ABSTRACT

Title of Document: BIOLOGY TEACHERS' PERCEPTIONS OF SATISFACTION: THE MEDIATING EFFECTS OF WORKPLACE CONDITIONS AND EPISTEMOLOGICAL BELIEFS

Elizabeth R. Daniels, Doctor of Education, 2014

Directed By: Dr. Carol Parham, Department of Counseling, Higher Education, and Special Education

National policy discourses have placed biology at the heart of the Nation's goal to achieve a global knowledge-based economy. However, researchers are finding educational trends of increasing biology teacher shortfalls which may undermine the achievement of that goal (National Science Board [NSB], 2012). Indeed, researchers have found science teacher shortages have been inexorably tied to many U. S. educational and societal problems, such as the goal of maintaining global economic competitiveness with other nations (National Academy of Sciences [NAS], 2007). On the other hand, in addition to research findings of the large science teacher shortfalls, researchers have found biology teachers' perceptions of satisfaction have a high correlation with retention. As a result, it appears critical to maximize the needed retention of biology teachers by increasing teachers' perceived levels of job satisfaction.

Over the years, educational researchers have investigated science teacher perceptions of satisfaction as discrete units of workplace conditions or

epistemological views. Researchers have given little attention to the relationship between school workplace conditions and the epistemological belief system of biology teachers regarding their views on the nature of teaching and learning, which may contribute to high levels of perceived satisfaction and commitment to their schools. The purpose of this study is to examine the dynamic interactions between these factors to identify the positive and negative influences on biology teachers' perceptions of satisfaction, thusly impacting teachers' practice behaviors, motivation, and commitment to the profession.

School systems share many features with large organizations; therefore the design of this study utilized prior research from industry on stress affecting employee perceptions of satisfaction in the workplace. From organizational literature, Kristof-Brown et al.'s (2005) organizational model of person to environmental fit is adapted to illustrate the interactive flow between teachers' personally held epistemic beliefs systems with extant school workplace conditions.

A review of literature suggested there are four workplace conditions most salient to biology teachers' perceptions of satisfaction; administrative support, student discipline, collegiality, and accountability along with three predominant epistemological beliefs of realism, contextualism, and relativism which formed the basis of the study.

For this qualitative case study a semi-structured interview developed by Luft and Roehrig (2007) is utilized. The Teacher Belief Interview (2007) questions are designed to capture the epistemological beliefs of biology teachers.

BIOLOGY TEACHERS' PERCEPTIONS OF SATISFACTION: THE MEDIATING EFFECTS OF WORKPLACE CONDITIONS AND EPISTEMOLOGICAL BELIEFS

By

Elizabeth Roberts Daniels

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Advisory Committee:
Professor Dr. Carol Parham, Chair
Dr. Dennis Kivlighan
Dr. Helene Cohen
Dr. Olivia Saracho
Dr. Patricia Richardson

Dedication

Dedicated to my family and friends.
The list is long. I am deeply appreciative of that fact. You have supported, counseled, and encouraged me to continue this quest. Most of all, you have stood by me even at times when I seem to have abandoned you. Not so.
A special thanks to
Ermon for all the coffee and counseling and Brett for all the dinners and your computer wizardry.

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Chapter 1: Introduction

Context of the Study

Teachers bear the burdens of society's higher expectations for schools (Johnson & Project on the Next Generation of Teachers, 2004).Yet the nature of teaching within those schools is a very complex undertaking (Fenstermacher & Richardson, 2005). It is widely acknowledged that a wide array of variables impact teaching and present challenges to even the most experienced science teachers to effect successful outcomes of student learning often leading to perceptions of dissatisfaction and a loss of commitment when teachers perceive success is not forthcoming (Darling-Hammond, 2007). There are indications that the current demonstration of school climates coupled with rigorous standards and high-stakes testing are challenging teachers' perceived job satisfaction and teaching commitment (Day & Kington, 2008; Ingersoll & Perda, 2011).

Policymakers have frequently turned to supply-sided initiatives to increase the number of science teachers (Ingersoll, 2002). Among the many programs developed to recruit new candidates to teaching were (and still are) salary incentives, alternative certification programs like "Teach for America", "Troops- to -Teachers" and teacher recruitments from overseas (Shen, 1997a; Feistritzer & Haar, 2007). There is much debate among policymakers and leading educational researchers whether there are enough science teachers in the pipeline to teach (Tobias & Baffert, 2009). Indeed, on the supply side, the number of science teachers entering the profession could be declining, or not keeping pace with the number of teachers retiring at the end of their

careers. Yet, it is worthwhile to note that two influential researchers have indicated the demand for teachers would be diminished if retention rates were increased. For example, Ingersoll (2002) suggested in his study that over 90% of science teachers are hired to replace pre-retirement teachers. In addition, Darling-Hammond (2003) states, " The problem does not lie in the numbers of teachers available; we produce many more qualified teachers than we hire. The hardest part is keeping the teachers we prepare" (p.7).

The retention of a qualified science educator work-force could be the greatest challenge to the national goal of student achievement toward a universal science literate global society (Ingersoll & Perda, 2011). The workplace environment is a critical aspect to this teacher retention (Ingersoll & Smith, 2003). Ingersoll, (2006) notes research evidence has linked workplace dissatisfaction to teacher turnover. In addition, Wriqi (2008) suggests teacher's perceptions of satisfaction are strongly influenced by the surrounding climate of the workplace and understanding the constructs of teacher satisfaction is key to retaining teachers.

In addition, recent research studies suggest another component is impacting teachers' perceptions of satisfaction. Increasingly, researchers note teachers' epistemological beliefs about the nature of teaching and learning influence positive and negative perceptions of workplace conditions. These personal belief constructs may provide an understanding of perceived teacher satisfaction because they can serve as a lens for an insight into teachers' motivation, performance and commitment to their schools (Klassen, 2010). There is much debate among policymakers and leading educational researchers whether there are enough science teachers in the

pipeline to teach (Tobias & Baffert, 2009). Indeed, on the supply side, the number of science teachers entering the profession could be declining, or not keeping pace with the number of teachers retiring at the end of their

Increasingly, a number of educational researchers suggest workplace conditions and teacher beliefs are linked to one another, and that there are often tensions between them that challenge teacher perceptions of effective teaching. These fundamental beliefs often lie below the conscious level and "provide us with a ready-made response to our environment" (Bernier, 1981, p. 294). For example, Teachers' unconscious beliefs about their accepted mode of knowledge acquisition and the nature of teaching and learning may at times be misaligned with the climate of their school and may negatively affect teachers' views of themselves and their workplace conditions. According to researchers, if these challenges are not managed by the teacher, they may lead to teacher's perceptions of dissatisfaction (Eklund, 2008; Ladd, 2011). Relatively few educational studies have examined the mechanisms of these dynamic interactive relationships (Ingersoll & Perda, 2011; Roellke & Rice, 2008). This study will seek to contribute to educational organizational research studies that have explored teachers' epistemological beliefs with their school's climate resulting in teachers' perceptions of satisfaction. In addition, this study will offer an exploration with the research lens focused particularly on biology teachers. Research evidence has suggested biology teachers experience the largest mobility rates and have the greatest opportunities for careers outside of teaching for both men and women. Biology teachers also benefit from higher pay, status, and more rapid advancement relative to teachers in other subjects (NSB, 2008). Researchers have

suggested with such opportunities teachers' with perceptions of dissatisfaction with their work environment or dissolution of their commitment to teaching are less tolerant of the psychological stress and tensions resulting from work place conditions, and seem more ready and willing to seek job satisfaction elsewhere (Hanushek, Kain, & Rivikin,2004; NSB, 2006, 2008).

Perceptions of Job Satisfaction

In much educational literature it is recognized that the nature of satisfaction is a complex construct. In its simplest form, job satisfaction can be defined as an individual's overall feeling about their job (Eklund, 2008). For example, over many decades, numerous educational research studies on perceptions of job satisfaction have found that teachers often cite a view that a positive teaching and learning environment would make the profession of teaching a highly satisfying experience (Darling-Hammond, 2007; Futernick, 2007; Johnson & Birkeland, 2003; NCES, 1997). Since the mid-1980's, the workplace conditions most often cited by teachers in research studies as likely to create such an environment are as follows: 1) support and buffering by administrators, 2) appropriate student behavior, and 3) collegial supports ((NCES,1997). Within the last 13 years, researchers found teachers' were also citing that support and aid in negotiating accountability challenges would also be significant to effecting a positive work environment (Futernick, 2007).

However, Ingersoll and many other influential education researchers suggest it is not enough to identify the workplace conditions that contribute to teachers' perceptions of satisfaction. Instead, they identify a need to examine the relationship between the teacher's personal fit and the local school environments' workplace

conditions which either sustains or erodes teachers' perceptions of satisfaction (Day & Kington, 2008; Kristof-Brown et al., 2005; Ingersoll & Perda 2011; Ladd, 2011). Changes in teachers' perceptions of satisfaction may result in either increased commitment, or a loss of commitment to school values and possibly to the teaching profession (Alliance for Excellent Education [AEE], 2005; Hanushek, Kain, & Rivkin, 2004; Ingersoll, 2010; Smith & Ingersoll, 2003; Loeb, Darling-Hammond & Luczak, 2005; National Center for Teaching and America's Future [NCTAF], 2003; Rosenholtz & Simpson, 1990). For instance, a teacher who enters their profession wanting to make a difference or embracing the moral purpose of teaching may find teaching less appealing in work environments where they must regularly face extrinsic pressures such as rigorous standards, high-stakes testing, loss of professional autonomy, hectic workdays, excessive paperwork, and student disciplinary problems (Cochran-Smith, 2004; Day & Kington, 2008; Kristof-Brown et al., 2005).

Science Teacher Perceptions of Satisfaction. As science teacher shortages continue apace, research evidence indicates they threaten the very structure of the educational process (Keigher & Cross, 2010). Contemporary educational theory and research indicates science teacher perceived satisfaction levels and their links to teacher commitment and attrition may undermine the Nation's goal of teacher quality and moreover, the goal to achieve universal science literacy. For instance, two high profile reports from The National Research Council (2002) and the National Academy of Sciences (2007) directly tied mathematics and science teacher staffing problems to many educational and societal problems such as the low U.S. educational performance compared to other nations and to global economic competitiveness.

Subsequently, when the Business-Higher Education Forum's (Education Week, 2008) report projected shortfalls of 280,000 math and science teachers by 2015, their prediction held ominous implications for the nation's future scientific global status, which, in turn, raised the stakes and compelled focusing educational research on understanding the constructs of science teachers' perceptions of job satisfaction and motivation for leaving the teaching profession.

Science teachers experience greater perceived levels of job dissatisfaction and are more likely to leave the profession compared to other subject area teachers (Ingersoll & Perda, 2011). Ingersoll (2003) points out that this perception of dissatisfaction appears to play a bigger role in the turnover than salary or higher paying jobs. Several researchers support this finding by Ingersoll. For example, Hanushek and Rivkin (2007) stated in their study "analysis of teacher mobility showed that salary affects mobility patterns less than do working conditions" (p.80). Also, Murphy and DeArmond (2003) found that job opportunities play a lesser role in teacher attrition.

Today, science teachers' perceptions of satisfaction may be challenged by the rigor of a subject that requires not only expert content knowledge and special training of the subject taught, as was found in the past, but also necessitates the need for pedagogical skills that encompass regular instruction as well as delivery of sophisticated inquiry-based laboratory instruction (Roehrig & Luft, 2004; Frazier & Sterling, 2008).

Biology Teacher Perceptions of Satisfaction. Although few research studies have disaggregated the sciences to examine which subject may be experiencing the

most perceived levels of dissatisfaction, the small numbers of studies that have disaggregated the subjects suggest biology seems to be affected as the most tension-laden. Many states' have indicated the biological sciences were the hardest to fill, oftentimes reporting trends of vacancy rates averaging between 52-56% (NSB, 2008, 2012). Currently as noted in the NSB (2008, 2012) reports, biology vacancies remain difficult to fill. In addition, state administrators indicated it is hard to retain biology teachers after the initial hire (NSB, 2008, 2012).

Researchers indicate biology teachers do experience two predominant pressures which may exacerbate the flow of biology teachers in and out of schools (Roehrig & Luft, 2004; NSB, 2008). The first pressure for teachers resides in biology's historical and current pre-eminence to produce a science literate citizen for the nation. The second pressure stems from the No Child Left Behind (NCLB) Act of 2001 which required states to develop standardized science tests by the school year 2008 to measure overall academic proficiency by 2014. Many states chose biology to meet the NCLB mandate of high-stakes testing for monitoring teacher performance and student achievement (Tobias & Baffert, 2009).

The satisfaction perceptions of biology science teachers unlike the perceived satisfaction of other teachers may be aggravated by stressors such as strict state and science standards for curriculum development, state mandated biology requisite for student graduation, and by the federal NCLB's high-stakes science testing as a piece to the overall proficiency of a school to meet annual yearly growth mandates (NRC, 2008). Too, a lack of resources such as lab equipment, lab consumables, and teaching spaces for proper scientific investigation could increase tensions among the teachers

(Darling-Hammond 2007; Tobias & Baffert, 2009). These aforementioned stressors would present even larger challenges for teachers to meet the federal and state standards for science student achievement, if there is an absence or inadequate supply of lab equipment and consumables. However, even with adequate provisioning, science teachers have time constraints to inventory, set-up, and take-down laboratory activities during the regular school day. This often requires extra time in the evenings or on weekends (Tobias & Baffert, 2009) presenting challenges to not only the professional aspects of the job, but the personal aspects as well. Another vital concern that research indicates is necessary for proper laboratory investigations are room assignments possessing lab spaces with adequate water supplies, ventilation hoods, and safety equipment (Bryk &Schneider, 2003; Tobias & Baffert, 2009). Certainly, poor facilities would be demoralizing to teachers (Futernick, 2007).

Although science teachers would be especially challenged to conduct laboratory investigations without the minimum requisite facilities, researchers found biology teachers cited that workplace conditions of administration support, student discipline, collegiality, and accountability had larger roles in their levels of dissatisfaction and leaving than facilities (Eklund,2008; Hanushek & Kain, 2007). Furthermore, Barnett Berry (2008), president of the Center for Teacher Quality, suggests that based upon data gathered from the center's survey of more than 150,000 teachers adequate facilities and resources are not a separate category of workplace conditions but would fall under the purview of good administration/ leadership.

Ingersoll and Perda (2011) suggest that generally biology science teachers are analytical problem solvers and readily challenge bureaucratic constraints and

inconsistencies, therefore are more likely to encounter friction and tension in the workplace when they are nonetheless urged, and sometimes required, to heed knowledge about teaching from external authorities such as learning theorists, principals, professors, and educational researchers which may not be aligned with the epistemological beliefs of the teachers regarding the nature of teaching and learning (Day & Kington, 2008); Fenstermacher & Richardson, 2005).

Researchers have found this alignment or misalignment of teacher beliefs with their school's climate has a direct impact on teacher's perceptions of satisfaction, thus, impacting teachers' behaviors, motivation, and commitment (Day & Kington, 2008). Understanding how biology teachers' perceptions of the reciprocal interplay between workplace conditions and teachers' beliefs and their relationship to teachers' perceived satisfaction and commitment may have the potential to increase teacher quality, perceptions of satisfaction and commitment, as well as science student achievement. The workplace conditions and epistemological beliefs will be defined in the following sections of this chapter and further developed in chapter two.

Dimensions of Epistemological Beliefs

Recent research studies suggest psychological intrinsic instability or perceived dissatisfaction is created when school workplace conditions are misaligned with a teacher's epistemological beliefs on the nature of good teaching and learning in an effective environment (Bryk & Schneider, 2003); Kristof-Brown et al., 2005; Salburg, 2010).

Schraw and Olafson (2002) note that almost all writings on epistemological beliefs, whether in education or psychology affirm a three-category descriptive

system of surface behaviors as proxies for the core underpinnings of teacher beliefs and assumptions about knowledge. The first category, which is realist consists of dichotomous views with absolutes; an acceptance of knowledge transmission by experts, usually inflexible and often evidenced by teacher-centered behaviorist approach of direct-instruction. The second category, contextualist, is a combination of acceptance of knowledge from experts but tempered through reflective constructed personal knowledge and more student- teacher centered approaches are evidenced with emphasis on group-oriented instruction. The third category, relativist, knowledge is self-constructed, flexible, and changing, wherein teachers are regarded not as experts but creators of a special environment to promote individually based experiences evidenced by only student-generated activities. The highest quality teaching level promulgated by the reform standards for science–inquiry learning (National Research Council [NRC], 1996) lies between the contextualist and relativist approaches to teaching.

Much research finds most teachers enter the profession with an altruistic contextualist student- teacher centered epistemic belief system (Luft & Roehrig, 2007; Day & Kington, 2008). Yet, the research findings from these studies have also found almost all teachers in their first years use teacher-centered pedagogy. In addition, the research studies noted many veterans are likely to exhibit this type of pedagogy as well. These paradoxical behaviors point to changed behaviors in teachers as they negotiate workplace conditions coupled with inconsistencies, tensions, and contradictions to their core belief system. According to Brown and Fuller (2004), two overarching tension factors emerge from this instability; pervasive feelings of

"survival" and "inadequacy". These negative feelings experienced by teachers over time may lead to low self esteem, perceptions of dissatisfaction, and attrition.

Dimensions of Workplace Conditions

In the ensuing research literature, these workplace conditions are referred to as dimensions of school climate, which are often cited by teachers as the leading causes of their perceived dissatisfaction. It is important to examine these conditions carefully for they are catalysts which build frustration and deter teacher commitment. According to Loeb, Darling-Hammond & Luzack (2005) the most salient to teachers' perceptions of satisfaction and commitment are administrative support, student discipline, collegiality, and accountability.

The first workplace condition is the need of support by administrators. This condition has special significance and emphasis in its relationship to teacher retention issues as being the one most often mentioned by teachers and in addition undergirds most all other school workplace conditions. This is a key finding identifying the principal as the instructional leader who shapes the culture of the school, especially support pathways to nurture teachers, especially the novice teachers (Colley, 2002). Usually hired by the principal, a natural imprinting occurs by the teacher who in turn will often look for guidance and direction from the principal (Ingersoll & Kralik, 2004; Tye & O'Brien, 2002). In large schools with many daily educational demands upon the principal, this guidance and support may not be readily available, often leaving the teacher feeling abandoned.

The second condition is student discipline (Smith & Ingersoll, 2003). This is cited by teachers almost as frequently as the issue of administrative support.

Classroom management challenges the skills of all teachers but especially those of the novice. Research indicates negative student attitudes and behaviors contribute to teacher burnout and attrition.

The third condition is collegiality. Schools which have strong cultures of mentoring and professional development tend to alleviate the sense of isolation and frustrations felt by teachers. As an added benefit, teachers often experienced increases to their teaching skill repertoire and a stronger sense of self-efficacy. Darling-Hammond (2003) ascertained that schools which used these tools experienced less teacher turnover.

The fourth condition is accountability. It is a relatively new source for teachers' perceptions of dissatisfaction with their profession. Yet in a relatively short time some teacher surveys found accountability as the top-ranked reason for leaving teaching (Tye & O'Brien, 2002). For instance, the No Child Left Behind Act called for a national form of accountability with mandates, which increased teacher stress and frustration through the pressures of high- stakes testing, test preparation, and standards with negative consequences for both the teacher and the student (Cawelti, 2006). Crocco and Castigan (2007) found that accountability measures worsened teacher attrition.

Research Problem

Research evidence has linked teachers' perceptions of dissatisfaction to increasing rates of biology teacher turnover. Biology teacher shortages exist in all the nations' states to some degree or another. Understanding the sources that generate perceptions of dissatisfaction or satisfaction among biology teachers is essential given

their perceived importance to the Nation's educational reform efforts in closing the global economic achievement gap (Useem & Nelid, 2005).

Thus far, investigations into the antecedents of biology teachers' perceived satisfaction have identified the organizational context as a significant influence. Researchers have also found epistemological beliefs are related to teachers' perceptions of satisfaction. However, few of these studies explore the varying degrees of internal and external pressures each factor of the workplace may pose on biology teacher beliefs which may lead to perceptions of dissatisfaction and a loss of commitment to the school or teaching profession. For example, in the current accountability climate, few studies have explored how biology teachers' may experience significant tensions from accountability mandates of high- stakes assessments, Adequate Yearly Progress (AYP) measurements, and graduation prerequisites which may intensify the challenges of workplace conditions on their epistemological beliefs. Teachers may perceive that it is necessary to accept practices they do not agree with or find it easier to follow prescribed curriculums or reconcile discrepancies between their beliefs and school climate by becoming disenfranchised from the mission of the school or become oppositional to school transformation interventions depending upon the capacities of the teachers to manage the workplace challenges affecting their perceived levels of satisfaction (Day & Kington, 2008 ; Sleegers & Kelchtermans, 1999).

In light of the fact that research on understanding the dynamic relationship between workplace conditions and epistemological beliefs affect on biology teachers'

perceptions of satisfaction appears limited, this study will seek to contribute to the research base.

Research Purpose

The purpose of this study is to use qualitative case methodology to identify biology teachers' perceptions of the factors affecting perceived job satisfaction. In the research literature, workers' perceptions of psychologically potent factors of workplace conditions to effect positive or negative evaluative judgments about their perceived job satisfaction has been measured many ways, although many researchers are not in agreement on how it should be measured (Spector, 2000). However, organizational climate theorists have pointed for some time to Lewin's (1938) seminal study which is summed up by Locke (1976) that " perhaps the simplest most useful model of the determinant of on global job satisfaction is congruence or fit of the person to the setting, because this conceptualization underlies all attempts to study satisfaction" (Schneider, 1985 p.580). This researcher will use Kristof-Brown et al.'s (2005) modeling of teachers' perceived job satisfaction conceptualized as a person to environmental fit which is very similar to the earlier influential theories and models of organizational behavior such as those studies by Lewin and Locke. Kristof-Brown et al.'s (2005) paradigm of person-fit is presented in this study's Conceptual Framework section.

This study is designed to detect the observable differences in teachers' epistemological beliefs which allow them to cope or adapt to challenges to their perceived levels of satisfaction presented by workplace conditions by examining the responses of teachers to semi-structured interview questions.

Research Questions

This primary/overarching research question for this study is: What are high school biology teachers' perceptions of factors affecting teachers' perceived levels satisfaction? This question is further emphasized and will be clarified by two supplementary questions:

1. How does the interplay between administrative support, student discipline, collegiality and accountability with biology teacher epistemological beliefs impact perceptions of satisfaction?

2. How are perceived levels of satisfaction related to a coherence or lack of coherence between beliefs and the culture?

Significance

This study has the potential to add to the research on teachers' perceptions of satisfaction by exploring the alignment or misalignment of biology teachers' beliefs with the school's climate which may challenge their abilities to sustain perceived satisfaction levels (i.e., commitment). This study may help school leaders to understand the workplace conditions that contribute most to teachers' perceptions of workplace satisfaction so as select and develop strategies to manage and support effective biology teachers.

In addition to making workplace conditions visible to school leaders, this study may provide a lens for administrators to view teachers' epistemic beliefs through which teachers filter workplace experiences. Since current research finds

beliefs strongly affect teacher behavior, this lens could provide an understanding of teacher's perceptions of satisfaction as well as be instrumental to enhancing quality teacher practices.

Conceptual Framework

The conceptual framework of this study focuses upon the organizational perspective that the workplace conditions of schools and teacher epistemological beliefs influence teacher's perceived satisfaction and commitment outcomes. In order to understand this relationship, Kristof-Brown et al.'s (2005) model of the suitability of an individual to the workplace climate is adapted for this study's paradigm of teacher's perceived satisfaction. This approach as illustrated in *Figure1* allows a more detailed analysis of the degree to which teachers' perception of school context variables predict perceptions of job satisfaction as an interaction between specific personality (beliefs) and environmental factors rather than a measure of an overall perceived sense of satisfaction with the job.

