school. While teaching her first two years, Margaret attended classes through the county ACP program to obtain full certification. She has a degree in biology and experience as a laboratory scientist.

Mandy (mid-career)

Mandy was a traditionally certified teacher with seventh and eighth grade science classes at School B (see table 1). She was beginning her fourth year of teaching. Additionally, she had a year of student teaching experience as part of her certification program after obtaining her biology degree. She had previously taught biology, chemistry, physics, and anatomy & physiology in high school.

Vince (veteran)

Vince was an ACP teacher with a degree in chemistry. He had been teaching eighth grade physical science for ten years at the same school (School A) (see table 1) and was the science department chair. He began teaching after fifteen years of experience in the industry. Vince was respected within the county science education community and was chosen to help pilot the current physical science initiative within the district.

Vanessa (veteran)

Vanessa was a traditionally certified teacher with ten years of experience. Her current assignment was at School B (see table 1). Vanessa had a degree in science education but also obtained additional science courses due to changing her major during college. She taught honors and pre-IB physical science classes. She had also taught at several other schools within the same county but the courses were always earth/space science.

Table 1 explains the profile of the schools in which the participants were working.

Table 1: School Profiles

School	05-06 Stability %	05-06 LEP %	06-07 School Grade	05-06 School Grade	06-07 % Free or Reduced Lunch	05-06 % Free or Reduced Lunch	06-07 Minority Rate
A Noel & Vince	90.9	14	A	A	56	47.7	61
B Mandy & Vanessa	92.6	6.6	A	A	39	37.9	49
C Natasha	79.5	10.1	C	A	78	76.8	96
D Nancy	90.7	31.2	C	B	82	82.2	85
E Margaret	n/a	n/a	C	n/a	50	n/a	58

Timeline

The study data was gathered from September through May, 2007. From October to June, 2007 the interviews and focus groups were conducted, journals and observations were collected and the transcription data was analyzed, leading to the conclusions. The following table (Table 2) documents the data collection timeline.

Table 2: Timeline

Method	August/ September	October/ November	December/ January	February/ March	April/ May
Focus Group I	All participants 9/27				
Journal		All participants	All participants	Six participants	Six participants
Interview		All participants	All participants	Six participants	Five participants
Observation				Nancy 3/27	Natasha 4/2; Vanessa & Mandy 4/3; Noel & Margaret 4/13
Focus Group II					All participants 4/18

The timeline consisted of the following categories: focus groups I & II, journals, interviews, and observations. The focus groups were conducted at the beginning and end of the study and all of the teachers were present. The focus group meetings and the phone interviews were limited to one hour each and were audio-taped for later transcription. The interviews were guided by forty questions from the Salish I Research Project (1996) (Appendix E) which helped elicit perceptions teachers had about their practices. Teachers also added details about their classroom or personal experiences and set up a time for the next interview. Each teacher submitted journals approximately once a week. The teachers were observed one time, and the researcher stayed an average of two hours in each classroom. In total, there were over forty

hours of taped and transcribed conversations, six observations, and over one hundred journal entries to examine.

Again, the teachers were requested to submit journals every week but time constraints caused by personal and professional commitments kept some teachers from responding on a weekly basis. After answering the selected interview questions the teachers sometimes shared other experiences from the past week. The data was imported into the software program NVivo/NUD*IST, Revision 1.2.

One teacher, Vince, was seriously injured during school in February and needed hospitalization and therapy which prevented him from completing the school year. He participated in the journal writing and interviews and the final focus group but it was not possible to observe his classroom.

The focus groups, journals, interviews, and observations attempted to gather information to describe the experiences of middle school science teachers. The questions asked during the focus groups and interviews were designed to gather evidence of the teachers' perceptions about their experiences and beliefs. Journal responses provided the teachers with an asynchronous means for describing perceptions of daily occurrences in their classrooms. The classroom observations allowed the researcher to gather information and authenticate some of the stories the teachers shared. Sitting in their classes and seeing the resources available to the teachers helped the researcher understand the challenges they faced.

Data Collection

The researcher employed focus groups, interviews, and journals, which were imported into NVivo/NUD*IST, Revision 1.2, coded and cross-analyzed to reveal themes. The researcher also made observations of the teachers in order to add to the total picture of the experiences of

middle school science teachers. The goal of the study was not to superimpose the researcher's preconceived notions, but rather to explain authenticated realities within the classrooms of science teachers.

Focus Groups

After the teachers were selected and signed the consent form, a meeting for all the study group members occurred on September 27, 2006 at 5:30 p.m. at the researcher's classroom. The room was a large classroom configured with tables in the center which accommodated all the teachers around the perimeter. The meeting was in the Focus Group format using questions that were developed following the guidelines established by Krueger and Casey (2000). By definition, a focus group is a special type of group with a specific purpose, meeting in a comfortable and permissive environment (Krueger & Casey, 2000). The purpose of the initial focus group was to share information with the selected science educators about the study they were joining and to allow them to build trust with the researcher.

Focus Group I started with opening questions (Appendix D) that were designed to be non-threatening and would facilitate the teachers sharing their experiences. Each person shared his/her answer to question one: Tell us who you are, where you teach, and what you enjoy doing when you're not teaching? Next, the group answered introductory questions. These questions pertained to the focus of the study and the teachers' thoughts about their connection to the topic of science teacher education. The questions were intentionally open-ended and provided the researcher with information about how the teachers understood their importance to the study. An introduction question was: How did you learn about the research study?

Transition questions followed, which asked the teachers to think back to when they started teaching and what the early weeks were like for them. The next question led the group

into the key questions dealing with the issues that were driving the study. Key questions were the most challenging for the teachers, but provided the most insight about their contribution to the study. The teachers shared what supports were the most helpful for them in their early days of teaching. They also explained the areas they wish they had been more prepared for and how they perceived the impact on their practices.

To conclude the initial focus group the teachers were given a chance to reflect on their experiences and answer the ending questions such as: What advice would you offer to a new teacher just beginning a career in education? The researcher offered a brief summary of the answers from the key questions and then asked the teachers to affirm or clarify the conclusions. The teachers were also given an opportunity to cover anything that had been omitted that they felt needed to be discussed about middle school science teachers and their unique role in schools.

Focus Group II was conducted at the conclusion of the study and the questions followed the method from Krueger and Casey (2000). Opening questions pertained to the objective of the validation of the transcripts from prior interviews and any changes needed (Appendix D). Next, the teachers were asked to imagine a giant magic top hat. In thinking about their school experiences during the study year, they were instructed to pull out the supports they had, and list them on the left side of their papers. On the right side they listed the supports they wished they had been provided.

After the teachers created their lists, which corresponded to the introductory and transition phases of the focus group, they were asked to share their lists and explain how they thought the supports that were missing for them could be provided in the future (key question). At the conclusion, the teachers were asked the following: Based on what you know now, if a good friend told you they were thinking of becoming a teacher what would you say to him/her?

At the conclusion of Focus Group II, the teachers were given a chance to reflect on their experiences. The researcher offered a brief summary of the answers from the key questions and then asked the teachers to affirm or clarify the conclusions. The teachers were also given an opportunity to cover anything that had been omitted that they felt needed to be discussed about middle school science teachers and their unique role in schools.

Journals

Teachers were invited to post a journal entry through an electronic mail or web log (blog) on a weekly basis. The teachers' responses were confidential and read only by the researcher. If there were no spontaneous messages the researcher sent a reminder or sometimes a prompt. A sample prompt was a statement like, "What happened while you were teaching science this week?" The intention was to maintain contact and develop trust between each participant and the researcher. There was a conscious effort to avoid any feeling of obligation or guilt if a teacher was too busy with other responsibilities to provide an entry every week. It was hoped that, as trust was built, the teacher recognized the e-mail and blog connection as a way to vent about problems or share successes. The researcher made every attempt to maintain the professional distance to avoid offering solutions, yet still providing a safe place for teachers to share their thoughts.

Since school computers were not considered private, the teachers were asked to post their journals to an e-mail address outside the public school domain. They had added confidentiality by using a non-school computer to share their journals. The design was intended to enhance their comfort level if they needed to share negative thoughts or experiences (Miller, 2003). Some teachers chose to use personal computers while others used their school computer; one responded via a blog. The blog was also private between the participant and the researcher. The

journal exercise gave teachers a place to share their beliefs and experiences. They also gave insights about their teaching practices and their job satisfaction.

Interviews

New teachers are diverse and so are their classrooms. The Salish I Research Project Final Report (1997) related the experiences of secondary science teachers relative to their preparation programs. Although the Salish study was designed to gather information for the improvement of teacher preparation programs, it was primarily concerned with teachers' perceptions. The forty question instrument used to interview teachers was designed to find out ways teachers' beliefs and experiences influenced their teaching practices.

Looking for teachers' perceptions about their practices, the researcher decided to utilize the same questions as the Salish study for the phone interviews. After the first focus group meeting, a series of six individual phone interviews were conducted and audio-taped with participants. Two participants missed the entire series and their responses were contributed through journals. Based on research by Kvale (1996), each participant was questioned about science education. These conversations were transcribed exactly. The interview questions were generated from the forty questions on the Teachers' Pedagogical Philosophy Interview (TPPI) (Appendix E), which was developed by Richardson and Simmons (1994) and used in the Salish I Research Project. Each interview included a portion of the forty questions so they were answered over the course of the study. The researcher guided the interviews to help maintain the focus of the study. The intention was to gather evidence of the experiences teachers were having, explore any differences, and find ways to analyze the responses using NVivo/NUD*IST, Revision 1.2.

The initial interview covered the first ten questions of the TPPI, and each teacher answered the first ten questions during the first interview. The researcher then separated the remaining 30 questions into groups of six to be covered in the subsequent interviews. After the initial interview, the researcher created a question sheet for each of the future interviews. The question sheets were printed and placed in a notebook to monitor which questions were on the agenda at each interview. The questions were numbered one through six as the individual interview guide. The question sheet prevented any mix-up of the questions as some interviews were back to back and some were several days apart.

The teachers were invited to schedule the phone interview on a monthly basis. At times, there were conflicts with school holidays and the interview was scheduled earlier or later to accommodate the school calendar. In some instances, the teacher had personal commitments which prevented conducting the interview exactly four weeks apart. Most of the teachers preferred to schedule the interview on the weekend so they were more relaxed and had time to be more thoughtful.

Every attempt was made to clarify the thoughts of the teachers and avoid assumptions about their experiences. The interviews lasted no longer than one hour each to allow the researcher and the teacher to plan the interview at a time that was convenient to both. The individual interview provided a safe environment in which the teachers shared the experiences that had been good or bad during their course of teaching.

The researcher conducted six phone interviews with five of the seven participants. There were times when teachers forgot about the appointment so it had to be rescheduled. At the end of the study there were two teachers, Nancy and Margaret, who had not completed all six phone interviews. They requested that they be allowed to answer the remaining questions via e-mail.

The data provided was helpful but the richness of the interaction between the teacher and researcher was lacking.

Observations

During March and April 2007, the researcher visited each science class. The researcher scheduled the visits with the teachers, obtained permission from the school administrator, and spent about an hour at each classroom. The visits, although brief, were intended to find support for what the teachers had been reporting in journals and interviews. The observation instrument (Appendix F) was not the traditional evaluative instrument such as the Florida Performance Measurement System (FPMS). The instrument was developed by the researcher according to the work of Brightwell (1993). Based on Brightwell's premise that teachers benefit from observations, which are considered positive feedback rather than critique, the instrument used for the observations was designed to remind the observer of each area to be noted. It was not designed to evaluate the teachers' abilities, but rather the resources and general atmosphere of their classrooms. The purpose of the visits was to ascertain the setting in which the teachers conducted the task of helping students understand science. The researcher scheduled the visits with the teachers, obtained permission from the school administrator, and spent about an hour at each classroom.

Each class was evaluated with the same instrument and attention was given to the surroundings of the classroom. The physical setting, number of students in attendance, time of the class, intention of the teacher, intended student activity, student behavior, media used by the teacher, media used by the students, available equipment and supplies for the lesson, and the access to safety equipment were all noted during the visit. Attention was given to any aspect of the environment which could have impacted the lesson.

Data Analysis

The focus groups, interviews, journals, and observations created a substantial volume of raw data. The process of sorting and determining themes within the documents was complicated. A software program designed for qualitative data analysis (QDA), NVivo/NUD*IST, Revision 1.2, provided a method for importing the text and coding the themes within, which it calls 'nodes' (Richards, 2002). The software created a tree structure that linked the data, but the researcher determined the coding headings and assigned each segment of text to a particular category. The software created a scaffold of the data to be organized for analysis.

The clarity of themes began to emerge during the analysis of the journals and interviews and the patterns were compared and contrasted to see what these seven science teachers had in common and what was different. The researcher compared notes taken during focus group sessions, journals, transcripts of interviews, and notes from observations. Over time specific categories of data began to emerge that corresponded with the themes from prior literature. However, there were also emergent themes the researcher was not expecting. Listed below are the initial nodes or categories which were coded in the transcripts of focus groups, journals, and interviews. The nodes marked with a "*" were themes discussed in the literature.

Experiments	Concepts*
Behavior Problems	Classroom
Supplies*	Socioeconomic*
Paraprofessionals	Hands on*
Beliefs why they Teach*	Teacher Learning/Student Learning
Ability as Teacher*	Connect/Motivate Students
Organization Ability	Interactions w/ Parents
County Course Guidelines	Special Education*
Student Learning Styles*	ESOL*
Differentiated Instruction*	Teacher Support*
Reading Level*	Mentor*
Laboratory	Love Subject Matter*
Tests*	Classroom Environment*
Love Students	Personal Crisis

Interactions w/administrators.
Skills at Class management*
Skills at Lesson Creation
Staff Development*

FCAT*
Want to make a difference in society*
County Benchmarks

After the initial themes were identified they were counted as preliminary nodes. The researcher grouped the nodes into categories to make the data more manageable and to highlight bigger themes in the data. Some preliminary nodes were placed in multiple categories. The subsequent headings were: (a) professional identity, (b) teacher preparation, (c) personal experiences of vulnerability, (d) curriculum policy influences, and (e) cultural diversity. After analysis, these were grouped based on their relationship to teacher resilience (Gu & Day, 2007). Two categories supported resilience: professional identity and teacher preparation; and three that undermined resilience: personal experiences of vulnerability, curriculum policy influences, and cultural diversity.

Data that had not previously been discussed extensively in literature related to science education did not fit into the other categories: accessibility of resources, impact of support network, and teachers and metaphors.

Support Resilience

Professional Identity

Professional identity included areas that teachers described as giving them a perception of generativity and value in their profession: (a) beliefs why they teach, (b) big ideas and concepts, (c) classroom tone, (d) make a difference in society, and (e) connects with and motivates students.

Teacher Preparation

The Teacher preparation category included items that described ways the teachers felt their training had helped prepare them. It also included comments about areas in which they felt they needed to continue their education and training. The nodes related to teacher preparation are: (a) mentors, (b) organizational skills, and (c) staff development.

Undermine Resilience

Personal Experiences of Vulnerability

Personal Experiences of Vulnerability included the areas that related to difficulties for teachers: (a) unable to teach the subject they love, (b) lack of supplies, (c) little support from paraprofessionals, (d) the difficult lives of students, (e) personal crises, (f) disruptive class environment, and (g) negative interactions with administration. All of these areas were expressed as obstacles that made teachers question their effectiveness in their classrooms.

Curriculum Policy Influences

The curriculum policy influences related to the areas of their practice that teachers perceived to be impacted by the recent changes in local, state, and federal laws. They shared some of their philosophical ideals about government control and standardized testing. Curriculum policy influences included: (a) tests/accountability, (b) inclusion, (c) ESOL, (d) reading, and (e) inquiry.

Cultural Diversity

Cultural diversity included topics that related to the variety of students in their classes. It included the following nodes: (a) behavior, (b) class environment, and (c) behavior related to culture.

There was another body of data that did not fit into the other categories but added to the literature related to science education. Teachers shared their experiences related to the accessibility of resources. This was not simply availability of resources but the actual challenge of securing equipment and supplies and the ease with which they could be organized to conduct classroom activities. Teachers shared extensive stories of their reliance on their support network. Although there is research on teachers and metaphors there is no extensive body of literature with science teachers. The emphasis on global awareness and having a green planet both impact the role of science teachers and may foster some of the urgency these teachers feel about their responsibility.

As the data were coded, several themes emerged from the perceptions teachers described. The phenomena of middle school science teachers' experiences were described through their journals, observations, focus groups, and interviews. As the data were gathered and recordings were transcribed the teachers were asked to make corrections and verifications of the data. Gradually, the experiences of the middle school science teachers emerged.

