ABSTRACT

Career-Focused Field Trips as Experienced by At-Risk Rural Students: A Case Study

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A lack of recent research focused on field trips as pedagogy in K-12 settings established the foundation for this work. The research design followed multiple-case case study model. The participants were four male students from a small rural high school in central Texas. Each participant, previously labeled as academically "at-risk", had identified an inability to describe connections between academic science content as presented in their common classes and future jobs, vocational training, and/or careers requiring higher education. Because the participants had no directed field excursions addressing this desirable knowledge and/or skill, a career-focused field trip was designed to address the self-identified deficit reported by the participants. The specific research questions were:

1. How does the ability to describe connections between academic science content (biology, chemistry, and physics) and future careers change as rural students experience a purposeful excursion to a post-secondary facility providing vocational training?

2. When do the connection(s) between content and future careers become evident to students?
3. What effects or impact do newly discovered connections have on rural students' aspirations with regard to future career or higher education options?

Data were gathered using existing school records, an initial survey, one-to-one interviews conducted before and after the field trip, focus groups conducted before and after the field trip, and observations during the field trip. Data analysis revealed that all participants were able to describe various connections between academic content and careers after the field trip, as well as identify a specific incident that initially established those connections. In addition, all of the participants reported discovering options for careers during the field trip not previously realized or considered. Each participant indicated that they found field trips to be effective. As a result of their singular experience, they collectively voiced a belief that career-focused field trips should be included in all required science classes starting in late middle school and continuing through at least the 10th grade.

Career-Focused Field Trips as Experienced by At-Risk Rural Students: A Case Study

by

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A Dissertation

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DEDICATION

To Charles, Joseph, and Rebecca,

may I always be someone of whom you were proud

CHAPTER ONE

Introduction

Rural schools and the students of rural schools are not well represented in education's current body of research (Hardre, 2007). While reasons cited for this lack in representation vary, it is generally accepted that data are difficult to obtain and even more difficult to generalize among campuses across the country designated as *rural* (Gandara, Gutierrez, & O'Hara, 2001). The apparent lack of a clear definition acceptable to all stakeholders involved in rural education has been potentially removed with the newly revised classification system from the National Center for Education Statistics (NCES). Released in 2006, this schema places schools in one of four basic categories: city, suburb, town, and rural. Each of those major categories is further defined accordingly: city and suburb – large, midsize, small; and town and rural – fringe, distant, and remote. Removed from the equation are any references to economic viability, descriptive terms referencing isolation or references to residential income and/or revenue. The new system relies on geo-coding technology and proximity to an urbanized area.

The most recent statistics available indicate that over 30% of the nation's public schools are located in communities described as rural. When reported by state in 2003, the National Center for Educational Statistics indicates the range as 0-52.2% from Hawaii and the District of Columbia to Vermont, respectively. The number of students attending rural schools nationwide is typically around or slightly less than 20%. Despite their number and impact on educational outcomes, rural public schools and their student populations are statistically underrepresented in current educational research, accounting

for less than 6% of the sampled population in some recent studies (Hardre, Crowson, Debacker, & White, 2007).

Background of Study

Providing a high quality public education to rural students is a concern that many, even within the field of education, may fail to adequately grasp. Many unfamiliar with rural school districts may envision pastoral settings where small classrooms afford fortunate students more friendly contact with concerned faculty conducting the business of teaching and learning at a slower, less frenzied pace (Sizer, 1996). The reality is rural schools have more diverse populations, higher rates of poverty, and higher numbers of single or no parent households than most urban schools (Gandara et al., 2001; Hardre, 2007). Because rural property values are generally lower than urban or suburban properties, rural schools typically have lower tax revenues with which to supplement teacher state salaries and experience greater difficulty attracting and retaining certified teachers (Hardre, 2007). Results from a 2006 Southwest Educational Development Laboratory report indicate rural schools with the highest poverty levels and lowest math scores across Texas, Arkansas, and Louisiana are consistently staffed with the lowest paid teachers. Fewer of those teachers had advanced degrees particularly when compared with urban schools.

Additionally, many rural schools are isolated from major metropolitan areas. There are immediate, accessible benefits to urban and suburban students that may not be obvious when considering the educational opportunities available to those particular students. Urban and suburban students have local access to complementary social and economic institutions that serve to enrich their school experience which might include

such venues as museums, zoos, planetariums, and local productions by theatre and college groups (DeYoung, 1995). These readily available options are absent from the average rural student's common experiences, in or away from school (Gandara et al., 2001).

Parents exert a powerful influence in the rural classroom as well (Brewer & Landers, 2005). In addition to the isolation from metropolitan influences, students in rural communities may be isolated from neighbors and extended family by sheer physical distance due to the size of property upon which they dwell (DeYoung, 1995). If they live *5 miles from the nearest house*, parents become the single consistence backdrop for the rural student. Assuming the home environment is a positive one does not guarantee that reality. Rural students are more likely than their urban and suburban counterparts to have parents who abdicate responsibility on a periodic basis, leaving adolescents for extended periods unattended and unsupervised (Hardre, Crowson, Debacker, & White, 2007).

Compounding the effect of parental influence, research has shown that the educational achievement of parents is critical to the achievement and aspirations of their children (Gandara et al., 2001; Ishitani, 2006). This is particularly true in rural homes where the value of education may not be understood or appreciated (Cobb, McIntyre, & Pratt, 1989; Hardre, 2007). Rural schools are attended by young children and adolescents who are statistically more impoverished, who are more likely to reside in substandard housing, and whose parents have higher rates of unemployment and illiteracy than their urban or suburban counterparts (Hardre, 2007). Lack of educational achievement and subsequent vocational success on the part of parents often translates into the same for their children (Gandara et al., 2001; Hardre et al., 2007). More often than urban and

suburban parents, parents of rural students make no plans for their children to venture beyond high school for vocational or higher educational options (Brewer & Landers, 2005). When they do have goals in mind, they are more likely to report that students should be finished with vocational or academic training no later than age 20 and cite the military or vocational training centers as favored options for students (Cobbs et al., 1989; Brewer & Landers, 2005). Familial lack of socioeconomic resources and isolation, place many rural students in the position of making uninformed and less appropriate decisions regarding their future vocational and higher educational options (Hardre et al., 2007).

Isolation creates conditions which give rural schools unquestionably powerful influence. Often, one rural system is the only experience that students have from kindergarten through high school graduation (Hardre et al., 2007). When this is the case, one single (and possibly very small) district serves as the only model against which students can judge their own abilities and talents (Sizer, 1996). Because this educational setting represents the only choice available to many parents, attracting and retaining quality teaching staff is critical (Zimmer-Gembeck & Mortimer, 2006). If the classroom environment created by the teacher offers opportunities and experiences in which students are encouraged to increase their knowledge and develop their talents, then the rural school is more than adequate. A less welcoming or stifling climate can serve as a deterrent to future education or training when students assume that all educational settings are equally negative (Freire, 1985; Delpit & White-Bradley, 2003; Zimmer-Gembeck & Mortimer, 2006). Rural schools have varying degrees of difficulty attracting and retaining highly qualified, experienced teachers who can serve the rural students well. Salaries and degree of isolation are chief among reasons that teachers are not

willing to contract their services to rural districts (DeYoung, 1995). Teachers who do work in rural schools may be the only certified English, math, or science teacher and thus find themselves teaching multiple levels and possibly multiple subject areas for less pay than their urban or suburban counterparts who teach only one subject at one or possibly two levels (Hardre, 2007; Hardre et al., 2007).

Personnel, both faculty and administrative, directly influence the overall climate of the rural campus (Zimmer-Gembeck & Mortimer, 2006). This is particularly important on high school campuses as adolescents push for autonomy (DeYoung, 1995). The rural high school campus is often perceived as more controlling than either urban or suburban campuses. More traditional in their methods and philosophies, overall behavior is often controlled on a rural campus through promises of rewards and threats (Sizer, 1996). Students are compelled to simply follow rules (Cobb et al., 1989). Assumed to be reflective of more traditional values, typical "dress codes" on rural campuses include style or type of clothing, acceptable haircuts and facial hair for male students, hair color for female students, and visible tattoos and/or piercings. These guidelines are often perceived by rural students as more severe than on either urban or suburban campuses (Hardre, 2007).