Figure 1. illustrates the conceptual links of the climate's workplace hierarchy as conceived for this study by situating the workplace conditions as environmental factors (extrinsic) interacting with persons'(teachers) epistemological beliefs (intrinsic). Research acknowledges that workplace condition perceptions and teacher beliefs may vary from one school organization to the other and in addition, may vary in the same organization. And yet, overall there is a consensus among climate theorists which describe particular work-place conditions which have the greatest

influence on worker perceptions of satisfaction in domains such as large organizations like public schools (Riggio, 2009).

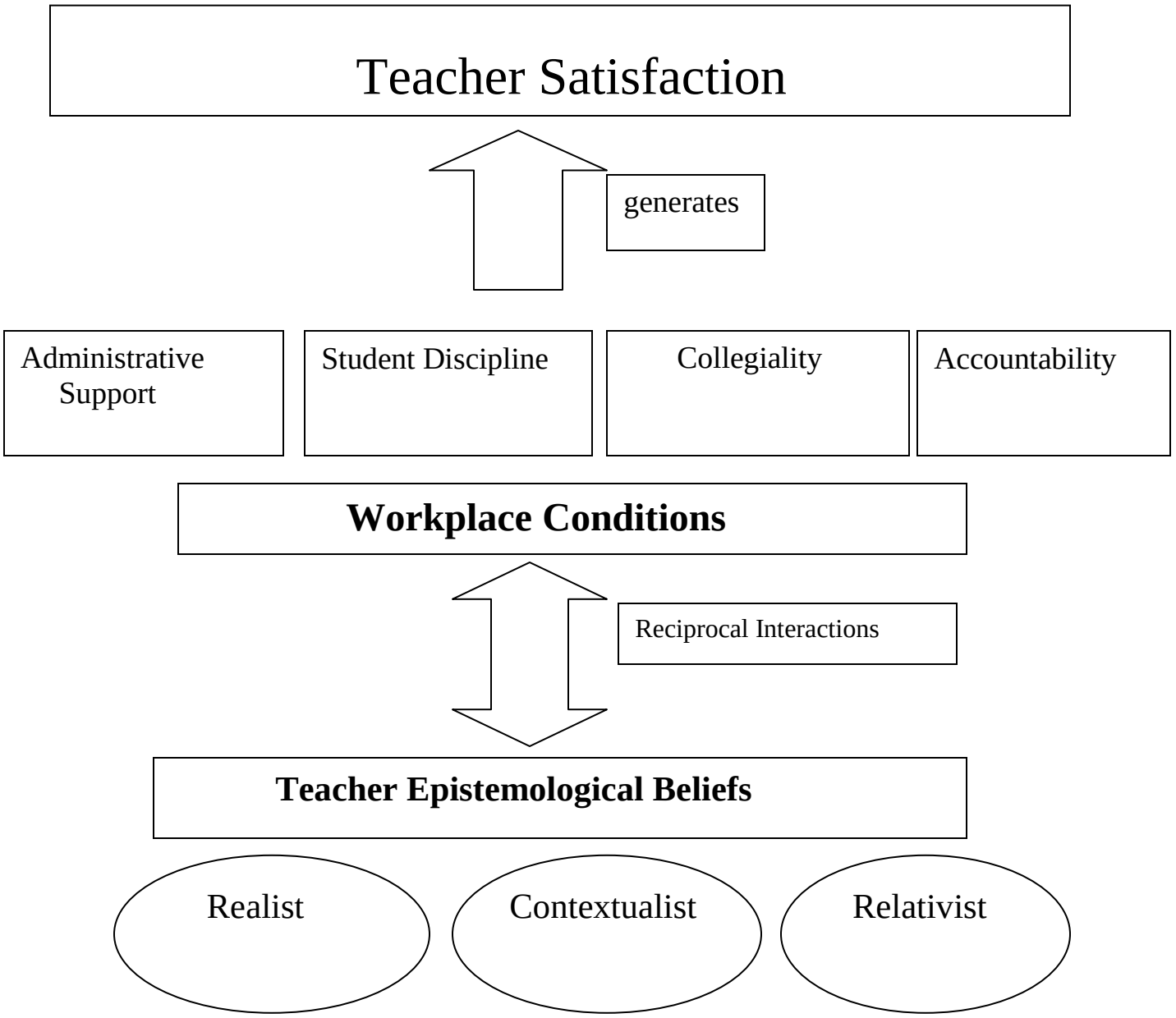


Figure 1. **Conceptual Framework to examine teacher's perceptions of satisfaction adapted from Kristof-Brown et al.'s 2005 model of worker motivation through person- environment fit.**

Research Design

This qualitative case study is intended to identify relationships between school workplace conditions and teacher epistemic beliefs about the nature of teaching and learning, and their effect on biology teacher's perceptions of satisfaction. Perceived satisfaction levels are indicators of high school biology teachers' commitment. According to Kotze and Roodt (2005), a strong correlation has been found between perceptions of job satisfaction, commitment, and retention which in turn may have implications for schools toward keeping their teachers.

For this study, high schools in a major metropolitan school district in the Mid-Atlantic region will be chosen for the schools' high retention rates in biology as compared to the district's other high schools. The intention is to identify the factors necessary for biology teacher success and school performance. Each education setting implements and enforces key policies differently. However, this district and state have been actively encouraging much uniformity over at least a decade of reform efforts by aligning and standardizing expectations for schools, teachers, and students. Thusly, this researcher's expectations would be that the schools' climates might tend to generate normative behaviors from the same enduring educational policies that would mold similar behaviors in many of the district's school communities.

The method chosen for the data collection in this qualitative case study is the semi-structured interview (see Chapter Three). At the national and local levels, much self-reporting by biology teachers has been accomplished through quantitative survey instruments. Luft and Roehrig (2007) note that triangulation of the data collection has benefits but mostly draw backs when sampling teachers' perceptions. They suggest

that teachers sometimes tend to select responses in surveys that reflect what they believe may be the current professional educational thinking of what should be done in practice rather than what is actually done. Also, according to Fang (1996) a survey often requires asking participants to respond to lists of beliefs or workplace conditions which may or may not possibly represent their professional reality. Thusly, this study will rely upon the semi- structured interview questions designed to allow access to the thinking of teachers by probing the thoughts of teachers and allowing for an open-ended questioning strategy to expand those teachers' thoughts. The interview questions for this study are further developed in Chapter Three.

Although secondary science teachers' perceived satisfaction/ commitment issues encompasses all science disciplines, biology is a critical sample in this particular state, for it is the only science that has high-stakes accountability pressures in addition to the other climate conditions which research literature has indicated that seemingly creates perceptions of dissatisfaction in teachers.

Definitions

The following definitions are provided to ensure uniformity and understanding of these terms throughout the study. The researcher developed all definitions not accompanied by a citation.

Adequate Yearly Progress - A provision of the *No Child Left Behind* Act that categorizes the annual academic performance in the sciences (i.e., biology for most states) that each school must reach. According to the law, all students must be proficient by the 2013- 2014 school year.

Climate- the dimensions or facets of work conditions that characterize a particular organizational environment (Schneider, 1995)

No Child Left Behind Act of 2001 (NCLB) - The legislation that reauthorized the Elementary and Secondary Education Act (ESEA) also known as Public Law 107-87 (U.S. Department of Education, 2001b). NCLB focuses on (1) assessment and measurement of proficiency for all students and teachers, (2) adequate yearly progress, and (3) highly qualified teachers.

Job Satisfaction- the positive and negative attitudes and feelings of teachers generated through dynamic relationships between working conditions and teacher-held epistemic belief systems about the nature of teacher and learning (Eklund, 2008).

Teacher Epistemological Beliefs- the teachers' philosophies of teaching and world views about the nature of teaching and learning are the intrinsic factors of the school workplace. The dominant categories are (Schraw & Olafson, 2002):

a) Realist- teacher held view that relies mostly on experts, directed views, often black and white situations with a resultant teaching practice that is teacher-centered with information provided by teacher to student.

b.) Contextualist- a belief that is comprised of self- constructed views with some reliance on expert knowledge resulting in a teaching practice that is student-teacher centered with much of the expert information guided while the student makes connections between the expert information and their own constructed knowledge, some researchers refer to this concept as constructivism.

c.) Relativist- a belief that asserts knowledge is totally self constructed and not accepting of outside expert influences (e.g., no curriculum guide) resulting in a

teaching practice that is totally student centered; the teacher makes possible an environment for the student's sole construction of knowledge; not often seen in a public school setting.

Working Conditions- the extrinsic factors such as the character and conditions of the organization in which an employee work (Eklund, 2008). According to researchers the most salient working conditions for teachers' perceived satisfaction levels and commitment are four categories administrative supports, student discipline, teacher collegiality, and accountability (Loeb, Darling-Hammond, & Luczak, 2005; Riggio, 2009).

a.) Administrative support- is a key finding identifying the principal as the instructional leader who shapes the culture of the school, especially support pathways to nurture teachers.

b.) Student discipline- classroom management of student behaviors challenges the skills of teachers. Research indicates negative student attitudes and behaviors contribute to teacher burnout and attrition.

c.) Collegiality- refers to a positive working relationship among teachers highlighted by a sense of collaboration with and recognition from colleagues.

d.) Accountability- Grounded from the No Child Left Behind Act mandates create pressures through high- stakes testing and school proficiency measurements with consequences for both the teacher and the student.

Limitations of the Study

1. The study's setting is limited to high schools with a high retention rate for teachers and high test scores for students in a major metropolitan school district in the Mid- Atlantic region.

2. Due to the small/unique sample available for the study, results may not be generalizable beyond the specific group from which the sample was drawn.

3. The findings of the study are limited to the existing workplace conditions in the high schools where the study was conducted.

Organization of the Study

The second chapter contains the review of the literature and research related to the construct of biology teacher satisfaction. The background of perceived job satisfaction issues are examined along with an in-depth examination of the potential causes and effects of specific school workplace conditions. The methodology and procedures used to gather data for this study are presented in chapter three. The findings from the study will be in the fourth chapter. The fifth chapter will contain a discussion of the findings, implications, limitations, and recommendations for further study.

Chapter 2: Review of the Literature

Overview of the Literature

This case study examines important contextual variables which surround biology teachers' perceptions of satisfaction. In addition, although educational job satisfaction research has been more systematically studied for new teachers and science teachers, this researcher expects that similar interactions are positively tied to biology teachers' perceptions of job satisfaction as well.

Two areas of research literature are relevant to this study pertaining to biology teacher's perceptions of satisfaction: a) high school workplace conditions including administrative support, student discipline, collegial interaction, and accountability and b) teachers' epistemological beliefs about the nature of teaching and learning; realism, contextualism, and relativism.

Unlike prior studies with a lens on macro-level external demographic variables such as student enrollments, salary, and retirement issues as contributing factors to perceived satisfaction and commitment concerns, in this study the focus is at the micro-level of school teachers' perceived views on satisfaction problems, which has received less attention in the educational organization literature. Although educational studies on teachers perceived job satisfaction at the school level appear limited in number, this study will build upon studies that reveal empirical evidences of the reciprocal interplay and degrees of dominance between school workplace conditions and teachers' epistemological beliefs which appear to mediate teachers'

perceived satisfaction and commitment outcomes (Brewer, 1996; Eklund, 2008; Luft & Roehrig, 2005; Sahlberg, 2010, Spector, 2000).

Ingersoll and Perda (2011) found science teachers experience greater perceptions of job dissatisfaction and are more likely to leave the profession compared to other subject area teachers. What can be done to keep them? In this study's review of the literature, seven prominent organizational factors were identified from research studies which suggest that these factors have strong correlations with teachers' perceived job satisfaction outcomes. Amongst the group, four factors are frequently categorized by scholars as extrinsic workplace conditions. They are considered in this review because of the extant of many quantitative and qualitative studies pinpointing them as organizational antecedents to teachers' perceptions of satisfaction and commitment. They are workplace conditions of administrative support, student discipline, collegiality, and accountability. These conditions appear to consistently challenge biology teachers' perceptions of satisfaction (AEE, 2011; Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2005; Loeb, Darling-Hammond, & Luczak 2005; NCES, 2007; Rosenholtz & Simpson, 1990; Shen, 1997b). The next three organizational factors are categorized as intrinsic factors. The literature review identified three notable epistemological belief systems held by science teachers. Scholars categorized these beliefs as realist, contextualist, and relativist and found them more or less stable and discrete depending upon the capacities of teachers to manage their beliefs among persistent daily work environmental challenges (Sleegers & Kelchtermans, 1999). These seven prominent

organizational factors are reviewed by this researcher for their influences on biology teachers' perceptions of job satisfaction.

Also, scholars suggest that educational organizational research shares many elements of work in the social service professions and business organizations which have demonstrated affects on perceptions of job satisfaction. This study draws on two workplace perspectives that are utilized to guide this study's approach for examining biology teacher perceived levels of job satisfaction. First, the workplace sociology and psychology perspective provides a dimension for understanding the philosophical underpinnings of teachers' epistemological beliefs (i.e., intrinsic) and their impact on teachers' behaviors in the school settings and resultant satisfaction outcomes. Second, the business organizational perspective provides an understanding of the contextual framework, person-environmental fit, within which the relationships between teachers' epistemological beliefs and workplace conditions (i.e., extrinsic) function to impact biology teachers' perceptions of job satisfaction (Byrk & Schneider, 2003; Caprara et al., 2006; Kristof-Brown et al., 2005; Luft and Roehrig, 2007; Rosenholtz & Simpson, 1990).

This chapter's following sections are organized with the intent to inform, focus, and situate this study's discussion of biology science teachers' perceptions of job satisfaction as it is shaped by the links and tensions between workplace conditions and the teachers' epistemological beliefs about the nature of teaching and learning. In the first section, this study explores the background of job satisfaction perceptions, the erosion of teachers' perceived satisfaction, and resultant costs to the education profession. The second section of this review includes an examination of the research

on the organizational extrinsic (i.e., workplace conditions) and intrinsic (i.e., epistemological beliefs) factors that relate to teachers' job satisfaction perceptions. This is followed by a section which includes work from researchers based on the organizational interactive paradigm, which takes into account the person-environment fit model and provides the basis for this study's conceptual framework, as illustrated in Chapter One. At the end of this chapter, a summary will highlight relevant details found in the literature review regarding biology teachers' perceptions of job satisfaction.

Perceptions of Job Satisfaction Factors

Since school systems share many features with large organizations, design of the present study utilizes prior research from business on factors that produce stress in the workplace to help in understanding the strains on biology teachers' perceived satisfaction levels. A review of literature suggested while there are many various factors considered in the ongoing research on teachers' perceptions of job satisfaction, there are two general types of factors frequently found in business organizational studies. The first one is usually referenced as extrinsic factors of climate which seemingly generate enormous amounts of stress and tension leading to perceptions of dissatisfaction. Because teaching shares many elements of the work in complex organizations, Herzberg's (1966) Motivation-Hygiene Theory; a seminal business concept on perceptions of satisfaction in the workplace provides an understanding of the extrinsic factors frequently cited by teachers. Herzberg conducted studies to identify factors in an employee's work environment, which caused perceived levels of satisfaction or dissatisfaction. Herzberg's "hygiene"

factors were found to have the most affect on employee perceptions leading to dissatisfaction. According to Herzberg, these hygiene factors are the most useful for organizations to look at for those "who are attempting to keep their workforce" (p.32). Herzberg found perceptions of dissatisfaction often led to employees leaving, the following five factors were listed as vital to company policy are as follows:

1. supervision
2. relationship with the boss
3. work conditions
4. salary
5. relationship with peers

The organizational perspective is also relevant to the understanding of the second group of factors. The organizational behavior theory ties intrinsic factors such as beliefs, attitudes, and behaviors to workplace conditions (Kristof-Brown et al, 2005; Ingersoll, 2003; Loeb, Darling-Hammond, & Luczak, 2005; Spector, 2000)). Research on the intrinsic variables has ranged more widely than the more objectively extrinsic factors. Research has spanned from direct overall feelings about the actual work of teaching such as working with students and seeing students learn and develop to more indirect feelings generated by perceptions about the teacher's individual self, such as efficacy and empowerment, often filtered by their epistemological belief systems (Sahlberg, 2010). For this study's foci the intrinsic factors examined will be the epistemological belief systems of teachers about the nature of knowledge and learning. The fundamental assumption is that employees' epistemological beliefs influence whether they perceive their workplace as suitable

environments (Kristof-Brown et al, 2005; Sahlberg, 2010). This assumption not only reinforces that climate factors influence practice, but also, as research suggests that beliefs affect practice as well. Not only have researchers seemingly captured several important types of teacher-held beliefs, but they have also characterized three overall epistemological beliefs of teaching and learning views through which many teachers have experiences of the school climate (Baxter-Magolda, 1993; Luft & Roehrig, 2007; Richardson & Simmons, 1996; Schommer, 1994; Schraw & Olafson, 2002). These philosophical views or beliefs represent the different forms of a teacher's practice and are developed in the following section. These teaching practices represent perceptions consistently affirmed by many current and earlier epistemological researchers (Luft & Roehrig, 2007; Perry, 1970; Nespor, 1987; Richardson & Simmons, 1994). Increasingly, educational research studies suggest the dynamic relationship between underlying external and internal pressures of workplace factors and the epistemological beliefs of teachers may be possibly affecting perceptions of job satisfaction (Ingersoll, & Perda 2011; Ladd, 2011).

Teacher Satisfaction Paradox

Kane (1991) stated "few other jobs offer the immediate intrinsic satisfaction and learning that teaching in an elementary or secondary school may afford from the first day of employment" (p.2). Science teachers, either new or veteran in the teaching profession as a whole did report an overwhelmingly great deal of perceived job satisfaction with their careers as teachers in the 2003-2004 School and Staffing Survey data reported by the Science and Engineering Indicators (NSB) 2008 report.

As discussed in Chapter One, the intrinsic nature of the education job is very appealing to teachers; a sense of service, a true vocation (not just a job), interpersonal interactions, and/ or a job that is perceived as creative and autonomous.

Notwithstanding this immediate sense of perceived satisfaction, the feeling does not seem to hold long with science teachers as research studies have found the overall turnover rate of science teachers is about 50% by their fifth year (Darling-Hammond, 2000, 2003; Ingersoll & Perda, 2006). This intriguing satisfaction paradox appears to be expressed in the results of the 2006 Metropolitan Life Insurance Co. survey results. The data analyzed 1,001 public school teachers' perceptions of workplace satisfaction. The resulting trend left researchers puzzled over an outcome suggesting that while there was an increase in teachers' views on satisfaction from 40% in 1984 to 56% in 2004, controvertibly, 25% of this same group reported plans to leave the profession in 2010. However, when the 2012 MetLife Survey noted the lowest levels of teachers' perceived satisfaction in over 20 years, the report posited an explanation for the earlier purported conundrum by finding that teachers often cited they seem satisfied with teaching as a career, but the report also indicated when teachers experience workplace challenges to their perceived effectiveness leading to an inability to sustain it; tensions and conflicts often arise leading to a diminished sense of perceived job satisfaction. For instance, Stoeber & Rennert (2008) found school teachers are among those professionals with the highest level of daily job stress arising from tensions and conflicts in the workplace.

An example of the workplace conditions impact on teachers' perceptions of job satisfaction is found in a study by Johnson and Birkeland (2003). These researchers' findings indicated that 24 out of 50 teachers left their jobs just after the first two years of service. In the study's findings, several workplace conditions were noted to be determinants of large amounts of perceived dissatisfaction, such as problems with administrators, student discipline issues, and inadequate resources.

Scholars have suggested if teachers are left unsupported in resolving pressures from the workplace conditions, many teachers appear to become dissatisfied and tend to "sink" and often leave the profession. Etzioni (1969) describes this as a natural "weeding out" in organizations and suggest some turnover in any organization is beneficial and prevents stagnation. However, educational psychologists have long held that the developmental nature of learning for teachers and students requires high rates of consistency in school staffs (Durkheim, 1961; Rosenholtz, 1989). Whether some school turnover is good or bad is debatable among researchers, but turnover attributed to perceptions of dissatisfaction 50% of the time can have various cost ramifications (AEE, 2011; Ingersoll, 2002).

Dissatisfaction Costs

Teachers' perceptions of dissatisfaction with purported ties to the alarming attrition rates of teachers may impact the nation's goals to achieve schools in which all students have the opportunities for success. As recognized in many educational studies, a large part of a successful school environment is the significant role that

teachers play in contributing to students' achievement and therefore, the school environment is impacted by teacher leaving or disengagement, such as increased absenteeism or a lower work effort (Day & Kington, 2008; Hanushek & Rivkin, 2007; Ladd, 2011). Researchers suggest one consequence of perceived dissatisfaction may contribute to the high flows of teachers in and out of schools. For example, researchers found during a twelve month period, one million teachers or almost a third of the teacher workforce was in transition (AEE, 2011). Many research studies refer to these high flows, in and out of education as either the "revolving door" or a "bucket with holes in it" and indicate these flows seriously compromise student achievement (CCSR, 2005; Hanushek, Kain, & Rivkin, 2004; Ingersoll, 1999; Smith & Ingersoll, 2003; NCTAF, 2003, 2007).

Indeed, school systems and their respective schools' goals are affected by any teacher turnover. For the school system, money and time is spent over and over again to recruit, hire and prepare a teacher at an average cost of about $50,000 per teacher (Carroll et al., 2000). Accordingly, progress on school goals, plans, and initiatives such as curriculum, technology, and collegial interactions slows down as the time and energy of the educational institutions are now diverted to recruiting, hiring, and orienting new members to the school culture (Boyd et al., 2003; Weiss, 1999). NCTAF (2003) estimated that the recruiting and training of new teachers cost the country an increase of $7 billion per year. This loss of human resource translates into

a multitude of school disruptions and replacement costs for school communities (Colgan, 2004; NCTAF, 1996; 2003).

Although these flows are comprised of all teachers, research disaggregated a dominate type of leaver, the science teacher, and as discussed in Chapter One, specifically biology teachers (Tobias & Baffert, 2009). The National Academy of Sciences in their Rising Above the Gathering Storm (2007) report examined the science turnover rate and found many states were issuing uncertified teacher certificates because of the science teacher shortages. In addition, the report indicated the issuance of probationary certificates was extremely high among the states as well. For example, Texas issued 1,256 probationary science certificates in a one year period between September 1, 2007 and August 31, 2008. Researchers found large issuances of uncertified and probationary certificates problematic for state staffing efforts because frequently a 60% turnover rate occurred among the certificate holders (Darling-Hammond, 2008; Ingersoll & Perda, 2011). Aside from the problems of the state issuances of certificates, the report indicated overall very few university students were choosing to enter science education. With so few science education majors declared at the universities and the apparently large shortfalls of science teachers, the report called for an immediate recruitment of 10,000 new secondary science teachers per year for the next decade to meet the shortage of teachers.

Workplace Conditions

In the research literature workplace conditions (i.e., extrinsic) and teacher epistemological beliefs (i.e., intrinsic) are strongly correlated with teachers' perceptions of job satisfaction and commitment. As Ingersoll (2003) often suggests in his studies, workplace conditions are significant findings for education because they are alterable at the school level. In addition, Fenstermacher and Richardson (2005) found that beliefs can also be alterable along with many school conditions and will be explored in the following epistemological belief section of this chapter. Thus, as Ostroff (1992) suggests, since environmental workplace conditions and teacher beliefs appear malleable, organizations can develop environments which promote teachers' perceptions of work satisfaction and commitment.