This study provided an opportunity for teachers' voices to be heard. The experiences among middle school science teachers revealed the conditions they found in their classrooms. The level of support they received from their peers, administration, and county level science staff was documented during collection. Having a window into seven middle school science classrooms enabled the researcher to compare the responses to similar questions. Organizing the

data into themes enabled commonalities to emerge (Kvale, 1996). Also, taking time to verbalize their thinking gave teachers the ability to “look” at their roles in the classroom (Munby & Russell, 2001). Recognizing limitations and setting realistic goals impacted teachers’ beliefs that they are making a difference in their professional lives. When teachers believe they have the ability to bring about positive change in their students they are more likely to believe they should remain in the classroom (Day et al., 2006).

Throughout the entire process, effort was made to begin looking for the similarities and variability within the data. Although the final analysis had to wait for the concluding focus group meeting, there were clear patterns of perceptions and experiences for individual teachers and for the group at large.

Trustworthiness

Teachers reported beliefs, ideas, and perceptions through open ended questions during focus groups, multiple journal entries with no guiding questions, interviews with specific questions, and short observations designed to authenticate teachers’ settings. All of these methods, focus groups, journals, interviews, and observations, were utilized to provide a triangulated collection of data to document teachers’ perceived experiences.

The seven middle school science teachers’ perceptions and descriptions were analyzed. The different types of data were organized to identify similarities and differences among data types. Based on what teachers reported in each data type, a triangulation of data was possible. Information reported in each method provided mostly consistent perceptions. When there was conflicting information, the researcher relied on member checks and information gathered at the final focus group to give clarification.

The questions for the focus groups were selected based on the Kruger and Casey (2000) method; the questions for the interviews were used in studies by Diana (2005) and the Salish I Research Project (1996). The journals provided reflections of the teachers' daily challenges, and the observations, although short, used a format based on Brightwell's (1993) template designed to build trust between the teacher and researcher to add authenticity to the stories told by the teachers. The researcher had experience conducting interactive group discussions similar to focus groups, transcribing audio-taped seminars with student teachers, and interviewing, gathering, and organizing teacher data for other researchers. Participants read and corrected transcripts during the study and at the final focus group meeting. This enabled a triangulation of data to determine the authentic experiences of the middle school science teacher.

There were some nodes that did not fit into a larger category. This information was in some cases placed in a category of new findings and in some cases, upon further clarification by the participants, was found to be more relative to one individual teacher than the group.

Chapter three explained how the researcher gathered the information from the teachers. In chapter four, the data will be shared and analyzed. In chapter five, the implications of the study will be given with the recommendations for further research.

CHAPTER FOUR: ANALYSIS OF DATA

Introduction

Chapter four explains the findings of the research study. The results include the purpose of the study, the findings from prior literature and themes with minimal literature background that emerged. The implications of the study were given with the recommendations for further research in chapter five. The data from two focus groups, 38 telephone interviews, multiple journals, and six classroom observations was repeatedly reviewed to determine the experiences of middle school science teachers. The data, obtained over the nine months in one school year, were transcribed, sorted and analyzed. Nodes or categories were determined when the interview transcriptions were imported into N-Vivo/NUD*IST, Revision 1.2. After many readings, themes were clarified.

Purpose of the Study

The purpose of the phenomenological study was to investigate the cumulative effect of the experiences of middle school science teachers' experiences, beliefs, and teaching practices. The goal of the study was to share the voices and stories of middle school science teachers as they taught. The techniques used in the focus groups, interviews, journals, and classroom observations were used to examine the perceived experiences among these seven teachers.

In development of the themes, the researcher constantly referred to the research question guiding the study: How do middle school science teachers in a large urban school district perceive and describe their teaching experiences?

Themes Confirming Prior Literature Findings

The phenomenon of middle school science teachers was particularly intriguing to the researcher, a veteran science teacher. While the experiences of the seven teachers in the study were unique, the researcher observed many similarities to her own experiences as a high school science teacher. The teachers brought their own distinctive backgrounds to the study. The teachers' abilities to meet the challenges of their jobs were determined by their professional identity and their teacher preparation.

Professional Identity

Teachers' professional identities were formed through their preparation prior to teaching and during their career. They explained how their career experiences impacted their understanding of teaching. Many teachers spoke of their hope to change the world, but the realities of their job had some concerned about daily survival. Regardless of their experience level, teachers expressed a desire to keep learning and improving. The preliminary nodes of beliefs why they teach, big ideas and concepts, classroom tone, make a difference in society, and connects with and motivates students were foundational to the teachers' willingness to develop resilience and persistence in their jobs.

Veteran

The veteran teachers shared experiences and perceptions indicating stamina and resolve. They were invested in their careers and determined to reach their goal of helping students learn regardless of the adversity they faced. Vanessa, a veteran teacher, had worked through many of the difficulties some of the newer teachers found frustrating. She explained how her belief about

why she was a teacher was linked to the big idea that science highlights. Her perception was that teaching was the ultimate experiment (interview #2):

Vanessa: I think it's because they're new. It seems that teaching science is, teaching anything is, an unending experiment? If it doesn't work period one, you do it differently period two. If it doesn't work this year, you do it differently next year. And I think that maybe new teachers think okay this is how I'm gonna do it, this is what's gonna work. And you really have to um, soften and allow it to be dynamic and allow it to change and allow it to be an unending experiment. You have to listen to others and, and, ya know, respect the different motivations of the kids and, and advise, correct, and explore and something that new teachers have to discover. Something new mothers discover.

...You know, you think, aahh, my kids aren't going to watch TV!

...You know I would never park my kid, I would never leave my kid in the car while I went in 7-11.

...Just things that, that you don't know until you're there and by the time the second or the third one comes along they're usually pretty good kids.

Vanessa's attitude and sense of humor helped her cope with the challenges she had faced throughout her career. She alluded to experiences as a mother to explain how she became more comfortable with her role of teacher. She laughed about the ways parents are confident about their rules when their children are young yet compromise these hard stands as they gain experience in the challenging task of raising children. She explained that parenting is an experiment just like teaching. When a strategy does not work she tries a different one.

Vince considered himself to be a competent teacher, yet he was concerned about his lack of training with certain types of learning needs. Finding ways to make learning possible for students with disabilities was a challenge for him even as a veteran teacher. Many teachers struggled with the multiple preparations within one classroom. Vince referred to differentiated

instruction as a means for all students to have their lesson presented in a way that met their ability. Designing lessons for a wide range of students within one class was considered an impediment by Vince in the following excerpt from interview #3, p. 7-8:

Vince: I think, one of the biggest impediments and Oh! I would be ...it's going to happen more and more. We do have such mixed classrooms. Mixed levels, you know skill levels of classes that it's so difficult where you have five or six kids that are way, way ahead. They get all the standards and sometimes when you're teaching it it's kind of repetitive for them. Sometimes, well, then you have another group of basically, like they're average and then you have kids that are really, really low, low, low. Low level readers, and low level math kids I mean, really low.

...and they're all in the same classroom and one of the biggest impediments is that you have to differentiate and it's difficult. That, I mean, that's the big thing now, differentiated instruction. And it's not in these yet. They don't set out things for me.

Vince went on to explain some of the frustration he felt from the diverse abilities of his students:

Vince: I spend all the time...now of course, I know, I understand if you have a bunch of low, low, low skills then sometimes they cause some behavior problems too whatever.

.... well, the thing is that then they have no one else there to look at like oh, you know, a model or something. I understand that.

... that's why they mix and all that but they've gotten to the point that you have like really, really mixed classes. I mean...

.... low, low, first grade readers in eighth grade! I mean, we have that.

Vince was frustrated by the divergent needs of students within his classroom. His suggestion of keeping all the bright students together and all the low students together had been tried before. The ability grouping left some teachers with the bright, capable learners while the other teachers had all the lowest students.

Vince continued in interview #3, p. 10:

Vince: yes, and then...even more, I know that most of the schools are going this way and we are next year...now, this year, we have mostly all ESE in our classrooms mainstreamed ALL. They only have a small population of 14 kids that are self-contained right now.

...and next year, even those 14 and we're talking about autistic, um, you know, um, like severely mentally retarded type of deal?

...you know, they will be, those 14 will be in our classrooms. There's not going to be any ESE at all. And then that's the trend that a lot of middle schools are doing right now.

Vince was apprehensive about the inclusion of special education students in his classes.

Teaching students who were autistic and "severely mentally retarded" was not part of his training. He was not trained to recognize those needs and design lessons for the varying exceptionalities found in the ESE classes. He was uneasy about the ways to adapt his labs for students with special needs.

Vince explained that being a science teacher does not mean the job is limited to teaching science (interview #3, p. 25):

Vince: so you know, but um, again, I think it's just that, that, um, because of that, the grade, the school grade and because of the FCAT and all that, um, I think a lot of more let's say, a lot of more to do's are on our list that are different subject areas which sometimes bothers that it limits the teaching and your curriculum. We do the AR which takes time off from our time.

Besides having to adjust to the needs of special education students, Vince had to find ways to improve reading abilities within his science classes. He was not trained as a reading teacher yet he was given the responsibility of coordinating his science lessons with the best practices for teaching reading so his students would be better equipped to decipher their textbooks. Regardless of the initial training he received, Vince was committed to making a

difference in society and his desire to see all students connect the concepts of science motivated him to persevere.

Vince and Vanessa were skilled teachers. They had many successful years of experience in the classroom. When they were asked to teach students whose needs were outside their realm of experience, they were frustrated and curious about how they could fulfill the needs for those students. But their resilience enabled them to face the challenge set before them.

Mid-career

Mandy and Margaret were progressing in their professional identities. Each found their limitations frustrating. Although there were many complaints, there was evidence of developing coping skills. The teachers complained about behavior problems but they also found a way to implement their own lunchtime detention. The desire for affirmation and encouragement created tension for the teachers. They expressed hesitation and confusion in dealing with some situations. They wanted someone to tell them they were on the right track. Mandy spoke of her ideal situation and hope for future job assignments. She envisioned a time when teaching school would be less stressful and chaotic. Emotionally and physically she invested all week long then needed to recover over the weekend (interview #1, p. 6):

Mandy: but that, in my ideal situation, if things could run that smoothly it would be awesome! You know, mental organization has got to be my number one right now. And it's, I, week after week, like this week, I'm so burned out. I just didn't care. I'm like...get me to four o'clock, I just want to go home! And then, and then I kind of refresh myself over a weekend and I jump back into it and sometimes I make it all the way to Friday without crying and sometimes I don't. and it all comes down to...do I feel mentally prepared for the next day. If I can think a whole week ahead of time...my brain works a lot better...

Mandy explained in the second interview a month later (interview #2, p. 20):

Mandy:That was a major transition and this is the second week in a row now, I've made it Monday thru Friday and haven't cried.

...haven't cried about my job!

...yea! I know, it doesn't mean I'm not frustrated.

Mandy was an experienced teacher but she was in a completely different environment than any she had taught in previously. Her current subject area was one she had never taught and the cultural backgrounds of her students were different. She had taught in an inner city situation before, but it was the combination of many factors that created the cumulative stress. She struggled with living in a new state, teaching mostly very low, middle school students, and worried about job security.

Margaret was teaching at a new school and was frustrated by the misbehaving students. She described her disappointment in the ineffective leadership within her school. Margaret perceived the lack of discipline in the student body was connected to the inexperience of the administration. She perceived that having better classroom management skills would enable her to be a more effective science teacher (interview #1 p.8):

Margaret: okay. Well one of the first things that I learned from being a teacher. I had like, I had pretty good background knowledge of science I thought (laughs) that was enough to get me through.

...it is nothing about. You don't have to ...honestly, you hardly have to know anything about science. You have to be such a good manager. You have to have so many good management styles.

Margaret was confident in her understanding of scientific principles but she did not think that was as important as having good management skills. She was aware of the need for patience and the ability to motivate students. She did not recognize the value of her science background

because she was busy creating an environment where the students would be receptive to the knowledge she had to share.

Later, in the second interview, Margaret continued to express her frustration at the lack of discipline in her school (interview #2):

Margaret: it's just been tough, like, there's been like ...constant fights in the hall. And the new dean is young, he's taught in the classroom for about two years. He's, he is a good guy and he is extremely overloaded. And he is not getting to the referrals at all.

...the kids all really...there has to be a fight in order for him to deal with it...

Margaret was frustrated at the problems she faced with discipline. She took time to write referrals for misbehaving students but felt there was no follow through from administrators. Not only did she deal with the misbehavior and time lost writing referrals, but she experienced frustration which added to her dissatisfaction with her job.

While Margaret tried to remain positive, the next interview included more concern over the lack of discipline at her school (interview #3, p. 9):

Margaret:...None of the referrals that I put out are being dealt with. The only discipline that these children have is a lunch detention that I give them. I take my lunch time almost every day and I give lunch detentions to these kids. And it doesn't do any good they just laugh it off. They don't really care about it.

Margaret was still expressing frustration over the management at her school. She had resorted to lunch time detentions which caused her to sacrifice her own break time to supervise students who had broken rules. She believed her administrators were letting her down.

Novice

Margaret was not the only teacher frustrated by the experiences she was having in her career. Noel shared in her journal (Feb. 16) that she perceived that other teachers were taking

advantage of her. She was trying to establish her niche within the school hierarchy. Noel wanted to define her professional identity. She wrote about her conversations with two co-workers.

Noel wrote: We all have less than five years experience under our belts (actually one has five this year), so we're all still relatively new to the teaching thing and are still trying to navigate this field. But yet, we all still manage to take on just about anything we're asked to take on.....

Personally, I've taken on many projects at school as well (and seeing that I always feeling like I'm tooting my own horn when I list that stuff, I'm going to just not list it, unless you need me to let you know what they are for the research study purposes). But after all that long windedness, my point is this: it always seems like it's the same people stepping up and taking on the extra responsibilities; it always seems like it's the same people being asked to do the extra stuff because it's known that if anyone else is asked they will say no.

Noel was sharing her frustration at being overwhelmed in her job. She was committed to making a difference in society and connecting with her students. She had willingly agreed to the jobs she was doing. Although she was aggravated at how powerless she felt she failed to recognize her responsibility for putting herself in this position. She had gradually taken on more obligations to try to make life better for her students but failed to recognize the imbalance in her own life.

Mandy and Margaret were mid-career teachers with several years of successful teaching experience yet they felt it was their inadequacies that prevented them from being able to relax and enjoy their jobs. Noel, as a new teacher, was frustrated by the lack of support from her peers. The teachers were emotionally and mentally exhausted from their own efforts to achieve a balance in their careers. However, their resilience helped as they struggled to maintain their commitment to their beliefs of why they became teachers. Noel was left trying to fend for herself.

Teacher Preparation

College training or alternative education programs provided teachers with a foundation to begin their career in teaching. Veteran teachers had experience with a variety of classroom situations. Teacher preparation programs helped teachers have the confidence to face the complex situations in their classrooms. Teachers' training was in constant need of modification. Knowing how to successfully teach middle school science was a moving target. Teachers who remained in the classroom had to have resilience to constantly modify their skill set. Beyond their initial training, teachers gained insights from working with a variety of peers and students, and by participating in staff development. Yet, even teachers who had completed their education training and had years of successful teaching were challenged by their students' needs. Vanessa was a veteran teacher yet she explained the challenges of meeting the needs of a diverse student population (interview #6, p. 4):

Veteran

L: ...How do you accommodate students with special needs in your classroom?

Vanessa: Individually, that's the most important thing. You accommodate them individually and I think it's important to accommodate them, um, dynamically. What works with one child, one day, may not work with that same child the next day. It can be so dynamic. I've had kids who are deaf and hard of hearing (DHH), ADHD, SLD, ESE, gifted, TMH, physical handicaps and then the stuff that they bring from home, their special needs like their, ya know, crazy parents, their crazy life, their

...ya know, drug addicted parents, their, um, no food in their tummy, no school supplies. I think it's really important to recognize that kids have different needs, different motivations and that it changes by the minute so I, I approach special needs individually and dynamically. I think it's also important to use the resources that you have.

The students' diversity included their academic ability, culture, socio-economic status, religion, and race. Teachers shared the challenge of preparing for whatever type of need a student might have. Vanessa was curious and a bit nervous about the county's decision to serve gifted autistic students through the International Baccalaureate (IB) classes. Teaching in the IB program, Vanessa was held to specific guidelines for student curriculum, but she wondered how she may have to adapt the program to make it possible for the special students to be successful as well.

Vanessa: Next year, the autistic unit is moving from Eastside Middle to School B and we're gonna get twelve autistic kids and some of them are, uh, very, very smart and some of them are gifted and we may have to accommodate their gifted needs within the IB program so that's gonna give us, that's gonna give me a new challenge.

Vanessa had been teaching for ten years and was planning a way to meet the learning needs of autistic gifted students. She was experienced in teaching many different types of exceptional children so she was taking this challenge in stride. However, she was concerned at her own lack of training and her ability to provide the best environment for these students. She did not know of any special training she would receive to prepare her for the exceptional students she would be teaching next year.