Another powerful determinant of quality in rural schools, as in schools everywhere, is curricular adjustment in light of No Child Left Behind (NCLB) legislation. The pressure on teachers and school districts across the country to reduce the achievement gap and produce academically successful students is enormous (Wilczenski & Coomey, 2007). In rural schools, narrowing of the curriculum is particularly common because NCLB proficiency encourages basic knowledge and application on the part of all

students (Ives & Obenchain, 2006). While this is one of the chief complaints and weaknesses of the federally-imposed high-stakes testing system, it is particularly problematic for rural districts who already suffer from a demonstrated lack of highly-qualified teaching personnel (Bouck, 2004). Emphasis on the basics which are known to be tested does, in the least case, serve to prepare students for success in those tested areas (Delpit & White-Bradley, 2003). This testing of basic skills, and the importance placed on the scores achieved, also allows less-qualified teachers to participate in that effort with some degree of proficiency as well (Ives & Obenchain, 2006; Monk, 2007). Lack of qualified staff also restricts the curriculum that can be offered in rural schools (Gandara et al., 2001). Predictably, a lack of consistently qualified personnel manifests as few to no college-prep or advanced placement options for those rural students in need of enhanced academic challenge (Hardre, 2007).

Universally, students often lament that academic content bears little meaning in their experience (Bialeschki, 2007; Hardre et al., 2007). Comments such as "Why do I have to learn this?" or "When will I ever use this?" resound in every classroom and in every discipline whether adolescents are engaged and participating or bored and frustrated. A good part of their vocalizing is likely peer-driven, normal, and expected. However, some students actually envision very little connection between content and their lives or their futures (Hardre, 2007). For these students, school is simply a location and series of activities that consume seven or more hours of the day. In content areas where abstract consideration and analysis are necessary, such as higher level math and sciences, this can present particular frustrations for many adolescent students (Kolb, 1984; Scarce, 1997) and result in their being labeled as "at-risk students." These students

often come from homes where influential role models are not available and conversations driven by future aspirations do not happen (Cobb et al., 1989). Their off-campus lives do not include active discussions with influential adults who might further develop those connections between school and work or who can adequately demonstrate the need for higher level math and science (Hardre, 2007).

Students who have expressed or demonstrated an inability to develop abstract connections between academic content and future vocations would likely benefit from alternative experiences developed for that express purpose (Atyeo, 1939; Davies, 2008). For those students who are at-risk or who have difficulty with developing abstract connections, off-campus excursions, or field trips may represent a crucial opportunity (Scarce, 1997). Isolation resulting from enrollment in a rural school impacts them more severely than might be initially evident (Hardre et al., 2007). While it might represent an ordinary or routine event for urban or suburban students, a field trip may be extraordinary, exceptional, and possibly once-in-a-lifetime event for any rural student (Atyeo, 1939; Rone, 2008; Wright, 2000). Rural schools typically have less revenue to fund such excursions; in addition, greater travel and concerns regarding liability as a result of extended travel time on well-worn roads in a predictably older district school bus serve to discourage such events (Popescu, 2008). However, administrative concerns must be weighed in light of future outcomes, particularly for these students. If given the opportunity to explore and discover connections between academic content and future career options (Bialeschki, 2007), they stand a much better chance of making decisions which are to their benefit as individuals and to the benefit of society as a whole (Ishitani, 2006).

Statement of Problem

Field trips are one pedagogical choice teachers can select for specific curricular outcomes. At its very basic, a field trip provides students with something other than the day-to-day routines in the classroom, a unique experience providing an opportunity to construct or reinforce meanings and connections (Roberts, 2006). Such excursions help students recognize the need for learning to read and write, to understand the concepts introduced in math and science, essentially exposing students to a world greater than the one they inhabit from day-to-day and the career possibilities in that larger context (Carroll, 2007). Field experiences, excursions, or field trips have long been recognized as valuable for students of all ages. Experiential learning theory (ELT) has its foundation in the constructivist theories of Dewey, Lewin, and Piaget. While this more recent model of learning and development has been applied to and studied primarily with adults (Kolb, 1984), its origins are based on educational models first developed for children and adolescents.

Rural schools represent something akin to a black hole when considering the amount of research that has been dedicated to the specific needs and problems of the population educated therein (DeYoung, 1995). As little as 6% of the studies conducted on the nation's high schools includes rural school samples (Gandara et al., 2001; Hardre, 2007; Hardre et al., 2007). Rural schools represent 30% of the nation's campuses and are responsible for the educational outcomes for just under 20% of the nation's students. Issues critical in their impact for these students include: adequate teacher supply, taxes, and poverty (DeYoung, 1995; Hardre et al., 2007). Rural school districts have a higher percentage of students who are from single or no residential parent households. As such,

these households offer little or no direction or encouragement to explore vocational or higher education options past high school graduation (Hardre et al., 2007). Rural students engage in risky behaviors more often than their urban or suburban counterparts, specifically sex and underage drinking, and have a greater incidence of emotional problems quite possibly due to extended isolation (Gandara et al., 2001). Consequently, rural students more often report lower aspirations when asked about their futures, particularly careers and higher education options. Once they have completed high school, some rural students appear unable to envision further investment in extensive training and seem willing to settle for less when considering careers that require extensive training and/or higher education (Cobb et al., 1989).

The state approved and adopted curriculum for every course taught in Texas public schools is outlined by the Texas Education Agency (TEA) as the Texas Essential Knowledge and Skills (TEKS). The TEKS at the high school level include: a general requirement statement (listing any prerequisites, recommended grade or age level of potential students, and the credit earned upon successful completion), an introduction (a series of global statements/goals covering the basic curriculum design), and a list of knowledge and skills (a further defined minimal list of required topics and competencies to be included during the course). Three science courses – biology, chemistry, and physics – are required for graduation by the participants selected for this study. Each of the science courses includes a goal that students be able to recognize various disciplines as they relate to future potential careers. TEKS 3(D) contains identical text for each of the three required courses, describing the desired goal, and can be found on Texas

Education Agency's (2009a) website: The student is expected to describe connections between (biology/chemistry/physics) and future careers.

Often, rural students report that they see no connection between what is taught and how content might be needed in future careers (Zimmer-Gembeck & Mortimer, 2006). They lack the resources available to those students schooled in or very close to metropolitan areas – including museums, universities, and out-reach programs (such as TRIO, Gear-Up, and Talent Search) which serve to put students in contact with live role models (DeYoung, 1995). To make these options available to rural students requires travel, an expense many rural districts cannot afford (Popescu, 2008).

Field trips which are content specific and career oriented (particularly at the high school level) may offer at-risk rural students the only opportunity they have to discover and thus be able to describe connections between academic science content and future careers (Zimmer-Gembeck & Mortimer, 2006). The purpose of this study was to investigate the following questions:

1. How does the ability to describe connections between academic science content (biology, chemistry, and physics) and future careers change as rural students experience a purposeful excursion to a post-secondary facility providing vocational training?
2. When do the connection(s) between content and future careers become apparent to students?
3. What effects or impact do newly discovered connections have on rural students' aspirations with regard to future career or higher education options?

Limitations

This study had several limitations. The participants were 12th graders on a rural high school campus who had received instruction from a specific set of teachers as a cohort. As indicated in the literature, research on rural schools is sparse, but what is known indicates that campuses are vastly different based on economics, location, and population demographics. Given the diversity of the students involved and the diverse nature of rural high schools, it is expected that this study will more fully explore and explain the particular problem on this high school campus and students' ability to describe connections between academic content and future careers (Merriam, 1998). The intervention experienced by participants was a field trip, specifically designed to provide access to a postsecondary setting not previously explored by the students. The effects of the field trip on their capacity to describe connections between content and future careers will provide the measure of effectiveness (Yin, 2003). While experiential learning theory provides the theoretical framework for this study, the effective classroom practitioner is typically more concerned with viable pedagogical choices which are proven effective, regardless of theory. Therefore, generalizing the results herein may provide other rural high school science teachers additional evidence for choosing purposeful field experiences when teaching in similar settings with similar students.