A*dministrative Support Workplace Condition.* According to the research reviewed, among the multiple challenges biology teachers face, leadership is a critical factor that impacts their positive or negative perceptions of job satisfaction in the teaching profession (Bobbitt et al., 1994; Loeb, Darling-Hammond, & Luczak, 2005; Ingersoll & Perda, 2011; Rosenholtz, 1989; Rosenholtz & Simpson, 1990). A trend in research studies for several decades, many scholars have found the lack of administrative support is among the top reasons for teachers' perceived dissatisfaction and leaving (Hanushek & Rivkin, 2007; Tobias & Baffert, 2009). For example, Weiss (1999), using the 1995 Schools and Staffing Survey (SASS) data, noted that among the many positive or negative perceptions held by teachers on workplace conditions, administrative support was at the top of the list. Similarly, Smith and

Ingersoll (2003), also using the 1995 SASS and Teacher Follow-up Survey (TFS) data for their survey, found teachers who had expressed perceived dissatisfaction as reason for leaving, indicated "among the reasons for their decision to quit are: student discipline problems, lack of support from the school administration; poor student motivation; and lack of teacher influence over school wide and classroom decision making" (p.46). Also, Shen's (1997b) study of the 1995 SASS follow up survey found a lack of administrative support appeared to be the predominant reason why teachers left teaching or transferred schools. The survey indicated teachers' perceived workplace problems were less understood by their administrators.

Rosenholtz and Simpson (1990) labeled the relationships between teachers and administrators as "principal buffering" (p.245). According to the researchers, principals that work to reduce extraneous interruptions (e.g., testing responsibilities, parent demands) to the teachers' core tasks of teaching lessen teachers' frustrations. This "buffering" according to the study is identified as one of the most important factors for helping teachers to perceive a sense of satisfaction and survive in challenging working situations, such as managing unruly students (Fuller et al, 1999; Ladd, 2011; Shen et al, 2012; Tye & O'Brien, 2002).

The literature consistently found the principal instrumental to the creation of distinct working environments (Certo & Fox, 2002; Darling-Hammond, 2007; Ingersoll & Perda 2011; Fenstermacher & Richardson, 2005; Ladd, 2011). Administrators establishing a clear culture of shared norms and values are often able

to detect value dissonance early and may work to reduce teacher frustrations and reconcile tensions when there are intensive and persistent changes in expectations, working conditions, and practices (Leithwood & McAdie, 2007). These supportive atmospheres are highly predictive of teachers' perceptions of job satisfaction (Ingersoll & Perda, 2011).

Student Discipline Workplace Condition. Researchers suggest this extrinsic workplace condition is often closely entwined with administrative support as exerting a great influence upon teachers' sense of satisfaction (Darling-Hammond, 2007; Futernick, 2007); Smith & Ingersoll, 2003; Loeb, Darling-Hammond & Luczak, 2005; NSB, 2008; Sahlberg, 2010). The Center for Teacher Quality (CTQ, 2007) conducted a survey of 150,000 teachers across seven states. They found teachers selected student discipline and administrative support as two major issues for their perceptions of dissatisfaction. Buckley, Schneider, and Shang (2005) sum up teachers' perceived job dissatisfaction as "primarily due to poor salary, poor administrative support, and discipline problems" (p.42). According to the Bureau of Labor Statistics (2007) report, found teachers perceived overall workplace conditions dissatisfying when challenged incessantly by "unmotivated or disrespectful students, unruly behavior, and perhaps violence in the schools" (p. 13).

Mitchell & Arnold (2004) noted a lack of classroom discipline has been at the top of an annual Gallup Poll of Public Attitudes toward public schools since they began in 1968. For example, one negative consequence of classroom discipline issues

is its apparent ties to teacher turnover. The Consortium on Chicago School Research (2007) report found "the number of students with behavioral problems in a classroom are strongly [negatively] associated with [teachers'] plans to continue teaching" (p. 38). Additionally, Rosenholtz and Simpson's (1990) seminal finding suggests that managing student behavior is very important to sustaining teachers' perceptions of satisfaction. This management is seen with much importance for if teachers are unable to succeed with classroom management, then they are unable to focus on instruction, which researchers have noted appears the more perceived satisfying aspect of teaching. Unable to move forward, teachers experience stress and perceptions of dissatisfaction and often elect to leave the teaching profession. Chang (2009) explains this finding further by discussing the negative association between student disruptions and a teacher's goal of achievement, such as utilizing inquiry approaches to instruction. NSB (2008) also found high school science teachers were more likely than other teachers to identify student discipline as a major contributor to teachers' perceived dissatisfaction levels. According to Chang (2009) teachers' perceptions of job satisfaction diminishes overtime and may lead to a loss of commitment by the teachers if the disruptions continue.

Collegial Interactions Workplace Condition. This study also suggests teachers need a supportive culture. Much of the research indicates perceptions of job satisfaction increases when schools are "organized for productive collegial work under a principal's effective leadership" (Johnson et al., 2004, p. 67). Weiss (1999)

suggested from her analysis of SASS data (1988, 1994) that school cultures had a significant relationship with teachers' morale and commitment to stay in teaching. Similarly, Ganser (2002) notes teachers are more likely to stay when extra support is provided early. Unfortunately, support programs to aid teachers vary from school to school, ranging from those with weak supports to ones that are very strong (Johnston et al., 2004). Researchers suggest most schools usually do have in place some type of collaborative assistance such as mentoring, but often they have not been well designed (Ingersoll & Kralik, 2004).

Luft and Roehrig (2007) suggest experienced science teachers can as groups support each other to create a positive learning and teaching environments by sharing instructional strategies. Notwithstanding strong cultures of support, the overall vulnerability of teachers may set them up to withdraw from help even in schools with the best workplace conditions (Grossman, 1990; Mehl, 1993; Talbert & McLaughlin, 1993). Indeed many studies suggest teaching can be overwhelming (Ingersoll, 2007; Huling-Austin, 1989; Kane, 1991; Ladd, 2011; Renard, 2003; Veenman, 1985). Some studies point to a reality shock for teachers. Often, there is a divergence from the theoretical teachings of formal education induction programs or their own constructed belief system that possibly leads to conflicts and tensions to what they encounter in schools, which frequently demand complex multiple decision-making by teachers (Cochran-Smith, 2004; Kopkowski, 2008; Luft & Roehrig, 2007; Smith & Ingersoll, 2003; Veenman, 1985). According to researchers, leadership is essential for fostering

collaborative environments to prevent a likely scenario of withdrawal by many teachers into isolation when they cannot adjust to workplace challenges (Bryk & Schneider 2003; Rosenholtz 1989; Sahlberg, 2010).

In another study, the University of Chicago research group analyzed all Chicago novice teachers in 2005 and concluded "the degree to which new teachers are welcomed and assisted by school faculty has a significant influence on teachers' reports of good experiences, intentions to continue in the profession and plans to remain in the same school" (p. 17). Also, Kapaidia, Coca, and Easton (2007) found new high school science teachers indicated they were more significantly likely to stay when they perceived high levels of induction to their schools occurred. Indeed, researchers have found collegiality is a strong component of perceived satisfaction for most teachers and particularly at the high school level among the biology teachers (Brunetti, 2001; Tobais & Baffert, 2009).

Accountability Workplace Conditions. In order to understand the influence of educational accountability and it's relatively more recent addition to workplace condition constraints on biology teachers' perceptions of satisfaction, this section presents an overview of accountability. Accountability pressures are a relatively recent development for all schools. Few studies have been conducted regarding the accountability effects on schools, even though accountability testing outcomes are politically popular (Clotfelter et al., 2003; Goldhaber & Brewer, 2000; Ingersoll, 2003; MetLife, 2005; Rudelvidge, 2003).

Although the accountability movement began with the 1964 Elementary and Secondary Schools Act (ESEA), its focus was primarily directed toward requiring testing of all students receiving Title I funds. As an example of a good business construct, the movement created a production–function to get money in and test scores up. However, a 1983 federally funded report, A Nation at Risk, charged schools, educators, and students with a lack of motivation and talent. This scathing report cited school systems contained serious educational flaws and were considered to be the leading cause of the loss of U. S. educational ground to foreign countries (Berliner & Biddle, 1995; Berliner, 2000). The public's faith in the public education system was shaken by the report (Rudelvidge, 2003). Many states responded by increasing standardized testing (Erickson, 1987). For instance, twenty years ago, fewer than a dozen states required standardized testing for all students. Now, high stakes testing occurs in almost every state (Hoffman, Assaf, & Paris, 2001).

Federal education policy mandates and testing requirements have been restructured in ESEA many times ending most recently in the form of the No Child Left Behind Act of 2001 (NCLB). This last evolution of the ESEA as the 2001 NCLB Act finally tied federal funds to test scores. States would lose that funding if they refused to test their students. Furthermore, even if states conducted the tests, NCLB required the states to develop their own standardized tests, which in turn became vehicles from which they were judged as a measure of schools' Adequate Yearly Progress (AYP) toward meeting the federal goal of "academic proficiency" for every

student in 2014. In addition, failure to make AYP would have serious consequences for schools, teachers, and students (Flynn, 2002), such as closing schools and /or firing teachers. Relevant to this study is a central accountability tenet of NCLB to "hold teachers accountable for improvements in student achievement" (United States Congress, statute 1620, 2002a).

During the accountability movement's nationwide expansion, education accountability honed severe consequence systems for the motivation of high performance in schools, teachers, and students (Tye & Obrien, 2002; Herman, Baker, & Linn, 2004). For example, when schools fail to meet the requirements of NCLB, they are labeled as "failing". Unfortunately, this failure status stigmatizes teachers and students as well as leading to teacher/student frustrations and dissatisfaction as their intrinsic perceptions of self-efficacy is diminished in such a climate (Caprara et al., 2006). For example, Rosenholtz (1989) states "teachers' productive commitment to schools requires psychic rewards, task autonomy and discretion, opportunities for learning, and efficacy about their work" (p.422). She further notes that failure to meet these needs results in "teacher dissatisfaction, absenteeism, or outright defection" (p.422). Also, researchers note high stakes accountability such as NCLB judge success in the form of test scores which strip teachers of many intrinsic or extrinsic values of perceived satisfaction ((McNeil, 2000; Tobias & Baffert, 2009). This has even greater significance for low performing socioeconomic disadvantaged schools to attract and retain teachers in a high stakes accountability climate (Shen et al., 2012).

In another study, Clotfelter et al. (2003) found in their study of North Carolina's school systems that accountability measures affected the retention of teachers, especially novice ones, in its low-performing schools by weakening their intrinsic beliefs. In general, they found school-based systems "are one[s] in which the personnel in effective schools are recognized and rewarded while the personnel in failing schools are publicly scrutinized and subject to sanction" (p. 37). Widely documented concerns of biology teachers' pressures to be held solely accountable for student performances in lieu of other factors operating at the school site, such as a school's low socio-economic level have lead to much teacher frustrations and perceptions of dissatisfaction with teaching. Scholars have noted biology teachers, not unlike other teachers, appear to become quickly dissatisfied and leave the profession or transfer to schools deemed to have higher economic school settings, thereby possibly eliminating performance problems associated with lower economic school levels (Darling-Hammond & Sykes, 2003; Jacob, 2002). For example, Hanushek and Rivkin (2007) analyzed career moves made by 375,000 Texas primary teachers and found teachers moved to schools with fewer minority students, fewer poor students, and students with higher test scores. Since the wages were about the same, researchers suggested that a general set of working conditions such as accountability most likely had influenced the teachers' moves.

Teacher Epistemological Belief

A more recent focus in educational research suggests that in order to produce substantial educational changes, teachers' epistemological beliefs must be factored into the interrelated organizational conditions of schools (Fenstermacher & Richardson, 2005; Luft & Roehrig, 2007). Researchers suggest beliefs about the nature of teaching and learning are connected to classroom practices which have been in turn linked to teachers' perceived levels of satisfaction and commitment (Fang, 1996; Kang & Wallace, 2004; Tsai, 2006; Rosenholtz, 1989). Although, Schommer-Aikens and Easter (2006) found most educational researchers generally have focused on three main groups of beliefs imperative to the education process, such as 1) beliefs about students, 2) beliefs about the confidence to complete a task (self-efficacy), and 3) beliefs about subject content matter, a few early epistemological theorists such as Rokeach (1968) pointed to a centrality of a belief system which seemed to have deeper implications and consequences for individuals' perceptions, attitudes, and behaviors. Similarly, Bronfenbrenner (1979), an American psychologist, posited a theory about the existence of a primal underlying ideological belief system which appeared to influence the development of beliefs, such as teacher efficacy. Likewise, Nespor (1987) predicted that indeed, as idiosyncratic as the nature of beliefs are, these underlying deeper layers are extremely influential to predicting behavioral outcomes from individuals' negative or positive perceptions of tasks and problems.

Recently, many scholars increasingly acknowledge that individuals' hold a seemingly central epistemological belief which belies most of their other beliefs and

may influence with singular uniformity individuals' personal and professional domains, such as perceptions of school environments and job satisfaction (Day & Kington, 2008; Fenstermacher & Richardson, 2005; Luft & Roehrig, 2007). However, the existing literature suggests it is not easy for individuals to personally access their central belief system and requires a meta-metacognitive awareness in order to recognize the epistemological belief and entails much intensive personal reflection to do so (Brownlee, Purdie, & Boulton-Lewis, 2001; Pajares, 1992; Tsai, 2006). Therefore, given the complexity of reflective practice or the time needed for reflective practice, researchers suggest many individuals may not understand the nature of their central belief or the impact of that belief on their perceptions of dissatisfaction when workplace conditions operate inharmoniously with their centrally held belief tenet (Brownlee, Purdie, & Boulton-Lewis, 2001; Day & Kington, 2008; Pajares, 1992; Schraw & Olafson, 2002). However, most educational researchers generally accept that teachers' deep rooted epistemological belief systems seem to be readily visible in attitudes, behaviors and teaching practices (Luft & Roehrig, 2007; Schraw & Olafson, 2002, Tsai, 2006).

Researchers suggest all teachers possess an array of skills, behaviors, and attitudes which are shaped by their central epistemological belief that affects with varying degrees their levels of perceived satisfaction and commitment to teaching (Fenstermacher & Richardson, 2005; Luft & Roehrig, 2007; Schraw & Olafson, 2002). Such findings may have implications for possibly reducing teacher turnover,

but without a doubt epistemological beliefs impact teaching and learning. With this in mind, several of the most prominent and influential conceptions of epistemological belief systems about knowledge are presented.

Epistemological underpinnings of teachers' cognitive orientations. According to educational researchers, recent teacher epistemological belief systems of realism, contextualism, and relativism, as defined in Chapter One, can be traced back to and developed from several seminal epistemological works. According to researchers, many of the early developmental epistemological theoretical models may have differed in their research foci, but many resulted in similar findings consisting of epistemological belief strands ranging from naïve to sophisticated, which are clarified in the following notable epistemological studies (Brownlee, Purdie, & Boulton-Lewis, 2001; Clandinin & Connelly, 2000; Kang & Wallace, 2004; Schraw & Olafson, 2002). For example, Hofer and Pintrich (1997) indicate "a growing area of interest for psychologists and educators is that of personal epistemological development and epistemological beliefs: how individuals come to know, the theories and beliefs they hold about knowing, and the manner in which such epistemological premises are part of and an influence on the cognitive processes of thinking and reasoning" (p. 88).

Epistemic research began with the groundbreaking work of William Perry, the foundation of what we know today in educational epistemic research, in his 1970 investigative study of Harvard male college students' abilities to change from simple

forms of reasoning and learning to much more complex forms of learning and reasoning. One reason for focusing on Perry's dimensions is that they are components of all of the major educational epistemological belief models (Hofer & Pintrich, 1997; Baxter Magolda, 2004; Schraw & Olafson, 2002).

In his study, Perry designed a method to determine an individual's beliefs about the nature of knowing by collecting data of individuals' responses of perceptions regarding how perceived knowledge is received and with what degree of certainty and acceptance by individuals. Perry's results noted that Harvard male college students harbored three overall epistemological positions, which he categorized as "dualism, multiplism, and relativism", categories which today have changed in educational epistemological studies to become known as realism, contextualism (i.e., constructivism), and relativism.

Perry's knowledge groups began with individuals that believed knowledge existed as right or wrong and that this knowledge could be received by an individual from an external locus, such as an expert. This belief of dualism was deemed naïve because of an individual's apparent lack of any personal reflection or flexibility of thought as determinants to the possible veracity of truths, posited as certain and absolute, from outside authorities. Educational scholars categorize this belief as realism with teacher behaviors of teacher–centered pedagogical instruction evidenced by mostly direct instruction to passive students. The next category of multiplism is equivalent to today's category of contextualism. In this fundamental belief system

individuals accept some absolute truths, but with a caveat that many things can not be known for certain. When approaching a learning task, these individuals seem to possess more personal flexibility in reasoning. In schools, contextualist teachers' pedagogical behaviors are mostly student- centered with much less focus on direct instruction (Schraw & Olafson, 2002). Perry's final group or relativism found the students preferred to accept only the knowledge which they generated. In schools today relativistic instruction would appear exclusively as self-instruction by students through activities such as portfolios. Due to the independent nature of study, relativistic pedagogical instruction is not readily found in most public education systems (Luft & Roehrig, 2007).

Perry concluded that individuals' holding beliefs of multiplism seemed more flexible in their thinking and maintained higher satisfaction levels as his study's boundaries and challenges became more ill-defined than those holding the naive beliefs of dualism. Therefore, epistemic researchers have suggested teachers' holding contextualistic beliefs may be more likely to manage conflict in their work environments which may otherwise lead to lead to disappointment and disillusionment resulting in a loss of satisfaction (Ladd, 2011).

A subsequent epistemological study of women's intellectual development by Belenky et al. (1986) was based on Perry's constructive developmental theoretical framework of knowledge. The study's findings were similar to Perry's conclusion that most epistemological perspectives ranged from naive to sophisticated. However,

Belenky et al.'s study emphasized received knowledge from expert authorities is characterized as "listening to the voices of others" (p.33) as opposed to "listening to the inner voice" (p.52) which according to the researchers signified the more sophisticated way of reasoning. Also, apart from Perry's findings that individuals seem to prefer an advancement to a more sophisticated way of thinking, Belenky et al. found some individuals at certain points in their careers appear to prefer the naïve epistemological stance; to be guided by received expert knowledge instead of reflecting on their personal and professional experiences, especially if the naive stance aligned with the individuals' perceived culture of the workplace.

Teachers' Epistemological Belief Implications. Since Perry's and Belenky et al.'s work, several decades have passed and epistemological belief researchers continue to note beliefs generally fall into three overarching belief philosophy categories of thinking about the nature of teaching and learning; the realist, contextualist, and relativist (Brownlee, Purdie, & Boulton-Lewis, 2001; Kang & Wallace, 2004; Loft & Roehrig, 2007; Schraw & Olafson, 2002). Scholars note these three epistemological belief systems are often revealed in the words and metaphors teachers' use to describe their roles in the classroom (Fenstermacher & Richardson, 2005; Tobin, 1993; Tsai, 2006). Researchers frequently found that almost all science teachers were generally in agreement with the contextualist view of valuing student-centered pedagogical practices as suggested by the national science standards of NRC (2008). However, notwithstanding teachers' reported deference to the epistemological

view of student- teacher centered or contextualist view, Luft and Roehrig (2007) noted many science teachers used teacher-centered approaches (i.e., realist view). In addition, other researchers found more often than not beginning science teachers almost exclusively exhibited teacher-centered practices (Luft & Roehrig, 2007; Richardson & Simmons, 1997; Schraw & Olafson 2002). Scholars suggested this apparent belief system paradox may possibly reflect workplace scenarios where teacher belief systems are perceived not to be in alignment with the school's climate conditions. Day and Kington (2008) suggest the resultant teachers' behaviors, contrary to their fundamental beliefs, may be elected in order to survive school workplace conditions and classroom pressures. Researchers note conflicts between fundamental beliefs and workplace conditions can lead to disappointment, disillusionment, and a loss of perceived job satisfaction (Fuller & Brown, 1975; Fenstermacher, 2005; Kang & Wallace, 2004; Rosenholtz & Simpson, 1990). An example of these inconsistencies were found in a study called the Salish I (1997) project, which was composed of a broad stratum of eight educational think tanks and university researchers. It was formed to conduct an investigative study of the rationale behind the discord between the beliefs and practices of teachers, especially new science teachers. The study found that new science teachers oftentimes, enter the profession with contextualist beliefs or possibly even relativist views but more often than not change quickly to the realist view of teacher-centered practices (Brownlee, Purdie, & Boulton-Lewis, 2001; Luft & Roehrig, 2007; Simmons et al., 1999).

Furthermore, the study suggested, as did later research studies which followed the Salish project, that this change may be attributable to the challenges of school workplace conditions (Day & Kington, 2008; Ingersoll & Perda, 2011). Scholars believe the disconnect resulted many times in the loss of perceived job satisfaction and commitment (Day & Kington, 2008; Tobias & Baffert, 2009).

Environmental Workplace Conditions –Epistemological Fit

The research on person to environmental fit has been linked to a number of affective outcomes for biology tea**c**hers, such as perceptions of job satisfaction, commitment, and retention, specifically through the mediating affects of the reciprocal interactions between the epistemological beliefs of teachers and workplace conditions (Dinham, 1995; Kristof-Brown et al., 2005). Furthermore, organizational climate theorists note that organizations, like schools, may have a collective overall philosophical context or culture which appears to influence each schools' respective workplace conditions similar to the centrality of teachers' epistemological belief systems (Schneider, 1985; Shraw & Olafson, 2002). Thus, according to Day and Kington (2008) two outcomes may be expected when a school's culture is aligned with the epistemological belief system of the teacher. First, the school as well as the teacher would experience relatively less tensions and conflicts. Second, less tensions and conflicts would be reasonably expected to be positively associated with higher levels of perceived satisfaction and commitment. For instance, Bang et al. (2007) stated "when considering the teachers' beliefs and practices the most positive experiences were those where there was a level of match between the teachers'

beliefs and the school setting (p. 258)". However, as noted earlier in this study, researchers are generally in agreement that either epistemological beliefs or workplace conditions can be altered to accommodate levels of perceived job satisfaction, specifically through strategic workplace interventions (Day & Kington, 2008; Fenstermacher & Richardson, 2005; Ingersoll, & Perda, 2011). For example, in much educational literature, it is recognized that some teachers may do well in highly structured environments with explicit standards and accountability measures, while others have teaching beliefs that flourish in more flexible environments (Brownlee, Purdie, & Boulton-Lewis, 2001; Day & Kington, 2008). It is reasonable to assume that perceptions of job satisfaction will be influenced more or less, depending on how closely teachers' practice, knowledge, and beliefs align with or deviate from the accountability climate of the school (Cohen & Ball, 1990). Thus, teachers may find themselves perceiving levels of satisfaction or dissatisfaction depending on the level of effort necessary to manage contradictions, tensions and conflicts within and between the dimensions of workplace conditions and their belief system.

Even more, the beliefs of biology teachers may be challenged in the current high-stakes accountability climate as policies seek adherence and compliance by teachers to a technical realist perspective of the transmission of knowledge and reliance on outside authorities. This is in stark contrast to the NRC (2008) recommended contextualist views of promoting science teaching through student centered inquiry approaches to instruction. In addition, it is contrary to many biology teachers' espoused contextualist views of the nature of good and effective teaching (Luft & Roehrig, 2007; Sahlberg, 2010). Therefore, when science teachers attempt to

negotiate between prescriptive accountability workplace conditions and their epistemic beliefs along with attempts to incorporate the national science standards' requirements, the inconsistencies, tensions, and contradictions in teaching approaches might bewilder teachers, eventually eroding their perceived levels satisfaction (Sahlberg, 2010; Wriqi, 2008).