Vanessa had been at the same school, in the same district, for several years. She was asked to teach a new course just like Mandy but Vanessa's confidence was much stronger and she perceived that she would be able to achieve success with her students (interview #2):

Vanessa: Well, this year I'm kind of on my own because um, the seventh grade teachers that are teaching physical science are all teaching out of the interactions book and Mandy has some of the eighth graders and she's teaching the eighth graders out of the interaction book the same way she's teaching the seventh graders and so there are two teachers that, ya know, me and one other teacher, that teach eighth grade and are not teaching out of the

interactions book so we could work with each other but he's a long-time physics teacher and he's just kinda doing his own thing.

Veteran Vanessa advised the novice and mid-career teachers to stop complaining about how low their students were. She said complaining would not help them become more effective. She advised the less experienced teachers to simply do the best they could.

Vanessa:....I think the one thing that so many of them are doing and it's something that, that Mandy did, they spend so much time complaining about it and worrying about it and saying, "I can't teach these kids." They're, ya know, they don't wanna learn, they're Level One kids. And what I've learned is that ya gotta quit howling at the moon and just figure out, ya know, okay what can I teach 'em.
....'Cause these kids can learn, these kids can learn something. So what is it?

Part of Vanessa's philosophy to cope with challenges in her classroom involved her own strategies regardless of the subject or level of student, (interview #1):

Vanessa: you know I think a minute ago we were talking about principles in the classroom um, we preach diversity?
... and then we don't tolerate different... differences..

Vanessa attributed some of her success with varying levels of students to her management style. She used procedures that were taught from the first day of school. Vanessa used the organizational skills she had cultivated to regulate procedures and help maintain order in her class. She had high expectations and she made the students aware of their responsibility in the classroom.

Vanessa: right...you know my kids, I have rituals for everything. For like how we sharpen pencils, and how we throw garbage away, and

...and I don't spend a day at the beginning of the year discussing the class rules they just...I tell them as we go through the you know, as we go through the days and then I tell them, I have expectations. And some teachers have lists of rules on the wall.

Mid-career

Since she was an experienced TCP teacher, Mandy had many successful years to look back on to boost her confidence. However, Mandy had moved from Wisconsin and was starting her first year teaching middle school, first year teaching physical science, and her first year living in Florida. Mandy struggled to find a way to communicate the big ideas and concepts to her students. According to Mandy, many of her students were some of the most challenged in the school with low standardized test scores, second language learners, and behavior problems. Although she had previous teaching experience, Mandy frequently related stories of tears and fears about her performance as a teacher (interview #1, p. 1):

Mandy: and how I run my classroom and with my rules and how things need to be done and the procedure but when it comes to...and especially because I haven't had two years back to back yet.

Added to the stress of teaching every day was the concern over whether she would have a job the following year. She experienced anxiety over job security along with frustration about student performance (interview #1, p. 9):

Mandy: um, you know, when I ...I'm a person...I really do go day by day. I had anxiety in college and now, it can still kick in. but I had it in college and so I just learned to go day by day. And uh, to clear out the things and put away the things that you're not going to need right now. So last year, it was really quick, to figure out, okay, I'm at this school, I teach three subjects I have no idea how to do any of them so..step one. Put everything away that I don't need. And you know that's a non-event.

...step 2: find someone in all three subjects that's going to help you...and get like the first week of lessons ready.

Mandy had received many guidelines about the requirements for Florida educators and the necessity for all students to have passing scores on the FCAT. She was constantly seeking

reassurance about how her students would measure up on the tests. Mandy felt she was charged with the success of her students without having the proper training and preparation. She had never seen an FCAT test yet she was expected to prepare her students.

Mandy taught physical science for the first time and was frustrated by the lack of knowledge or preparation she had for the job. She perceived her lack of background knowledge as a weakness and felt that it would lead to ineffectiveness in her classroom. She convinced her boyfriend, Lance, to go to the hardware store with her to find the necessary equipment for her labs (Mandy, interview #2, p. 6):

Mandy: And he said, Why? And I go....because I'm terrible at this! I don't know what I'm doing. I don't know how to set this up. You could take me to Home Depot...I don't know what to buy! I don't know how to make an electromagnet. It says right here...and I said, but I've never done this! and the thing is that...he had to sit down and show me how to....you know....we went to the store and he said, you have to buy this and I said, well, explain to me why we're buying this wire and not that wire? And he told me all the reasons....okay....and then he said, you might want to consider these batteries over these because the kids will play with them and drain the batteries.. and he's not a teacher

...but he knew this stuff. And because I have to learn it....you know, because I have to teach it to other kids...I'm finally paying attention. And so yesterday and today when I'm demonstrating to the kids, how to build an electromagnet, and today, how to use them...and how to fix them when they don't work anymore...um, I even explained to the kids...hey, guys, this is kind of hard. This is something, two days ago...I had no idea how to do. I said, but look..I'm trying my best and I'm trying my hardest and trying to tackle something I've never done before and look now I look good at it!

Although Mandy was teaching science, she was not teaching an area of science with which she had prior experience. She was frustrated by her own lack of background knowledge. Even though her expertise was life science she was required to help her students make

connections in physical science. Her goal was to find a way to communicate the main concepts to her students (Mandy, interview #2, p. 10):

Mandy: those are the main ideas for me because I think, if I had to take a step back and look at the chapter and say...you know, there were four objectives and can they name them? Sure. It's not vocab. It's objectives. So um, I think their brain is still at this point, and even in high school, learning how to organize information. They just don't have anywhere to put it...

Having an idea of how to teach the subject, Mandy was still seeking ways to motivate her students to work independently on experiments. Her past experience with these students had not been positive. They were reticent in their willingness to work in groups. The students resisted Mandy's efforts to establish a cooperative tone within their classroom. Mandy resorted to class demonstrations prior to the actual activity so the students could see a preview of the process they needed to perform. The difference in this approach and the strict inquiry her curriculum demanded was the bypass of the students' low reading level. Mandy functioned better if her room was organized and she spent time keeping things orderly as she worked with her students. Mandy provided a scaffold her students could work from and build relationships across between the different groups (Mandy, interview #2, p. 13):

Mandy: You've got group work so....the first thing I did was...okay, I have these new kids and I don't know anything about them...let's just go for it. And so, I went for it, I gave them the activity...and they all fought..... I finally tried the second time, like, I demonstrated the whole thing for them.. and the next day they could do it on their own. And again, it was a big mess....but that's how I've always learned things, just trial and error. Just figure it out. So, I looked at the clock...(laughs) the calendar...and I'm thinking, okay, I've been doing InterActions for twelve weeks. I was two or three weeks behind in content...now I'm almost a month or five weeks behind the content...

Mandy took ownership for the poor performance of her students. Her frustration at their inability was internalized. She felt she had let them down (interview #3, p. 15):

Mandy: it's going to be all lower kids and I had to figure something out so...um, the best thing that I could do was go ahead and create my own um...my own system where first the kids can learn to be civil toward each other. Because, you know the teamwork thing wasn't working. I couldn't even get them to work with just assigned partners, or assigned tables.

...Cause they just were arguing all the time. And I think that a lot of that comes from the fact that they're so low. And they're extremely different kids.

...their feelings are hurt so quickly and so easily. Um, so, at the end...I just found the kids that I knew could succeed. Well, first I found a way for them to all work. Once they all started working, I said, okay, you're doing so good, they had to be really reinforced their positive changes.

Through Mandy's persistence the students began to grasp the concepts of physical science. She worked hard investing personal time, coping with antisocial behavior, and convincing her students of their ability to solve problems on their own. The constant stress of learning the material, coaxing the students, and finding creative ways to teach a subject matter she was not trained to teach, added to Mandy's frustration. Even though Mandy was an experienced teacher, she was overwhelmed by the personal cost her teaching required.

The novice teachers, particularly the ACP teachers, were not aware of their abilities as it related to their preparation. They were struggling for survival yet the frustration expressed by the TCP teacher was not as intense as those who were studying teaching practices while they were making their own discoveries in their classrooms.

Personal Experiences of Vulnerability

Teachers tried to communicate with students and share their love for the subject they were trained to teach. The desire to change lives was derailed by a variety of obstacles. The teachers' resilience was tested by the constant barrage of traumatic events in their lives and the

lives of their students. The teachers shared many instances where they felt isolated and distraught over their personal health and well-being. Teachers shared their sadness at teaching the concepts of science to children who were dealing with tragic, life changing issues in their homes. Some of the teachers had support from their family members which buoyed them in the rough times.

In order to maintain a healthy classroom, teachers perceived the need to pay attention to their own well-being. Veterans Vanessa and Vince had accidents that put their own health in jeopardy. Noel cared for a family member recovering from knee replacement surgery. The teachers' physical well-being was also connected to the emotional demand of their jobs.

Veteran

Vanessa had blacked out at the wheel and wrecked her car (interview #5, p. 1):

Vanessa: Well, you know, the worst part of this whole accident is it looks like I may never know if it was a brain failure or a mechanical failure. We've, um, gotten lots of good news. I don't have a brain tumor, I don't have diabetes, I don't have hypoglycemia, you know, my heart looks good, my lungs look good. But, um, for some reason on, ya know, 8:30 on a Sunday night I was driving down the road and, and next thing I know I was in a totaled car.

Vanessa was concerned that her auto accident may have been caused by some serious health problem. She had spent hours in the hospital over the weekend to determine why she blacked out while driving home. She expressed in another excerpt that her weekends were spent doing experiments and preparing for her upcoming lessons. This was a setback for her at home and work.

Teaching science proved dangerous for Vince when he fell from his stool and broke his arm (interview #4, p. 1):

Vince: oh, I know, it is weird because I've been using that stool for like, seven or eight years, the same stool. It's a metal stool and then I was sitting comfortably you know, going over a lab. I think it was the lab that we were just finishing. And then I got up, you know, I got off the stool, to write something on the overhead. I think it was like an example or something.

...and right then, all I know is that the next thing I knew is I was thinking wait a minute, am I falling down? I mean literally it was slow motion. And I could see I was falling down.

In Vince's class, the students were horrified and shocked when he fell. In order to get help, students were forced to act quickly and call administration. Vince was still in charge, giving orders and making sure the students were under control. His dedication to his students also added responsibilities to his co-workers.

As soon as he was able, Vince sent in assignments for his substitute and his peers brought student work for him to grade. He was dedicated to helping his students achieve their goals even in his absence (interview #2, p. 13):

Vince: but I have been um, sending the work, like in terms of like, weekly, on this day we're going to cover this topic and you have to read this or the sub will do that. And this day I want them to go over this or put this video about the same topic to have kind of a review of it. You know, that I've been doing so....

...cause I want to be sure they continue with the curriculum. And then the teacher comes back and if there's anything that I wanted collected. I mean, some things are just you know, write this or whatever but if it's anything I really want collected to see if they are learning anything then well she'll bring it to me here at the house. And then I look at it, I look over it.

Although Vince was making a sacrifice to help his students continue their education during his absence, his willingness to grade their papers added responsibility for his co-workers. Another teacher offered to bring papers to Vince during his convalescence and entered grades in the school computer. The intent was to benefit the students but this meant that Vince's co-

workers were helping his substitute and transporting papers back and forth to Vince. He was passionate about his desire to present the concepts of science to his students, but the efforts to maintain continuity for Vince's students added to the other teacher's workloads.

Vince: but um, so things like that and they know that I'm doing that cause I put my signature so they know I'm looking at the work and that I'm grading it and whatever.

....so they know it's not just busy work because it isn't. I just want to make sure they know, and I've been lucky because the teacher that comes, and she's the team leader, what she's been doing out of the goodness of her own heart is taking whatever it is I'm grading, she goes to the computer and she enters it. So that's good, they're getting grades for it.

Vince wanted to make sure his students were getting a quality education in his absence.

Vince stated that the students would most likely work harder for the substitute if they knew he was still monitoring their progress. The team of teachers were dealing with their own work, their concern for Vince, and making the learning environment best for the students. The teachers were not forced to add to their work, and they did not object, but the cumulative effects created tension and stress for the team.

Mid-career

Mandy, trained in life sciences, was spending lots of time studying physical science and buying supplies for labs. Her resilience to keep working hard was hampered by her personal life and her fear of failure at her school. Mandy reported uncooperative students and little support from her peer teachers. She spent hours in the gym working out to alleviate the stress of her job. She was also compelled to become physically fit. The personal stress of coping with school was compounded for Mandy as she prepared for elective surgery during the second semester. Her

boyfriend was supportive but she had to find her own way of coping with the physical and emotional demands of her job (interview #1, p. 11-13):

Mandy: oh my god! (Laughs.) The first word that comes to my mind is patience.

...I would call the book **patience my child** ...or something just witty and sarcastic because...if you don't have patience, if you don't have a sense of humor...it will never make it. It will never make it. There are some days where I just...I just crash and burn. The joke in my house is...you know..."Miss are you ready to go to dinner?" I say, DON'T call me MISS!

Mandy talked about her exhaustion, frustration, and emotional involvement. Mandy described how she cried after school and struggled to recover from the stress of her job. She was also concerned that she would not be rehired for the following school year (interview #1, p. 35):

Mandy: Lance's like...you and your cushy job! I'm like, ...and he's saying this as I'm crying into the pillow and he's giving me a hug.

...he knows that makes me laugh. And I'm like shut up! I haven't sat down in 9 hours!

Mandy had overcome a serious weight problem. She stated she had lost over 100 pounds in the last few years. In making adjustments for the changes in her body, she also had to make certain psychological changes. One area was her relationship with her mother. Even though that was part of her personal world it had an impact on her professional world. She reflected on how she modified her discipline with her students after she had been able to confront her mother. She made conscious efforts to be in control of her body and she perceived that control as a tool she could harness for use in her classroom (interview #1, p. 16):

Mandy: ah, one thing I do feel very experienced with, however, is weight loss. But granted, it's because of what I've been through and all the people that I've met as I've lost my weight. All the avenues I've taken, emotionally, and all the, all the things I've read about it because I'm so passionate about doing that for myself that

now..when I, when I meet people that want to know my story I ...I really do feel like an expert!

(Mandy, interview #3, p. 28):

Mandy: and so...I um, I picked out the three kids that were most...the other thing was these two boys were horsing around and I said stop it, sit down and they didn't. And finally, one of the two boys is like 6'5". He's huge, he's a tall, tall boy. And they're horsing around, horsing around and I said stop it. Stop it. And finally, I stood up and I looked right into the boy's face, both of them and I said, get out and sit down. I said, get out and when I tell you what to do you will do what I tell you. So that was the beginning of the class and they just do not listen the first time I tell them and I just got tired of it. And I finally stood my ground. And I don't think I could have, I know I could not have done that at the beginning of the year.

Part of the confidence Mandy gained in order to stand up to her students was connected to her relationship with her mother. She felt that her ability to stand her ground when her mother disapproved of her decisions had inspired her to stand her ground with her students. She realized that her students were not likely to mutiny or report her to administration. Rather than negotiate with them, she placed strong demands on their behavior. She was more content when she began to take the power away from others. She slowly recognized how vital it was to be in control of her life and her classroom.

Mandy: and they didn't, if they got up and they marched out in the hallway and said shit about me or called me....I don't care! I did not care and...

...and I think my confidence in my appearance and my ability and my review I'm just like, no one can touch me.

Novice

Noel had to deal with emotional situations with her students in addition to teaching science. Noel was exhausted from the challenge of meeting the emotional needs of her students.

Brittany, a sixth grade student, was watching her mother cope with cancer (interview #2):

Noel:....Oh, I come home completely exhausted! Because not only have I been teaching five periods a day but I've had Brittany come up to me and you know, she needs to get that out of her system.

Coping with health problems is hard for adults, but especially hard for children. Noel believed part of her job was to give support to Brittany as she coped with the trauma in her life.

Noel was emotionally drawn to Brittany and wanted to shelter her from sadness.

Noel: if mom puked her guts out for three hours last night and she needs to get that out of her system and I'm the teacher that she feels most comfortable with.

...I don't have a problem with it because if I'm the only person she can come to that's fine. I would rather this little eleven-year-old girl get it out of her system than have her take it with her day after day after day after day. But, um, then of course, I take it home.

In Noel's effort to lighten Brittany's burden, she added to her own. Noel was emotionally invested in the situation. Hearing Brittany explain how disturbing her home life could be, Noel felt the sadness. She was depressed listening to the horrible events going on in Brittany's home.

The attempted suicide of a sibling was a tragedy faced by another of Noel's students. The student who took an overdose of pills was in eighth grade and the younger sister, a sixth grader, was in Noel's classroom. During the school hours, the troubled older sister had been taken to a hospital and her parents were notified. Noel realized the eleven-year-old sister was

going to be walking home alone. While tending to the students in her class, Noel made contact with the school administrators to find a way for the younger sister to be cared for after school.