Significance of the Study

Students in rural school settings represent a poorly investigated population and one which is at higher risk for underachievement with regard to vocational and academic goals than is generally appreciated. The results of this study affirm the need for science curricula tailored to include field trips or excursions for student populations in rural

settings. At the very least, this study adds to the overall limited literature base that exists regarding research of rural schools.

Definition of Terms

1. *At-risk students* – students who are identified for reasons not limited to but include the following: learning disabilities, emotional or behavioral problems, poverty, lack of support or encouragement at home for academic achievement, classified as rural, from single parent households, non-English speaking households, and more often male than female (Ormrod, 2008).

2. *Field trip* – any kind of short-term educational expedition, trip, or experiential learning experience; organized to achieve certain objectives for and made by a group of students as part of their regular school work (Ayteo, 1939; Hunter, 1916). Synonyms within this work include *field studies, field excursion, school excursion,* and *study excursion*.

3. *Experiential learning* – the process of making meaning from direct experience and personal reflection, involving the learner directly in the phenomena being studied; examples include service learning, field trips, in-class active project learning, and cooperative education (Davies, 2008; Kolb, 1984).

4. *Formal learning* – information or academic material that is presented as knowledge to students in schooling situations; already exists in the public domain and is (theoretically) available to everyone (Cross, 2007).

5. *Informal learning* – learning from doing, personal experiences or witnessing the experiences of another; involves a social event of some type and may be indicative of most true learning (Cross, 2007).

6. *Service learning* – the linkage of service to academic content and standards providing personal and social learning experiences as well as opportunities for career exploration while helping to determine and meet real community needs (Wilczenski & Coomey, 2007).

Methodology

The research questions for this study were the determining factor in selecting an appropriate research design. The questions guiding this decision were:

1. How does the ability to describe connections between academic science content (biology, chemistry, and physics) and future careers change as rural students experience a purposeful excursion to a post-secondary facility providing vocational training?
2. When do the connection(s) between content and future careers become apparent to students?
3. What effects or impact do newly discovered connections have on rural students' aspirations with regard to future career or higher education options?

Application of an intervention (field trip) and student perceptions measured with each question indicated that a narrative multiple-case case study was the most logical choice for this project (Yin, 2003).

A narrative multiple-case case study provided the opportunity to include additional influences which illustrate the complexities of conducting such investigations (Merriam, 1998). Although not directly addressed by the research questions herein, influences on the participants involved in this study certainly included any number of or all of the following: individual personalities of the student, aspirations of the student,

educational history of the student, school environment, teacher quality, experience/educational record within the various science disciplines (biology, chemistry, and physics), family socioeconomic status, parents' educational achievement and aspirations for the student, parental employment records, citizenship status and ethnicity. A narrative case study allowed inclusion of such information, lending deeper understanding of these unique participants (Yin, 2003; Merriam, 1998; Wolcott, 1994).

Participant Sample

The rural school selected for this study was considered 'rural distant' under the NCES' newly created guidelines as it is *more than 5 miles but less than 25 miles from an urbanized area* (the city of Waco). Students from this campus who were possible participants for this study were in the 11th grade. They had received all of their high school academic science classes on the same campus, subject to the same teachers for each of the separate disciplines. They received no other formal instruction during each of the three courses. Initially all possible participants were surveyed, reporting their interests and future aspirations. Those who could not describe connections between science content (biology, chemistry, and physics) and future careers were further selected. From this group, those who could not describe connections between academic content from at least two of the three disciplines created the potential group of participants for the study. The selection of final participants was based on the number of final candidates. Participants were selected in order to represent maximum variation with the study group (Merriam, 1998). Given the latest statistics reported by the school and available on the campus website, this group of participants was predominantly white,

both male and female, and classified as "at-risk" as well as "economically disadvantaged".

Data Collection Procedures

The data collected for this study included survey information, records of past academic performance in the selected high school, TAKS scores from 8th, 10th, and 11th grade science assessments, individual interviews, and focus groups conducted between the selected participants and the researcher. As described by both Merriam and Creswell, the role of the researcher was best defined as "participant-observer". Employed at the time by the school district and teaching one of the required classes (chemistry) on this campus, the activities typical of the observer were subordinate to the primary role as the teacher of record (Merriam, 1998; Creswell, 1997).

Initially through the use of a survey, each of the participants identified difficulty describing connections between academic content and future careers in at least two of the science academic areas considered in this project. From the students selected for the study, semi-structured interviews were used to elicit further information from students regarding their reported difficulty with describing connections between academic content and future careers (Creswell, 1997). Interviews provided further evidence of difficulty as well as any other factors which influenced the student's inability to envision connections between academics and career (such as family or peer interactions).

Additional participant-specific documentation collected included grade reports from the three science classes taught on the campus and science TAKS scores from grades 8, 10 and 11. While these reports individually served to more fully describe the participants, they could further and collectively provide guidelines when considering

whether such results could be generalized when working with similar groups of students (Merriam, 1998).

The participants selected for this research was attended a field trip designed to particularly emphasize the application of academic content from one or more of the classes for which the participants had already earned a high school credit. The field trip was conducted during the school day with all participants experiencing the event as a group. The site for this excursion was the Waco campus for Texas Technical State College (TSTC). Specific vocational programs on this campus represented potential and more acceptable career options for rural students' and their families as earlier described. As a group, the participants attended presentations based on identified areas of interest, were given the opportunity to interact with faculty on the TSTC campus, and toured the campus facilities as a group. Further, the students were provided with financial aid information specific to the TSTC campus as well as the identified programs and made aware of the TSTC's employment commitment to their graduates.

After a break for lunch, the students were taken to a neutral off-campus location for a focus group interview, responding to semi-structured interview questions. After one week to reflect upon the experience, they provided further feedback in the form of individual interviews. This venue provided the researcher an opportunity to further explore the individual responses given during the group interview as well as to receive feedback from students who preferred not to speak while with the group.

Data Analysis Procedures

The data provided in this case study was reported as a narrative (Creswell, 1997). Initially, the case and its significance were outlined, providing a thorough description of the research questions and participants in the project. Next, the sources of data (student inventory, student records, pre- and post-treatment live interviews and focus groups) were analyzed and interpreted. In the first analysis, the researcher was looking for patterns among students reporting an inability to describe connections between science content and future careers. In the second analysis, the researcher was looking for a possible single incident during the students' excursion experience that led to successful connections recognized between science content and future careers. In the third analysis, the researcher was looking for changes in students' perceptions regarding future career and higher education options as a result of the field trip experience. The final analysis provided a comparison across the cases in light of the original research questions.

Conclusion

Rural students and their schools are historically under-represented in educational research and literature of the late 20th century. Little appears to have changed with the new millennium. Rural students have unique problems which create particular concerns regarding their aspirations and future careers. These problems often originate in homes where little adult encouragement or guidance is provided; these same problems are often compounded by the schools where highly qualified staff is temporary, limited, or not available. Field trips offer rural students, and particularly at-risk students, enrichment experiences which may stabilize their ability to make connections between academic science content and their future career options.

This section provided an overview of the problem and proposed a narrative multiple-case case study involving students who self-identified an inability to describe connections between science content and future careers or higher education options, using a field experience or excursion as the treatment. Participant selection, data collection, and data analysis were discussed as well as limitations and implications for generalizability of results.

Chapter Two offers a more complete literature review used to frame the study. The literature reviewed includes the following:

1. A historical foundation for field trips starting in the early 20th century (field trip as pedagogy) – including the progressive educational foundations of field trips; the impact of NCLB on curriculum, curricular decisions, and field trips; and web-based field trips.
2. A review of rural schools – historical versus current descriptions of rural schools, hiring practices in rural schools, and the impact on curriculum, funding of rural schools, the critical need for academic role models particularly on rural campuses;
3. A review of rural students – lack of research with regard to rural students and their schools; parental expectations and post-graduation aspirations when compared with urban and suburban counterparts; the social and political outcomes of an educated populace; and the need for apprenticeships in the United States;
4. A review of experiential learning theory and Freire's banking concept of education;
5. A description of multiple-case case study – a brief review of case study in the social sciences and its effective use in educational research.