On the other hand, scholars suggest science teachers' perceptions of satisfaction and commitment may be sustained, even with a misalignment between teachers' beliefs and workplace conditions, by the ways and extent to which workplace conditions can be altered to facilitate how school expectations such as accountability reforms are received, adopted, adapted, and sustained by teachers (Brownlee, Purdie, & Boulton-Lewis, 2001; Day & Kington, 2008). Caprara et al. (2006) emphasized whether the job setting is in business or education, an examination of the person-environmental fit relationship holds great implications for perceptions of organizational job satisfaction and commitment.

Summary

Literature on teachers' perceptions of job satisfaction reflects the complex nature of defining perceived job satisfaction in the school workplace. This study is prompted for the need to understand biology teachers' perceptions of job satisfaction for there are many costs associated with their loss of perceived job satisfaction, such as teacher leaving or negative changes in teachers' behaviors, thereby, impacting schools' effectiveness for student achievement. The extent to which teachers are able

to and are supported in managing the challenges of their workplace experiences may determine their sense of satisfaction and in turn their retention.

The existing literature frequently suggests four salient factors/conditions impacting teachers' perceptions of satisfaction; administrative support, student discipline, collegiality, and accountability. In addition, researchers noted that teachers' resultant perceptions of satisfaction may be generated as these workplace conditions are filtered through three predominant epistemological belief lenses of realism, contextualism, and relativism. Organizational researchers such as Kristof-Brown et al. (2005) have theorized that these reciprocal interactions can be conceptualized and operationalized through a person–environmental fit model which can illustrate the mediating affects of personality characteristics and environmental characteristics on job outcomes such as perceptions of satisfaction and turnover.

Literature suggests the associative role between workplace conditions and teachers' epistemological beliefs of the nature of teaching and learning influence teachers' abilities to sustain perceived levels of satisfaction and retention. Some studies found psychological intrinsic turmoil is created when school workplace conditions are misaligned with teacher beliefs of the nature of good teaching and learning. This misalignment appears to be frequently correlated to a loss of teachers' perceived job satisfaction. There appears to be a need for further study into the nature of this misalignment. For example, many of the empirical studies reviewed suggest many science teachers seem to enter the profession with an altruistic student-centered epistemic belief system. Yet a body of research exists which suggests that many

science teachers in their first years of teaching use teacher-centered pedagogy. In addition, some veterans exhibit this type of pedagogy as well. Researchers suggest these paradoxical behaviors may point to changed levels of perceived satisfaction in teachers as they negotiate workplace conditions. With the troubling aspects of biology teacher shortfalls there is a pertinent need to examine the nature of these negotiations.

Chapter 3: Methodology

Overview

This study seeks to explore teachers' perceived constructs of perceived satisfaction or dissatisfaction resulting from the interactions between biology teachers' epistemological beliefs and their workplace conditions. As discussed in Chapter Two, according to researchers like Day and Kington (2008) contend these beliefs filter workplace conditions and frequently the outcomes of the alignment or misalignment of these beliefs with workplace conditions seem to affect teacher perceptions of satisfaction and commitment. In order to better understand the process by which biology teachers develop these perceptions of satisfaction and commitment, recent as well as historical research studies were explored. These research studies often noted that an inquiry research process which allowed teachers to describe and elaborate on their teaching experiences appeared to be a fruitful method for researchers to gain a rich understanding of the studied phenomena (Fenstermacher, 1978; Munby, 1984; Luft & Roehrig, 2007).

To that end, among the historical empirical evidences, the Harre and Second (1972) study is particularly relevant, in which the researchers noted that "the things that people say about themselves and other people should be taken seriously as reports of data relevant to phenomena that really exist and which are relevant to the explanation of behavior" (p.7). In addition, recent research findings also suggest that interpretations of relationships posited by teachers in their own words offer insights into the construction of their professional status (Luft & Roehrig, 2007; Simmons et

al., 1999). Likewise, organizational scholars suggest that workers' in their own words may provide insights into the construction of their perceptions, behavior and attitudes of the job setting, such as perceptions of job satisfaction (Kristof-Brown et al. 2005; Sahlberg, 2010).

Indeed, several researchers suggest the developmental process of teachers' perceptions of satisfaction may be portrayed vividly through qualitative means which allow teachers to describe and elaborate on their teaching experiences in their contextual settings (Fenstermacher, 1979; Maxwell, 1996; Munby, 1984; Luft & Roehrig, 2007). In addition, Tschannen-Moren,Woolfolk, and Hoy (1998) noted mental phenomena, such as teacher beliefs, have been regularly evaluated by quantitative analyses of questionnaires and psychological inventories, but suggested there is a need for researchers to explore teachers' lived experiences and the meanings generated therein that influence teachers' beliefs through a qualitative approach. Thus, since this researcher intends to present a detailed description of how teacher's perceptions of satisfaction is developed through the responses by teachers to semi-structured interview questions using teachers' language—teachers' own voices, this study lends itself to an examination of biology teachers' perceived satisfaction through a qualitative research design.

In this chapter, the qualitative methodology is described along with the research design approach that will be used to conduct this study. Topics covered include descriptions of the qualitative methodology, the multiple-case study design, and a rationale for choosing these approaches for this study. This is followed by an

account of the research sample, data collection, data analysis, and integrity of the research.

The following section provides a deeper explanation regarding the researcher's selection of the qualitative methodology along with the elected research design of multiple case studies to answer the research questions.

Qualitative Multiple Case Study Design Rationale

Creswell (1998) states qualitative research is "an inquiry process of understanding based on distinct methodological traditions of inquiry that explore a social or human problem. The researcher builds a complex, holistic picture, analyzes words, reports detailed views of informants, and conducts the study in a natural setting" (p. 15). For several reasons, Creswell's qualitative inquiry descriptions would appear to be appropriate for answering this study's research questions; (1) How does the interplay between administrative support, student discipline, collegiality, and accountability with biology teacher epistemological beliefs impact perceptions of satisfaction (2) How are perceived levels of satisfaction related to coherence or a lack of coherence between beliefs and the culture. First, qualitative inquiry can be used to build a holistic view of biology teachers' perceptions of job satisfaction in their school environments. Second, the qualitative approach of analyzing words would allow this researcher to present a detailed description of how biology teachers' perceived satisfaction is developed by using teachers' language—teachers' own voices regarding their perceptions of satisfaction resulting from the reciprocal interplay between workplace conditions and their epistemological belief systems (Merriam, 1998; Yin, 2003). Third, this study's semi-structured-interview questions

guided by the conceptual framework, as illustrated in Chapter One, are designed to elicit teacher views of satisfaction. Finally, qualitative inquiry would take into account the teachers' natural context (i.e., school environment, epistemological beliefs, perceptions, and behavior).

Within qualitative methodology there are specific types of research designs (e.g. ethnography, grounded theory, case study) each with a distinct focus and interpretive framework. Merriam (1998) noted that one of the predominant strengths of a case study design is the use of its thick rich description of a phenomena in a natural setting thus allowing for an "in-depth understanding of the situation and meaning" (p.19). Therefore, the case study is a qualitative interpretive paradigm that would facilitate this researcher's assessment of biology teachers' perceptions of satisfaction from their interactions within their environments expressed through their own words.

Furthermore, a specific type of case study, the multiple case study, allows for a comparison of cases. For example, Yin (2003) states how a multiple case study can be used to either, "(a) predict[s] similar results (a literal replication) or (b) predict[s] contrasting results but for predictable reasons (a theoretical replication)" (p. 47). Thus, for the purpose of investigating the reciprocal relationship between teachers' epistemological beliefs and workplace conditions mediating roles on biology teachers' perceptions of satisfaction, this researcher will use a multiple case study for the possible ability to predict the epistemological differences between the biology teachers which may have varying impacts on their perceived satisfaction levels. Like the case study, the multiple case study not only provides a rich interpretive

framework for the study's research purpose, but in addition, the multiple case study allows comparisons between the cases of data generated in order to support or modify this study's theory of perceived satisfaction. For example Stake (1998) characterizes this as instrumental:

> In what we may call *instrumental case study*, a particular case is examined to provide insight into an issue or refinement of theory. . . researchers may study a number of cases jointly in order to inquire into the phenomenon, population, or general condition (p. 88).

As mentioned above, the case or multiple case design attributes consist of rich descriptions of the phenomena, occur in natural settings, and allow for case comparisons. In addition, several researchers note case studies can be distinguished from other forms of qualitative research by their focus on a single unit or bounded system (Merriam,1998; Yin, 2003). Miles and Huberman (1994) define a case as "a phenomenon of some sort occurring in a bounded context" (p. 25). They describe a bounded case as a circle with a heart in the center. The heart represents the focus of the study and the circle defines the boundary area. Describing a case in this way, the researchers found the heart would clearly define the starting point for the research undertaking and the circle would prevent the research from becoming too broad and furthermore, would keep the study controllable by limiting the scope and length of the study.

In this multiple case study, the heart of the circle is the teacher, which is the unit of analysis for this study. The study will focus on four biology teachers with two to three years of experience. The boundary consists of selected high school settings wherein the biology teachers' epistemological belief systems, either of realism,

contextualism, or relativism, might possibly interact with the four workplace conditions to impact their perceived outcomes of job satisfaction.

The approaches used for sampling, data collection, and data analysis are guided by the goal to generate in-depth descriptions and understandings of teachers' perceptions of satisfaction. Therefore, it is better to select a few entities for in-depth study rather than a large number that would be studied only superficially (Merriam, 1998; Stake, 1994).

Research Sample

In this multiple case study, the school sample will be purposefully selected to represent a variety of teaching experiences in an attempt to maximize what could be learned to answer the research questions. This study specifically targets secondary biology teachers with two to three years of experience because of this group's purported attrition and mobility out of the education profession. Biology was chosen because of the unique teaching demands, expectations, and tensions that the literature has implicated could be reasonably assumed to accompany biology science teaching. For instance, researchers found when accountability assessments and school climate factors foster positivist, traditional teaching paradigms that are not in alignment with the national science standards' recommended contextualist paradigm of science through hands-on inquiry pedagogy, or are incongruent with the epistemological beliefs held by teachers, some biology teachers were noted as experiencing turmoil and frustration when choosing to implement their perceived effective routes leading to successful biology teaching and student learning (Day & Kington, 2008; Luft & Roehrig, 2007).

The biology teachers selected will work in a well-resourced school district in the suburbs of a major metropolitan area in the Mid-Atlantic region. This district serves as a model context for this sort of investigation for several reasons. First, the district's ability to provide adequate facilities and resources to the sciences would tend to eliminate possible perceptions of dissatisfaction from the demoralizing aspect of teaching without them. Second, for over at least a decade of reform, the district and state have established much uniformity by aligning and standardizing expectations for schools, teachers, and students in the biological sciences through curriculum rewrites and the utilization of similar high-stakes biology tests by the district and the state for student graduation requirements. Lastly, in order to pass the test there is an underlying assumption that enduring educational policy improvement initiatives would shape similar teacher practices with regard to curriculum delivery and test preparation methods.

Patton (1990) suggested the sample of participants should be selected explicitly to encompass instances in which the phenomena under study are likely to be found. For this study, the phenomenon is biology teachers' perceptions of satisfaction. Educational organizational researchers have found that teachers' satisfaction outcomes are correlated to the interactions between teacher epistemological beliefs and workplace conditions. Moreover, researchers note that frequently tensions exist within these interactions and if these tensions are not managed often lead to perceptions of dissatisfaction and a loss of commitment (Day & Kington, 2008; Ingersoll & Perda, 2011; Ladd, 2011).

Accordingly, ten high school sites that have high rates of student performances on annual state and high school assessments along with low overall turnover rates were selected. This information was available through the school system's published reports. However, the researcher noted five of the ten high schools reported slight variations in the percentages of teachers with less than five years experience than the other five high schools with similar characteristics. The researcher purposely selected the five high schools with the reported slight variations which seemed to this researcher might reasonably suggest some mobility in their staffing, possibly the sciences. This researcher hypothesized the variations might prove more fruitful in the search for biology teachers with two to three years of teaching experience. Therefore, in order to maximize the richness of the data to be collected, this researcher contacted the five high schools with high state and district biology pass rates for the last three years as well as reflecting slight variations in the percentages of teachers with less than five years experience. This study specifically targets secondary biology teachers because of this group's purported attrition and mobility out of the education profession. In addition, researchers indicate a large number of the nation's biology teachers' leave the profession in their first three years of teaching because of a perceived loss of satisfaction.

To gain access to the district's high schools, the researcher met with the district's research office contact who agreed to the value of this study's possible findings which may have merit toward the hiring and retention practices at the district level as well as at the school level. This researcher gained access to the biology teachers of the five high schools through the science specialists' identification of

biology teachers with two to three years of experience. Invitation letters (see Appendix A) were sent to the seven candidates identified to solicit participation in an interview regarding their views on school climate and instructional approaches in the classroom. Of the seven biology teachers contacted, four agreed to participate. Thus, the sample size for this study was comprised of three biology teachers with three years of experience and one teacher with two years of experience from four different high schools. Table 1 provides a brief overview of the four participants.

Table 1

Attributes of Teachers

Person	Age	Gender	Year in Teaching	Undergrad Science Educ.	Level of Educ.	Non-Teaching Exp.	Cert. Route
Eban	24-29	Male	4th	Yes	M.S.	No	Trad.
Griffin	30-35	Male	4th	No	M.S.	Yes	Alt.
Josie	41-46	Female	4th	No	PhD.	Yes	Alt.
Sara	24-29	Female	3rd	No	M.S.	No	Alt.

Data Collection

In general, qualitative case study research requires the use of multiple data sources (Creswell, 1997; Yin, 2003). In order to maximize an understanding of the process by which biology teachers develop perceptions of satisfaction and commitment resulting from the relationship between epistemological beliefs and workplace conditions, data will be collected from semi-structured interviews.

First, the initial point of contact with the selected teachers was a demographic interview which served to build a rapport with the researcher (Appendix B). Glesne (2006) suggests establishing relationships with participants in order for participants to become more comfortable and therefore, more willing to share information that is of interest to the researcher. Also, the demographic interview provided this researcher with valuable background information of the participants.

Semi-Structured Interview. The biology teachers were interviewed individually by the researcher using a semi-structured interview protocol developed by educational researchers, Julie A. Luft and Gillian H. Roehrig in 2007, targeting biology teachers' beliefs and practices. Emerging themes from the responses of the teachers were used for further probing during the teachers' semi-structured interview (Krathwohl, 1998).

The seven questions in the Teacher Belief Interview (TBI) (see Appendix C) for exact questions) were developed by Luft and Roehrig (2007). The semi-guided interview questions are designed to allow teachers to thoroughly discuss belief conceptualizations of their epistemological beliefs and their interactions with workplace conditions. For credibility, the TBI was created through intensive research and expert belief consults in "an iterative process of revision and reflection" (Luft & Roehrig, 2007, p.42) to explore the underlying epistemological beliefs, specifically, of biology teachers and to understand how teaching experiences impacted those beliefs.

According to researchers, semi-structured interviews provide consistency across multiple interviews, yet allow for the addition of follow-up questions and

address unanticipated topics that may be relevant to the study (Merriam, 1998). Also, Patton (2002) suggests the semi-guided interview method sets boundaries for the interview thereby facilitating a shorter duration for the interview. Additional advantages of the guided semi-structured interview include: establishment of a repeatable method for questioning, directs the interview to utilize time efficiently, and provides a framework for analysis of the responses (Patton, 2002).

Therefore, guided by the semi-structured questions, the researcher followed up the questions by prompting further elaborations on specific responses offered by the teachers. Leaning toward an open-ended conversation was intentional and permitted emergence of a wide range of teachers' perceptions about workplace climate and satisfaction. The interviews occurred at locations and times convenient for the teachers. The expected length of each interview was estimated to be at approximately forty minutes to one hour; the actual times lasted about 45 minutes. All interviews were audio recorded and transcribed for data analysis, as explained in the next section.

As recommended by Patton (2002), an immediate post interview review was conducted. After a discussion by telephone of their transcribed responses to the questions, one participant, Griffin, wanted to add to his interview. Likewise, as recommended by Patton (2002), any areas that needed further elaborations were discussed in this immediate post-interview analysis.

Data Analysis.

This study draws from an in-depth interview for each of the four biology teacher participants to capture their epistemological beliefs about the nature of

science teaching and learning and their perceptions of satisfaction about themselves and school-wide influences.

There are three types of coding: descriptive, topic, and analytical. Descriptive coding is often used in quantitative research that involves storing information. Topic coding labels the text in transcripts with subject heading. Analytical coding is the most useful in qualitative research that allows researchers to identify themes, which lead to the emergence of patterns and possibly more themes (Richards, 2009). In this study the researcher utilized analytical coding to establish a coding strategy that reflected the conceptual framework and research questions, but, in addition, allowed for the incorporation of any unanticipated responses.

The data collected was transcribed and in turn uploaded into NVivo 10, a computer assisted qualitative data analysis program for organizing, coding and analysis of qualitative data collected on this study's four teacher cases. First, an inductive approach to data analysis was used that is consistent with a cross-case comparative method (Strauss & Corbin, 1990) wherein data were collected and preliminarily analyzed in stages to reveal themes and patterns in open auto coding by NVivo10. During this process the major concepts, themes, or categories present within each question are identified using codes based on words frequently used by the participants. The open coding was used to identify any new emergent school-based themes which might have influenced teacher perceptions of satisfaction. The results were compared to the coding nodes developed from the conceptual framework's research-based workplace conditions. Second, the researcher relied upon Luft and Roehrig's (2007) coding maps (see index) developed for each of the seven TBI

questions to identify teacher belief systems regarding the nature of teaching and learning. Though, this researcher modified Luft and Roehrig's teacher-centered/ traditional-instructive and student centered/ responsive-reform based categories on the coding maps to correspond with this study's epistemic terms of realism/teacher-centered, contextualism/student-teacher centered. However, as discussed and defined in Chapter One, relativisim/student- centered teaching and learning (i.e., no curriculum, portfolio-generated learning) is usually absent from the public school setting. This researcher relied upon the descriptions of teacher behaviors and evidences of student learning from the study of Schraw and Olafson (2002).

Gall, Gall and Borg (2003) suggest one approach to facilitate data analysis for a researcher is to code and categorize based on or adapted from other researchers' studies. Thus, for this study the thematic categories heavily relied upon the coding maps from Luft and Roehrig 's (2007) TBI. Since the interview questions are very specific to each epistemological belief dimension, teachers' qualitative responses can be categorized quite effectively in this way using codes that reflect the three epistemological beliefs categories; realism, contextualism, and relativism.

Also, a peer review by two fellow doctoral students led to discussions about alternative coding theme possibilities which in turn provided this researcher an opportunity to view participant responses in different ways. In addition, the discussions frequently supported this researcher's coding conceptualization, such as the use of child nodes for research-based parent nodes of workplace conditions of administrative support, student discipline, collegiality, and accountability. For instance, a child node was created by this researcher for participants' comments on

school resources rather than a separate parent node. Based on this study's literature review, several scholars suggested school resources would seem to fall under the purview of the administrator.

From the data analyzed, case summaries were developed for each teacher. Then a cross case comparison was completed from the node matrix developed to present and compare the data responses of participants' epistemological belief systems expressing realism, contextualism, or relativism and their impact on teachers' perceptive views of the four workplace conditions and resultant perceived levels of satisfaction.

Integrity of the Research

This researcher employed several strategies to establish the trustworthiness of this research (Lincoln & Guba, 1985). According to Merriam (2002) researchers strengthen a study's trustworthiness or validity by accumulating substantial evidence and producing a "thick rich description" (p.29) of the results. For this study, semi-structured interview questions provided information rich cases by using the original language and wording of participant statements taken directly from audio recordings throughout the transcription, coding, and analysis of data. Also, member checking with participants helped increase the trustworthiness of this study's assertions. For example Stake (1995) states that participants should "play a major role in directing as well as acting in case study" (p. 115). In order to utilize member checking in this study, the researcher contacted participants by telephone to clear up any misconceptions in a post-interview analysis and provided each participant with a copy of the interview transcripts in order for participants to check for accuracy of their

statements. In addition, the researcher shared the findings of the data collection and analysis with participants for their input and corroboration.

Ethical Considerations

Glesne (2006) suggests just as a researcher provides a rationale for the purpose of a study and its potential contribution to an academic field, he or she must also consider the ethical ramifications of conducting an investigation. The primary concern is that involvement in a study should not result in any harm to the participants (Glesne, 2006). In this study, each participant was given a consent form and letter that outlines the purpose and parameters of the research and explains that participation is voluntary and withdrawal at any time is acceptable without any repercussions (see Appendix B). Confidentiality was guaranteed; pseudonyms were used for the district, school and participants. Information about any participant will not be shared with others.

Researcher's Background

Creswell (1985) stated that "clarifying researcher bias from the outset of the study is important so that the reader understands the researcher's position and any biases or assumptions that impact the inquiry (p. 202). Therefore, I include my story which indicates the research lens through which I conducted this research.

As a high school biology teacher, I have come to agree with the consistent educational research findings indicating that what the teacher does in the classroom is the most important element in determining whether children succeed. At the same time, as a veteran teacher of eighteen years, I have come to recognize two factors

which undergird and significantly shape that teacher behavior; trumping even the most prestigious of degrees--- teacher beliefs and workplace conditions.

This understanding evolved from an observational multi-faceted lens constructed at the high school level through experiences honed from varying roles served in the school science department, specifically as a biology teacher, science staff developer, mentor, biology team leader, and resource teacher. Each of these roles often required adjustments between the climate of the school and my epistemological belief of the nature of teaching and learning. I had the knowledge and experience to make those adjustments. But I did come to realize each workplace condition has the ability either to stabilize or destabilize an environment for effective teaching through challenging teacher beliefs. Moreover, I found the likely outcome of any destabilization which occurred seemed largely attributable to the inability to reconcile the beliefs teachers' held about effective teaching and learning to workplace conditions. The more disparate this gap appeared the more likely frustration levels seemed to increase resulting in perceived high levels of dissatisfaction and some teachers subsequently exiting or transferring from our school.

Without a doubt I experienced within myself and others that workplace conditional turmoil intensified when the added lever of NCLB accountability reached the school level. Frequently, in my roles as a teacher, a mentor or staff developer, I found increasing amounts of stress in veteran teachers as they struggled to reconcile conflicting curriculum practices and beliefs in relation to the demands of workplace conditions, especially those of accountability. But, more problematic was the amount of stress found in new biology teachers. Several of the teachers were drawn from

alternative programs of teacher certification offered by local universities. However, many had very little clinical training.

In my capacity as either the mentor or staff developer as I worked with these teachers I noted that workplace conditions singularly appeared to impact their teacher perceived satisfaction levels more than those trained in four year university science educational programs. I also discovered several were in need of large amounts of support and advice as they wrestled to become accustomed to the contextual climate of the schools---administration, student discipline, collegiality, and accountability. Teaching role overload and expectation dissonance raised challenges to their beliefs and resultant teaching behavior as they attempted to develop and implement strategies to solve issues and reconcile their teaching belief to the workplace. The negative emanations were at times a mixture of withdrawal or strident demands. I did find these behaviors appeared associated with tensions and turmoil when the teachers expressed perceptions of dissatisfaction with certain conditions of the school environment. However I, also, came to recognize that active and continuous communication and collaboration among the teachers seemed to ameliorate much of that tension.

This study began as an examination of workplace conditions relating to teacher turnover. I was curious about the underlying cause or causes that led to teacher perceptions of dissatisfaction or satisfaction. Some questions arose about the black box that existed between workplace conditions' constraints on teacher's perceptions of satisfaction. What changes in teacher belief systems and/or teacher behavior are caused by these constraints and challenges of workplace conditions?