L: but do you find that there is support within your school? I see that you had to scramble with the SAFE office to get food and stuff for somebody. Do you find that that is um, a big source of help?

Noel: there are places, yes! There is support within the school system like Friday, after I discovered the issues with the little girl and her older sister; she was going to have to walk two miles home by herself. She and her sister usually walk home but since her sister was removed from school on Friday, she was going to have to walk home by herself. Well, to me eleven-year-old having to walk home after finding out your sister wasn't coming home with you for the weekend? Very sad.

The administrators were willing to allow Noel to be responsible for finding the sixth grader, determining her last teacher of the day, and to be sure she had an escort home from school. The task of locating the student was part of the afternoon activities along with maintaining her regular classroom lesson. The school did not have a procedure to support the teachers in this crisis. Teachers reported juggling their regular job as well as dealing with unusual, unexpected, sometimes traumatic events that impacted their students.

Noel: so I explained the situation that she was going to have to walk home by herself and could the school resource officer please drive her home? And he got the school resource officer on the phone and the school resource officer said yes. Have Miss Middleton find her and bring her to me and I would be more than happy to take her home. So...there are supports there, absolutely.

Noel recognized the toll all the emotional investment took on her life. She explained that she depended on her parents to help her comprehend the struggles of her students.

Noel: right. Maybe that's my problem. I care too much! (Laughs)

L: I think that's why you went into teaching. I'm sorry. (Laughs)

Noel: crazy person!

L: yea. (Laughs). Well, so how do you um...how do you recharge? I mean, what do you do that helps you unwind about that? And you said, you talk to your parents about that...are they a good...

Noel: I do. My parents and I are very close. Um, and actually, I'm currently living with my parents because the housing market here stinks.

Noel laughed when she stated she 'cared too much' but much of her enthusiasm to meet the needs of her students took energy from her. She was diligently working to find ways to help keep her students safe and teach science concepts at the same time.

In addition to sharing her problems with her parents Noel helped her mother recover from knee replacement surgery (January, journal #1):

Add to that the fact that my mom had her knee replaced on Monday the 8th and things have just been piling up. Fortunately the kids have been blessedly glad to be back at school and have been behaving and are excited to be learning about Mitosis, which is what we're learning now, so at school (other than being behind in the order of instruction), things are going smoothly.

Looking forward to speaking to you tomorrow!
Noel

Teachers explained the ways they developed resilience to cope with the challenges faced in their personal and professional world. The difficulties were also related to the influences of curriculum policy.

Curriculum Policy Influences

Curriculum policy influence was substantiated by the teachers' journal entries and interview transcripts. Inclusion, standardized testing, scripted instruction and second language students were all part of the changing demands of the classroom. Finding ways to develop inquiry lessons with students of low reading levels took its toll on the resilience of the teachers.

They expressed concern about meeting the needs of students who were academically challenged. Veteran and mid-career teachers were concerned about their inability to meet the needs of the students who were mentally challenged.

Veteran

Vince also had some concerns about the inclusion his school planned to implement the next school year (interview #2, p. 16):

Vince: I know, but yes, they've already started. They're separating, self-contained and actually, we, we got included this year (there) were like 60 ESE kids that were not before. And we have 'em. And they've been doing fairly well, I mean, under the circumstances but now the, the 14 that are...it's just 14 kids and those are the ones that are really, really handicapped, really, really severely.

.....and those are coming with us (regular classrooms) next year.

Since the FCAT accountability began, more remedial programs were implemented.

Vince explained some of the efforts to help all students achieve (interview #3, p. 21):

Vince: and they have no, no, no electives at all. Just intensive reading, so they have kind of a language arts twice a day and then they have kind of a math twice a day.

Vince's explanation of why students were taking only remedial math or reading classes as electives points out his own concern about the well-being of the whole child. He explained his frustration that although the students were not making adequate scores on the FCAT they were being forced to exclude more appealing educational opportunities because they were not deemed academic enough to help the student pass the ultimate test.

In addition to the state tests, the county set up benchmark exams for the teachers to administer. The county tests took more time from science teaching. Teachers were expected to

administer state and district tests, prepare for state tests, and keep students motivated during the process. Vanessa shared her perceptions about district level testing in a January journal entry:

We gave the science benchmark test this week. It covers the 8th grade benchmarks and the kids have only had half a year of 8th grade science. There were a lot of questions on the test that they haven't had yet. I understand that the purpose of the test is to measure growth at the end of the year, but after taking it, my students are discouraged. They thought they were ready for FCAT, but now many of them feel unprepared. They don't get that we are testing them over something they haven't learned yet.

The way Vanessa taught was influenced by curriculum policy and she described her frustration with the tests (interview #3, p.16):

Vanessa: FCAT...definitely affects the way I teach. They took the Science benchmarks test last week which is a nightmare since they've only had eight, half of their eighth grade here. And now we spend this week going over um...

Vanessa said the school grading scale, determined by student performance, was not a fair assessment of teacher's performance and further eroded teachers' resilience (interview #2):

Vanessa: That doesn't reflect the teachers. I mean I really am bothered with the whole concept of, um, crappy teachers work at crappy high schools.

Determining how good a school was with a report card grade did not correspond with Vanessa's idea of a professional environment. She felt fortunate to be working at a school with the best grade but she recognized that there were excellent teachers working at schools with the lowest grade, which was a disservice to her colleagues.

Vince shared that he valued the freedom to make choices about day-to-day curriculum (interview #2, p. 5):

Vince: okay, um, there, I think I've said this before. And I mean, this is a fact. I, I think we have control over how we go about teaching, like what strategies we'll use and if we'll use the thinking maps today or if we'll use...or we'll read from the book and then

just some reading in the content area or if we're going to do experimentation, you know, whatever.

However, the guidelines set forth by the county curriculum leaders, in Vince's opinion, were arranged for FCAT rather than for optimal student understanding.

Vince: and they decide on the order of the benchmarks and all that. And some of it has to do with also, the FCAT. What the FCAT's gonna do. Like they know certain things will be on the FCAT some of the benchmarks aren't annually assessed. Well, I know that they on purpose put certain benchmarks first, you know, so that um...

Vince was concerned by the order of instruction used with his students. He knew there had been research used to determine how the concepts would best be presented to students but he was still hesitant to endorse the guidelines. He was aware that the questions on the FCAT could pertain to a large quantity of material and his students were not always ready for some of the information prior to the test.

Vince agreed with some of the policies and tried to see the overall plan for the areas he did not embrace (interview #1, p.8):

Vince: what else, um, I guess it should be built on teamwork. I think a lot of teamwork between the students a lot of interactions...(laughs). No pun intended....with the new books...

L: did they pay you to say that?

Vince: not only to see the students engaging in teamwork but also that the students see the teacher as part of that team also. That we all have a goal that we all are there because we have a goal...where I'm trying to move them on and make sure that they're learning something and moving on and at the same time that they...that they're able to not only learn the science and apply it but also to learn how to you know, communicate within themselves and how to treat each other with respect and how to socialize. When they're out there in the real world, it's what they're going to be doing. Whether they're going to be teachers on a team or whether they're in a firm orwherever they're at they're going to be needing to communicate and interact with other

people and they have to learn how to do that. And what better way than by learning that in some type of science class.

Vanessa was more vocal about her purpose in following the guidelines (interview #5, p. 3):

Vanessa: Well, I, I teach the benchmarks because I want to keep, keep my job. Um, and that's how I arrive at, at the goals in terms of the framework of what my responsibilities to Utopia County Public Schools are. But it's also real important to me that kids, um, become life-long learners of science and that they enjoy science and that maybe some of them will go on into some of the, ya know, sciences where we really, really need good women (and a couple of men).

The perception that students have a connection to the curriculum was of utmost importance to Vanessa (interview #5, p. 4):

Vanessa: Um, I believe that my students learn best by A) having some, um, uh, personal um, what's the word that I'm looking for, uh, ownership of it. I mean the kids have to care about global warming, um, in order to learn about it and think about it so I think it's really important that the kids learn best when they have some, some personal interest and some personal ownership. I also think they learn best when they're doing hands-on, um, activities. But I did have an experience with that this week that I was a little disgusted with. Um, we, uh, Mrs. Jones (at the county office), sent me one middle school put together what she calls FCAT SCAT and it's 30...

...little labs and we would do 10 a day for 3 days and um, they rotate every 5 minutes and what I found was that that's too fast for the kids. It doesn't give them enough time to, to really process the information, to really, to really care about the information. And so, a lot of, like there was one station about sublimation and had dry ice and all they wanted to do was stick a penny in the dry ice.

The attempt to review all the concepts in a blitz format was overwhelming for teachers to put together and Vanessa thought it was too much too fast for her students. Vanessa recognized that her students were adolescents and that it was important for her to keep that in mind as she prepared her lessons. Her lack of experiences with the new subject area and new textbook were

secondary to the goals she set for herself each year. Primarily, she wanted to teach science and regardless of the latest policy she intended to be true to her own philosophy (interview #1, p. 2):

Vanessa: but this year...I'm teaching the physical science and I don't know the benchmarks, and I don't know the textbook, and I don't have the....

...And...I don't like the physical science and you know, it's important to me that we respect our water rights issues, it's important to me that we vote for candidates who feel the same way that I feel about cleaning up the Everglades and protecting our aquifer and you know....it's important to me that the kids understand these things, so that they can make intelligent decisions. Turn the flippin' water off when you're brushing your teeth!

...so...all the curriculum and stuff, it's really important but once you learn it and start teaching it then you know it and then you can focus on the things that are really gonna make a difference.

Besides impacting the students, Vanessa felt compelled to keep a balance. She recognized she was a better teacher if she built in some ways to find enjoyment as a teacher. This was a mechanism she used to maintain her resilience.

Vanessa: you're going to be there eight hours a day, you've gotta enjoy it....you know, Mandy's in tears. She's in tears some mornings when she comes into the classroom. And that worries me..she said, I know this great thing with the...can and boiling water...and I said, then do it...and she said, it's not in the book and I said, just do it. You know.

L: she's in bondage to the curriculum.

Vanessa: and when did textbook publishers get to decide?

Vince explained the order of instruction provided by the county science guide failed to consider that classrooms of students were diverse. He described scenarios where teachers were not able to adhere to county guidelines and explained that effective teaching involved more than following the prescribed order of instruction (interview #2, p. 7):

Vince: and then at the same time, it does, it's kind of set up, it never works that well, but it's kind of set up so that if you do follow the order of instruction, and with the time, this year, they even put time on it how long, like you should dedicate a week to this benchmark or two weeks to this or whatever. They did that.

Vince felt the order of instruction was helpful but that it should be used as a guide. He often found he had gone for several months without looking at the suggested timeline. Although, he felt that was mostly because he was an experienced teacher and his administrators were willing to trust his judgment. Since he was familiar with the concepts and the style of instruction the county was mandating he saw some of the flaws of the design. He found some of the recommendations were not in the order he preferred. He modified the guidelines or was able to re-teach the background information when needed.

Vince. Right now, we're discussing energy before force and that's,..it's not that that's impossible to do that but, I always feel that you should teach force first and then once the kid knows what a force is, a push or a pull, whatever, okay, THEN teach energy because then what you're basically saying is that the force...when you push a ball or something, you apply a force to it. What you're doing at that moment is...the force doesn't travel with the ball but what's traveling is the transfer of energy the energy that you put into the ball. And using the force as a medium. You know what I mean? And um, that they don't know because if they're learning energy first...well, they may not know what a force is yet. And they're kind of like, mmm, I wish that was clear.

Part of teaching involved an awareness of the whole student. Vince explained his interest in activities students were doing outside his classroom. He wanted to recognize students who were outstanding athletes, chorus stars, or those who were accomplishing goals in other non-academic areas (interview #1, p. 1):

Vince: I don't know, if you would ask me to describe myself as a teacher, I would definitely say, the first word that comes to my mind is that I'm really concerned about...very, very, concerned ...each, I try to make sure that um, that I'm not only concerned

about what they're learning in science but how they're doing in general. ...in all their classes...

Mid-career

The teachers expressed frustration with the curriculum policy demanding inclusion of special needs students. New regulations demanded the teachers teach students with limitations in language, reading, and intelligence and do it well. Standardized tests determined the progress students were making. The compassion teachers felt for the students and the knowledge that school grades and earnings were tied to the performance put added stress on the teachers. They struggled to find a way to maintain their enthusiasm for their jobs.

Presenting lessons for a class with a broad range of ability was of concern to many of the teachers. Margaret had students who had been identified as Emotionally Mentally Handicapped (EMH). They were included with students of varying abilities and there was always a struggle to be sure she was making the lesson challenging for the brightest and appropriate for those with lower ability. The following excerpt was from Margaret's journal:

Margaret: Low's: I have 3EMH students mixed in with a regular class of 30. When we talk about cells they shout out "I don't get it!" I am so frustrated at not having the opportunity to work with them more. They really want to succeed. I am not able to provide them with the help they need. Not to mention half of the class is ESE.

Note: EMH- Emotionally Mentally Handicapped, ESE- Exceptional Education and Student Services

In interview #1, Margaret again shared her frustration with the IDEA inclusion guidelines:

Margaret: my good learners, I have an EMH kid and he tries so incredibly hard and he tries to learn it. Not just to do good in grades but he really tries to learn. He wants to be a good learner.

The next interview (#2), Margaret shared the challenge of dealing with exceptional (ESE) students:

Margaret: and...a lot of students together so that just makes for a really tough time. We have an ESE teacher in that classroom too. And sometimes what she'll do is she'll pull some students out and that's really helpful because there's always, there's about three or four students in one class that have really, really tried their hardest and they get distracted with all the other students so...the ESE teacher will pull those students out and take 'em into a silent classroom and they'll do their work there.

Margaret expressed concern with her special education students' inability to keep up with the class. The challenges for the students, combined with her own inability to provide the best learning environment for their needs was frustrating for Margaret. She had never been trained to teach special needs students.

Mandy complained about presenting reviews for the Science Comprehensive Assessment Test (SCAT). Her anxieties mounted as the FCAT test drew near and her class became more difficult to manage. When FCAT was finished, Mandy expressed her relief (journal):

"I am SO HAPPY the FCAT is over. I've never been so drained in my life and ultimately it made me sick working to the bone like that. The stress that came with doing the FCAT stations and then a 2nd straight week of review with 8th graders just before the test was exhausting on me and my body. I just felt awful and I'm still recovering (my weekend to Ohio – which I planned forever ago – just made me feel worse because I got sick all over again.)

Mandy had worked to the point of exhaustion, in her opinion, to help prepare her students for the standardized tests FCAT and SCAT. Her physical and emotional reserves were drained. Since this was her first year teaching in Florida, she was trying to prepare students without a complete picture of the challenge they faced. She expressed relief and confidence that next year would be easier because she would know what to expect.

Novice

Nancy was the only teacher who voiced a positive view of the curriculum guidelines set up by the county. She explained her lessons were planned with the county prescribed order of instruction (interview #2):

Nancy: I decide what to teach and what not to teach by going through the order of instruction...listed by the county...by going through what is in the textbook because it's laid out and scaffolded for us.

Nancy expressed some relief at having the order of instruction provided by the county. She also stated that she felt less pressured by the FCAT since the key testing year was eighth grade. She was not as closely scrutinized as a teacher with eighth grade students because she was part of the team building the knowledge of the students rather than reviewing and preparing for the test.

The veteran, mid-career, and novice found the prescribed instruction somewhat limiting. The teachers were accountable for teaching specific materials at each grade level but their performance was evaluated by their students' achievement. Teachers with less capable students would be more challenged to meet expectations than teachers with classes of high performing students.

Cultural Diversity

Teaching students from many different cultures created diverse classrooms unlike some teachers had previously experienced. Some were faced with students of a variety of races and social classes. The classroom environment often changed based on the latest violence in their neighborhoods. Some students were accustomed to solving problems with violence. Students came to school without sufficient sleep because they had been awakened by police activity in the

middle of the night. Along those same lines, many were also hungry because there was not enough food in their homes. The classroom behavior and cultural norms were challenges which teachers had to learn to manage. Teachers with diverse populations did not mention the advantages of the different cultures and backgrounds of their students.

Teachers' cultural diversity backgrounds for this study were broad. Six of the seven participants were women, two were Latino, and three were parents. Nancy and Natasha were college students, earning their masters in science education while teaching. The diversity of the teachers as well as their students was part of the dynamic environment of their classrooms. The teachers described some of the challenges they faced trying to understand the actions of their students.