CHAPTER TWO

Literature Review

In this chapter, literature related to the research questions is offered to demonstrate the significance for this study. As the first research question deals with the efficacy of field trips as a pedagogical choice for rural science teachers, current research with a focus on field trips is presented first. Because there is a lack of research dealing with rural schools and their students, available recent research concerning those schools and their students is also presented, addressing aspects of both the second and third research questions. Experiential learning and the importance of learning through conversation are explained as this establishes the framework for this particular teaching pedagogy. Finally, the selection of narrative multiple-case case study is explored as the model for this study.

Field Trips

Records of Research from Early to Mid-20th Century Field Trips

Records from educational sources at the start of the 20th century reveal little information regarding off-campus excursions. However, between 1920 and 1935, the number of articles appearing in research journals indicated an increased interest in this pedagogy, with four articles appearing from 1920-1924, increasing to 19 articles from 1925-1929, and 45 articles from 1930-1934 (Atyeo, 1939). Early 20th century progressive educators, particularly in the sciences, gave life to the concept now called the "field trip". The first city to officially incorporate field trips into its public school

curriculum was Philadelphia. In 1921, the school appointed a committee that eventually recommended over 50 field trips (referred to as "the excursion method") be planned to enrich the subjects offered (Atyeo, 1939).

Born in the science laboratory. "CAUTION - Do not smell the cyanide: even the fumes are deadly poison" (p. 33) reads the introduction to Hunter's chapter on the function of a field trip in the 1916 edition of *Laboratory Problems in Civic Biology*. As early as the 1910s, some science educators were recognizing the need for *city children* to visit such places as parks and fields in order to gain a better perspective of *the environment* (Hunter, 1916). Through the first half of the 20th century, there were several series of often-adopted science textbooks that strongly advocated the need for field trips and excursions to further enhance science knowledge, even hinting at possible social ramifications for students and their futures as a more knowledgeable citizenry (Baker, Mills, & Connor, 1938; Curtis & Urban, 1949; Curtis, Caldwell, & Sherman, 1934; Hunter, 1907, 1911, 1916; Moon, 1921; Moon & Mann, 1938).

Additional influences. A popular voice of the 20th century progressive movement in education, John Dewey (1938) defended the use of field trips (or as he called them *study excursions*) as an effective method for breathing life into multiple disciplines such as history and geography, not just the natural sciences. His aim was to situate what might, in the isolation of the classroom, become lifeless as a result of separation from anything resembling a social context. Before Dewey (1938), there were voices in science education at the turn of the century reminding teachers to include sufficient time for investigations; science students were to be considered investigators searching for

verification of truth, not idly absorbing information deemed necessary (Montcrief, (1903). The National Education Association's (1899) records from its annual meeting in 1899 indicated a minimum 40% laboratory time was recommended for students to obtain enough experience in any creditable science class.

An offshoot of the *laboratory method* used in science classes whereby students ventured into the field to find and observe relevant material, excursions quickly spread to other disciplines as well particularly those taught to adolescents (Atyeo, 1939), an age when curiosity was believed to peak. Then (as now) textbooks stood as a representation of necessary curriculum – that which would be required and needed for a productive life. Remaining stable and unchanging, the probable usefulness and application of textbook information could be judged through the insight provided by the dynamic nature of and information obtained while on excursions (Cross, 2007). Field trips were considered so critical there was a general fear in the early 1930s that too few were being taken, even though the country was in the midst of the Great Depression. A survey conducted in 1932 of 268 public school principals revealed that they considered field trips to be inherently valuable but too little used (Fraser, 1939).

Records of Late 20th and Early 21st Century Curricular Options

Over 70 years later, advocates of field trips echo progressive education beliefs that well-planned excursions help students understand the need to learn reading, writing, math, history, art, science, and geography – singly or in any combination (Carroll, 2007). Field trips represent one of the best opportunities for students to create connections between the textbook and the world at large (Scarce, 1997). Advocates of field trips point to the fact that not only do students learn best in socially relevant surroundings,

textbooks and classrooms (regardless of their 21st century accoutrements) lack actual knowledge of the world because they are mere representation only (Baker, Jensen, & Kolb, 2002; Scarce, 1997).

Narrowing of the curriculum due to NCLB. Curricular decisions reflect the values of those who control such decisions. In the current climate created by NCLB, curriculum is limited and teaching tends to focus solely on those topics which are known to be tested (Lamb, 2007). The second half of the 20th century was dominated by the mechanistic view of education promoted by Thorndike (Gibboney, 2006). As a result, reductionist efforts whereby teachers implement classroom strategies to continuously prepare students for high-stakes tests are routinely defended (Delpit & White-Bradley, 2003). This is believed to be especially true when overall teacher effectiveness may be judged on that single score (Lamb, 2007). High-stakes tests have slowly evolved in the last 50 years to become the only measure by which to evaluate schools, teachers, and students (Bracey, 2009; Ives & Obenchain, 2006). As a result of the growing pressures for accountability under NCLB, instructional methodologies and creative pedagogy (including field trips) have been generally curtailed or abandoned totally (Ives & Obenchain, 2006; Lamb, 2007; Powell, Higgins, Aram, & Freed, 2009). With regard to field trips specifically, the emphasis on standardized, high-stakes testing has produced a reluctance to take students out of the classroom. Even where that decision might be entertained, academically-focused field trips may not be feasible as budgets are constrained by the costs of administering the tests. School traffic at museums across the country has dropped by one-quarter in the past five years and is now stagnant. The top three reasons currently cited for lack of field trip opportunities are (Popescu, 2008):

1. Performance demands due to NCLB;
2. Increased transportation and insurance costs; and
3. Tightening or narrowing of curriculum, eliminating field trips.

The bottom line has become students' academic performance on selected standards which constitute the basis for high-stakes testing as mandated through the federal legislation. Success on these tests has produced a nation-wide classroom culture which promotes a heavy focus on lower-order cognitive skills, primarily memorization, retention, recall, and rudimentary comprehension (Ives & Obenchain, 2006; Wilczenski & Coomey, 2007).

Web-based field trips. Schools across the country have invested considerable amounts of money to install and maintain internet access on a wide scale for their students. Using computers in teaching does not simply mean having a new tool; it also means reformatting information into a different medium. Educational software is still in its developmental stage and, as such, the market is filled with options which range considerably in quality and usefulness (Forester, 2000). Those who promote this development insist that this access provides students with new communication options and challenges which hold new promises of achievement (Goddard, 2002); further, the argument in favor of heavy investment on the part of schools rests of the notion that high school students are only a couple years from a workplace where computing skills are in demand (Oppenheimer, 2003). On the opposite side of this debate are those who find students overwhelmed by the sheer volume of sources of information offered by the internet (which are not always accurate or reliable) and frustrated by security issues as well. This is particularly true for poor students and rural students, a situation where it is

common that the school's computer system represents the only real point of access for the student (Oppenheimer, 2003).

Web-based field trips are the latest in virtual options available for teachers to implement in their classrooms. For campuses without the funds to actually travel, they represent an enrichment option which may allow some insight for students; however, they do not substitute for first-hand experience (Scarce, 1997). For the purposes of this research, two volumes were reviewed. The selection of these volumes, *More Virtual Field Trips* (Cooper & Cooper, 1999) and *New Virtual Field Trips* (Cooper & Cooper, 2001), was based upon recommendations from textbook publishers (textbooks adopted by the school selected for this study). The chapters considered for review in each volume were those which highlighted science topics.

The chapter from *New Virtual Field Trips* dealing with science was entitled "Science and Industry" (Cooper & Cooper, 2001). It contained 20 pages of references to websites ranging from anatomy, aviation and aerospace, biology and botany, biotechnology and cloning, chemistry, earth and environmental, forensics, general, geology, gems and minerals, health-drug and alcohol addiction, materials, microscopy, museums and laboratories, optical illusions, paleontology, physics, and technology. Of the 60 separate listings, the greatest number were under the category "museums and laboratories" (19 sites). Most of the sites indicated a "gaming" component and (when not blocked by the school's firewall) were specified as appropriate for "upper elementary students". A few sites provided historical information with regard to specific scientists and their contributions; there were very few that contained information on vocations or

careers. The primary focus, while educational, appeared to emphasize lower-cognitive, gaming skills.