What kinds of interventions might be necessary to bring teacher beliefs/actions into alignment with school vision/mission?

Many educational research studies have acknowledged that to list workplace conditions is not enough to understand the climate at a school. My study will seek to add to the current research literature which seeks to understand science teachers' perceptions of satisfaction, especially biology teachers by examining the interplay of teacher- held beliefs about the nature of teaching and learning and school workplace conditions.

In the next chapter the study's findings are presented.

Chapter 4: Findings

This chapter presents the results and data analysis for the study. The data presented below is guided by the seven questions of the TBI. These questions targeted the teachers' epistemological belief systems regarding the nature of teaching and learning generated opportunities for follow up questioning. Table 2 outlines the four TBI questions targeting the teachers' epistemological beliefs about the nature of teaching and the three TBI questions about the nature of student learning.

Table 2

TBI Questions Separated by Beliefs on Teaching and Beliefs on Learning

Beliefs about Teaching	Beliefs about Learning
1.) How do you maximize student learning in your classroom?	3.) How do you know when your students understand?
2.) How do you describe your role as a teacher?	6.) How do your students learn science best?
4.) In the public school setting, how do you decide what to teach or what not to teach?	7.) How do you know when learning is occurring in your classroom?
5.) How do you decide when to move on to a new topic in your class?	

This chapter includes a general comparison of the teachers' schools and their background as biology teachers. These descriptions are followed by an analysis of the findings. The remaining part of the chapter is dedicated to presenting themes that emerged from the cross-case data analysis of the teachers. The cross-case analysis was used to intensify the researcher's understanding of the biology teachers' perspectives of satisfaction and to address the study's two research questions; (1)

How does the interplay between administrative support, student discipline, collegiality, and accountability with biology teacher epistemological beliefs impact perceptions of satisfaction (2) How are perceived levels of satisfaction related to coherence or a lack of coherence between beliefs and the culture.

Characteristics of Schools

Table 3
Profile of High School Characteristics

High Schools	Chester	Upton	Clearwater	Black Rock
Total Student Pop.	1,935	2,124	2092	2.237
% Ethnicity of Student Populations				
White	48.5	51.2	53.8	49.6
Hispanic	15.9	17.2	18.7	16.4
Black	15.4	13.8	12.3	15.2
Asian	13.2	12.6	11.3	13.5
Other	7.0	5.2	4.2	5.3
% of Farms	<5	<5	<5	<5
National SAT Average 1498	1816	1826	1827	1837
State Biology Performance Pass Rates	>95	>95	>95	>95
Turnover Rates*	<11	<13	<14	<12

*Turnover less than 16% in 0-5 years experience are stable (NSB, 2012)

The four high schools selected for the sample share five similar characteristic shown in table 3: (1) school size, (2) diverse student bodies, (3) high socio-economic standing, (4) high student performance on standardized tests, and (5) low turnover. The schools have populations that are diverse, but possess a predominantly larger

white population. The schools have small percentages of students in the free and reduced meal program (i.e., relatively high socioeconomic level). State biology test pass rates are high and average SAT scores are above the national levels. The schools have low turnover and fairly similar proportions of teachers possessing 0-5 years of experience.

High School Teachers' Background

A data display (Table1) in Chapter Three was used to present the profiles of the four teachers. Overall, the comparison of the teachers' characteristics was similar to the purported general high school science teaching population (Tobias & Baffert 2009). Research suggests that at the secondary high school level, most teachers hold advanced degrees (NSB, 2008). Similar findings were reflected with the participants of this study. All four teachers hold masters degrees in the field of education. One participant has a doctorate in biology. Despite this similarity, two attributes: previous work experience and type of certification differed between this sample and the general science teaching population. As discussed in the literature review, most of the teachers entered the teaching profession with undergraduate degrees in science education and little, if any, professional work experiences. In contrast, three of the four biology teachers interviewed for this study entered teaching via the alternative-certification route. For example, Griffin and Josie were mid-career professionals in non-teaching careers with undergraduate degrees in biology. Sarah was recruited after graduating with a degree in biology by a teacher program. Eban was the only teacher that held a science education undergraduate degree with a major in biology. The differences in teachers' employment background and the manner in which teachers

entered the field are useful to note because they may have underlying implications for the teachers to possibly sustain or erode their perceptions of satisfaction and commitment to the profession. Researchers suggest there is a 60% attrition rate (i.e., loss of satisfaction/commitment) for alternatively certified teachers (Darling-Hammond, 2007). However, traditionally certified teachers are experiencing large turnover rates as well (Ingersoll & Perda, 2006). Educational organizational researchers posit a pattern that many teachers appear satisfied with the career of teaching, but later these perceived satisfaction levels seem to decrease over the course of their teaching career (Ingersoll & Perda, 2006).

The following section, will include teachers' brief explanation why they chose the teaching field, their epistemological beliefs about the nature of teaching, and learning, the connections between beliefs and participants' positive and negative views of workplace conditions, and the overall perceptions of satisfaction for each participant through analysis of a cross case matrix.

The Cases

Case 1: Eban. Eban is in his fourth year of teaching biology at the same high school. He expressed why he chose science teaching as an undergraduate degree as well as a career:

> I have been interested in biology all my life. As a camp counselor, I would help the kids make various collections and hold discussions of the wildlife surrounding the camp. I saw teaching as an extension of what I really enjoyed doing and pass that excitement on to others.

Table 4

Profile of Beliefs: Eban

Teacher-Centered ←			→ Student-Centered
Realism	Transitionalism	Contextualism	Relativism
Nature of Teaching			
***	***	*******	0
Nature of Learning			
*	**	****	0

Eban's E*pistemological Beliefs*. Eban's beliefs on the nature of teaching are predominantly contextualistic (i.e., constructivistic). He makes many statements reflecting his use of student – teacher centered instructional strategies (Table 4). When asked about his role as a teacher his response captures his overall view. "I facilitate students learning the material. I package the information that they need to focus on more". This facilitating and packaging concepts for the students is evidenced in the way Eban described his approach for students to conduct a lab investigation. Prior to the start of lab, Eban reviewed content information and the objectives of the lab. He designed a lab with the primary goal of connecting students' knowledge of the observed lab phenomena to real world situations. To achieve this goal he developed strategies to guide his students' thoughts and questions about their observations. Also, Eban's response to the question "How do you maximize student learning in your classroom?" illustrates a consistency in his constructivist approach toward teaching:

> I try to always have lots of varied assignments, with an emphasis on lab investigations for group sharing, teaching of concepts by students for students so that they can practice their understandings of the material on each other.

Eban's epistemic belief of contextualism on the nature of teaching carried through his beliefs on the nature of learning as well (Table 4). Many of his responses were coded as contextualist leaning toward student-teacher centered approaches. Eban's view on learning emphasized that the role of the student was to explain, apply, and connect their learning to new situations. This view was clearly captured in his response to the question "How do you know when learning is occurring in your classroom":

> The students are engaged in understanding the questions; when I hear students explaining the material to other students, when I hear relevant questions that come from their understanding the material.

Table 5

Profile of Positive and Negative Beliefs about Workplace Conditions: Eban

	Administrative Support	Student Discipline	Collegiality	Accountability
Positive	***	0	*	*
Negative	*	*	*	*********

Eban's Emerging Environmental Contextual Influences. Perceptions of workplace conditions emerged throughout the interview (Table 5). However, one in particular came to the forefront when Eban was asked "In the public school setting, how do you decide what to teach or what not to teach". Eban had much to say about the workplace condition of accountability that appeared to govern his curricular decisions. Interestingly, the strong negative attitude Eban expressed regarding

accountability measures at his school seem to emanate from external sources at the district (e.g., district exams, curriculum indicators) and state (e.g., HSA exams, standards) levels. Eban believed the constant state and district revisions of tests and curriculum eroded his efforts to combine key biological concepts with the inquiry instructional plans he had crafted in order to teach for student understanding of those concepts:

> To have everything changed every so often even in the short time I've been teaching and told to replace it with something that I did not develop, and in most ways will be inferior, and will take more time and effort just to incorporate is maddening.

Eban stated accountability measures like "The HSA and the district exams have the greatest influence on what I teach. Everything I do is geared towards students acquiring the knowledge to pass the test." He also indicated the tests impacted how much time he could spend covering required topics. Ironically, after communicating much concern and frustration over accountability's impact throughout the interview, he stated "I personally like the idea of a state exam as I can constantly stress that students need to understand the material to pass the exam." Eban's belief on when to move on was coded as realism (teacher –centered). Although, when Eban was asked about this seeming contradiction to his pedagogical considerations using student feedback, he admitted his statements were sentiments of frustration from his concerns that the assessments narrowed the scope of what he taught and eroded his ability to teach creatively.

For Eban the general source of his perceived dissatisfaction with teaching stemmed from accountability issues. Throughout the interview his negative comments

were noted. Overall, his perceived dissatisfaction is summed up by Eban when he states:

> It would have been wonderful to have competent materials to start with, the district's materials are horrible, to constantly hit the reset button to teach more curriculum based on testing after all my time and effort improving state and district mandated materials is extremely discouraging and counterproductive. I hope the next change [core standards] is not so invasive but since I have worked so much of the material to overlap, and review, preview, and build off of other material, how could it not be?

On the other hand Eban expressed perceptions of satisfaction with his support from administration. He notes the lack of pressure from administration regarding his curricular decisions "I am allowed a degree of leeway with teaching as I am producing good results". He also felt administrators consistently supported his classroom decisions to maximize learning by removing disruptive students. He states "If I need to send a student out, they will accept him so that he has a place to go."

Case 2*: *Griffin. A 4th year teacher has been at his present high school for all of the past three years. Griffin is a career changer. He had worked as a lab technician in the local government's natural resource office. Besides his regular lab routines, he conducted environmental outreach programs for science teachers and their classes. Griffin shares why he chose to enter the teaching profession:

> I found I enjoyed my interactions with the students and teachers. I considered I could be a teacher where I could use my biology knowledge and skills that I had learned on the job to enrich the students' learning. I had been thinking about going back to school to get a masters degree, when I saw this teaching recruitment program offering two things I wanted; teaching and a masters degree. I applied and was enrolled.

Table 6

Profile of Beliefs: Griffin

	Teacher-Centered ⟷			Student-Centered
	Realism	Transitionalism	Contextualism	Relativism
Nature of Teaching				
	****	**	*****	0
Nature of Learning				
	**	*	*****	0

Griffin's Epistemological Beliefs. Griffin's belief responses on the nature of teaching alternated between pedagogical approaches that reflected student-teacher centered beliefs of contextualism and teacher- centered beliefs of realism. When he was asked "How do you see your role as a teacher", he clearly leaned toward the student –teacher centered position of contextualism stating "I'm basically a facilitator. I want to extend their knowledge into everyday life and ask questions that relate to real life experiences".

Indeed many key statements by Griffin point toward a contextualist approach to teaching. For instance, he indicated he preferred hands-on activities and inquiry lab investigations. He also pointed out that he frequently modified his biology lessons by augmenting them with outside supplements from his natural resource workshops. He indicated these materials had been developed explicitly to facilitate pedagogical approaches for student inquiry.

Notwithstanding Griffin's contextualistic approaches to teaching, realism with its teacher-centered approaches figures almost as predominantly in his responses as

the contextualistic ones. This realist pedagogical approach is illustrated in his responses to two TBI questions on the nature of teaching. (Table 6). For the first question, "In the public school setting, how do you decide what to teach and what not to teach?" Griffin reflects:

> Well basically there is a curriculum syllabus that I have to follow from the district and that forms the background to what I'm supposed to teach. I go by the standards, I go by the indicators that are sent down from district.

For the second question, "How do you decide to move on to a new topic in your class?" Griffin's statement once again emphasized reliance on the curriculum:

> The curriculum sets the weeks allocated to each biological topic and there is a small window when these district tests must be given for each of these topics. There is pressure to be in step with the other members of the biology team. Also, the administration makes it clear overall the biology team should be teaching the same thing and getting good test scores.

Subsequently, these responses were coded as realist, teacher-centered. On the other hand, Griffin adds that "although I feel compelled to adhere to the allocated times, I refuse to teach biology as a string of facts to be memorized for a test". Griffin was prompted to explain this in more detail. The situational constraints that seem to pressure Griffin into apparent shifts between his contextualistic teaching behaviors and realistic behaviors are explored in the emerging environmental contextual influences section (Table 6).

Griffin's belief on the nature of learning primarily exhibits a stable contextualist oriented belief system (Table 6). This overall consistency is captured in his response to the TBI question "How do your students learn best". Griffin states:

> I think my use of interactive groupings of students has been the most effective tool for them to develop understandings of the biological concepts. They get interested, excited and start thinking about how these concepts can apply to real-life. What is wonderful to see is that they teach each other. Also, they

> seem to develop a deep understanding. They don't have to memorize facts to learn.

Aligned with Griffin's aforementioned contextualist behaviors he clearly believed student learning was occurring when students asked relevant questions about the topics and even more importantly could make real life connections. Subsequently, when asked "How do you know when learning is occurring in your classroom", Griffin explained:

> I prefer written or verbal explanations that demonstrate an understanding of the problem and can extend this knowledge to the real world. The analysis questions are where the bulk of students do the difficult learning and I get the most "ah-ha" moments.

Table 7

Profile of Positive and Negative Beliefs about Workplace Conditions: Griffin

	Administrative Support	Student Discipline	Collegiality	Accountability
Positive	*	0	***	*
Negative	***	*	*	****

Griffin's Emerging Environmental Contextual Influences. Griffin's interview responses revealed some workplace hindrances that he perceived constrained his teaching practices. Consistent with Griffin's earlier remarks, Table 7 shows that his largest concerns expressed were about accountability measures and administrative support. Griffin clearly held contextualist beliefs on learning and lamented that he was required to follow the "narrow" curriculum guide. He wanted the latitude to go further in many areas to develop and deepen student understanding of the topics. However, Griffin perceived administrative pressures which required him to prioritize his teaching practices with close adherence to the curriculum time frame, guidelines

and testing. Nonetheless Griffin indicated he still managed to incorporate " a good number of labs and activities" into his teaching practices, especially with the support of his biology team. This is illustrated when Griffin states "my adjustment was not too bad, there were teachers who helped me". The team apparently shared Griffin's enthusiasm as he reported "they would meet and share materials as they discussed test scores and grades".

In summary, Griffin expressed perceptions of dissatisfaction with accountability measures and administrative support, but articulated positive perceptions of collegiality. However, when Griffin spoke with this researcher again he was very unhappy about a new accountability measured just adopted that he said "would require large amounts of documentation about myself as a teacher yet again reducing the number of active learning activities for my students". Also, Griffin indicated the measure is directed at teachers as part of their yearly evaluation process by the administrators "and it's going to be a good percentage of our evaluation". Griffin appears very dissatisfied with this new development:

> I mean, the last time we spoke, it was like, well, this is a challenge and, well, I'm up to it, but right now looking into the future and what we're supposed to be, what we were required to give and produce looks like it's going to be very difficult here. It's going to be difficult here.

Case 3: Josie. Josie has taught biology at her school for three years. Like Griffin she is a career changer. She is a little older than Griffin. Josie has a doctorate in microbiology and has work experiences in the government and private foundations. Josie is a single parent with three boys. When asked, why she changed careers, Josie replied:

> I needed a job with more flexible hours. The teaching work schedule offered compatible times to my sons' schedules. It also presented an opportunity to do something that really appealed to me, I like working with children. Also, I feel my science background could really add to the students' science curriculums.

Table 8

Profile of Beliefs: Josie

	Teacher-Centered ←			→ Student-Centered
	Realism	Transitionalism	Contextualism	Relativism
Nature of Teaching				
	0	**	*******	0
Nature of Learning				
	*	*	****	0

Josie's Epistemological Beliefs. Josie's belief responses to the four interview questions point to a contextualist orientation (Table 8). The questions elicited descriptions of strong contextualist instructional behaviors toward her pedagogy, her role as a teacher, and implementation of the curriculum. To illustrate, when asked "how do you maximize student learning in your classroom" Josie's response contains many behaviors that are contextualist oriented:

> I just use a variety of different types of activities, so I have individual learning, I have group activities, I have a lot of hands-on activities and lab investigations groups, so I teach in as many different learning styles as I possibly can. I spend a lot of time on the Internet and talking to other colleagues and trying to come up with best practices for teaching each lesson, and I never teach the same lesson each year, I'm always modifying. I also do a lot of random choosing of groups to make them interact with each other and explain concepts to one another.

In addition, Josie viewed her teaching role as a facilitator to the learning process: "my role as a teacher is to provide them with the information and to then let

them use that information to learn". Her strong content knowledge apparently allows her to make adaptations of that information to meet the student needs. Josie stressed that she focuses on making her classroom and lessons relevant and engaging:

> I have a lot of things up in my classroom, lot of posters, things like that, that they could look at, I have live animals in my classroom that they get really interested in. So I try to make my learning environment relevant to biology.

Josie reveals student-teacher centered beliefs and teacher autonomy when she discusses the school's curriculum guide when she responds to the question "In the public school setting, how do you decide what to teach or what not to teach?", she replies:

> There is a school curriculum guide, developed by the district and state so we know what content we have to teach, but they don't tell me how to teach it. I don't follow the curriculum, I don't use every worksheet in the curriculum guide and go step-by-step. So I follow the school curriculum guide as just sort of a resource of what topics need to be covered enduring understanding the essential questions I take from the curriculum guide, but I make my own modifications based on student feedback and my goal to have students apply this knowledge to the real world. The principal allows us to be flexible enough to do what we want to do, which is a good thing. He supports our decisions in developing our curriculum.

However, when Josie is asked "how do you move on to a new topic?" Josie acknowledges her curricular freedoms are tempered by the curriculum timelines and the district and state assessments:

> There is pressure because I know I have six weeks to teach the first unit, I know I have three weeks to teach the next unit, I know I have four weeks to teach the next unit, and so forth. So I teach what I can within the timeframes. There are all the concepts that I have to teach before each district unit test and then the state test. But, when moving from concept to concept, I look for student feedback from their individual projects or group activities.

Josie admits she is seemingly dissatisfied about having to "move on" and the school's focus on test scores:

> You can't pursue something that the kids might want to take an extra couple of weeks on because you are so tied into making sure everything is taught, and that everybody understands it before the test. So that if the kids are really interested in ecology and we could take a field trip and do something, we can't do things like that.

In the same way that Josie's profile on the nature of teaching reflected an overall contextualist belief so does her profile on the nature of learning. Throughout the three interview questions on the nature of learning, Josie responds that optimum student learning appears in her cooperative groups and lab investigations. She explained the student discussions, relevant questions students posed, their written responses, and visual presentations indicated levels of student understanding of topics. Josie also notes the student's body language when learning:

> Well, I look for aha moments. I look for the student who says, "Oh, I get it now" or just the facial expressions, the way that their body relaxes as lot of students are tense when they are learning, but then when they get it, they relax a little bit.

Table 9

Profile of Positive and Negative Beliefs about Workplace Conditions: Josie

	Administrative Support	Student Discipline	Collegiality	Accountability
Positive	**	0	****	0
Negative	********	0	0	***

Josie's Emerging Environmental Contextual Influences. Josie's interview responses point to two workplace conditions that she perceives are constraints to her teaching practices (Table 9). The first situational constraint is Josie's perception of a lack of support by the administrator and the second constraint relates to accountability

measures. Some of Josie's concerns with accountability measures were previously noted as pressuring her perceptions of flexibility in curricular decisions as when to "move on" from a topic and sometimes limiting her pedagogical decisions for instilling more creativity and depth to her lessons to ensure student understanding of the concepts. Although, Josie had responded earlier that the principal gave her discretion in curricular decisions; she mentioned in her interview many areas where she did not feel the principal's actions facilitated her teaching and learning goals. Examples of this include interruptions by excessive public speaker announcements and large class sizes of " 35" students which restricted her abilities to implement many inquiry labs. But two specific administrative behaviors appeared as the nexus of much of Josie's perceived frustrations with school administration. Josie perceived a loss of teacher autonomy as a result of her perceptions of the principal's inconsistencies and lack of clear communications toward solving problems:

> For example, a student cheated on the test I gave her a zero. At first the principal agrees with me then the parent comes in and says, my child got a zero on this but she got everything right, and I say it's because she cheated and the principal said, well, you have to give her the grade. He always does a reversal when parents protest and other teachers have commented about this as well. Okay, it's almost like the student is always right and the teachers have to go back and correct whatever we didn't really do wrong to make the students or their parents happy. So the principal it seems to me is more for the community than for his own teachers.

Also:

> Cell phones is the biggest distracter to student learning in my classes, and the school keeps changing the policy to be more permissive so the students can now have their cell phones between periods, which means that they walk in with their cell phone still texting away or listening to music or whatever, and they sit down with their cell phones out, they don't want to put it away. I spend valuable class time then enforcing my policy of no cell phones.

Notwithstanding Josie's negative perceptions on the quality of leadership support, she also had a few more concerns with accountability measures not reflected

in her earlier comments of their perceived limiting role to produce student-teacher centered quality teaching pedagogical approaches to learning. Josie expressed concerns that accountability pressures on teachers and students changed teaching practices "for the worse". She commented:

> Test scores being the most important thing in the school is the biggest problem that teachers have, especially me, because at times I want to teach to the test and have to resist those urges and yet at times find myself teaching toward the test.

She indicated these psychological pressures of standards and high-stakes testing produced had altered the students own attitudes toward learning:

> They want to memorize concepts its easier and offers them more security than when they are learning from interactions with other students. They are sometimes impatient with me, "saying is this going to be on the test".

In summary, Josie expressed perceptions of dissatisfaction with workplace influences which she perceived challenged her contextualist belief that teaching and learning should be centered as a collaborative enterprise between student and teachers. Her perceived satisfaction seems derived through her interactions with her colleagues and students as noted in her comments below:

> I spend a lot of time on the Internet and enjoy talking to other colleagues and trying to come up with best practices for teaching each lesson, I interact with teachers, biology teachers at other schools through district meetings, so four times a year we have a meetings where we all get-together and talk about certain topics about what we taught last year, about anything new in the curriculum, and how we were teaching it, how we were testing it and things like that, and we're in continuous contact by email.

Also:

> I know that I can go someplace and make more money and not work as hard, which is even better but I come back every year, and the reason I come back every year is the students. So, I can't not be a teacher. I enjoy the students' ah

ha's as they realize and verbalize their understandings of scientific concepts. I simply enjoy them.

Case 4: Sarah. Sarah is a 3rd year teacher with two years of experience at her school. Sarah's decision to enter teaching appears shaped by limited opportunities in the job market and the enjoyment of working with children:

> My biology degree qualified me for a menial job in a lab. I would need a PhD in biology to move ahead. Also, I enjoyed teaching as a volunteer at the children's museum. So I decided to accept a recruitment offer to enter teaching and earn a masters degree as well.

Table 10

Profile of Beliefs: Sarah

	Teacher-Centered ⟷			Student-Centered
	Realism	Transitionalism	Contextualism	Relativism
Nature of Teaching				
	0	*	******	0
Nature of Learning				
	0	0	*****	0

Sarah's Epistemological Beliefs. Sarah's TBI interview responses shown in Table 10 reflect teaching and learning strategies that appear stable and centered firmly in a contextualist epistemic belief system. However, Sarah throughout the interview mentions "barriers" that challenge her beliefs of contextualism. According to Sarah they cause a "good bit of stress" and perceptions of dissatisfaction. These barriers that seemingly generated stress and resultant areas of perceived dissatisfaction are explored later in Sarah's section on workplace influences.