Veteran

Vince found problems not only from a socio-economic diversity standpoint, but also from different academic levels (interview #4, p. 11):

Vince: they're so different and you know like this year I have a sheltered class and I never had in my life and that's all like 14 kids that are Hispanic together in one class. And they hardly know any English so I'm definitely going to address and teach the class differently with that....

Although Vince was Latino, his students presented a variety of backgrounds and he was forced to find ways to bridge the divide between his culture, his students' cultures, and the culture in which they were both living and learning.

Vince's perception about student success was influenced by their poor attendance. Students who were frequently absent for extended periods of time, returned and offered to make up their work. In a classroom with primarily reading or book work it may have been possible, but with a class designed with experiments and class activities it was nearly impossible. He

knew some students were absent due to family issues, to care for siblings, or to help their parents. Students from families of poverty added stress to the teachers because of their attendance problems (Vince, interview #3, p. 20):

Vince:And that's another thing and even if they're willing...I mean, we have kids that are absent a lot but then they come back and they're willing to make up all the work and everything but how can you really make up the work even if you want to? If what was taught you haven't even seen?

....some of them, they will go back and try to read and then they can't even read. Or they don't understand what they're reading or something so they're not....oh, man. But a lot of things. So our absences are also a major, major issue.

Mid-career

Teaching science to uncooperative students presented Mandy with an opportunity to build a community of learners. Her students were anti-social with each other and refused to conduct cooperative group experiments. They had to overcome cultural differences to enable them to conduct experiments in groups (interview #3, p. 10):

Mandy: it's going to be all lower kids and I had to figure something out so...um, the best thing that I could do was go ahead and create my own um...my own system where first the kids can learn to be civil toward each other. Because, you know the teamwork thing wasn't working. I couldn't even get them to work with just assigned partners, or assigned tables.

Mandy attempted to follow the designated curriculum but the students refused to stop fighting and she was forced to find ways for them to build a community. Often Mandy was drained because of the emotional toll her resilience took from trying to conduct lab activities with students who refused to work together. She explained her challenge in (interview # 4, p. 2):

Mandy: Cause they just were arguing all the time. And I think that a lot of that comes from the fact that they're so low. And they're extremely different kids.

...their feelings are hurt so quickly and so easily. Um, so, at the end...I just found the kids that I knew could succeed. Well, first I found a way for them to all work. Once they all started working, I said, okay, you're doing so good, they had to be really reinforced their positive changes.

Mandy expressed frustration at her students' inability to work cooperatively. The mandated curriculum relied heavily on inquiry and students' ability to read and solve the scientific problems with their lab team. The students' inability to break down the text contributed to the antisocial behavior according to Mandy. She was forced to find a way to help her students learn the concepts in spite of their reluctance to work cooperatively.

Novice

At the start of the study Nancy was enthusiastic, but her participation waned. She repeatedly missed interview appointments, failed to contribute journal writings, and appeared to have dropped out of the study. When Nancy finally rekindled her participation in the study, she attributed her absence to her masters program, dating, elective surgery, and trying to sell her home. She later reported being dropped from her college program because she failed to turn in assignments. Nancy's final interview questions were answered via e-mail as a journal because it was not possible to find a way to talk by phone. The desire to meet the needs of students conflicted with Nancy's ability to keep balance in her personal life.

Nancy was teaching at an inner city school (School D) with many students from dysfunctional homes. One incident from Nancy's second interview showed the challenge her students faced:

Nancy:....and there's another girl in the ninth grade I have her sister, her seventh grade sister and the ninth grade sisterher second baby is due in like any day! She had one in seventh grade and now she's in ninth grade on her second one! That's just...and I've been to their house and it's like...

The idea that her student lived in a family with rampant teen pregnancy was an emotional experience for Nancy. The student's home support system was in jeopardy, which could have impacted her education.

Nancy: mom's a baby.....and it's sad.

L: and is the mother going to have to.....the grandmother going to have to help raise these kids?

Nancy: as well as she can but the two that she's got....I mean, the seventh grader I have is crazy as a loon and then the sister is crazy as a loon. She was even crazier! So between the two of them.....

Low socio-economic status, mental health issues and teen pregnancy in the same family could bring serious challenges for her student but also for Nancy. In addition to teaching her students, Nancy would be monitoring the situation in this student's world and trying to be sure the family was connected to the social services they needed.

Nancy: well, she's got three now and the fourth one on the way! And there's a little boy too...Cindy, the seventh grader, there's a little brother, I guess he's in elementary school, I'm not sure how old.....

...I'm not sure what grade maybe fourth or fifth. And then the mother and then the boyfriend....and I don't know who else lives there. Every time I go over there....I've been to the house three times because this Stephanie is a big problem. I had her last year and I have her this year. I mean, she told another teacher to go fuck herself. I mean, she just, she's crazy.

...but she likes me....(laughs)

...yeah, I mean, I've taken her home, I've gone to her mother, I've convinced her to take anger management classes. You know, I've really tried to work with this girl but...she's crazy!

The cultural diversity of the students created a unique atmosphere for Nancy's classroom. Stephanie's dysfunctional home reminded Nancy of her own adolescent scenario. Nancy shared

her personal history with a dysfunctional family life. The following was Nancy's story of her youth from interview #2:

Nancy: I'm trying to think...I think I started to Verano (community college) before my class graduated because I was expelled like in September or October and I think I enrolled in January.

...well, yea, I had a 1240 on my SAT.

Rekindling Nancy's personal trials uncovered an emotional connection that involved Nancy's own experience as a runaway teen. She felt a deep desire to intervene for Stephanie and made personal sacrifices to ensure that Stephanie would be able to remain in school.

Nancy: I was homeless. I ran away from....I was a runaway.....(laughs)...I was working.

The options for students with poor attendance and dysfunctional homes were part of the reason Nancy cared so deeply about what was happening in Stephanie's home. The possibility of Stephanie finishing school looked bleak so Nancy reached out to help her.

Nancy: yea, that's why I was expelled because it was hard to get to school you know, and I didn't have an alarm clock....and...you can't wash your clothes...and you know...you don't know where you live.....

Nancy had been successful in college yet became defensive during her graduate class when her instructor assumed that inner city school teachers have not experienced the same trauma as their students. She preferred not to explain her past but she resented her college professor's assumption that only students with middle class backgrounds would be enrolled in masters courses.

Nancy: I do have quite a background. And people look at me and they're like...oh yea, you're so white.....and little do they know, I went to Woodward (middle school), I went to Memorial (high school), you know....

When Nancy looked at her students she recalled her own past struggles. She wanted to help them overcome.

Nancy: yea, I lived in Pleasant Hills, I ran away from home. I lived on the street. I was expelled from school. My brother's a drug dealer. You know, people don't realize that. They're like, oh yea, you're getting your masters degree. In fact the professor one class said something like, I know none of you in here have ever gone through this because you know, you guys all come from a nice middle class background and blah, blah, blah....and she was serious.

Teaching in an inner city school brought satisfaction to Nancy even though it rekindled some of her past traumas.

Nancy: yea, and that's why I like being in a Title I school though, because some of these kids are, you know, headed that same direction or some of these kids maybe I can help them.

When Nancy was homeless and missed school she was expelled from high school. She had good grades, high level courses and good behavior but she was not allowed to continue her studies.

Nancy: I was like, I just want to go to school. The principal was like....well, you missed 15 days you can't go to school....so...

...now they have a SAFE coordinator, they have all these agencies they would refer you to.....

The hope of salvaging students was part of Nancy's motivation. She wanted to prevent a repeat of her own traumatic school days.

Nancy: I look back on that and I'm like, there were so many chances that somebody could have done something and there was nothing. I had AP classes, I mean, everything, all the way.

Nancy was studying for her masters degree after being a high school drop-out. Her perception was that she was barred from high school because of her dysfunctional home and the rules of the school system. Nancy empathized with her students and stated she wanted to help

them navigate out of their difficult situations. Her perception of their difficulties was influenced by her own experiences and background.

Natasha's background as a social worker provided a foundation for her understanding of her students. Like Nancy, she was motivated to help her students escape the dangers that surrounded them. Natasha's experiences in the classroom compelled her to reflect on her own background and find ways to relate to her students (interview #1, p. 1):

Natasha:it's [teaching middle school] been very conflicting with my personal views. I don't like having to control others..... But I'm realizing more and more that they can't and I need to be authoritative, something that I really, really don't want to do.they've kind of taken advantage of that and I've realized that they definitely need an authoritative person in order to keep things under control and I'm not that type of person so I've been trying to learn how to do that as quickly as possible in order for these kids to learn....

Regardless of her personal philosophy, Natasha had to adjust her beliefs to make her classroom more effective (interview #1, p.3):

Natasha: ... I never had any intentions to scream, I've never had the intentions to be mean.....I only wanted to be loving and caring and positive...

....they only respond to yelling and something negative because that's what they're getting at home and that's what they've been getting within the classroom so it's definitely conflicting with who I am too.

Growing up in the working class gave Natasha experience with tough individuals but when she went to college she tried to elevate her own thinking to escape that mindset (interview #1, p. 6):

Natasha: ...So, I'm having to...like, revert back to those times where I was really street smart and trying to implement that now into who I am...but yea, these kids, the teachers that they respect...like Ms. Bellamy told me, this girl touched her and she turned around pulled off her weave.

...and that's what the kids respect.

Natasha recognized the intimidation tactics other teachers used in their classrooms but she could not implement them in her class. Natasha had serious conflicts between her personal views of freedom and autonomy and her need for authority in her classroom. She looked to her peers for guidance but the difference in the culture of her students and her own was significant. Natasha explained she was frustrated with her inability to find strategies to maintain control in her classroom.

Natasha was also upset by the prejudice of her students. She attempted to have a class discussion about the choices her students were making (interview #4, p. 13):

Natasha: A couple of days ago, um, it was in my fourth period class, and this class, all my, all my classes I have behavioral problems in, of course, I think my fifth period I have the most behavioral problems in but for some reason I felt my fourth period, I had the most kids who were really, genuinely hostile towards me for whatever reason.

Natasha explained how she had tried relating to her fourth period students but for some reason they remained unfriendly. In some ways she felt uncomfortable sharing anything of her personal life with these students. She had smiled and spoken kindly to them but because she was Euro-American and most of them were African-American there seemed to be a barrier.

The cultural differences between students and teachers were very evident in Natasha's classroom. One student shared a theory he had formed from watching television. He believed that Euro-American teachers came to the low socio-economic schools to teach because in befriending the future criminals they were insuring their safety. If they knew the 'bad' kids then their homes, cars and even their life would be spared from harm. In the course of the dialogue a student shared information from a recent Oprah television episode.

Natasha: No, no. But, um, I, I told 'em, and this is the honest to God truth, I had one girl, okay, raise her hand, she's like I was watching Oprah a few days ago and...um, she said that the reason why white teachers work in black schools is because they think we're all criminals and they wanna work in a black school because they wanna try to make sure we don't end up murdering or raping or stealing from them.

Natasha had committed to helping others and moved from social worker to teacher but was perceived as selfish by her students. The relationship between Natasha and her students was challenging because of the students' wariness of Natasha's motives. The differences in cultures and general lack of trust was a disappointment to Natasha. Helping students from poverty was a passion of Natasha's yet her energy and resolve were sapped trying to cope with constant discouragement.

Noel was looking for strategies to relate to her diverse students in the large urban school district. Unlike Noel's small town background and cultural experiences in Pennsylvania, her urban students had different expectations for school (focus group #1):

Noel: Three days into my student teaching and he (mentor teacher) would leave the room, and he would say, your turn and he would leave the room. And it was just me and so because he shoved me into that, I left my student teaching thinking, I can do this. Like I really can do this, I'm ready, I can do this...

Since Noel had a strong internship experience, she was confident she would be successful in her new classroom in Florida. Noel explained she had thought she had all the answers, but it turned out she was in for a different world. Noel even said she thought she would die the first day of classes (focus group #1):

Noel:...I've got all these education classes I'm ready. The first day those kids came in I thought I was gonna die. Oh my God!

Teaching in Florida was not the same as the small town, mostly middle class Euro-American school she had worked at in Pennsylvania. Noel now had students from urban, low

socio-economic homes with increased learning disabilities and multiple races in her classroom (interview #2, p. 2):

Noel: I was used to small town. Small town, I student-taught in a classroom where you could say to the kids, there's ten minutes left in the class. I'll turn on some music and you guys can get your homework started. And what would they do? They'd do their homework!

Fortunately, Noel was able to regroup and find alternative ways to manage her classroom. The skills and confidence from her internship provided a foundation for her. Initially, she was frustrated and anxious about her new teaching assignment (interview #2):

Noel: These kids, don't do that. I seriously, I thought I was going to die. I couldn't...I had to learn classroom management all over again. Everything I had learned in college was wrong um, I had to learn how to teach these kids again because everything I had learned in college was wrong. I mean, it wasn't necessarily wrong but what they had taught me wasn't going to work for these kids.

Noel was rethinking her educational strategies in light of the different cultural backgrounds of her students. What had been successful in her internship with the students from a rural area was not working with the urban students she was teaching.

Contributions to the Literature

Accessibility of resources

Teachers need specific supplies and equipment to teach science classes. Maintaining engaging lessons without adequate materials could lead to complacency and break down the resilience of teachers. Many teachers reported frustration with obtaining needed supports for conducting inquiry based lessons.

By visiting Natasha's classroom in March, the researcher witnessed the storage room where lab materials were kept. Natasha's room had no locking cabinets or storage areas. Only

one of the two doors of her classroom locked so she relied on the community science closet for supplies. The room was spacious but crammed full of supplies with no apparent organization. There were boxes stacked on top of tables. It was nearly impossible to walk around without moving boxes. The possibility of a teacher accessing supplies for labs was doubtful. Natasha's supervising teacher stated how embarrassed she was but that she had not had the time to organize the materials. There may have been adequate supplies for science labs but it would have been a major task to procure what was needed on short notice.

In contrast to the jumble of supplies at Natasha's school, Margaret was at a new school and her complaint was a lack of supplies, "I have no supplies!" (interview #2, p. 9). Vince insisted that there must be supplies for lab activities for effective science teaching (interview #1, p.5):

Vince: um, maybe we are so used to so many lab activities. And I believe that the only way you can learn science is that basically, the majority of the lessons are taught through cooperative learning...good working to focus on what's happening just really communicating...

Besides having the needed supplies for labs, Vanessa shared that her school was fortunate enough to have another resource and support, there was a school nurse to help solve the problems with sick children (interview #3 p. 17):

Vanessa: Um, at our school, the Spring Lake Health Foundation put in a nurse-practitioner.

...these kids all day long who have earaches and, you know, strep throat and things like that but their parents don't take them to the doctor for whatever reason so there are things like that that influence my teaching in a positive way. Um, so, state level, local level, national level, you know, national level, that child left behind, I'll talk to a politician who spent twenty years in the classroom instead of, but don't, don't make legislation for me when you've never even been in a classroom.

Vanessa was concerned with the connection between student health and student achievement because she knew how difficult it was being a teacher without those resources. Her attitude reflected the concern others had about the support networks they found vital to their jobs.

Impact of support network

The support network included county science staff, school administrators, peers, friends, and family. Teachers reported satisfaction at different levels of support and how much they relied on this for continued effectiveness. They also reported their perceived lack of support and their disappointment. Teachers' resilience increased when there were adequate supports and decreased when the support was lacking. The teachers' professional identities were enhanced by their supporters. The quality of teacher preparation provided a foundation for teachers to build their practice. At each level of experience, the teachers' resilience was boosted by encouragement and affirmation from their support networks.

County

The teachers working with the InterActions curriculum had mixed perceptions about their effectiveness. For Vince, this was his second year, since he had been part of the pilot program the previous year. Many of the pitfalls Vanessa, Mandy, Nancy, and Natasha found had been worked out at Vince's school because of the previous experience. The county had made efforts to provide support for the teachers but some teachers were not convinced it was sufficient.

Even with the experience and order of instruction provided by the county science staff, Vince could see there were potential problems with students who failed to grasp concepts they had to build on for future lessons (interview #2, p. 10):

Vince: also, and this year the worst thing, or I'm not saying, the worst thing, but I'm just saying it's bad but the worst thing that

could happen is that this curriculum is based or building upon or the worst thing that could happen is like two weeks later you thought they got it and this happens. And then when they need to connect what they're doing that week with what they learned two weeks ago and they don't. Then you're like, oh my god, they're not going to learn anything because they don't remember the other thing.

...and if they haven't gotten it they won't get it.

As a new teacher, Natasha was frustrated by the lack of support she received. Using the new textbook was only part of the problem. She was at a school where the resources appeared to be lacking. Unlike Vince's school, Natasha was fighting to get sufficient resources to conduct even the simplest lab activities. Without the support of her husband, she felt her resilience would not likely survive. She had issues with classroom set up, resources, and student attitudes (interview #5, p. 5):

Natasha: that they needed that, right, because, ya know, they just told me "Do this curriculum, do this curriculum" so...