In the second volume, *More Virtual Field Trips*, the chapter dealing with science was simply titled "Science" (Cooper & Cooper, 2001). It contained 15 pages of references to websites covering: anatomy, archaeology, aviation and aerospace, biology, chemistry and genetics, botany, earth and environmental education, forensics, general science, inventions, paleontology, physics, and technology. As indicated by the title, more trips were listed (as in none are repeated from the original 60), adding 45 new options. This collection was heavily loaded with university labs providing more game-based activities designed to explain specific science phenomena. Again featured were historical developments regarding technology currently used in "everyday lives" but little to no reference involving career options students might consider.

Rural Schools and Rural Students

The profound lack of research focused on rural schools indicates the challenge involved for those interested in studying the needs of rural students or the conditions of rural schools (Gandara et al., 2001; Hardre et al., 2007). Estimates vary, but approximately 30% of U.S. schools are labeled rural along with 16-28% (again, estimates vary) of the nation's students (DeYoung, 1995; Gandara et al., 2001; Hardre et al., 2007). The variance of statistical information has two major implications – first, the lack of consistent definition (i.e., what constitutes a rural school) and the lack of research (Hardre et al., 2007).

Rural Schools

Most of the existing research examining the U.S. educational system focuses on urban schools. The obvious lack of research focusing on rural schools is difficult to defend when realizing that 244 out 250 of the poorest counties in the nation are rural. This indicates that an increasingly invisible group is subject to the treatments proposed to address those problems which have been well-studied – urban identity, urban problems, and urban future (Whittle, & Denaus, 2007).

In 1992, approximately 22,400 schools in the United States were classified as rural. Based on demography and economy, schools were classified as (DeYoung, 1995):

1. High Growth (located immediately adjacent to expanding large cities);
2. Reborn (repopulated by city dwellers attempting to escape urban problems such as high volume traffic and high crime rates);
3. Stable Rural (self-sustaining, market-agriculture driven, able to sustain local traditions – especially those involved with school as well as meeting national schooling demands, possessing a strong local tax base owed to agricultural economy);
4. Depressed Rural (local economy underdeveloped and migration is outwardly directed); and/or
5. Isolated Rural (located far away from transportation centers or commercial interests).

Any apparent ambiguity, confusion, or lack of an acceptable clear definition was potentially removed with a recently revised classification system from the National Center for Education Statistics (NCES). Released in 2006, this schema places schools in

one of four basic categories: city, suburb, town, and rural (National Center for Education Statistics, 2006). For those labeled as rural, any references to economic viability, population numbers, descriptive terms referencing isolation or references to residential income and/or tax revenue are removed. Each of those major categories is further defined as:

1. city – large, midsize or small;
2. suburb – large, midsize, small;
3. town – fringe, distant and remote; and
4. rural – fringe, distant and remote.

The new system relies solely on geo-coding technology and proximity to an urbanized area.

Recruitment and retention of teachers in rural schools. There is no question that rural schools have a difficult time recruiting and retaining highly-qualified teachers as mandated by NCLB (Hardre, 2007). In part, the failure of colleges to include rural school concerns in their curriculum can be blamed (Barley, 2009). For those unfamiliar with rural teaching, many rural schools are isolated from major metropolitan areas placing doctor's offices, shopping, and entertainment at distances hard to justify for a casual visit (DeYoung, 1995).

Rural schools have varying degrees of difficulty attracting and retaining highly-qualified, experienced teachers who can serve the rural students well. Salaries and degree of isolation are chief among reasons that teachers are not willing to contract their services to rural districts (DeYoung, 1995). Those new to the profession and/or unaware of the demands rural teaching assignments can carry often find themselves responsible

for an entire discipline (e.g., a science teacher who is teaching biology, physics, and chemistry) for less pay than their urban or suburban counterparts who teach only one subject at one or possibly two levels (Hardre, 2007; Hardre et al., 2007). The highly-qualified mandates demanded under NCLB have created disincentives to teach in small rural schools as teachers must be highly-qualified in all classes taught. The result is that rural schools with smaller populations (less than 300 students) experience higher turnover rates than rural schools with larger numbers of students (Beesley, Atwill, Blair, & Barley, 2010).

Because rural property values are generally lower than urban or suburban properties, rural schools typically have lower tax revenues with which to supplement teacher state salaries and experience greater difficulty attracting and retaining certified teachers (Hardre, 2007). Results from a 2006 Southwest Educational Development Laboratory report indicate rural schools with the highest poverty levels and lowest math scores across Texas, Arkansas, and Louisiana are consistently staffed with the lowest paid teachers. Fewer of those teachers had advanced degrees particularly when compared with urban schools.

With respect to the public's general awareness of rural schools, many misconceptions have been created as a result of the more heavily-studied urban schools. The reality is rural schools have more diverse populations, higher rates of poverty, and higher numbers of single or no parent households than most urban schools (Gandara et al., 2001; Hardre, 2007). What may also be lacking is an understanding that federal funding is not equally distributed across school systems; in other words, a child in a rural school does not "net" as many dollars from the federal government's education funding

formula as an urban or suburban student sitting in a classroom, sometimes less than 10 miles away (Hooker, Montgomery, & Youdan, 1996).

Rural campus climate. Relatively little is known about rural communities and their schools. Most research is descriptive demographically but does little to illuminate the ways in which they differ from urban or suburban campuses (Gandara et al., 2001). The climate and influence of the rural school is unquestionably powerful. In so much as the school's function is to create a motivational climate, teachers and administrators have multiple demands placed on them. Those who support and create autonomy on their campuses give students meaningful choices, make learning relevant, and provide explanations for tasks that are meaningful, imparting the critical need for an internal locus of control. On the other hand, teachers and administrators who motivate and control students – particularly students on high school campuses – using extrinsic methods (e.g., rewards and threats, emphasizing rules rather than teaching reason) do little to help students develop and mature into fully functioning adults (Hardre, 2007).

Often, one rural system is the only experience that students have from kindergarten through high school graduation (Hardre et al., 2007). When this is the case, one single (and possibly very small) district serves as the only model against which students can judge their own abilities and talents (Sizer, 1996). Because this educational setting represents the only choice available to many parents, attracting and retaining quality teaching staff is critical (Zimmer-Gembeck & Mortimer, 2006). If the classroom environment created by the teacher offers opportunities and experiences in which students are encouraged to increase their knowledge and develop their talents, then the rural school is more than adequate. A less welcoming or stifling climate can serve as a

deterrent to future education or training when students assume that all educational settings are equally negative (Freire, 1985; Delpit & White-Bradley, 2003; Zimmer-Gembeck & Mortimer, 2006).

Personnel, both faculty and administrative, directly influence the overall climate of the rural campus (Zimmer-Gembeck & Mortimer, 2006). This is particularly important on high school campuses as adolescents push for autonomy (DeYoung, 1995). The rural high school campus is often perceived as more controlling than either urban or suburban campuses. More traditional in their methods and philosophies, overall behavior is often controlled on a rural campus through promises of rewards and threats (Sizer, 1996). Students are compelled to simply follow rules (Cobb et al., 1989). Assumed to be reflective of traditional values, typical dress codes on rural campuses include style or type of clothing, acceptable haircuts and facial hair for male students, hair color for female students, and visible tattoos and/or piercings. These guidelines are often perceived by rural students as more severe than on either urban or suburban campuses (Hardre, 2007).

Rural curriculum – Economy of scale and NCLB. Rural school curricula are affected by economic factors not typically understood by those not intimately involved with public education. Economies of scale, the real per pupil cost, and work against rural schools all eventually take their toll on the curricular offerings. All public schools are supplemented with Average Daily Attendance (ADA) federal funds. Larger school districts, especially those larger than 5,000, attract considerably more money and can therefore invest in much more for their students in the way of various curricular and program offerings. Fewer ADA monies and lower local tax bases translate into limited curriculum, fewer programs, lower teacher salaries, and insufficient technological

resources; all of these place rural students at risk for receiving lower quality curriculum and less education than they need to compete on the national and global scene for jobs (Gandara et al., 2001; Hooker, Montgomery, & Youdan, 1996).