To this end of examining Sarah's disposition toward the contextualist approaches toward the nature of teaching, this researcher explores her responses to

the four TBI questions which reflect beliefs on the nature of teaching. For example when asked, "How do maximize student learning in your classroom" Sarah's reply demonstrates a rich repertoire of contextualism in her teaching strategies:

> As much as possible, I involve students a lot. I found that lecture wasn't a very good way, so then it is mostly investigative. I do my best not to just tell them but I ask for feedback, make them participate in the lesson and know when to go deeper into topics, I use a lot of discussions and hands-on activities. Especially because it's science, there are always many activities and labs to do, so that they really get involved and they learn, not just the theory but they see how it all plays out in practice and make connections to the world. The way that I set up my class, there are opportunities for manipulating students so that they have different groups, I do not set up rows of students so I can easily set up my cooperative pods.

In keeping with a contextualist's pattern, when Sarah is asked about her role as a teacher, Sarah states her role as "I am a facilitator, rather than somebody who just imparts the knowledge". Sarah indicates she spends many hours modifying her lessons through much outside research (e.g. resource books, internet) on biology concepts and grouping techniques. Sarah remains consistent as a contextualist when she responds to the question" In the public school setting, how do you decide what to teach or what not to teach? :

> There is a curriculum guide to follow, but I find I need to add more touches to make it more engaging and relevant to all my students. The kids are curious and I take the time to expand the lessons with more activities.

Sarah acknowledges that she often falls behind the time lines specified in the curriculum guide, but nonetheless prioritizes her students' learning as illustrated below in her reply to "How do you decide to move on to a new topic in your classroom", she states:

> I am adamant on enriching the curriculum. I need to make sure that they get some kind of hands-on activity, especially if I don't detect student feedback

> that connects prior information to the new concepts. If I don't then I am just talking to the wall.

Sarah's strong contextualist belief responses on the nature of teaching are also consistently shown in her responses to the three interview questions on the nature of learning (Table 10). An analysis of Sarah's explanations of the strategies she employed for student learning parallel those used for teaching. This is demonstrated in Sarah's response when asked, "How do you know when your students understand?" She replied:

> I always conducted a feedback, different ways of finding out, sometimes I'd just question them, ask a few questions after the lessons for a discussion and see how they defended what they investigated and their conclusions, and then, sometimes I'd give them a written evaluation to do from their group's activity, or exit cards about what they learned that day.

Contextualist strategies figure prominently in Sarah's responses to both questions "How do your students learn best" and "How do you know when learning is occurring in your classroom". In a similar fashion to her teaching practices to bring about student learning, Sarah utilized the outcomes of those instructional approaches to assess her students' learning. For example, Sarah's concept is clear when she says "my students learn best by doing. In every case students learn best when they have hands-on activities where they can manipulate things and do things that way." Likewise, individual and group activity outcomes seemed to form a large portion of her assessments of student learning. However, Sarah points out, "I use quizzes and tests as well to assess my students' learning."

Table 11

Profile of Positive and Negative Beliefs about Workplace Conditions: Sarah

	Administrative Support	Student Discipline	Collegiality	Accountability
Positive	0	0	***	0
Negative	******	****	0	***

Sarah's Emerging Environmental Contextual Influences. Sarah's workplace profile indicates there are several contextual factors that would influence her preferred contextualist methods of teaching and learning. As mentioned earlier, Sarah did make comments on conditions or "barriers" as she called them that caused her stress and tension. From her profile responses, Sarah perceives concerns with three workplace conditions; administrative support, student discipline, and accountability with administrative support garnering the largest share of her concerns.

From a review of Sarah's statements a theme of compliance appears to permeate all three areas. Apparently, Sarah became aware of these expectations from administrator walk-throughs, observations, and communications. Sarah touches on all three areas when she says:

> The administrators would be happy if I followed the curriculum guidelines more closely. They don't appreciate all the hours I spend developing creative projects. My test scores are not as high as the other teachers, but personally I don't teach to the test. I like to see kids engaged and excited. However, 100% of my kids passed the state high school assessment. Administrators, only ever do snapshots of the room. Okay, they come in, they stand here, they look for five or 10 minutes and they are gone. So they miss the lessons. Even on a formal evaluation they don't stay 45 minutes, so they miss parts of it. So they tell me my classrooms are too noisy. Of course they are, the students are up doing labs or interacting in discussions of the topic. It doesn't affect my

> performance throughout the rest of the year but it's frustrating, it's frustrating and it's stressful.

Sarah valued student interactions but acknowledged there were instances of a few unruly students, with little administrative support in disciplining them. Sarah states "when I sent them out as they were interfering with other student learning they were sent right back". She indicated her science colleagues helped her in class room management by setting up places where the science teachers could have "time outs" for students. Also, Sarah sensed she was supported by the other biology teachers; she shares "I had opportunities to observe them and learned from them how they were dealing with the students themselves, and we shared supplies and ideas".

Even when she encountered perceived impediments, Sarah was firmly committed to her teaching and learning approaches to make lessons relevant and engaging. Sarah expressed a lot of enthusiasm and satisfaction when she spoke about her interactions with the students. In addition, Sarah articulated her satisfaction with the collaborative aspects of her colleagues. The majority of Sarah's perceptions of dissatisfaction and stress seemed to stem from perceptions of disillusionment with her administrators' inabilities to understand her teaching and learning practices and apparent indifference toward student disruptions to learning in her classroom. To a lesser extent, the accountability measures which challenged Sarah's perceptions of satisfaction included constraints on pedagogical considerations, student feedback, and curriculum time lines. Each of these factors seemed to factor into Sarah's psychological turmoil of not "keeping up with my [her] peers".

Cross Case Analysis

This section presents the findings of themes that emerged from the cross-case data analysis of the teachers. The narratives and graphical displays of each case allowed this researcher to note similarities and differences in the cases using a node matrix in NVivo. The patterns and trends that are evidenced in the within- case findings allowed for a comparison of the epistemological beliefs of all cases (Table 12) with the workplace conditions of all cases (Table 13). In addition, the cross-case analysis served to deepen this researcher's understanding of the biology teachers' perspectives of satisfaction by presenting them in the framework of this study's two research questions: (1) How does the interplay between administrative support, student discipline, collegiality, and accountability with biology teacher epistemological beliefs impact perceptions of satisfaction (2) How are perceived levels of satisfaction related to coherence or a lack of coherence between beliefs and the culture.

Table 12

The Epistemological Beliefs of all Cases

	Realist	Transition	Contextualist
Eban	4	5	11
Griffin	6	3	10
Josie	1	3	11
Sara	0	1	11

Table 13

Profile of Perceived Positive and Negative Workplace Influences on all Cases

	Administrative Support		Student Discipline		Collegiality		Accountability	
	+	-	+	-	+	-	+	-
Eban	3	1	0	1	1	1	1	9
Griffin	1	3	0	1	3	1	1	4
Josie	2	8	0	0	4	0	0	3
Sara	0	6	0	4	3	0	0	3
Total	6	18	0	6	11	2	2	19

Patterns in Epistemological Beliefs

Table 12 show the distribution of beliefs about the nature of teaching and learning using participant responses from the Teacher Belief Interview. There are several patterns which emerge.

- An overall contextualist belief was held by all four participants. They all exhibited behavioral responses of instructional and learning strategies with a large emphasis on group-based learning activities and facilitated peer mediated learning.
- A pattern emerged in the participants' nature of teaching belief which demonstrated a shift from student-teacher centered/ contextualist approaches to an adoption of some measures of teacher -centered practices of a realist. From their narrative themes, Eban, Griffin and Josie in varying degrees seemed to experience pressures which

suggested they altered their belief patterns. Sarah remained student-teacher centered. Having worked for several years as science educators, Eban, Griffin, and Josie might possibly indicate as time progresses teachers may become fatigued as they negotiate and manage organizational constraints which are perceived to challenge their central epistemic belief.

- The consistency of the cases' student-centered contextualist belief was clearly evidenced when they all described their teaching roles as facilitating student learning
- Anecdotally, this researcher notes a commonality among the participants reasons stated for choosing the profession of teaching. Each participant expressed an enjoyment or relational aspect of working with children and oftentimes had prior student-centered work experiences (e.g. camp counselor, outreach coordinator, mother, museum volunteer) which may have influenced their thoughts and important instructional decisions.
- None of participants expressed relativism in their reported approaches to teaching and learning. This was not unexpected since relativists endorse a student- generated curriculum based entirely on student interest and individual goals. Educational scholars have indicated this type of teaching would be rarely evidenced in public school settings.

Patterns of Perceived Workplace Conditions Influences on the Cases' Epistemic beliefs

Table 13 reflects the workplace supports, constraints, or hindrances that participants perceive as either positively or negatively affecting their contextualist teaching or learning practices. There were several patterns that emerged from examining the organizational factors which appeared to impact the teachers' reported instructional and student learning practices and perceived levels of satisfaction:

- Among the working conditions, accountability measures appear as one of the dominant negative factors to produce perceptions of dissatisfaction in all participants. The participants expressed concerns which were reflected in their narratives about their pedagogical considerations which were limited by curriculum guidelines and timeframes. In addition concerns were expressed about assessment pressures on students and themselves. All four of the teachers mentioned the importance of test scores. This seemed to imply evaluative pressures existed in their workplaces. Eban was the only teacher that expressed merit with the assessments as tools to motivate students. All the teachers used the assessments to evaluate students. Griffin, Josie, and Sarah perceived levels of dissatisfaction with the testing climate's constraints imposed on their preferred teaching and learning strategies.
- The number of concerns expressed about a lack of administrative support was almost identical to the number of accountability concerns. This pattern may represent well-documented findings that the administrators' influences seem to be closely linked with workplace factors, such as accountability.
- Griffin, Josie and Sarah indicated perceptions of dissatisfaction with administrative support. Griffin and Sarah mentioned compliance issues. Josie

indicated conflicts with administrators and perceived a less than favorable environment with perceptions of constant external disruptions to her teaching environment. Eban perceived he was supported by his administrators, especially dealing in student discipline.

- Concerns with student discipline were largely not evident. Sarah was the only participant that acknowledged struggling with managing student disruptions.
- Collegiality was viewed favorably by Griffin, Josie and Sarah. High levels of perceived satisfaction were expressed in their narratives. They all pointed to informal peer support or formal biology content networks of colleagues as very helpful. Eban appeared satisfied with his perceptions of a few collegial interactions with his biology team.
- None mentioned formal in school professional development collegial interactions as valuable.
- From the case narratives, Eban appeared to be a fit with his school climate. Griffin and Josie seemed to manage their beliefs so as to fit their perceived climates. Sarah did not appear to align her belief to fit her perceived environment, but maintained apparently high levels of perceived satisfaction through her apparent self-efficacy and strong support from colleagues.

Summary

This study was designed to identify biology teachers' perceptions of the factors affecting perceived job satisfaction. The findings in this chapter are the results of the mediating affects between teachers' epistemological beliefs and psychologically potent factors of workplace conditions to effect positive or negative

evaluative judgments about their perceptions of job satisfaction. After the careful examination of the individual cases, several patterns emerged. The cross case analysis revealed that the units of analysis, the teachers, all held contextualist beliefs on the nature of teaching and learning. The boundary of workplace conditions most often reported as influencing satisfaction levels were accountability, administrative support, and collegiality. Accountability and administrative support issues emerged prominently as large sources of perceived dissatisfaction with the workplace, to a much lesser extent student discipline. Informal types of collegiality efforts generated a large level of teacher perceptions of satisfaction. Overall, the cases demonstrated a correlation between their epistemological beliefs of contextualism and perceived satisfaction levels as the teachers developed and implemented teaching and learning practices which they regarded as important to them.

Chapter 5: Discussion, Implications, and Conclusion

As discussed in Chapter One, biology teacher shortages exist nationwide to some degree or another. Educational researchers have noted that these shortfalls are highly correlated to biology teacher perceptions of their workplace conditions and may positively or negatively impact their perceived satisfaction (Ingersoll & Perda, 2011). In spite of this, relatively few educational studies have examined the interactions between workplace conditions and teachers' perceived constructs of satisfaction, especially biology teachers. In addition, the majority of educational studies have been quantitative; very few qualitative studies have been conducted. To that end, this study set out to explore high school biology teachers' perceptions of the factors affecting job satisfaction and possible outcomes of commitment to the teaching profession. My exploration used a conceptual framework based on the organizational perspective of person to environmental fit to examine those factors.

According to some educational researchers there are a myriad of workplace conditions which impact teachers' perceptions of satisfaction. In the literature review conducted for this study, administrative support, student discipline, collegiality, and accountability, were frequently cited by high school science teachers as contributing to their perceived levels of job satisfaction (Ingersoll & Perda, 2006; Riggio, 2009). In this study a lack of administrative support and accountability measures negatively influenced teachers' perceptions of satisfaction. Student discipline figured as a source of perceived dissatisfaction in only one of the teachers. This study showed supportive colleagues were central to the high levels of satisfaction perceived by the teachers The teacher perspective satisfaction factors cited by this group of high school biology

teachers are consistent with the sources of perceived satisfaction or dissatisfaction frequently reported by educational researchers in the literature (NCES, 1997; AEE, 2011).

In addition, educational research studies described three predominant epistemic belief systems with ties to teacher perspectives of satisfaction: realism, contextualism, and relativism (Day & Kington, 2008; Schraw & Olafson, 2002). As discussed in Chapter One, these beliefs may vary in a number of important ways. However, education scholars note taken as a whole, the three belief systems may suggest distinct ways of teaching and may have implications toward teachers' perceived satisfaction levels with their schools' workplace conditions and cultures (Luft & Roehrig, 2007; Schraw & Olafson, 2002). The first category of teachers hold beliefs of realism and are evidenced in teaching practices that are usually teacher-centered, inflexible pedagogical approaches of direct instruction to passive students. In the second category, the teachers with beliefs of contextualism frequently evidence student- teacher centered, flexible pedagogical approaches with emphasis on group-oriented instruction. The third category of relativistic teaching practices is evidenced by teaching practices which create special learning environments for self-instruction and learning by students. Relativistic pedagogical practices are rarely seen in public schools due to the independent nature of the student learning (Schraw & Olafson, 2002). This study's data analysis found the four biology teachers exhibited contextualist beliefs (i.e., student-teacher centered). This finding contrasts with Luft and Roehrig's (2007) study which suggested most teachers enter the teaching profession with contextualist student- teacher centered beliefs that appear to change

in their first years of teaching to teacher-centered practices. However this study did note that sometimes teachers altered their student-centered teaching practices to a more direct approach when encountering perceived workplace challenges. This finding is similar to Day and Kington's (2008) study which noted contextual constraints may cause teachers to alter their teaching practices.

In the following chapter, the body of literature on science teachers' perceptions of satisfaction (i.e., biology teachers) is used to situate, inform, and focus my findings. In addition, I explore the implications of my findings for policymakers and school leaders. Also, I review the limitations of my analyses and make suggestions for future research on the mediating effects of epistemological beliefs and workplace conditions on biology teachers' perspectives of satisfaction and commitment. Finally, I conclude this study with a reflection on my findings and their potential relevance for biology teachers' perceptions of satisfaction and retention.

Discussion

The primary/overarching research question for this study was:

What are high school biology teachers' perceptions of factors affecting teachers' perceived levels of satisfaction?

The findings for the two research questions are presented sequentially.

Research Question 1:

How does the interplay between administrative support, student discipline, collegiality and accountability with biology teacher epistemological beliefs impact perceptions of satisfaction?

Satisfaction Perceptions: looking through the Teacher's epistemological lens on workplace conditions.

Many educational researchers have suggested teachers' perceptions of job dissatisfaction results from any factor that is perceived to impede the primary goal of educating their students (Chang, 2009; Day & Kington, 2008; Rosenholtz, 1989). This research finding is particularly relevant for the biology teachers in this study who were found to have contextualist epistemological beliefs. Consistent with the epistemic literature of Schraw and Olafson (2002), they all favored and exhibited predominantly student- teacher centered practices (e.g., small groups, student feedback, inquiry labs) as valued pedagogical practices. Workplace factors that challenged these teachers' favored instructional approaches were often negatively viewed by the teachers. This finding is in agreement with business and educational organizational research studies of Herzberg, (1966), Kristof-Brown et al. (2005), and Eklund (2008). These researchers often labeled these unfavorable environmental factors as "dissatisfiers" and found that persistent pressures of these perceived dissatisfying factors lead to overall perceptions of dissatisfaction with the job and a loss of commitment.

Analysis of this study's data indicates each of the teachers encountered workplace conditions which either negatively challenged or positively supported their valued contextualist practices. Thus, the teachers perceived they were satisfied or dissatisfied depending on the level of effort necessary to reconcile the tensions between their beliefs and the perceived workplace constraints. This finding supports and extends prior research suggesting that teacher perceptions of support and buffering by administrators, appropriate student behavior, collegial supports, and aid

in negotiating accountability challenges impact perceptions of job satisfaction (Day & Kington, 2008; Fenstermacher & Richardson, 2005; Futernick, 2007).

There are similarities between the behaviors and attitudes expressed by the teachers in this study and those described by epistemic theorists such as Perry (1970) and Belenky et al. (1986). The studies' suggested that contextualist beliefs allowed individuals to be more adaptable in their thinking when encountering challenging situations. Also, these researchers noted individuals with contextualist beliefs could sustain high satisfaction perspectives while under duress from tensions stemming from their workplaces. In this study, the biology teachers all demonstrated flexibility in managing the workplace challenges to their beliefs of best teaching and learning practices, thus appearing to maintain a sense of perceived job satisfaction. This finding corroborates the ideas of Ladd, (2011) and Sleegers and Kelchtermans' (1999) that suggested teachers' holding contextualistic beliefs might be more likely to maintain their perspective levels of satisfaction when confronted with challenging workplace conditions which might otherwise lead to disappointment and disillusionment with the profession of teaching.

Notwithstanding the flexible nature of the contextualist, Day and Kington (2008) noted teachers' abilities to manage and cope with perceived persistent challenges to their effectiveness are not sustainable for the long term. The researchers also suggested that if workplace challenges are not altered to lessen their impact on the teachers' core belief system perceptions of dissatisfaction usually occurs. This study's findings support the ideas of Day and Kington (2008). For example, three of the biology teachers were frustrated and seemingly held increasing dissatisfied

perspectives on the persistent challenges of constant curricular or teacher evaluative revisions.

In light of literature which suggests that first year teachers often demonstrate realist (i.e., direct instruction), teacher-centered pedagogical approaches for teaching and learning, it is somewhat surprising that all the biology teachers in this study showed very little fluctuations in their beliefs of contextualism. This finding is different from the research study results of Luft and Roehrig (2007) and Richardson and Simmons, (1997). These researchers suggested that there are instabilities in the belief systems of beginning science teachers as well as some veteran teachers. This often results in realist teaching practices, especially with novice science teachers. On the other hand, this study's findings are consistent with the literature that indicated the teacher's core epistemic belief is stable, although at times the teacher practices might appear otherwise (Pajares, 1992; Rokeach, 1968; Sleegers & Kelchtermans, 1999). Three of the four biology teachers altered their valued teaching practices when they encountered accountability's high-stakes testing pressures. This study's findings are also consistent with Kang and Wallace's (2004) study that found the workplace constraints of teachers' schools may override contextualists' favored pedagogical approaches for student learning.

Administrative support

A large amount of quantitative and qualitative studies have noted the importance of the relationship between administrative support and teachers' perceptions of satisfaction. In the literature a lack of administrative support is commonly reported as one of the top reasons for teachers' perceptions of

dissatisfaction and loss of commitment to the teaching profession (Certo & Fox, 2002; Johnson & Birkeland, 2003; Ladd, 2011; NSB, 2008; Smith & Ingersoll, 2003; Tobias & Baffert, 2009). This study's findings clearly support that association. Three of the biology teachers, Griffin, Josie, and Sarah, expressed concerns and perceived levels of dissatisfaction regarding perceptions of a lack of support by their school administrators, specifically the principal. On the other hand, one biology teacher, Eban, perceived he was supported by his school administration and expressed a perception of satisfaction with the support he received.

Educational researchers have suggested that the role of the administrator is very complex. The research studies have often indicated it is hard to parse out the exact facets of teachers' perceptions of satisfaction or dissatisfaction attributable to administrative support or lack thereof (Ladd, 2011). Studies note that amongst the multiple extrinsic challenges biology teachers face, administrative support is a critical element, but it is closely intertwined throughout all the other workplace factors that influence biology teachers' perceptions of satisfaction (Darling-Hammond, 2007; Futernick, 2007; Smith & Ingersoll, 2003; Ladd, 2011; Loeb, Darling-Hammond & Luczak, 2005; NSB, 2008; Sahlberg, 2010). Nonetheless, many research studies have found that teachers did report specific behaviors of administrators that increased their frustrations and perceived dissatisfaction as teachers (Keigher & Cross, 2010; Rosenholtz & Simpson, 1989).

To reduce teacher frustrations and increase perceptions of job satisfaction, Rosenholtz and Simpson (1989) noted two of the most influential positive behaviors of an administrator. The first is to buffer the teachers from extraneous interruptions

and the second is to facilitate teaching and learning. This study found that biology teachers perceived concerns with one or both of these administrative behaviors. Eban perceived he was confronted with constantly changing curriculum and tests. Griffin found added layers of teacher/student evaluative measures would distract from his teaching practices and perceived he was unsupported in his instructional practices. Josie described large class sizes, frequent interruptions by public address announcements, and administrative inconsistencies as detracting from her teaching and learning practices. Sarah indicated she felt unsupported in her pedagogical practices and classroom management.

A possible explanation for the biology teachers' perceptions of a lack of support by their administrators could be found in the results of Jones & Egley's (2006) study who suggested that teachers and principals were looking through different epistemological lenses about the nature of effective teaching and learning practices to effect student achievement. In order to facilitate an understanding of each other's work the scholars suggested they needed to communicate frequently.

It is interesting to note that in this study all four cases perceived administrative communications as infrequent. Leithwood and McAdie's (2007) research on study on leadership practices found that a lack of dialogue between the principals and teachers regarding their respective goals for effective student achievement may result in teachers and administrators perceiving they are unsupported or obstructed in their work toward that goal. In this study, three of the teachers experienced outcomes of frustration and perceived dissatisfaction from their

perceptions of a lack of administrative support to achieve their goals (Ingersoll & Perda, 2011; Leithwood & McAdie, 2007).

However, to ameliorate possible conflicts between differing epistemological lenses, Leithwood and McAdie (2007) suggest administrators need to establish a clear culture of shared norms and values through frequent communications with teachers. Thus, according to the scholars, administrators would be more likely to detect teacher value dissonance early and could work to reduce teacher frustrations and reconcile tensions stemming from possible teachers' incongruent belief systems (Day & Kington, 2008).

Accountability

Tye and O'Brien (2002) found that accountability was the top-ranked workplace condition for teachers' perceived dissatisfaction and attrition. The results of this study showed that accountability ranked as a major concern among teachers, A possible explanation for this might be, if as researchers have indicated administrative support is entwined with all the workplace conditions then teachers' concerns of administrative support may have been reflected in Tye and O'Brien's accountability results as well. What are clear from the literature are evidences that teachers' perceptions of workplace challenges such as accountability measures and a lack of administrative support may impact teachers' perceptions of job satisfaction, as this current study found.

This study supports a finding by NRC (2008) which described biology teachers' perceived dissatisfaction with accountability measures in two predominant areas, pedagogical constraints and curriculum constraints. First, as mentioned earlier

in this discussion section, accountability pressures reshape teachers' valued pedagogical practices and result in increasing levels of teachers' perceived dissatisfaction (Kang and Wallace, 2004). This sample of teachers corroborated Kang and Wallace's (2004) findings since the teachers altered their contextualist instructional strategies to align more with the direct instructional approaches of a realist when factoring in their students' needs to pass the high-stakes assessments. Also, NCLB's accountability mandates evaluate teacher success in the form of test scores ((McNeil, 2000). This NCLB testing influence was confirmed in this study as all the biology teachers emphasized that they all had high rates of students passing the high-stakes tests.