...don't go away from the curriculum; you gotta do this, you gotta do this. And I'm like, okay, I'm doing it and it's not working so where do I go from there and it's funny 'cause I went, when I went to the interactions workshops, they couldn't tell me how to handle my problems 'cause my problems are so severe.

Although the support team was willing to answer questions and offer guidance for teachers with the new curriculum, they had no solution for the basic issues created because of the school's lack of resources (interview 5):

Natasha: they couldn't tell me. They're like, "Oh, um, well, this is designed for, for tables but you have desks. Let's come back to that." And they never came back to that.

The curriculum was only part of the problem. Natasha perceived her students were unable to achieve with the circumstances in her room. She had repeatedly asked for help and

expressed frustration with her ability to be effective and with her administration's lack of support.

School administration

Teachers' reported many instances where their administrators undermined their resilience. Few examples of affirmation by school leaders were shared. The feeling that their administrators were unsupportive led to teachers' attitudes that were adversarial rather than friendly. The perception from Vanessa and Mandy, who were both experienced teachers, at one of the highest socio-economic schools in the district, was that their administrators were not supportive. Although Vanessa's conflict was with a parent complaint she felt her administrator did not hold her in high regard (interview #2):

Vanessa: I got called in by my principal on Friday; she, she doesn't think very much of me. And, um, she's never said so but I just don't think that she thinks very much of me. She's new, she's young, you know? And she said that she, that the assistant principal had been talking to one of the parents of two girls on my team so that narrows it down.

...And that the mother was upset because I made the comment about doing your homework even if your grandmother died but she was also upset because there weren't enough materials for the girls to finish the project. Well, yeah, that's what happened, kind of, but not exactly.

Vanessa's administrator assumed the parent complaint was well-founded, and wanted Vanessa to explain why the students were not given the resources to complete their homework. The books the students needed were supposed to have been checked out prior to leaving class so they could complete the assignment. Vanessa had clearly stated that the students were part of the International Baccalaureate (IB) program and they need to be responsible for turning in their

work on time. The students were trying to escape responsibility for their own actions by telling their parents they were not given the resources to complete the assignment but that was not true.

Vanessa's belief that teachers need affirmation from administrators was reiterated by Mandy (interview #3, p. 21):

Mandy: ...and we had nothing to do with it and...you know, and then the administration came down really hard on our team. Now I say our team...but I can tell you this much, I got all "E"s (excellent) on my review.

...and I was just wow! Okay. And what...you know, there's one administrator that's like my age and so I kind of talk to him and say just, look do not bullshit me. Please!
Just tell me the honest to God truth, what is their opinion of me?
Because he's the dean, so he's like AP in training.

Mandy was aware of censure from the administration with regard to her team. There were problems with some of the teachers and their unwillingness to meet the needs of their students. Since Mandy struggled with her self-confidence, it was natural for her to worry that there were problems with her job performance. However, the dean assured her that the administration was hoping to encourage some of her team members to change or leave. The other team members were not meeting the standards of the administration so the entire team was reprimanded rather than the individual teachers. Mandy's resilience was sabotaged because the administration gave blanket orders she thought included her. Her performance was hampered by her feelings of self-doubt (interview #3, p. 22):

Mandy: He goes, their perception is that it's not you. Their perception is that it's more um, it's more this person, and it's more this person. Of course, this situation with the man that left is huge. But...they think that of that team, you have your shit together.

...he said, I really don't think you have anything to worry about. And I'm like, okay, so I'm not going to worry about my job and you know what? If they do decide to let me go at the end of the year, I have other things in my life that I can do that I'm passionate

about and I have a year at School B under my belt. Someone will surely take me.

Since Mandy's team was criticized by the administration, Mandy perceived her own job was at risk. She was part of the team so she presumed she was part of the problem. Mandy already criticized her own effectiveness and she relied on the administrator's feedback to encourage her. The evaluation she received for her own teaching confirmed that she was an excellent teacher but the doubts in her mind were hard to dispel (interview #3, p. 24):

Mandy: this is like, this is really, really demeaning. But I finally just, when I got my review, you're right, I was striving for perfection with no feedback and then once I finally got a little feedback from my Dean and then, the real feedback right from my principal.

Mandy's principal explained that the team would be reorganized for next year so she would be working with a more cohesive group. The principal wanted Mandy to have more of a leadership role.

Peers

All of the participants gave examples of support they received from their peers. The encouraging words and kind deeds of fellow educators went a long way to build resilience. The perception that there were people outside their classroom who were willing to lend a hand was vital. Margaret's team worked on unit plans together. They were building a community of support as well as helping design unit lessons (interview #2, p. 9):

Margaret: but you know I work with some really awesome people. I work with really good people. And we always work together, like on our team.

Margaret shared more at another time (interview #1, p. 4):

Margaret: yea, it was. This is something new that we did this year. I haven't been I haven't been, we haven't done this in the past two years. Um and the very beginning of school, in preplanning, they all had us create a concept map of for our individual groups and teams, like sixth grade science teachers...

...got together and they came up with concept maps for our first two units.

...and then we got together again and then um, we created our next two units and we've done the whole first two units together and that way we're all doing parallel planning and that's another way. We don't necessarily have to do the same things, same notes...

Margaret expressed appreciation for the group efforts and the way she was building relationships within the faculty. Natasha was building relationships with some of her peers by getting support with classroom management. A veteran male teacher provided some discipline support for Natasha. She did not agree with his methods entirely but she valued his ability to command respect from her students (interview #1, p. 3):

Natasha: well, I've had a couple of role models. Within Woodward (middle school)...I have a gentleman who has been there at Woodward for ten years.

...and he's also held administrative positions...I don't know...he's very old school...

... and I don't agree with a lot of things he does.

Managing unruly African American boys provided quite a challenge for Natasha. Since she was a young, Euro-American woman she relied on some of her peers to help with discipline. She had to find a way to help her students understand their bad behavior would not be tolerated. One of her female colleagues scolded Natasha's boys when some were pretending to slap Natasha on the rear. The African-American female teacher explained that their teacher might be Euro-American but the two teachers were sisters. She explained to the class that she would not

tolerate their disrespect. Natasha took this as a sign of acceptance from her peer teacher and was encouraged by the way the students responded (interview #1 p. 5):

Natasha: yea, they see a young white woman and I just recently found out that some of the male students when I turn my back they're pretending to slap my bottom.

...yea. So they have very little respect for me. And it has to do with um, I think, both being young and a woman, and I'm sure my skin color.

...but there's this one lady, she's, she's African-America, she's been there for a while and she stepped in and she made the kids, some of the kids in my class, apologize to me and she told them that I'm her sister, you know

...and I'm her colleague. And she's going to make sure that, you know, I'm taken care of and that her kids are going to give me the same respect that they give her. So her doing that has helped and I definitely look up to her for you know, doing that, and for making the kids think at least that...you know, it's Ms. Hanley's sister, regardless of her skin color, you know, I have to also, respect her.

Natasha often dreaded going to work. She spoke of the way she went home deflated and discouraged and relied on her husband to keep things together at home and help her regain her resilience.

Mandy explained in her first interview (p. 7) that there were teachers on her team who were willing to have copies made for the entire team and Mandy's copies would appear when they were needed.

Mandy: it's wonderful! So that's really helped and um, you know, my co-workers have been great that way. It's just, no one makes the assumption, we've found the one person who's done it before and she's kind of leading everybody else. And um, everyone's understanding and oh, man! It's a lifesaver.

Drawing a line between supporters like peers and friends was difficult. There were overlapping qualities when co-workers bonded and wanted to have friendships rather than strictly professional relationships.

Friends

Teachers spoke of the support they gained from others and there was also a feeling of unity with their peers that went beyond co-workers. Coping with their own health issues was challenging for teachers but the tragedies of their colleagues also affected their worlds (Vanessa, interview #5, p. 12):

Vanessa: We have another one, um, who was diagnosed with stage three ovarian cancer and um, doesn't have long-term disability.

...Ya know, it's tough out there and every time I see her, I like this woman very much, I'm very concerned about her but how many times can you say, ya know, how you feeling? Do you need anything?

...I mean, every time, every time I see her, of course that's what I say but...

When Vince started teaching he contacted one of his former teachers to thank her for the inspiration she had provided him. He was encouraged by the support she offered (interview #1, p. 2):

Vince: okay, well, I definitely..have one person who comes to mind is my sixth grade language arts teacher.

...well, I did find a Sophia Fontana but she's an attorney at law actually in Mt. Airy, N.C. and then I said, well, it doesn't hurt...I remember that I wrote to her with the address that actually appeared to her attorney at law office and I thought well..if it's not the same person the person will just not write back. Well....it was her! And...

Even though Vince's inspiring teacher was now a lawyer, she wrote to him and included a number of photographs she had saved from her time as a teacher. She had kept the treasures from her time as a teacher. She had made a lasting impression on Vince. He attributed his love of reading to her nurturing attitude in his formidable years.

Vince: we spoke on the phone and but I definitely remember with her as a role model, she was language arts, but I'll never forget that my love for reading, because I'm a very avid reader.

...my love of reading is because of her, I mean, she really instilled about how important it is to read and how much you can get out of reading and I remember that for everything that we read, I would say...well, not everything but let's say, four or five of the things that we read, she made sure they were um, plays like on Broadway and things like that and I remember that she used to take us to plays after we had read the story or novel.

Vince vividly recalled the way his teacher had inspired his love of learning and her passion as a teacher motivated him as he worked with his own students. Falling off a stool and breaking his arm was not enough to deter Vince from caring about his students from his hospital bed. Vince was devoted to his role as a teacher. He explained his commitment to offering tutoring both before and after school. He also shared how past students frequently stopped by to share their success in high school. He maintained his contact with his students, peers, and the study even after his injury. The identity of being a teacher was vital to Vince. He was proud to have the privilege of teaching his students. The affirmation he received from former students added to his resilience as a teacher.

Family

Teachers did not confine their jobs to the hours the school was open. The devotion to school and maintaining quality lessons for their students seemed to impact their entire lives. Vince shared that his sisters helped care for him during his recovery from his fall. Vanessa

explained that her own family was willing for her to conduct experiments in the kitchen when she needed to prepare her lesson plans. Natasha told of the support she obtained from her husband (interview #1, p. 4):

Natasha: ... my husband, my husband's been a big, a big role model...he's just inspired me in all types of different ways.

Noel lived with her parents to save on rent and they provided a listening ear when she came home burdened with the troubles of her students. There were many examples of the teachers' perception of themselves as more than teachers. In spite of the difficulties they encountered, they stated they were passionate about the role they played in society. The resolve to make a difference in society was key to keeping these teachers returning to their jobs.

Teachers and Metaphors

The teachers held tightly to their beliefs about why they were teachers and their altruistic goal of making a difference in society. There were repeated allusions to the importance of their sacrifices for the well-being of their students. There were many, especially the novice teachers, who perceived they were a type of hero figure for their students. Natasha, a former social worker, struggled to resolve her perceived inability to save her students (interview #1, p. 11):

Natasha:.....that their past does not necessarily determine their future, their fate. That they can eventually overcome what they feel is destined.

...and gain control over.....the environmental influences that have maybe shaped their lives thus far.

...that nothing has to be....set in stone...that they can overcome really any obstacle through knowledge, through gaining control, over their past learning maybe how things have influenced who they are cause I feel once you learn how you know, your environment, maybe your background has kind of made you who you are gaining control over that. By gaining control over that and learning how those types of things, like maybe your family, you

know, being poor, has shaped who you are it allows you to then overcome....gain control.

Natasha voiced her desire to help her students embrace their future as something they could control. She felt their attitude toward destiny gave them an excuse to settle for poor performance and low expectations of themselves. The sacrifices Natasha made were in hopes that she would be able to make a difference in the lives of her students (interview #2, p. 12):

Natasha: I work with kids after school. And before school and um,oh, my whole life is devoted to this job. Right now. I have no time for myself. Cause I'm also a full-time graduate student.

...so yea, I stay after school to tutor...I take work home with me. I did a student, this kid gave me a science project earlier and I edited the whole thing for him.

...I have some severe behavior problems. Like kids that should not be in my classroom.

...you know what happened? I got kids who got kicked off the other teams...out of the other classrooms. So I got the ones that even the more experienced teachers couldn't handle.

Natasha prided herself on the fact that she was the dumping ground for other classes. Although she was frustrated by the problem, there was a certain feeling of satisfaction in thinking that she could offer hope to those students. Her students were a type of captive audience. They were under her control and she was compelled to make efforts to deliver them from their tragic conditions. Natasha was willing to risk her own safety in dealing with the perceived criminal element in her school (interview #2, p. 14):

Natasha: I told the cops I've got gangs in my classroom. The cops tell me, tell the dean. I tell the dean he tells me tell the cops. I'm like, you know what...I have to go up to these gang members and rip their bandanas off. I've got bandanas all in my drawer. I confront them. 'Cause no one else is doing it.

The term 'positive light' that Natasha expressed continues to express her perception of her role as savior of the downtrodden within her school (interview #5, p. 14):

Natasha: really counteracting, um, the insanity that's going on with some positive light trying to give these kids, um, some hope because ultimately we love these children and we understand that they are still children and no matter how bad things are on the outside, we really, as teachers, it's our job to try to make the best out of it and not complain like everyone else is doing so we've just, every day, have just brain-stormed and come up with ways, like last night I was on the phone until 10 o'clock, 11 o'clock at night with the guy that's really, he and I have been really just discussing all these things we wanna do. And because we didn't make as much money as we wanted to yesterday, we're gonna start doing car washes and, um, ya know, just donation events outside of some stores.

Once Natasha was committed to helping her students go on a weeklong field trip, she spent hours outside school helping fundraise. The goal of taking her inner city students to Atlanta became a passion. She was dedicated to leading her underprivileged youth from their bondage. She wanted them to see that there was more to life than their neighborhood had to offer. The efforts of weekend walk-a-thons and car washes were going to help set her students free. The vision Natasha had was key to help her persevere in spite of the adversity she encountered.

The veteran teachers, Vince and Vanessa, appeared to have a more relaxed view of their role as science teachers. They both expressed a passion for teaching but they seemed to have moved their focus to growing future scientists. Vince was enthusiastic about workshops on differentiated instruction or other areas, as long as he was able to stay in his classroom and work with his students (interview #3, p. 17):

Vince: and then, teams are being sent slowly to um, workshops on differentiated instruction and all that. Year-long workshops, actually.

...I usually am there way before school begins and also way after school ends. I'm always there. Like, I'm literally, there from 7 o'clock until 6 o'clock every day. I am. And one of the things I do is...I tell kids that need extra help, I usually tell them, and we also have tutoring and all that at the school but some of them don't like to go to that or whatever so I always am open to like, anything you need to...go over with me or sometimes you don't get the homework and some do.

Vanessa did not perceive herself as the savior but rather a facilitator, directing her students to find the information they needed themselves (interview #2 p. 18):

Vanessa: ya know, whatever it is they're so full of questions and their parents say, "Ask your science teacher. Ask your science teacher."

...And I tell 'em, "Google it"...

Recognizing her role as parental, Vanessa explained some of the dynamics involved (interview #3 p. 20):

Vanessa: And it's real interesting to have kids two years in a row, particularly 7th and 8th grade because they've grown a lot but they're SO comfortable with me that they, they respond to me the way they would talk to their mother but and there's a lot of love. I love them, they love me. They're very, very comfortable with me. But, ya know, sometimes their mothers slap their faces and I can't do that.

Vince also takes a more parental attitude towards his students. His goal was to inspire his students to do well in all their subjects and become better at questioning information (interview #4, p. 13-14):

Vince: I think, okay, really, really, goes, my goals are two really, I always look at it this way, what is that...when they leave my class, they are inquisitive in whatever class they go to it doesn't matter if it's science or history, that when they go and leave me and they go to the high school...they will be very inquisitive and they will ask questions and they won't be afraid to and they won't just settle for the answer that a teacher gives them. They want like evidence of what is being taught to them. That's what Ithat's really my goal, my goal is that through science I'm able to teach them and

hopefully, that they'll see that um, that they could, um, question everything. And not only like I said, accept that but, well, they can't disrespect....but..

...and then the second one, like I said, it goes back to math, cause I think math and science go so much hand in hand and I really think that um, through science, I mean, the kids can learn a lot, a lot of math through the science class. And I always try to put a lot of math in the science class and all that. Because I love science, I love math myself so much...

Ultimately, Vanessa hoped that her students would become better stewards of the Earth

(interview #5, p. 7):

Vanessa: And so, yeah. Or, or they'll say, "We went to Home Depot, and we were going to get fertilizer for the lawn and I told my dad we had to find one that, ya know, was, was safe if it runs off into the lake." And, and ya think, yeah, they get it.