Another powerful determinant of quality in rural schools, as in schools everywhere, is curricular adjustment in light of No Child Left Behind (NCLB) legislation. The pressure on teachers and school districts across the country to reduce the achievement gap and produce academically successful students is enormous (Wilczenski & Coomey, 2007). In rural schools, narrowing of the curriculum is particularly common because NCLB proficiency encourages basic knowledge and application on the part of all students (Ives & Obenchain, 2006). While this is one of the chief complaints and weaknesses of the federally-imposed high-stakes testing system, it is particularly problematic for rural districts who already suffer from a demonstrated lack of highly-qualified teaching personnel (Bouck, 2004). Emphasis on the basics which are known to be tested does, in the least case, serve to prepare students for success in those tested areas (Delpit & White-Bradley, 2003). This testing of basic skills, and the importance placed on the scores achieved, also allows less-qualified teachers to participate in that effort with some degree of proficiency as well (Ives & Obenchain, 2006; Monk, 2007). Predictably, a lack of consistently qualified personnel manifests as few to no college-prep or advanced placement options for those rural students in need of enhanced academic challenge (Hardre, 2007).

Frustration on the part of faculty with NCLB's constraints on the curriculum and overemphasis on accountability is evident. Limited by lower enrollments and isolation, and particularly where the population is poor, rural classrooms can exhibit greater

fluctuate in student performance from year to year as grade level student populations can be wildly affected by the influx and/or efflux of a handful of students (Lamb, 2007). Classroom teachers caught in the bind of teaching rural students and meeting curricular goals tied to NCLB commonly complain that the curriculum is burdensome, heavily restrictive, does not meet the needs of individual students, and is underfunded to the extent that local curricular funds are stretched or appropriated to cover those costs (Powell et al., 2009).

Rural Students

Providing a high quality public education to rural students is a concern that many, even within the field of education, may fail to adequately grasp. Many unfamiliar with rural school districts may envision pastoral settings where small classrooms afford fortunate students more friendly contact with concerned faculty conducting the business of teaching and learning at a slower, less frenzied pace (Sizer, 1996).

Rural students and the classroom. Universally, students often lament that academic content bears little meaning in their experience (Bialeschki, 2007; Hardre et al., 2007). Comments such as "Why do I have to learn this?" or "When will I ever use this?" resound in every classroom and in every discipline whether adolescents are engaged and participating or bored and frustrated. A good part of their vocalizing is likely peer-driven, normal, and expected. However, some students actually envision very little connection between content and their lives or their futures (Hardre, 2007). For these students, school is simply a location and series of activities that consume seven or more hours of their day.

Because small rural campuses do not generally offer high-end academic courses, students often report that they don't feel ready for college (Doyle, Kleinfeld, & Reyes, 2009; Cobb et al., 1989). With little chance to fade into the background, students are funneled into the same classes, where teachers present academic content aimed *at the low-middle* students leaving those at the extreme ends to fend for themselves. With smaller classes, it is more difficult for students to fade into the background – everyone knows everyone else. Students also have few options when conflicts arise with other students or teachers; transferring to another class to avoid a classmate may be possible, but the teacher remains a constant (Lee, Smerdon, Alfeld-Liro, & Brown, 2000).

Rural students and the consequences of isolation. Many rural schools are isolated from major metropolitan areas. There are immediate, accessible benefits to urban and suburban students that may not be obvious when considering the educational opportunities available to those particular students. Urban and suburban students have local access to complementary social and economic institutions that serve to enrich their school experience which might include such venues as museums, zoos, planetariums, and local productions by theatre and college groups (DeYoung, 1995). These readily available options are absent from the average rural student's common experiences, whether in or away from school (Gandara et al., 2001).

These students often come from homes where influential role models are not available and conversations driven by future aspirations do not happen (Cobb et al., 1989). Their off-campus lives do not include active discussions with important adults who might further develop those connections between school and work or who can adequately demonstrate the need for higher level math and science (Hardre, 2007).

Parental influence and the aspirations-achievement gap. Parents are a fundamental influence over the climate of the rural classroom as well (Brewer, 2005). If they live *5 miles from the nearest house*, parents become the single consistent backdrop for the rural student. Assuming the home environment is a positive one does not guarantee that reality. Rural students are more likely than their urban and suburban counterparts to have parents who abdicate responsibility on a periodic basis, leaving adolescents for extended periods, unattended, and unsupervised (Hardre et al., 2007).

Compounding the effect of parental influence, research has shown that the educational achievement of parents is critical to the achievement and aspirations of their children (Gandara et al., 2001; Ishitani, 2006). This is particularly true in some rural home environments where the value of education may not be understood or appreciated (Cobb et al., 1989; Hardre, 2007). Rural schools are attended by young children and adolescents who are statistically more impoverished, who are more likely to reside in substandard housing, and whose parents have higher rates of unemployment and illiteracy (Hardre, 2007).

A gap between aspirations and achievement is more typically evident in rural students who are poor and lack a structured pathway out of that poverty (Doyle, Kleinfeld, & Reyes, 2009). Lack of educational achievement and subsequent vocational success on the part of parents most often translates into the same for their children (Gandara et al., 2001; Hardre et al., 2007). More often than their urban and suburban counterparts, parents of rural students make no plans for their children to venture beyond high school for vocational option or higher educational opportunities (Brewer, 2005); those children as well are more likely to lack a coherent and realistic life plan (Doyle et

al., 2009). When they do have goals in mind, parents of rural students more often report that they expect vocational or academic training to be complete no later than age 20 and cite the military or vocational training centers as favored options for their children (Brewer, 2005; Cobb et al., 1989). Familial lack of socioeconomic resources and isolation, place many rural students in the position of making uninformed and less appropriate decisions regarding their future vocational and higher educational options (Hardre et al., 2007). The result is that many rural students are confused and take few steps to realize any goals, often blaming poor preparation on the part of the rural high school (Doyle et al., 2009). Additionally, they report that influential, educated adults (i.e., teachers, administrators, guidance counselors) did not want them to go to college (Cobb et al., 1989). Finally, a lack of awareness on the part of rural students means they are often uninformed with regard to college application process because they do not seek actively the information and assumed that somehow the opportunity would simply appear upon graduation (Lee et al., 2000).

A Case Study

The early 20th century was a period during which the field of *human studies* developed and its use was advocated by many in order to more fully understand human nature and actions. Later known as sociology, one of its proponents was Wilhelm Dilthey. Dilthey, a German philosopher, defended the need to explore human understanding through less *scientific* means, claiming that perception and communication were necessary in order to more fully appreciate the human experience. Separating the objective nature of law-based natural sciences from human studies, he believed that experience was most effectively related and understood through ordinary personal

involvement. According to Dilthey, this level of understanding required full, deep knowledge of the particular – in other words, it required what has become known as a case study (Stake, 1978).

Choosing Case Study

Case study is a research strategy which does not require the use of any particular data set or evidence collected (Yin, 1981). Seeking to understand a particular event or person considered interesting or unique (Yin, 2003), a case study may pull evidence or data from fieldwork, archival records, interviews, questionnaires, verbal reports, observations, or any combination of these (Yin, 1981). The hallmark of a case study is the focus on an event or phenomenon situated in its context and the subsequent examination of that event, particularly when the event (phenomenon) and the context are not easily separated (Yin, 1981). Focusing on a single setting and the dynamics present within that setting, some past examples of case study research include a description of TVA in 1949 by Selznick, a study of the Cuban missile crisis in 1971 by Allison, and research on decision-making while shopping in a British retail store in 1973 by Pettigrew (Yin, 1981).

Because case study method seeks understanding, explanation, or description of a unique event, this method fits the problem central to this study. Of the three types of case study – exploratory, descriptive, and explanatory – this study is descriptive (Yin, 1981). The event researched, a field trip, and the questions asked in this study are organized into participant narratives, allowing each to be treated as a separate unit of analysis. As the study seeks to describe the changes experienced by the participants and to compare those

changes across the cases, this research is presented as a multiple-case case study (Yin, 2003).

Narrative Format

The first-person accounts contained within this case study were reported as narratives. While they are organized around the research questions (Yin, 1981), they were also presented just as the experiences were described by the participants, as first-person accounts (Merriam, 1998). It was also accepted that semi-structured or open-ended questions did not always produce clear, in-depth, or thoughtful responses from each participant; as a result, more or less questioning was evident in the various interviews conducted. Each narrative was reported in a separate section indicated by the participant's pseudonym, with an additional section covering the cross analysis and results (Connelly & Clandinin, 1990; Yin, 2003).