The second accountability concern indicated by the biology teachers was curriculum constraints which hindered their contextualist pedagogical practices. The curricular breadth and lack of depth was perceived by the teachers as impeding what they taught and their abilities to teach creatively. This finding is in agreement with Tobias and Baffert's (2009) study of science teachers which raised large concerns about school curriculums which often placed a heavy emphasis on content and too, contained restrictive time lines. Each of the four teachers appeared to struggle with the apparent fast paced curriculum guidelines and timeframes, most bending under the pressure, except for Sarah. Interestingly, perhaps Sarah's resolute determination to balance her pedagogical approaches with the curricular constraints stemmed from her overt confidence in her research-based best practices, such as student learning by inquiry, that she firmly believed were the most beneficial to her students' learning (NRC, 2008).

The comparative aspects of accountability's assessments may be unfair to teachers as found by Tobias and Baffert (2009). This study affirms Tobias and Baffet's (2009) finding. Eban and Josie perceived their administrators gave them greater autonomy in teaching of the curriculum because of their student's high pass rates and test scores, while Griffin and Sarah perceived less autonomy through administrative prescriptive pressures to comply with curriculum guidelines.

Student Discipline

The literature is replete with extensive research studies and surveys that indicate teachers perceive overall workplace conditions dissatisfying when constantly challenged by students with behavioral problems in their classrooms which disrupt their valued student instructional practices and learning goals (CTQ, 2007; Darling-Hammond, 2007; Futernick, 2007; Mitchell & Arnold 2004; Loeb, Darling-Hammond & Luczak, 2005; NSB, 2008; Sahlberg, 2010 ; Smith & Ingersoll, 2003). However, in this study, student discipline concerns were seldom mentioned by three of the biology teachers. One teacher did express concerns of unruly behavior in some of her students. My hypothesis for this finding centers on the select characteristics of my sample of schools. All of the schools have high socioeconomic status (SES) levels, high test scores and few reported discipline problems. Hanushek, Kain & Rivkin (2004) found the opposite correlates in disadvantaged schools. This study does not suggest that teachers in schools in which the students have higher SES do not experience student behavior problems that may cause a large amount of perceived teacher dissatisfaction, only that the participants in this small sample mentioned fewer concerns with student discipline. Having said that, one teacher, Sarah indicated she

had students that interrupted her labs and she needed support disciplining them. Sarah's perceptions of dissatisfaction did not appear to reside in the students, but to a perceived lack of support by her administrators to help her manage these students. This finding is interesting since on the surface it is contrary to many research studies which have found that student discipline issues often impede the teacher's abilities to achieve their instructional goals (Chang, 2009; NSB, 2008; Rosenholtz & Simpson, 1990). In addition, researchers have found a large negative association between student behavior problems and teachers' perceptions of satisfaction. There could be several explanations for this study's finding for Sarah's seemingly lack of perceived dissatisfaction attributed to her students' negative behaviors. For example, Chang (2009) suggests that a teacher's perception of dissatisfaction stemming from student discipline issues develops overtime. Sarah is in her third year of teaching. Perhaps for that reason she has not yet had enough time to develop perceptions of dissatisfaction that were attributable to her students' behavior problems.

Collegiality

Collegiality was found to be a strong positive component of biology teachers' perceptions of satisfaction in this study. This finding affirms most educational research which recognized that high school science teachers are much more likely to report high degrees of perceived satisfaction when they experience collaboration with and support from their colleagues (Brunetti, 2001; Luft & Roehrig, 2007). This study found that overall the biology teachers mentioned the importance of collegial interactions as significant to facilitating their teaching goals through sharing of instructional strategies to classroom management techniques. These collegial

interactions were for the most part informal peer supports or collegial content oriented networks.

However, the findings of this study did not align with research findings which indicated formal professional development, induction programs, or mentoring programs increased teachers' perceptions satisfaction (Kapaidia, Coca, and Easton (2007). The biology teachers indicated they did not find these types of collaborative assistances aided them in negotiating their schools' environmental constraints. It seems possible these results might be due to the importance the biology teachers placed on the informal interactions with their colleagues. Another possible explanation for this divergent finding may be suggested in the study by Ingersoll and Kralik, (2004) which suggested that the formal programs may not have been well designed to support teachers' perceived efforts to create positive learning and teaching environments. For instance, a professional development program perceived by contextualist teachers as a transferrable package of expert knowledge would conflict with their valued creative, collaborative ethos of knowledge construction. Therefore, if they are urged and sometimes required to heed this knowledge from external authorities, the contextualist teacher would likely encounter friction and tension with the program's implementation in their workplace or discount the program's merits (Day & Kington, 2008). Adding to this proposition, Nespor, (1987), indicated epistemic beliefs may filter out compatible information from the program while incompatible information may be rejected. And yet, as this study has found the flexible nature of the contextualist epistemic belief may allow them to make cognitive adaptations to the information presented to fit their needs.

This study does not suggest that formal induction and mentoring programs are not valuable supportive assistances for achieving teachers' perceived job satisfaction. It does suggest that an organized supportive professional culture where teachers have regular opportunities to collaborate may be more valuable for teachers with contextualist epistemic beliefs (Johnston & Birkeland, 2003; Schraw & Olafson, 2002).

Research Question 2:

How are perceived levels of satisfaction related to a coherence or lack of coherence between beliefs and the culture?

Person to Environmental Fit

Many business and educational organizational climate theorists in the literature have suggested overall perceptions of job satisfaction are a congruence or fit of the person to the culture (Sahlberg, 2010). In addition, organizational climate theorists note that organizations, like schools, may have a collective overall philosophical context or culture which appears to influence each school's respective workplace conditions impact on teachers (Schneider, 1985; Schraw & Olafson, 2002).

For this study, the business organizational perspective provided an understanding of the contextual framework, person-environmental fit, within which the teachers' epistemological beliefs (i. e, intrinsic) filtered overall workplace conditions' goals and values (i.e., extrinsic) or in other words the school's culture. Teachers' perceptions of an alignment or misalignment with the pervasive school culture job result in an overall sense or feeling of congruence with the goals and

values emphasized by their schools' workplace conditions often impacting teachers' perceived satisfaction outcomes (Kristof-Brown et al., 2005; Luft and Roehrig, 2007).

In the literature, a key finding by Colley (2002) and Johnson and Birkeland (2003) identified the principal as the instructional leader who shapes the culture or sets the tone of the school. The present study's findings seem to be consistent with Colley's (2002) and Johnson and Birkeland's (2003) results. The three biology teachers perceived a lack of support by their administrators for their valued contextualist teaching and learning practices. Therefore, in accordance with the aforementioned findings, it seems reasonable to expect that the teachers' values may not be aligned with the prevailing norms of the schools' culture.

Further, this study supports two research findings by Day and Kington's (2008). First, the researchers found that teachers' negative comments about their workplace conditions frequently reflected misalignments between the teachers' beliefs and the norms of their school's cultures. Secondly, the researchers found teachers appeared to express perceptions of satisfaction or dissatisfaction depending on the level of effort necessary to manage inconsistencies and stress within and between the climate dimensions of workplace conditions and their belief system. This study found this was the case for most of the participants. Eban's goals and values seemed to fit the culture of his school. Therefore, he expressed few negative comments about his school's overall goals and values and appeared satisfied. This study's finding for Eban supports Bang et al.'s (2007) finding that a match between the epistemic belief of a teacher and the workplace climate generates a large amount of perceived job satisfaction. Josie and Griffin did not appear to fit their school

cultures. The likely misalignment between the teachers' beliefs and their schools' cultures were reflected in their negative comments about some of the cultural norms and expectations they perceived impeded their teaching and learning practices.

The fourth teacher Sarah recognized that her incongruent values were not aligned with her school's prevailing norms, but contrary to the research findings she made very little adjustments to match the prevailing culture. Sarah expressed perceived dissatisfaction with aspects of her perceptions of the school culture, but maintained a high level of perceived satisfaction. As reported earlier in this discussion, an explanation for this might be attributable to her short teaching experience of two years. Thus, perhaps, as found by Day and Kington's (2008) study, Sarah has not endured the persistent pressures of her perceived dissatisfying factors for very long.

Consistent with the literature, this study found three of the teachers' made pedagogical adjustments to workplace constraints from their perceptions of individual workplace factors and sometimes from their feelings perceived from the norms and expectations of their schools' cultures. Although, at times seemingly displeased with the extent of their efforts deemed necessary to manage the workplace constraints, the teachers seemed to maintain an overall sense of perceived satisfaction with the teaching profession. This finding corroborates the 2012 MetLife Survey results which found teachers often expressed perceptions of satisfaction with the career of teaching, but also found persistent workplace challenges to teachers' perceptions of effectiveness as a teacher eventually diminished their levels of perceived job satisfaction.

Implications for Policy

As mentioned in the introduction, with the current shortage of biology teachers in the US, it is essential to understand how to maintain their retention in the nation's classrooms for at least two important reasons. First, at the national level, the biological sciences are perceived to be instrumental to closing the science achievement gaps between the students of the US and other nations. Second, at the local level science student achievement is often judged by student performances on high-stakes biology testing that has consequences for schools, teachers, and students exhibiting poor test performances. Many current studies indicate that the increasing rates of biology teacher turnover are linked more to teachers' perceptions of job dissatisfaction with workplace conditions than to macro-level concerns, such as salary or retirement issues. The findings of this study have important implications regarding the factors for policymakers and school leaders to consider for understanding the sources that generate perceptions of dissatisfaction or satisfaction among biology teachers in their school environments.

This study's findings indicate biology teachers instructional goals are closely related to their epistemological beliefs. Prior research has suggested these epistemic beliefs filter teachers' workplace conditions and the schools' cultures as either supporting their goals or impeding them, thusly affecting their perceptions of job satisfaction (Luft & Roehrig, 2007; Nespor, 1989; Day & Kington, 2008). In addition, most educational researchers generally accept that teachers' deep rooted epistemological belief systems seem to be readily visible in their attitudes, behaviors, and (Luft teaching practices & Roehrig, 2007; Schraw & Olafson, 2002, Tsai, 2006).

Therefore, school leaders could investigate irritating and frustrating school factors to teachers which would also most likely facilitate a determination of the epistemic orientations of the teachers. Thereby, through collaborative discursive efforts and feedback, the school leader could target appropriate strategies to ameliorate the frustrations of the teachers from an understanding of the teachers' epistemological beliefs regarding their valued teaching and learning practices.

The second implication that arises from the data pertains to the school leader who sets the tone or culture of their school. The data indicated that all the workplace conditions of this study were entwined with the administrators' behaviors, attitudes, and goals possibly rooted in the leaders' epistemological beliefs. Thus, distinct working environments are created by the school leader that can be highly predictive of biology teachers' perceptions of satisfaction. The administrator needs to be clear on their expectations in terms of job duties, teaching methods, and discipline. This could be accomplished through orientations at the beginning of the school year and reinforced at faculty meetings throughout the year (Riggio, 2009).

Organizational researchers suggest the congruence between a person's beliefs and their work environment has been positively tied to perceptions of job satisfaction (Day & Kington, 2008). In essence, to diminish tensions and turmoil from possible incongruent beliefs systems between the administrator and the teachers, administrative supports would be necessary in order for teachers to make adjustments to their epistemic beliefs to align with the school's culture. To that end, in order to aid teachers in their negotiation of perceived workplace constraints impacting their perceptions of job satisfaction, leaders must be meta- metacognitively aware of their

own epistemological orientations influencing their school's culture (Day & Kington, 2008). This awareness may elevate the leader's capacity to influence teachers' different epistemic interpretations of the environment by clearly defining what constitutes success in their schools through scheduled meetings with the teachers and faculty meetings (Riggio, 2009).

The third implication from this study suggests that frequent clear supportive communications by administrators impact biology teachers' perceptions of satisfaction. This study found overall the biology teachers perceived most of their respective school administrators' communications about specific school goals and feedback as infrequent, ambiguous, inconsistent, and often negative. These perceptions contributed to the teachers' perceptions of dissatisfaction with administrative support and negative perceptions of their schools' cultures. School leaders that work to provide structures to facilitate collaborative communications could significantly improve biology teachers' perceptions of any dissatisfying measures of their administrators' effectiveness, support, and school management (Leithwood & McAdie, 2007). Dependent upon effective administrators' leadership and established communication processes, teachers' perceptions of job satisfaction could be influenced by how the values, norms, and goals of the schools are communicated to teachers and in which, teachers have opportunities to address their perceived concerns (Riggio, 2009). Administrators could stop by the teacher's classrooms during teachers' planning times or have the teachers meet with them on a regular basis to chat. This not only cuts down on teachers' sense of isolation, but also

shows an administrator's supportiveness, and provides a forum for discussing issues teachers are facing before they become overwhelming (Rosenholtz, 1989).

The final implication for this study is the importance of collegiality to biology teachers' perceptions of satisfaction. One of the issues that emerged from this study's findings is that biology teachers' high levels of perceived satisfaction stemmed from their collaborations with, recognition from, and networking with fellow science teachers, specifically biology peers. Administrators could build upon this finding. They could establish ways to encourage collaborations, recognize teachers for working hard, and network with the staff. Perhaps, administrators could offer to visit or observe teachers' classes in a non-evaluative way and provide feedback before the evaluative ones take place to build trust (Leithwood & McAdie, 2007). For example, talk to each other in ways that will be productive about the teaching practices observed and then get to a place where the conversations could be richer.

In this study the biology teachers highlighted the importance of their largely informal interactions with their colleagues as significant to facilitating their teaching and learning goals. Prior research indicates the need for teachers to work together and a need for organizational structures that facilitate that collaboration. Administrators could support teacher collaboration by formalizing school policy to schedule common planning time among teachers and regularly scheduling times set aside for collaboration with colleagues. These types of supports appear to increase the likelihood of teachers reporting good teaching experiences and intentions to remain in teaching (Ingersoll & Perda, 2006).

On the other hand, the second finding that emerged from this study did not find formal scheduled professional development, induction, or mentoring programs valuable to the biology teachers' goals for teaching and learning. As prior research has suggested many of the programs are not well designed to meet the individual needs of the teachers (Ingersoll & Kralik, (2004). However, researchers have indicated schools which have strong cultures of mentoring and professional development experience less teacher turnover (Darling-Hammond, 2003). Perhaps, if policymakers and school leaders utilize the informal collegiality patterns of successes when developing the formal programs might garner a better reception from teachers. However, the key to the programs' successes would be teachers' perceptions that the information provided supports for their instructional goals. This could be done by providing content-specific or context-specific supports designed to promote ongoing discussions and collaborative efforts related to the teachers' instructional issues. For biology teachers, content-specific might be cutting-edge biology projects for students, whereas context-specific might be strategies to ameliorate workplace constraints, such as strategies to pace pedagogical practices in order to meet curricular timeline constraints.

Possible Limitations

Several limitations of this study need to be mentioned. First, while the sample size of four biology teachers from four high schools was purposely selected and appropriate for a qualitative study, they do not support generalizations to larger populations of teachers. All generalizations made by this study are to further current thinking about biology teachers' perceptions of satisfaction.

Second, three of the four participants were alternatively certified which differs from the traditional certification route for the majority of the general science teaching population which may impact the findings of this study.

Third, another limitation stemming from this study's methodological design was the use of only interviews to collect the teachers' data responses, although researchers have indicated this is one of the most reliable methods to capture epistemological beliefs.

Fourth, this study makes two assumptions from several epistemic research studies. The first assumption is that the three-category system of beliefs can adequately capture the core epistemological beliefs of teachers. Second, there is much debate in the epistemic field about whether these core beliefs can be developed or are static. This study views them as static but recognizes that some are flexible.

Finally, teachers' perceptions of satisfaction with workplace conditions are limited by the data collection over a specific and brief time span at the start of a new school year. Researchers have indicated teachers' perceived dissatisfaction often results from persistent challenges of workplace conditions to their goals of effective teaching and learning over time. A fresh start might have mitigated the past negative influences on the teachers' beliefs and new workplace challenges, such as added accountability initiatives may not have been operational yet.

Future Research

Due to the findings of this investigation, there are several suggestions this researcher has for future research studies. First, although we know what workplace conditions trouble biology teachers' perceptions of satisfaction we still know little

about the connections between workplace conditions and biology teachers' epistemological beliefs impact on teachers' perceived job satisfaction. Future research should delve further into understanding biology teachers' perceived job satisfaction constructs by applying different business organizational models of the person-environmental fit paradigm to the school setting. Additionally, since biology teachers experience significant tensions from accountability mandates of high- stakes assessments, Adequate Yearly Progress (AYP) measurements, and graduation prerequisites. It would be interesting to conduct a longitudinal study to discover if epistemological beliefs and instructional practices remain the same or if they change over time.

Researchers could also benefit from in-depth studies of the epistemological beliefs of administrators and how their beliefs are reflected in the cultures of their schools. Little is known about the congruence or incongruence between biology teachers' epistemological beliefs and their administrators' epistemological beliefs. This kind of analysis is necessary for gaining a better understanding of the interactions between biology teacher and administrator characteristics that might predict teacher's perceptions of job satisfaction.

Finally, studies which examine the perceptions of job satisfaction and commitment of biology teachers who are determined not to alter their valued teaching and learning practices in spite of perceived workplace constraints might prove valuable to understanding satisfaction perspectives. This suggestion stems from this researcher's observations of Sarah, a biology teacher who held a contextualist epistemological belief and was firmly committed to her student centered pedagogical

approaches for teaching and learning, even when she perceived workplace " barriers" to their implementation.

Conclusion

Research has indicated biology teachers' perceptions of satisfaction have a high correlation with teacher retention. Understanding the sources that generate perspectives of dissatisfaction or satisfaction among biology teachers is essential given their perceived importance to the Nation's educational reform efforts in closing the global achievement gap. One step toward understanding teachers' perceived satisfaction is to explore the factors that impact it. This study explored the factors of workplace conditions and teachers' epistemological beliefs that influenced teachers' perceptions of satisfaction. This study's findings support contemporary educational epistemic and organizational theory which found psychological intrinsic instability or perspectives of dissatisfaction are created when school workplace conditions are misaligned with teacher epistemological beliefs. The degree to which teachers were more or less able to manage this misalignment determined their perceived sense of perceived satisfaction. This study represents a step forward in furthering our understanding of how teachers' perceptions of job satisfaction or dissatisfaction in the workplace may result through the congruence or incongruence between teachers' epistemological beliefs and their organizational contexts.

Appendix A: Letter of Request for Teacher

Elizabeth Daniels
444 W. Broad St. Unit 222.
Falls Church, Va. 22046
240-447-9700
edaniel1@umd.edu

Date

Dear Biology Teachers:

I am writing to invite you to participate in a study that examines the link and tension between climate conditions of leadership, student discipline, collegiality and accountability on biology teachers' perceptions of satisfaction. I am conducting this study as a doctoral student in the Department of Counseling, Higher Education, and Special Education at the University of Maryland under the direction of Dr. Carol Parham.

I will conduct 30 minute to 45 minute interviews from a sampling of one high schools' biology teachers outside of the school setting. All interviews will be reported anonymously. You may choose the setting for the interview with the stipulation that noise levels must be at a minimum. The interview is semi-guided with 14 questions that are recorded for the data collecting. No one will be identified. After the research you are welcome to review the results.

Biology teachers encounter many daily challenges to implementing what they know as effective teaching. I hope you will help me to make an important contribution by sharing what you think and do. Many educational researchers believe real school change depends on it.

Thank you in advance for your consideration

Sincerely,

Beth Daniels
Doctoral Candidate, University of Maryland

Appendix B: Teacher Demographic Questions

Demographic Information Interview Questions

1. Name, School, Age
2. School demographics
3. Email address telephone number
4. Years in teaching profession
5. Number of years in present position
6. Subject levels taught
7. Best describes your certification route
8. Major/minor in college
9. How many years do you envision staying a classroom teacher?

Appendix C: Semi-guided Interview Questions for Teachers using TBI Protocol

Semi-structured Interview Protocol for Teacher Beliefs and Workplace Conditions

Science Teacher Belief Interview
Luft and Roehrig (2007)

1. How do you maximize student learning in your classroom? (Knowledge of teaching)

2. How do you describe your role as a teacher? (Knowledge of teaching)

3. How do you know when your students understand? (Learning)

4. In the school setting, how do you decide what to teach and what not to teach? (Knowledge of teaching)

5. How do you decide to move on to a new topic in your classroom? (Knowledge of teaching)

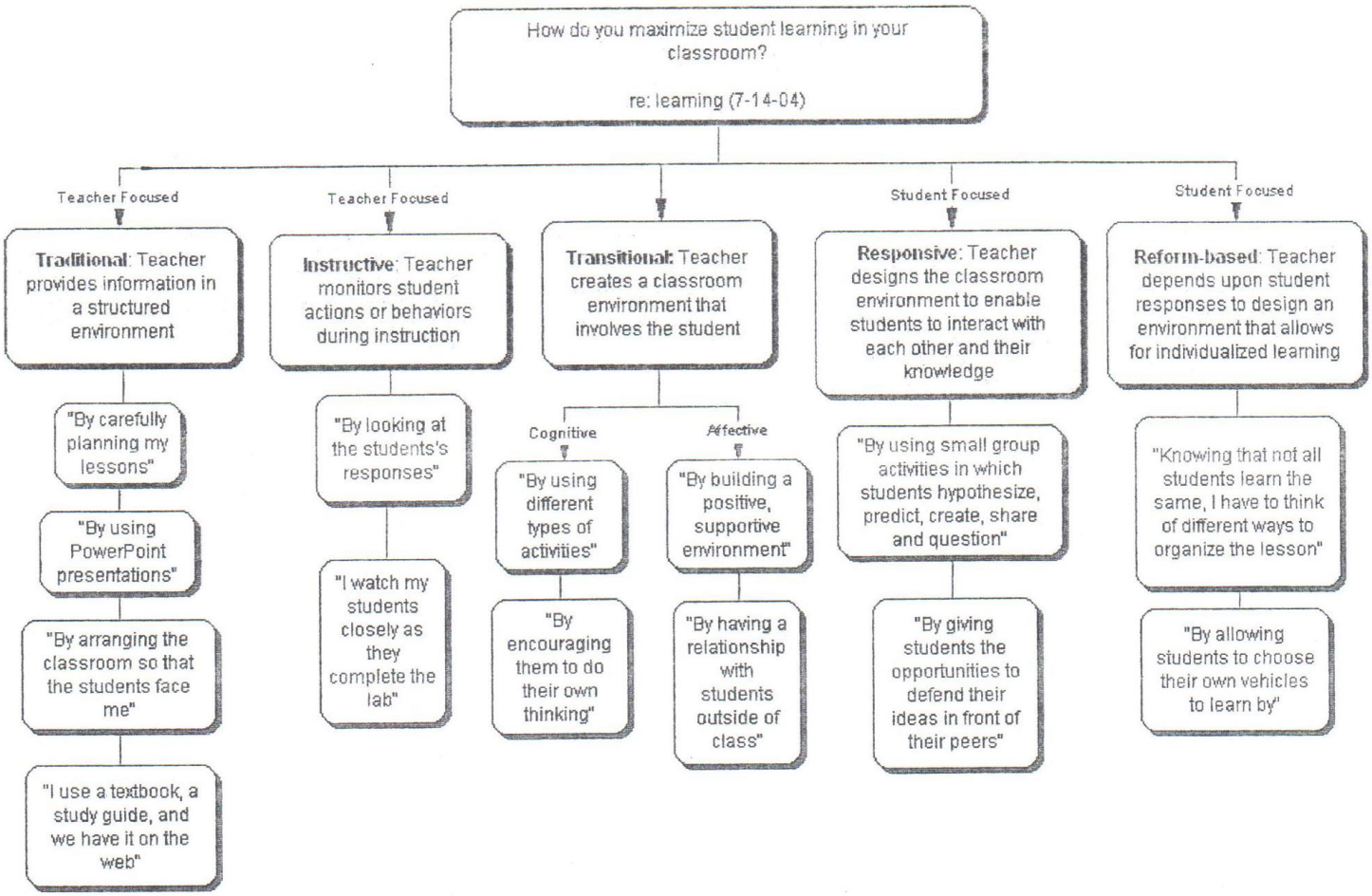
6. How do your students learn best? (learning)