Vince and Vanessa spoke of their goal of helping students apply the knowledge they gained in school to their everyday lives. The attitude was slightly modified from Natasha's urgent need to save her students to a desire to help students develop the skills to help make the world a better place. Although the veteran teachers were concerned about the needs of their students, they were passionate about the need to create future scientists to help solve the problems on a global level.

Summary

In the previously cited analysis, the expected themes from prior literature and themes contributing to the literature of middle school science teachers were explained. The goal was to find the answer to the research question: How do middle school science teachers in a large urban school district perceive and describe their teaching experiences? The conclusions and ideas for future research are reported in the following chapter.

CHAPTER FIVE: CONCLUSIONS AND FUTURE STUDY

Conclusions and future research were the focus of chapter five based on the impact of cumulative effects that contributed to teachers' dissatisfaction. Although the literature is extensive on studies of teachers' perceptions about their jobs (Ingersoll, 2002; Darling-Hammond, 2006) this study was designed to explore the underlying daily experiences with which teachers cope. The existing literature is enriched by the analysis of the perceptions and experiences shared by teachers working in classrooms. Teachers' insights about their challenges and the resilience they possess as they teach help inform decisions about education. Implications will be made in this chapter for middle school science teachers, science teacher educators, science content faculty, school administrators, and federal education agencies.

Conclusions

Themes Confirming Prior Literature Findings

Themes emerged confirming findings from prior literature. At the onset of the study these themes included professional identity, teacher preparation, personal experiences of vulnerability, curriculum policy influences, and cultural diversity. Moreover, themes with minimal literature background of accessibility of resources, impact of support network, and ownership of policies were also covered.

Professional Identity

Teachers need multiple opportunities to grow as education professionals. Throughout their career, teachers improved their perceptions of self-efficacy when they developed more skills for their jobs (Bandura, 1997). This confirms the findings of Cochran-Smith (2004) and

Darling-Hammond (2007) that teachers who are prepared are more capable of coping with the demands of their jobs. Not surprisingly, novice teachers found security in having the proper foundation to be successful in their teaching assignment. However, even veteran teachers perceived confidence and job satisfaction when they were provided with opportunities to expand their skills. Assigning teachers new content areas or special teaching assignments without encouraging them to obtain training and support resulted in frustration and ultimately, job dissatisfaction. This is consistent with Suell and Piotrowski (2006) finding the need for teachers who are new to a field to have preparation before entering a classroom. Teachers needed to know their administrators were willing to make an investment in their teachers' growth and development (Darling-Hammond, 2007; Ware & Kitsantas, 2007). Although it was ultimately the teacher's responsibility to seek the opportunities for career development, administrators needed to be willing to pay for substitutes and leave time so the teacher could attend.

Teacher Preparation

The teacher preparation theme encompassed not only the college preparation method but also the ways teachers were trained within the individual school for the actual teaching assignment they were given. Just like Ball (2000) found in his study, teachers who are new to an assignment do not know what they lack until they are in the midst of the challenge. Experienced teachers were frustrated when asked to teach subjects for which they had no preparation. Teachers were expected to find ways to make courses interesting even when they did not understand the subject they were teaching. Often they received no extra training to understand the content for courses they were asked to teach. They were unprepared to properly develop lessons for students to be successful just as the research of Humphrey and Wechsler (2007) found.

Personal Experiences of Vulnerability

Teachers need positive personal experiences. The teachers who reported positive personal experiences were content with their ability to perform in their classroom; this is consistent with research by Day et al., (2006). Just like their study, the teachers formed their identities through their experiences. When teachers perceived they had support from family members, fellow teachers, and administrators, they were hopeful about their job satisfaction. Teachers who were content in their jobs shared stories of a community of supporters. Even when they had difficulties, like increased regulations and lack of autonomy, teachers expressed a willingness to persevere because they believed they were making a worthwhile contribution to others including but not limited to their students and colleagues. Those who perceived they were not supported questioned their effectiveness and just as Munby and Russell (2001) found, they had to find a way to frame the problems in their classroom to determine a way to cope. Gu & Day (2007) pointed out teachers who were resilient found ways to keep doing their job.

Student beliefs impact teachers' abilities to help students achieve. The perceptions with regards to the impact of student beliefs highlighted the challenges associated with race, gender, and socioeconomic status. The attitudes of low achieving, low socio-economic African-American students towards novice white women teachers emphasized the need to increase the understanding and support to retain teachers in urban classrooms (Ladson-Billings, 2005). Teachers and students of different races and cultures need to find ways to bridge their differences. The teachers who entered a classroom with idealistic expectations of leading their students out of poverty and ignorance faced huge disappointment. The teachers need to find ways to reflect and reframe difficulties into learning opportunities for which they have expertise and power to bring about changes (Munby & Russell, 2001).

Classroom management was difficult for some teachers and administrators failed to enforce penalties for repeat offenders. Teachers expressed frustration with ignored referrals. Administrators who helped teachers with misbehaving students were perceived as valuable supporters adding to teachers' resilience (Gu & Day, 2007). Classroom teachers were the first to know of serious issues that required guidance counselors and social workers. The counselors had so many troubled students to help; they often relied on the teacher to find the proper resources for their students.

Curriculum Policy Influences

Curriculum policy influence has a strong presence in classrooms. Teachers explained the frustration they felt from curriculum policy influences that mandated they meet the unique and alternative learning methods of students with a variety of special needs. Often teachers are required to provide differentiated instruction without the training as reported by the Valli and Buese (2007) study. They felt inadequately prepared but willing to learn while recognizing the students were the ones who were shortchanged. The guidelines for curriculum, although helpful, failed to capture the messy nature of typical classrooms with interruptions and students who do not learn in a linear format. Butzin (2007) pointed out that these standards only set up a foundation for minimum learning levels.

Emphasis on accountability brought pressure on administrators which transferred to teachers and as Day et al., (2006) pointed out this brings more stress for teachers to meet the rigorous standards. Regardless of how hard teachers worked it never seemed good enough. Schools where learning gains were not deemed sufficient became known as failing thus, teachers and students were presumed inadequate. Rather than receiving support in challenging schools teachers perceived they were punished because they failed as Apple (2007) stated the teachers

believed all the regulation meant a lack of trust in teachers' ability from administrators and parents. Teachers were forced to give more practice tests so students would be better prepared for the final tests that Black (2007) pointed out. This brought frustration for teachers and students who grew tired of countless hours spent in preparation for the test. Teachers who were given specific curriculum with little or no option to personalize their lessons were frustrated. The teachers perceived they were asked to be a technician rather than a professional educator and they were resentful.

Teachers were reminded repeatedly of the high stakes tests. They were pressured to create lessons which followed the district required scope and sequences regardless of the needs of students (Weaver, 2007). Valli and Buese (2007) found the same demand in their study. Teachers were not encouraged to use their best professional judgment but asked to abandon the prescribed lessons only as a last resort.

The policies designed to bring about improvement for students have instead brought increased stress and frustration for teachers undermining their resilience (Gu & Day, 2007). The goal of providing better education for students with disabilities has brought inclusion of needy students in classes ill equipped for them. The goal of increased reading levels has brought about science teachers sacrificing science instruction time for silent reading. The changes demanded by policies from national, state, and local education agencies were often resisted by teachers because of the pressure they felt to meet demands imposed on them and as Keys (2007) pointed out the changes were not always seen as improvements best suited to the needs of students.

Cultural Diversity

Cultural diversity impacts how teachers relate to students. All seven teachers reported the challenges brought to their classroom by the culturally diverse backgrounds of their students.

The benefits of cultural diversity were not mentioned during the teachers' descriptions of their classrooms. The research of Cartledge and Kourea (2008) and Weaver (2006) was substantiated by the fact that the large district in this study was comprised of over one hundred different languages, numerous religions, and several races. Teachers were expected to make adaptations for laboratory activities when students did not speak English. The research of Tabachnick and Zeichner (1993) revealed the need for teachers to be responsive to the cultural needs of their students and yet many teachers were not prepared for the diversity within their classrooms. Within each classroom, teachers needed extra time to check for individual understanding because not only were they teaching science, but they were teaching English and literacy skills as well.

In addition to the challenge of increased diversity with ELL students, the teachers cited challenges dealing with racial diversity. As Ladson-Billings (2005) pointed out in her study, many teachers today as well as the teachers in this study were white. Some of the difficulties reported by the teachers in the low socio-economic schools related to the teacher being white and the majority of the students being African-American.

The teachers in the current study expressed concern at their lack of preparation to develop lessons for students with mental and physical handicaps. The pressure to help the students achieve was exacerbated by the constant reminder that school funding and teachers' jobs were closely tied to how well teachers met the needs of these most challenged students (Cartledge & Kourea, 2008). In spite of their lack of training, teachers were expected to find ways to adapt curriculum for the needs of all students. Regardless of language, physical and mental impairments, teachers were compelled to insure all students made adequate yearly progress.

Contributions to the Literature

Accessibility of resources

Accessibility of resources promotes quality teaching. Mere possession of resources does not guarantee a teacher will be able to access them for a class activity. Resource availability provided teachers with confidence to meet the needs of their students in contrast to Keys' research (2005). Having no training and practice to become comfortable using the tools meant teachers were hesitant to utilize equipment and students could not benefit from them. A room full of materials does not become organized and user friendly without effort.

Life science teachers obtained specimens from nearby garden centers the day of the laboratory which required special planning. Hardware stores were utilized to obtain needed equipment but teachers paid from their own money. The needed supplies were sometimes perishable and consumed so timing was important (Hoff, 2003). Teachers had to find ways to keep them from being stolen or destroyed when their rooms did not have locking cabinets. Sharing with other teachers was imperative since equipment was expensive.

Impact of support network

The resource of a support network for teachers impacts their performance. The support network among peers is essential for teachers as they share equipment and supplies. Science teachers, given time to coordinate lab supplies and equipment, were eager to conduct lab activities. Teachers' ownership of policies provides motivation for change (Keys, 2005). The push for accountability and standardized testing has resulted in a standardized curriculum with minimal teacher input. Teachers who were challenged to develop their own curriculum and trusted to know what was best for their students felt valued which supports Fendrich (2007)

research that teachers building curriculum around testing felt mistrust (Apple, 2007) and ultimately that their resilience was eroded (Gu & Day, 2007).

Teachers and metaphors

The metaphors for teachers in this study portrayed in their practice encompassed hero, savior, and mentor. Sometimes the martyr archetype was present. Personal metaphors are new to the literature on science educators. Most of the time, the archetypal role the teachers portrayed encouraged passion for their jobs similar to the research by Munby and Russell (2001). Many of the teachers indicated the need to feel as if they were saviors for lost students. The vision of rescuing students motivated some to spend hours beyond their contracted time to help students. Some teachers made home visits, planned field trips, and used weekend time to hold fundraisers to pay for activities to motivate low achieving students. One teacher spent her vacation time to take students on a field trip out of state. Making a difference in the lives of their students gave teachers the ability to overlook many of the challenges they faced on a daily basis (Lumpe, Haney & Czerniak, 1998). The satisfaction they felt from seeing their students achieve brought about job satisfaction.

Future Research

Cumulative effects on teacher attrition

More studies such as this one will help define the cumulative effects of professional identity, teacher preparation, personal experiences of vulnerability, curriculum policy, and cultural diversity on teacher attrition. Teachers are not leaving their classrooms because they do not want to be teachers. Often they move to schools with fewer challenges and more support (Gu & Day, 2007). More input from teachers while they are teaching would provide insight

about job dissatisfaction and how to best resolve issues in classrooms. Confidential outside sources for exit survey offer more reliable information about why teachers were discontent with their jobs.

Mentoring programs effectiveness

Many school districts have developed mentoring programs to assimilate new teachers into their jobs (Loeb et al., 2005). More research should focus on the effectiveness of the mentoring programs. Teachers and mentors who develop positive relationships may have specific characteristics in common (Loeb et al., 2005). Studies of success in mentor programs via schools who are retaining teachers would provide insight for improving relationships among teachers. The networks teachers form need to be examined and supported to encourage teachers to believe they have an essential role within the educational system.

Comprehensive teacher training

Studying the habits of the teachers who want to grow in their profession may add insight about job satisfaction (Darling-Hammond, 2007). Examining the underlying reasons for personal growth may enable schools to find ways to encourage more teachers to obtain additional skills and certifications. Schools should explore choices for staff development that meet teachers' needs and build competency (Bandura, 1997).

Impact of innovative support systems-community establishes environment

Research of innovative educational environments with emphasis on support systems may provide understanding about ways to develop schools where communities expect and encourage high performance from educators (Day et al., 2006). Administrators need the ability to encourage teachers and express appreciation with words and actions to act as an inspiration for

teachers. Communities that provide access to services such as daycare for their children, affordable housing for their families and safety at work and home may have higher rates of teacher satisfaction. Understanding the whole picture of the life of teachers will give more evidence about how to provide an environment that nurtures educators. Salaries, equipment, technology, training, and collegial atmosphere are not individually responsible for teachers' job satisfaction.

Conducting confidential surveys, encouraging teacher input, and providing opportunities for developing leadership skills within schools may give teachers the satisfaction they need to remain in classrooms (Darling-Hammond, 2007, Ware & Kitsantas, 2007). Building community advisory boards with business partners as well as parents, teachers, and students may offer non-traditional perspectives to classroom issues. Teachers who are looked on as professionals rather than technicians may perceive they are valued (Mangrubang, 2005).

Schools change constantly so solving today's problems will not prevent different problems tomorrow (Mangrubang, 2005). Teachers should be handled with care and encouraged to become strong and competent (Bandura, 1997). Programs developed to build team support and interdependence should be studied to give insight about how to deal with novice, mid-career, and veteran teachers. Developing resilient, stable, creative educators is a delicate operation and essential to maintaining teacher job satisfaction (Gu & Day, 2007). The cumulative effects of the challenges teachers face may, over time lead to the increased stress which results in teachers ultimately leaving their classroom.

APPENDIX A: IRB APPROVAL



THE UNIVERSITY OF CENTRAL FLORIDA
INSTITUTIONAL REVIEW BOARD (IRB)

IRB Committee Approval Form

#06-3631

PRINCIPAL INVESTIGATOR(S): LuAnn Dunn
(Supervisor – Dr. Larry Holt)

PROJECT TITLE: Experiences of Secondary Science Educators from Traditional and
Alternative Certification Preparation with Varying Years of Experience

- New project submission
- Continuing review of lapsed project #
- Study expires
- Initial submission was approved by full board review but continuing review can be expedited
- Suspension of enrollment email sent to PI, entered on spreadsheet, administration notified _____
- Resubmission of lapsed project #
- Continuing review of #
- Initial submission was approved by expedited review

Chair

Expedited Approval

Dated: 8/14/06
Cite how qualifies for expedited review: minimal risk and #7

Exempt

Dated: _____
Cite how qualifies for exempt status: minimal risk and _____

IRB Reviewers:

Signed: _____
Dr. Sophia Dziegielewski, Vice-Chair

Signed: _____
Dr. Jacqueline Byers, Chair

Signed: Tracy Dietz
Dr. Tracy Dietz, Vice-Chair

Expiration
Date: 8/13/07

Complete reverse side of expedited or exempt form

- Waiver of documentation of consent approved
- Waiver of consent approved
- Waiver of HIPAA Authorization approved

NOTES FROM IRB CHAIR (IF APPLICABLE): _____

APPENDIX B: ELECTRONIC MESSAGE

Electronic Message

Dear (Name of teacher),

I am a science teacher working on a research project. I need your help to answer these questions:

1. What kinds of experiences are critical or essential for preparing you to become a science teacher?
2. How is your belief system evident in your classroom practice?
3. How do local, state, and national curriculum mandates influence your teaching practice?
4. What factors influence your belief system as you gain experience in the classroom?

If you are interested in knowing more about this study and how to participate, you may contact me at dunnl@ocps.net or ladunn1@earthlink.net or 407-718-7925.

Your help will improve the future of science education.
I look forward to hearing from you.

LuAnne Dunn

APPENDIX C: RESEARCH NARRATIVE

Research Narrative

The Development of Science Teachers

I have been a public high school biology teacher for several years. I have been curious to learn more about the ways science educators develop from their initial experiences to becoming master teachers. In studying the literature and watching how some schools work, I have been intrigued to hear more of the stories science teachers have to tell.

I decided there is a need to understand the dynamics of the community of science teachers. I have questions about the ways beginning teachers are welcomed and nurtured. I wonder how much influence the learning community and the method of entry, traditional prep or ACP prep, has on the success of a novice science teacher and how much teachers continue to need this network of support as they work toward becoming master teachers.