Multiple-Case Case Study

Case study research does not always demand multiple participants in order to be effective (Yin, 2003). However, in this study, multiple cases were included in order to discover evidence of consistent patterns or changes as a result of the selected off-campus field excursion. Compounding evidence in this manner produces a case which is expected to be more robust and compelling (Herriott & Firestone, 1983).

Ensuring valid results through this study required treating each separate case in an identical manner, following replication logic. Careful selection of cases and rigorous attention to protocol is similar to conducting multiple (objective) experiments and was

predicted to produce similar results. Through strict adherence to a specific protocol, such replications can be expected to produce findings that are worthy of notice (Yin, 2003).

Effective Learning Environments

Current educational reform borrows from two separate, very different early 20th century education philosophers – Dewey and Thorndike (Gibboney, 2006). Thorndike viewed humans through a mechanistic lens, proposing that learning could be proven most easily and efficiently through test results – quantitative, measureable, and subject to statistical verification. Dewey, on the other hand, placed a premium on one's ability to deal effectively with the problems presented as a result of lived experience and believed that effective problem-solving provided the most reliable "proof" of learning (Gibboney, 2006).

A progressive leader in education of the early 20th century, Dewey (1938) felt that all learning was experiential, based in the life and experiences of the learner. While he believed in an "organic connection between education and personal experience" (p. 38), he did not believe all experiences were equally educational (Dewey, 1938). When weighing educational experiences based on their ability to provide for deep, and possibly transcendent, outcomes, Paulo Freire (1992) likened the traditional classroom to a banking system in which students passively receive information (presented as knowledge) with little to no time for reflection or meaning-making. In alignment with Dewey's (1938) concept of schools and their purpose, Freire (1992) also felt that the most effective learning was based on problem-posing and problem-solving.

Experiential Learning

When experiences are transformed into knowledge, experiential learning has occurred (Kolb, 1984). An integral part of some educational programs (e.g., secondary agricultural education), experiential learners are expected to construct meaning from their experiences, with active participation required just as described by Dewey (Roberts, 2006; Stinson, 1919). Broadly defined, experiential learning refers to activities that directly engage the learner (Cantor, 1997; Scarce, 1997) and the process by which the learners construct knowledge, skills and values from those experiences (Luckman, 1996).

Experiential learning theory. Experiential Learning Theory (ELT) is a well-researched model which has been developed as a result of working with adults (Rone, 2008; Scarce, 1997). A unique blend of theory and perspectives, ELT can be traced to the works of Dewey, Lewin, and Piaget (Kolb, 1984). Consistent with what is known about how adults learn, major corporations have consistently reported on the success of ELT as an educational pedagogy for employee training. Indirect indicators such as employee morale, increased productivity, and focus are typically measured and stand as proof of ELT's effectiveness (Rone, 2008; Scarce, 1997). Similarly, the bulk of research on educational settings and ELT as pedagogy points to its effectiveness in higher education. Very little research, however, has been done in K-12 settings using ELT as pedagogy (Kolb, Boyatzis, & Mainemelis, 2000).

Experiential learning and field trips. A field trip is a short-term experience, typically lasting less than a day (Rone, 2008; Scarce, 1997). If effectively and appropriately designed, a field trip presents students with situations where they are

"doing" something out of the ordinary classroom experience, interacting within an experience (Dale, 1946). Field trips offer the sort of enriching experiences that Dewey recognized as central to successful educational endeavors because they are just that – experiences, lived social events that become ways of knowing (Wright, 2000; Scarce, 1997).

As a result of a field trip, excursion or directed experience, students can discover themselves interested, inquiring, and generating their own questions as they become drawn into and fully engage the experience (Luft, Bell, & Gess-Newsome, 2008). Field trips provide opportunities to transform thinking, break down stereotypes, and help students see relevance in their academic courses (Rone, 2008; Scarce, 1997).

As a shared social experience, field trips provide opportunities impossible to create in the classroom. Although familiar and comfortable, classrooms cannot provide the social phenomenon of concrete experience that is common in the everyday setting of the field trip. Field trips can help to clarify and confirm connections between textbook content and real-life application (Scarce, 1997). Classrooms can provide representations of the world and, with the relatively recent inclusion of computers and videos, can provide insight (Oppenheimer, 2003). Classrooms cannot, however, provide the opportunity to discover and develop a direct experience with the world at large. That is the basic function of the field trip (Scarce, 1997).

Conversation during Experiential Learning

Conversation is unique to our human condition, making it possible for us to learn and communicate that which is understood (Baker, Jensen, & Kolb, 2002). It stands as an ordinary and yet profound interchange that is ever present. Taking on various forms,

it can be face-to-face, conducted via telephone or written letters, and now includes the virtual option (i.e., the internet). As an experiential learning tool, conversational sense-making can be traced back to the works of Dewey (1938, 1965), Lewin (1951), Piaget (1965), James (1977), Vygotsky (1978), and Freire (1992). While working from various perspectives and multiple disciplines, each saw learning and experience as intimately interwoven and rendered them incapable of separation.

Nearly 3,000 years ago, Old Testament history records the following instructions for effectively teaching the Ten Commandments to the children of the Israelites. Even with a rich tradition of literacy, they nonetheless saw the need for teaching children through conversation. Found in the sixth chapter of Deuteronomy, verse seven states: *Recite them to your children. Talk about them when you are at home and when you are away, when you lie down and when you rise*. (Bible, (n.d.), Deuteronomy 6:7)

Conversation in the classroom. Deep learning, as described by Freire (1992), requires a dimension of sense-making, an opportunity for students to engage in conversation, hopefully with the classroom teacher. However, Freire (1992) describes most traditional efforts in the classroom with the banking analogy, making deposits of information without time for consideration or discussion in any other context (Baker et al., 2002; Freire, 1992). Efforts are so polarized in the attempt to train students to correctly answer multiple choice questions that meaning-making and an allowance for conversational space have been all but eliminated. Experiential approaches to learning (e.g., field trips) allow for and encourage the inclusion of conversational space and the resulting reflection, leading to greater understanding (Baker et al., 2002).

Gaps in the Research

The specific plan of this research was to explore the following questions:

1. How does the ability to describe connections between academic science content (biology, chemistry, and physics) and future careers change as rural students experience a purposeful excursion to a post-secondary facility providing vocational training?
2. When do the connection(s) between content and future careers become evident to students?
3. What effect or impact does newly discovered connections have on rural students' aspirations with regard to future career or higher education options?

The subject of rural education has been neglected by researchers in the recent past. The past 150 years has seen a profound shift in the demographic concentrations of students. In the 1800s, over 75% of Americans lived in rural communities and their children attended small, one-room facilities where students focused on the 3R's (Springer & Gardner, 2010). Today's rural students, while representing approximately 25% of the nation's student population, are researched and reported in less than 6% of academic submissions (Hardre et al., 2007). Experiential education, specifically field trips as pedagogy and their effects on learning, has been researched almost exclusively in industry and higher education but not in K-12 settings. It would stand to reason therefore that any research involving experiential learning in rural schools with grades K-12 would be sparse. A descriptive case study with rural students, as they experience one purposeful field trip and tell their stories, would lend to both areas of research and investigation.

CHAPTER THREE

Introduction

There is ample evidence to indicate that rural students are poorly represented in educational research. The purpose of this research was to explore the efficacy of field trips as a pedagogical option for teachers presenting required science curriculum to students enrolled in rural Texas high schools and to increase the literature base available to practitioners and other interested researchers. An unintended consequence of federal legislation (No Child Left Behind) has been the reduction or elimination of field trips for students nationwide (Jones, Jones, & Hargrove, 2003). Within the Texas Essential Knowledge and Skills (TEKS) is an "essential knowledge" (3.D) indicating students should be able to "describe connections between academic content (biology/chemistry/physics) and future careers" (Texas Education Agency, 2009a). For those students who report an inability to describe connections between academic content and potential careers, this research explores the pedagogy and efficacy of excursions to a post-secondary facility providing vocational training. The research is guided by three questions:

1. How does the ability to describe connections between academic science content (biology, chemistry, and physics) and future careers change as rural students experience a purposeful excursion to a post-secondary facility providing vocational training?
2. When do the connection(s) between content and future careers become apparent to students?