7. How do you know when learning is occurring in your classroom? (learning)

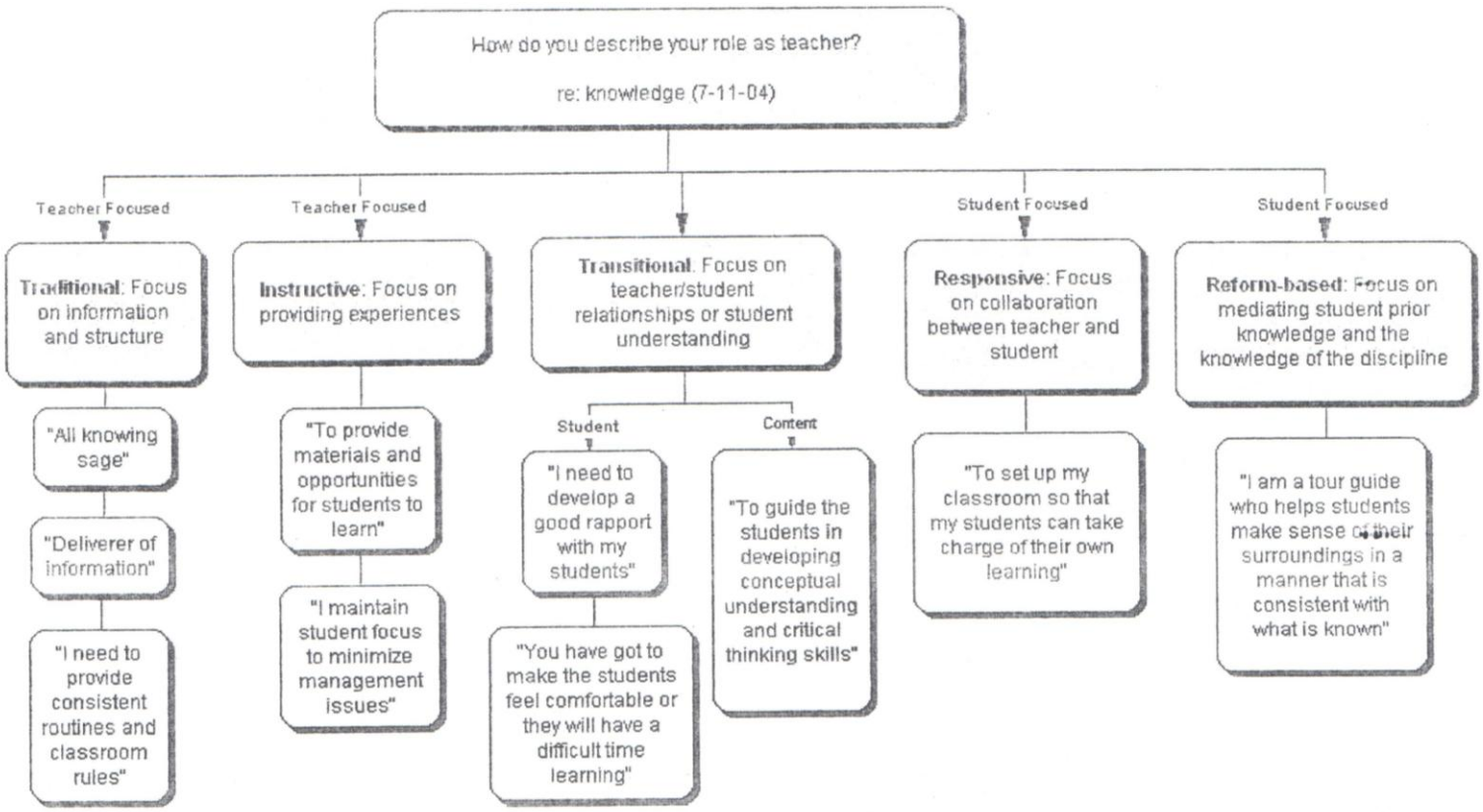
Appendix D

Corresponding Rubrics for Luft and Roehrig TBI (2007) Interview

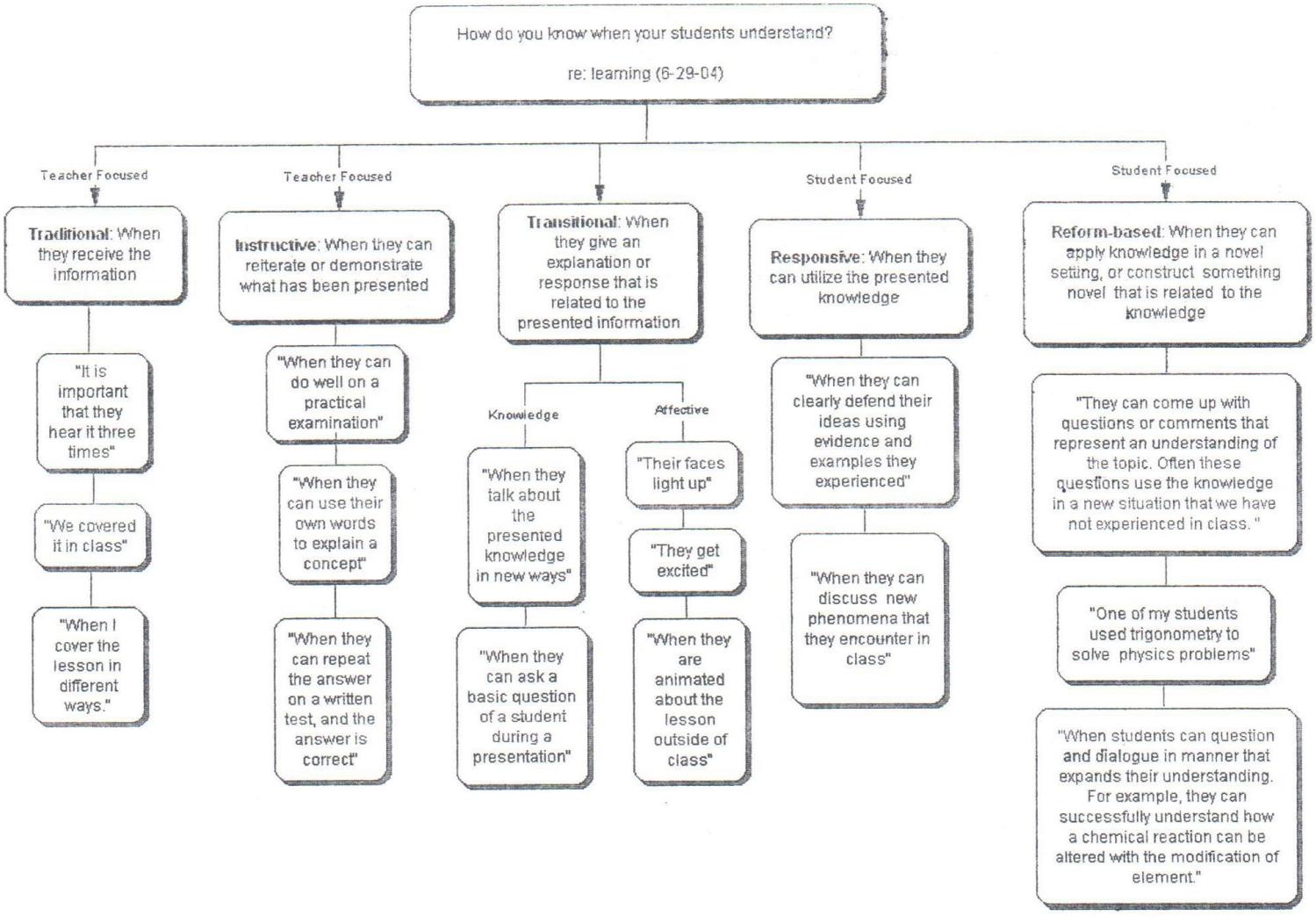
Capturing Beliefs – Question 1



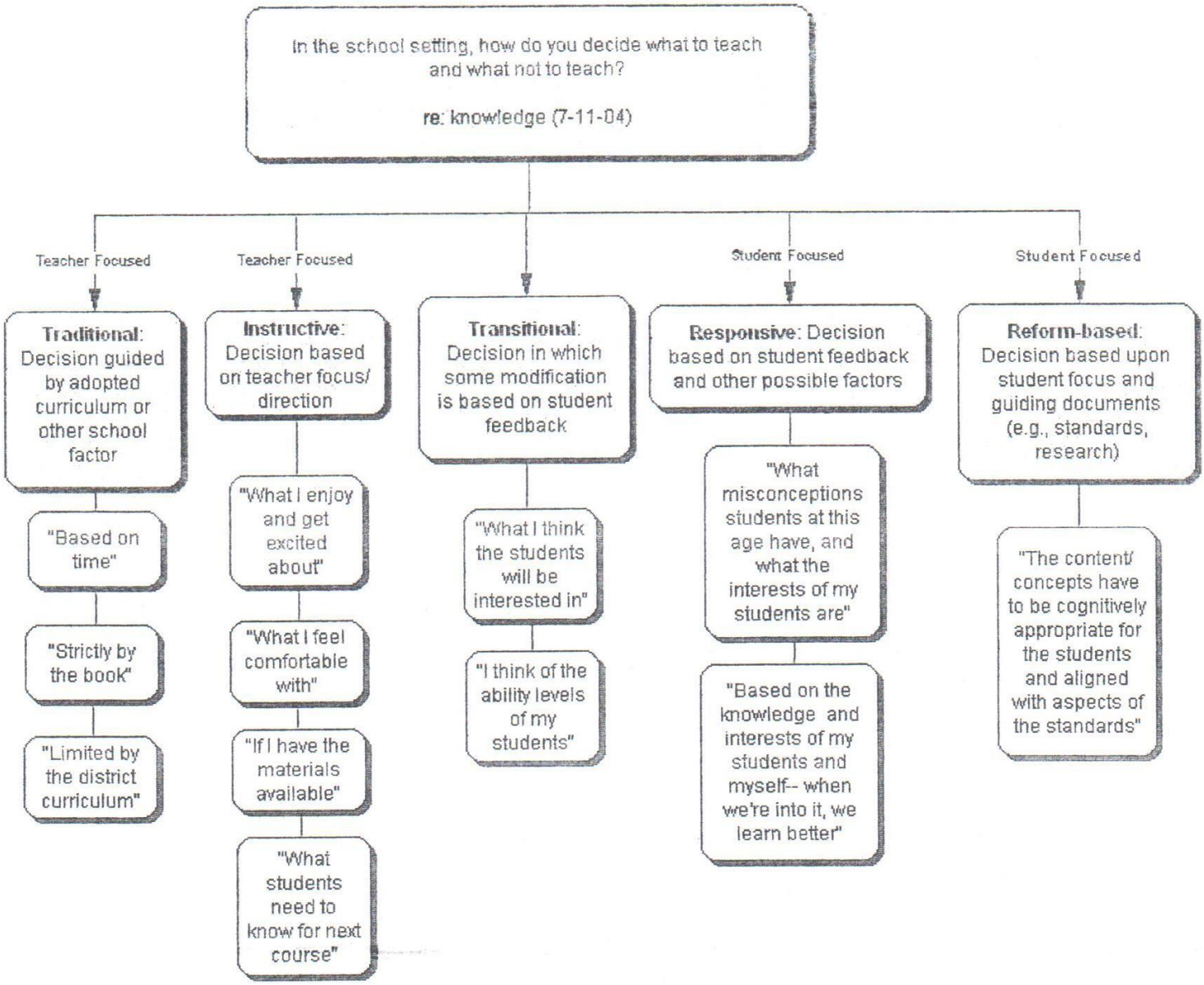
Capturing Beliefs – Question 2



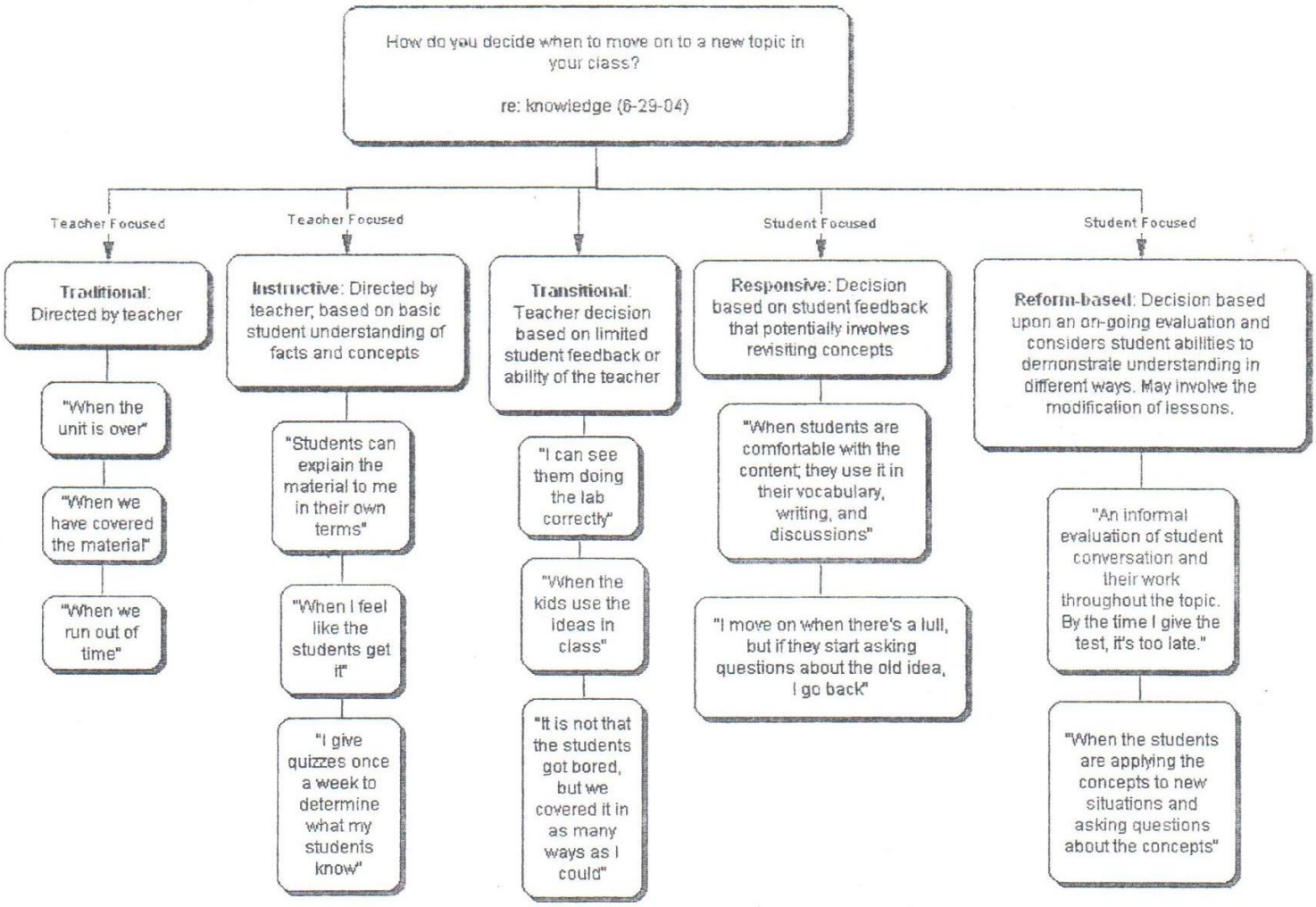
Capturing Beliefs – Question 3



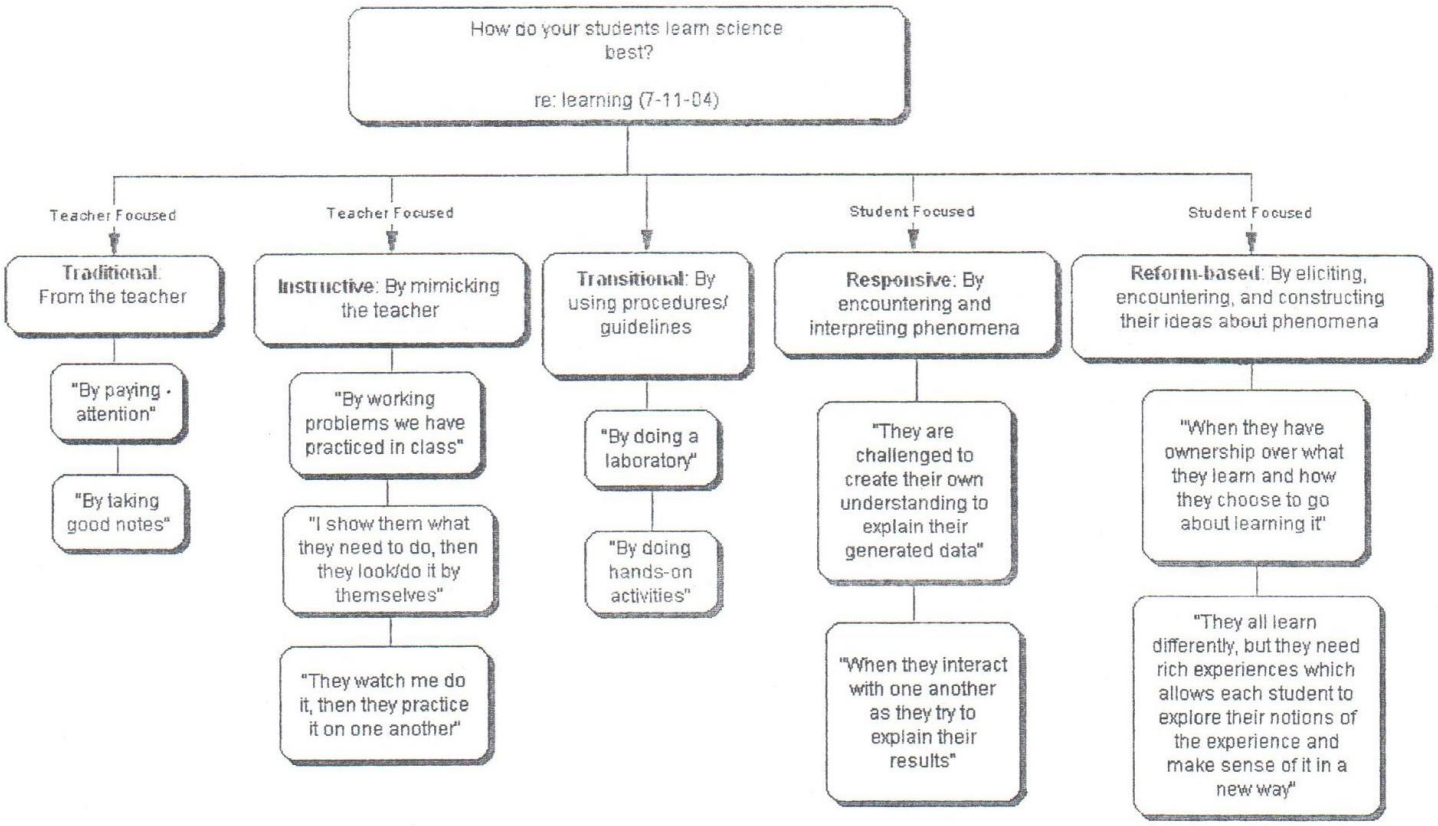
Capturing Beliefs – Question 4



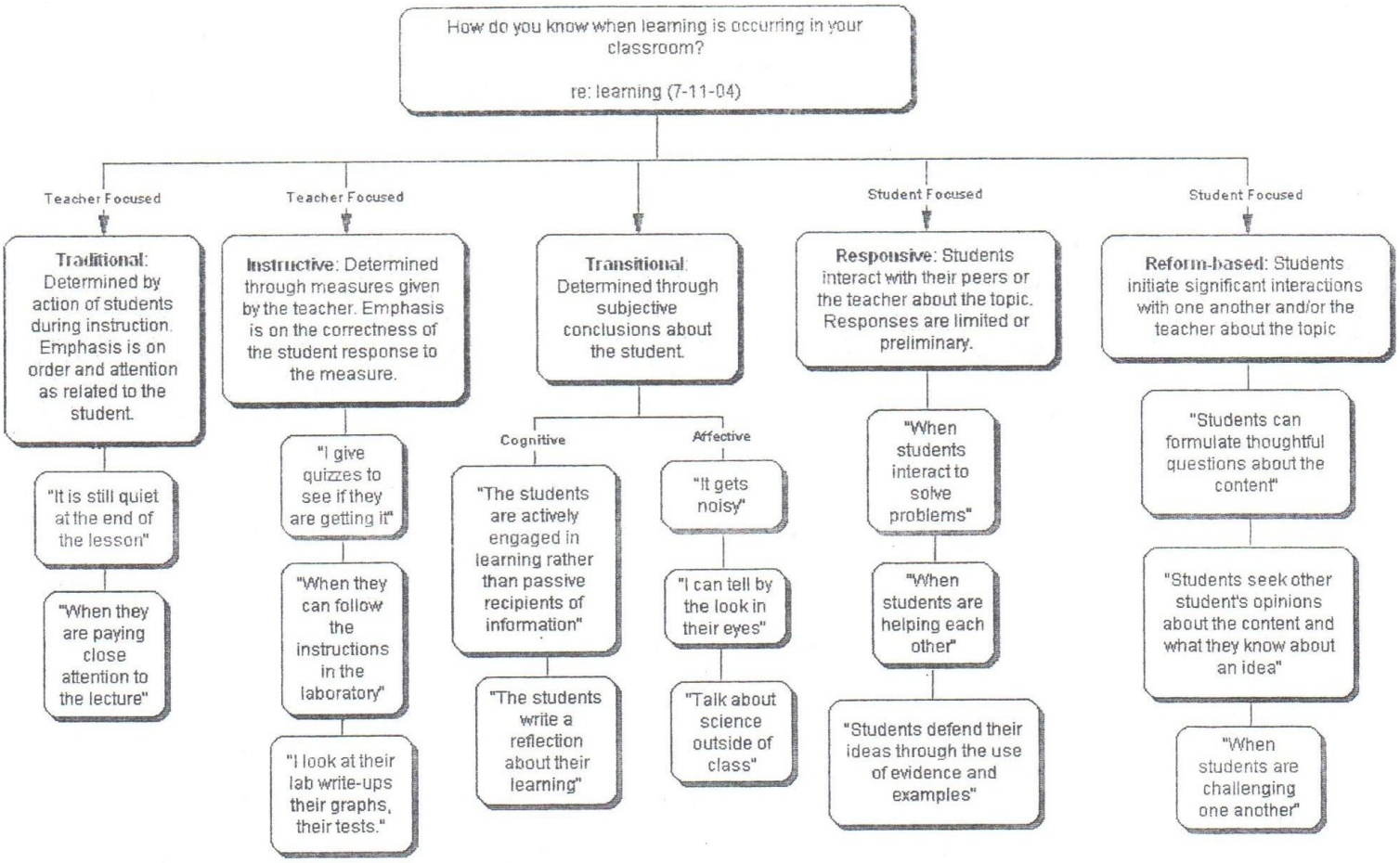
Capturing Beliefs – Question 5



Capturing Beliefs – Question 6



Capturing Beliefs – Question 7



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