The goal of my study is to give science teachers an opportunity to tell their stories. I hope this study will provide impetus for you to examine your practice, and work toward understanding how you fit in the community of educators. Using journals, interviews, observations, and focus groups, I believe the stories of each teacher will help reveal the thinking and challenges that are unique to science educators.

Sample questions: Describe your experiences from your first year of teaching. Were other teachers helpful? Have you had opportunities to collaborate with other teachers? What are some of the areas you wish you had help with but you do not? How do you feel you fit within the science department and the school as a whole?

I'm excited to be taking this journey with you. Thank you for your help and time.

LuAnne Dunn

APPENDIX D: FOCUS GROUP QUESTIONS

Focus Group 1 Questions-

1. Tell us who you are and where you teach and what you enjoy doing when you're not teaching?
2. How did you learn about this research study?
3. Think back to when you started teaching. Can you tell us what the early weeks were like for you?
4. How prepared did you feel when you met your students the first day of classes?
5. What was particularly helpful for you in your early days of teaching?
6. How do you think you should have been more prepared for your job and how did this impact your practice?
7. What advice would you offer to a new teacher just beginning a career in education?
8. If you could have five minutes to talk with the school superintendent about the needs of secondary science educators what would you want to tell him?

Focus Group 2 Questions-

1. If you have marked your corrections on your transcripts would you hand those to me?
2. Do you have any questions about the information from your transcripts?
3. Would you imagine that each of you have a giant magic top hat?
4. Would you reach inside and pull out the things that have been the most beneficial to you this year? Write these down on the left side of your paper.
5. Now would you reach inside and pull out the things that you wish you had been given this school year? Write these down on the right side of your paper.

6. Could you explain which supports were missing for you? How do you think we could provide those for future teachers?
7. Based on what you know now, if a good friend told you they were thinking of becoming a teacher what would you say to her?

APPENDIX E: INTERVIEW QUESTIONS

Interview Questions

1. How would you describe yourself as a classroom teacher?
2. What role model do you have for yourself as a classroom teacher?
3. Describe a well-organized classroom. When you have your classroom running the way you want it, what is it like?
4. How did you form this model of the well-organized classroom?
5. How long did it take you to develop this model of teaching?
6. What do you consider to be the founding principles of teaching? If you had to write a book describing the principles that teaching should be built on, what would those principles be?
7. How do you learn best?
8. How do you know when you have learned?
9. How do you know when you know something?
10. When you picture a good learner in your mind, what characteristics of that person lead you to believe that they are a good learner?
11. What is science?
12. In what ways do you learn science best?
13. When you learn science, is it different than learning mathematics or history?
14. What are the founding principles of science?
15. How do you decide what to teach and what not to teach?
16. How do you decide when to move from one concept to another?
17. What learning in your classroom do you think will be valuable to your students outside the classroom environment?

18. Describe the best teaching/learning situation you have ever experienced.
19. In what ways do you try to model that best teaching/learning situation in your classroom?
20. What are some of the impediments or constraints for implementing that kind of model in your classroom?
21. What are some of the tactics you use to overcome these constraints?
22. Are there any things at the local/school/state level that influence the way you teach?
What are some examples of this?
23. How would you describe your rationale for teaching science?
24. What influence does having a rationale for teaching have on your beliefs as a science teacher?
25. What influence does having a rationale for teaching have on your classroom practice?
26. If you were to compare your current rationale for teaching science, how would it change from your beginning teaching?
27. How often do you think about your beliefs for teaching science?
28. What are your goals for teaching science?
29. How do you arrive at these goals?
30. How do you believe your students learn best?
31. How do you know when your students learn and understand a concept?
32. How do you know when learning is occurring, or has occurred in your classroom?
33. How do you think your students come to believe in their minds that they understand something?
34. In what ways do you manipulate the educational environment (classroom, school, etc.) to maximize student understanding?

35. What science concepts do you believe are the most important for your students to understand by the end of the school year?
36. How do you want your students to view science by the end of the school year?
37. What values do you want to develop in your students?
38. How do you accommodate students with special needs in your classroom?
39. What do you believe are your main strengths as a teacher?
40. In what areas would you like to improve as a teacher?

APPENDIX F: OBSERVATION FORMAT

Observation Format

Category	Observation	Comments
Physical setting	Table/chairs Desks Lab/classroom	
Attendance	Number of students	
Class Time	Length breaks interruptions	
Instructor intentions	Lecture over new material Circulate while students interact Lecture and circulate	
Intended student activity	Taking notes Interacting with each other Listening/interacting w/ technology Working on lab	
Student misbehaviors	Sleeping Engaged in off-task conversations Other	
Media used by instructor	Chalkboard/whiteboard Paper Other technology	
Media used by students	Paper Chalkboard None/computers	
Equipment/supplies available		
Shower/sink availability		
Other comments:		

APPENDIX G: CONSENT FOR OBSERVATIONS

APPENDIX H: NODE CHARTS

Table 10: Node/Nvivo/NUD*IST Totals Interviews=Noel- TCP novice

Interview	1	2	3	4	5	6	Totals
Experiments			2				2
Concepts		8	3	3	4	5	23
reading level			3			1	4
behavior problems				3			3
supplies			1		1		2
paraprofessionals							0
ESE				1			1
Socioeconomic				1			1
hands on		1	1		1	3	6
laboratory				2	1	2	5
tests							0
(tests) federal, state policies							0
Mentor			3	1		2	6
Support			4	2	2		8
Classroom				5			5
personal crisis			1	6	2	3	12
beliefs why teach	2	9	7	12	1	3	34
ability as teacher	4	7	5	15	9	2	42
organization ability	1			8	3	1	13

teacher learning-student learning	2	7	3	4	4	3	23
connect/motivate students		7	9	9	14	5	44
interactions w/parents		1	4				5
interactions w/admin.			4				4
skills at class mgmt			3	4			7
skills at lesson creation		6	7	8	4		25
FCAT		7	9	9	14	5	44
Fed tests							0
county benchmarks		3	1				4
county course guidelines		5	2		1	2	10
student learning styles	2		2	1	6	4	15
differentiated instruction			2	4		2	8
special ED							0
ESOL							0
teacher support		8	3	9	4	3	27
staff development			2			1	3
love subject matter		2		6	6		14
love students		9		5	2	1	17
classroom environment	1	7	4	5	4	3	25
want to make a difference in society	1	10	6	8	2	5	32

Table 11: Node Totals Interviews-Nancy ACP Novice

Interview	1	2	3	4	5	6	totals
1. experiments	1	1					2
2. concepts	7	5					12
3. reading level		1					1
4. behavior problems	1						1
5. supplies	2	2					4
6. paraprofessionals							0
7. ESE							0
8. Socioeconomic							0
9. hands on	3						3
10. laboratory							0
11. tests							0
12. (tests) federal, state policies							0
13. Mentor	4						4
14. Support	4	2					6
15. Classroom	8						8
16. personal crisis		4					4
17. beliefs why teach	3	2					5
18. ability as teacher	8	12					20
19. organization ability	4						4
20. teacher learning-student learning	5	4					9
21. connect/motivate students	4	4					8

22. interactions w/parents		3					3
23. interactions w/admin.	1	3					4
24. skills at class mgmt	2						2
25. skills at lesson creation	4	7					11
26. FCAT		4					4
27. Fed tests							0
28. county benchmarks							0
29. county course guidelines		4					4
30. student learning styles	3	3					6
31. differentiated instruction		3					3
32. special ED							0
33. ESOL		1					1
34. teacher support	3	7					10
35. staff development	3	3					6
36. love subject matter	1	1					2
37. love students	2	3					5
38. classroom environment	8	3					11
39. want to make a difference in society	1	2					3

Table 12: Node Totals Interviews-Natasha ACP Novice

Interview	1	2	3	4	5	6	totals
1. experiments			1				1
2. concepts	4	9	6	3	8	5	35
3. reading level	1	2	1		2	1	7
4. behavior problems	3	4	4	11	10	6	38
5. supplies		2	1		1	2	6
6. paraprofessionals							0
7. ESE			5	1	2	3	11
8. Socioeconomic	7	9	6	2	4	5	33
9. hands on		2	2		1		5
10. laboratory		1	1				2
11. tests		9					9
12. (tests) federal, state policies							0
13. Mentor	1	3	1	1	1		7
14. Support	1	29	1	1		1	33
15. Classroom		2	5				7
16. personal crisis							0
17. beliefs why teach	15	2	13	26	12	6	74
18. ability as teacher	10	4	10	26	26	9	89
19. organization ability			3	2	7	3	16
20. teacher learning-student learning	4		2	4			10

21. connect/motivate students	11	2	9	25	13	8	68
22. interactions w/parents			2	1	1		4
23. interactions w/admin.			5	1	14	4	24
24. skills at class mgmt	7		4	9	7	3	30
25. skills at lesson creation	4		3	4	6		17
26. FCAT			4	1	3	3	11
27. Fed tests			1				1
28. county benchmarks			1		1		2
29. county course guidelines			3		2		5
30. student learning styles	3		7		5		15
31. differentiated instruction			3		3		6
32. special ED			1				1
33. ESOL							0
34. teacher support	3		18	8	8	6	43
35. staff development				2			2
36. love subject matter			3	6		2	11
37. love students	6		7	5	4	3	25
38. classroom environment	11	3	11	10	7	8	50
39. want to make a difference in society		1	16	20	21	15	73

Table 13: Node Totals Interviews-Margaret ACP mid-career

Interviews	1	2	3	4	5	6	totals
1. experiments			4			N.A.	4
2. concepts		5	2		7	N.A.	14
3. reading level		1	1			N.A.	2
4. behavior problems		2	4	1	2	N.A.	9
5. supplies		1	2		3	N.A.	6
6. paraprofessionals						N.A.	0
7. ESE		2			1	N.A.	3
8. socioeconomic		2	2	1	1	N.A.	6
9. hands on	2	2	3		5	N.A.	12
10. laboratory		1	2		2	N.A.	5
11. tests						N.A.	0
12. (tests) federal, state policies					2	N.A.	2
13. Mentor	1	2				N.A.	3
14. support			2	1		N.A.	3
15. classroom	4					N.A.	4
16. personal crisis			2		1	N.A.	3
17. beliefs why teach	2	4	2	3	3	N.A.	14
18. ability as teacher	4	4	8	2	6	N.A.	24
19. organization ability	2	2		2	3	N.A.	9
20. teacher learning-student learning	4	3	4	4	3	N.A.	18
21. connect/motivate students	1	4	4	5	7	N.A.	21

22. interactions w/parents	3		3	3	2	N.A.	11
23. interactions w/admin.		3	5	3	4	N.A.	15
24. skills at class mgmt	2	3	3		1	N.A.	9
25. skills at lesson creation	1		3	1	3	N.A.	8
26. FCAT		3	4	1		N.A.	8
27. Fed tests			2		1	N.A.	3
28. county benchmarks		3			2	N.A.	5
29. county course guidelines		3	1		1	N.A.	5
30. student learning styles	2	3	3	2	3	N.A.	13
31. differentiated instruction		3	1		2	N.A.	6
32. special ED	1	1		3	1	N.A.	6
33. ESOL						N.A.	0
34. teacher support	3	5	7	2	6	N.A.	23
35. staff development			1	3	1	N.A.	5
36. love subject matter			2	3		N.A.	5
37. love students	2	1	2	1		N.A.	6
38. classroom environment	2	3	7		3	N.A.	15
39. want to make a difference in society		2	5	3	2	N.A.	12

Table 14: Node Totals/ Interviews-Mandy TCP mid-career

Interview	1	2	3	4	5	6	totals
1. experiments		6	1				7
2. concepts		13	4	1	2		20
3. reading level	2	6	4	3		2	17
4. behavior problems	5	9	7	1		2	24
5. supplies		4	4		1		8
6. paraprofessionals			4				4
7. ESE		2	9	2		1	14
8. socioeconomic		2	6	2	1		11
9. hands on	2	4	2		4	1	13
10. laboratory			2			1	3
11. tests			1				1
12. (tests) federal, state policies							0
13. Mentor	9	6	8				23
14. Support	8	3	6				17
15. Classroom		7				1	8
16. personal crisis		2	4		1		5
17. beliefs why teach	3	17	11	11	4	6	52
18. ability as teacher	13	27	15	13	6	19	93
19. organization ability	6	10	9	1	2	7	35
20. teacher learning-student learning	3	13	6	2	2	3	29
21. connect/motivate students	5	20	17	1	5	5	53

22. interactions w/parents	2	2	3				7
23. interactions w/admin.	5	5	8			3	21
24. skills at class mgmt	5	6	13	1	2	4	31
25. skills at lesson creation	5	17	16	2	2	5	47
26. FCAT			4	1	2	1	8
27. Fed tests	1	1	2				4
28. county benchmarks	5						5
29. county course guidelines	4	6					10
30. student learning styles	1	16	6		2	1	26
31. differentiated instruction		7	4		3	1	15
32. special ED	1	3	4	1	1	4	14
33. ESOL	1	3	3		1	4	12
34. teacher support	9	12	18	2	1	13	55
35. staff development	2	2	5	2		2	13
36. love subject matter		7	4	7		1	19
37. love students	1	5	10	2	4	3	25
38. classroom environment	10	8	12	2	3	6	41
39. want to make a difference in society	4	10	16	7	2	8	47

Table 15: Node Totals/ Interviews-Vince ACP Veteran

Interview	1	2	3	4	5	6	totals
1. experiments	1	5	5				11
2. concepts	4	10	12	2	5	1	34
3. reading level	1		22	1		2	26
4. behavior problems			7			7	14
5. supplies		1					1
6. paraprofessionals			3			3	6
7. ESE			12	1		11	24
8. socioeconomic			9				9
9. hands on	2	3	7		1	1	14
10. laboratory	2	3	3		1	1	10
11. tests			2			1	3
12. (tests) federal, state policies							0
13. Mentor	3	1					4
14. Support		1				1	2
15. Classroom		1	3	1			5
16. personal crisis				10	7	4	21
17. beliefs why teach	1	5	16	8	7	7	44
18. ability as teacher	10	14	22	16	10	16	88
19. organization ability	6	12	10	3		5	36
20. teacher learning-student learning	10	11	11	2	1	3	38

21. connect/motivate students	11	13	19	7	6	11	67
22. interactions w/parents			5				5
23. interactions w/admin.		3	7			1	11
24. skills at class mgmt	2		7			3	12
25. skills at lesson creation	5	13	11	5	3	7	49
26. FCAT	1	7	16		3	1	28
27. Fed tests			6		1	1	8
28. county benchmarks		8	6	1	1		16
29. county course guidelines		10	2				12
30. student learning styles	5	7	10	3	4	3	32
31. differentiated instruction	4	4	14	2	3	8	35
32. special ED	1		10	1		6	18
33. ESOL	1		5	1		7	14
34. teacher support	1	10	16	2	1	4	34
35. staff development		1	2	4		2	9
36. love subject matter		6	8	7	2	4	27
37. love students			8	2	1	6	17
38. classroom environment	5		12	5	5	5	32
39. want to make a difference in society	1	2	15	6	2	11	37

Table 16: Node Totals/ Interviews- Vanessa TCP veteran

Interview	1	2	3	4	5	6	totals
1. Experiments		1	5			1	7
2. Concepts		6	3	2	2	2	15
3. reading level		2	4		1		7
4. behavior problems	3	2	5		2		12
5. supplies			6				6
6. paraprofessionals					1		1
7. ESE					1	1	2
8. Socioeconomic			6				6
9. hands on	1	1	6		1		9
10. laboratory	1		6		1		8
11. tests							0
12. (tests) federal, state policies							0
13. Mentor	2	4	5				11
14. Support	2	6	4			2	14
15. classroom		2	1				3
16. personal crisis		2	1	2	8		13
17. beliefs why teach	10	12	7	12	6	5	52
18. ability as teacher	10	23	21	12	9	4	79
19. organization ability	3	1	10	5	2	1	22
20. teacher learning- student learning	6	8	11	3	2	2	32

21. connect/motivate students	15	16	10	10	6	3	60
22. interactions w/parents	1	6	6			2	15
23. interactions w/admin.		9	5	2		1	17
24. skills at class mgmt	4	3	6	4	2	2	21
25. skills at lesson creation	6	6	12	9	3	1	37
26. FCAT		6	6		2		14
27. Fed tests		4	2				6
28. county benchmarks	2	3		1	2	2	10
29. county course guidelines	1	1	1				3
30. student learning styles	1	5	9	2	2	2	21
31. differentiated instruction		5	9	2	1	1	18
32. special ED			1				1
33. ESOL							0
34. teacher support	3	12	14	5	5	2	41
35. staff development		5	1	5			11
36. love subject matter	6	6	6	5	5	4	32
37. love students	9		4	3	1	2	19
38. classroom environment	15	8	10	2	1	1	37
39. want to make a difference in society	11	6	12	7	3	4	43

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