3. What effect or impact do newly discovered connections have on rural students' aspirations with regard to future career or higher education options?

Experiential education (EE), which provided the theoretical framework for this research, has been defined as "learning activities that engage the learner directly in the phenomena being studied" (Wright, 2000, p. 121). Conversation has been identified as a consistent factor in the early development of most gifted children. Enrollment in school ensures that conversation is dramatically reduced in classroom learning situations. However, there are indications that regular one-to-one access to adult mentors substantially increases the quality and quantity of learning in all children, but especially older children (Thomas, 1994). Curriculum-dependent field trips or excursions provide opportunities for such access. In the early 20th century, Dewey's approach to education was grounded in the experiential model, once writing that *education is life* and indicating what students learn should be rooted in social experiences and society (Scarce, 1997). In 1916, Dewey noted:

> From the standpoint of the child, the great waste in school comes from his inability to utilize the experience he gets outside…while on the other hand, he is unable to apply in daily life what he is learning in school. That is the isolation of the school – its isolation from life. (p. 1)

For students in rural settings, field trips or purposeful excursions may represent the only practical opportunity that provides them with concrete rather than abstract connections between academic content and future careers. The students who participated in this research were selected based upon responses to questions regarding their perceived ability to describe connections between academic content and future careers. A qualitative perspective offers a variety of methods which are more interpretive and better suited to answer the research questions (Denzin & Lincoln, 1998). Perceptions are better

described and understood through more naturalistic methods including survey instruments, casual conversations, and semi-structured interviews. It is for this reason that a narrative case study was selected for this project. Narratives provide the opportunity to include additional influences beyond the excursion experience which serve to illustrate the complexities of conducting such investigations, leading to a deeper understanding of unique participants involved. Multiple narratives provide the researcher with ample opportunity for cross-case analysis as well (Merriam, 1998; Wolcott, 1994; Yin, 2003). For those science teachers considering field trips as a pedagogical option, the qualitative perspective can provide descriptive evidence of applicability in their respective situations.

A Narrative Case Study

The underlying function of all qualitative research is to understand the world from the standpoint of those living in it (Hatch, 2002). As members of the same high school class, potential participants had shared experiences with regard to teachers and coursework on the campus selected for this study. Those students purposively selected for the study were individuals who initially responded to specific survey items. The survey items were designed to expose an inability to describe connections between academic content and future careers. This narrative case study presents a detailed account of those participants who self-reported an inability to describe such connections. With the field trip or excursion serving as the treatment for the participants, the purpose of this report was to describe their individual experiences and to determine the effectiveness of the excursion as a treatment for the participants.

As this research presents a detailed account of a selected phenomenon within a real-life context, support for the selection of a narrative case study is well established. In general, a case study is appropriate when focusing upon a particular characteristic, trait, or behavior exhibited by an individual or group of individuals (Lichtman, 2006). A first person narrative provides the opportunity to collect details from the participant(s) that serve to greatly enhance the understanding of basic human behaviors or attitudes (Bogden & Biklen, 1998). Narratives also provide each of the participants a chance to reflect on the meaning of their shared experience with a depth and richness which is not likely to be captured using methods common to quantitative studies (Manen, 1990). Further supporting the selection of case study, Yin (2003) asserts that case study is especially appropriate when "the boundaries of the phenomenon and the context are not clearly evident" (p. 1). In a similar vein, Merriam (1998) defines the *particularistic* nature of case study when it serves to answer questions or address concerns of everyday occurrence, as this study seeks to address. Creswell (1997), in a final note, adds the audience component. As this research seeks to add to the literature available to practitioners and other interested researchers, a narrative case study dealing with rural schools and their unique characteristics adds depth and description where both are sorely lacking.

Methodology

The questions posed in this case study were answered using a qualitative approach, enlisting methods traditional to qualitative inquiry (Mertens, 2005). The methodology included: selection of participants through survey, comparison of existing

student records, observations, and semi-structured interviews in both individual and focus group settings.

Planned implementation of directed experiences for the purpose of learning is common practice and a proven as well as popular option in the workplace (Baker et al., 2002; Kolb, 1984). While existing literature demonstrates that effective teaching is greatly enhanced through experiential learning (Rone, 2008), various pressures, particularly for performance on high stakes testing, have all but eliminated such experiences for public school students on any campus nationwide (Popescu, 2008). The goal within this multiple-case study was to provide a descriptive narrative of participants as they:

1. identified a perceived lack of connections between science TEKS and future careers;
2. experienced a field trip/excursion (treatment) designed to provide information regarding careers grounded in basic science concepts; and
3. reflected on the impact of newly acquired connections with regard to vocational choices they may have realized as an immediate result of the field trip.

This project was a descriptive narrative multiple-case case study design. The units of analysis are those participants purposively selected and agreeing to participate. Each participant was treated as a separate case; each was subject to the same data collection protocol, reporting, and analysis. Because each case was considered alone (as a "whole"), cross-case analysis was expected to indicate the extent of replication (Yin, 2003).

Surveys

A criterion-based survey was designed for screening potential participants for this narrative multiple-case case study. Eligible participants were initially determined based on perceptions reported on the survey specifically designed for that purpose (Merriam, 1998). As TEK 3D was the basis for the original research questions, the predetermined characteristics produced a series of statements designed to target those whose responses were positive for difficulty when asked to describe connections between academic content and future jobs (Vaughn, Schumm, & Sinagub, 1996). In addition to questions regarding students' ability to identify future careers based on their experiences in science classes (biology, chemistry, and physics), statements assessing post-graduation aspirations were also included; a copy of the survey located in Appendix A. The total number of cases was not expected to exceed six and was ultimately limited to four individuals.

Existing Records

Existing records or archived data were useful for a variety of reasons within this particular study (Merriam, 1998; Yin, 2003). Early on, data were used to qualify participants based on their record of enrollment at the selected school. Additionally, as the participants were purposively selected and agreed to enroll in the study, existing records were examined for data which included – attendance records, class ranking, ACT/SAT scores, TAKS scores, socioeconomic status and family structure. Interview questions were included to reveal parental education achievement and employment information, and student aspirations and parental level of expectation as reported by the participants (not the parents). Archived school records also enhanced descriptions of the

individual units of analysis. As a descriptive narrative multiple-case study, the expectation was to provide rich descriptions of the participants in addition to the data collected as indicated (Merriam, 1998; Mertens, 2005; Yin, 2003).

Observations

Observations are a critical component in most qualitative research projects. The research questions are usually predictive of the type of observations required. The researcher/observer must decide which role is most likely to produce the desired results. Possible roles for the researcher to assume include complete observer, complete participant, or participant-observer (Merriam, 1998). The participant-observer is more commonly assumed in everyday settings with small informal groups. This description most accurately depicts the activities outlined for this study and therefore the researcher assumed the participant-observer role when interviewing one-on-one, in the focus group setting, and during the field excursion. Acting as an obtrusive participant-observer was particularly important during the field excursion as it was later discovered that this experience was unfamiliar to all of the participants and their collective anxiety initially prevented effective interaction with the recruiter and faculty on site (Yin, 2003; Patton 2002). Observations were intended to capture as much detail as possible. Responses to open-ended and semi-structured questions by individual participants during the initial screening, focus groups, and follow-up interviews were captured through audio recordings and field notes were kept of the individual and focus group interviews as well. Field notes were used exclusively during the field trip to document participant interactions and reactions to the recruiter and faculty members on site as audio recording was impractical in that particular setting (Yin, 2003).

Interviews

In the most traditional sense, an interview implies one-to-one communication, a situation during which one person elicits information from another (Merriam, 1998). Interviews offer immediate benefits not easily obtained through the use of surveys and other quantitative means. Semi-structured and open-ended interview questions facilitate two-way communication allowing follow-up questions, more in-depth queries, and flexibility within the event (Brady, 1998). Individual interviews were conducted at two critical junctures in this work. Initially, participants were interviewed to guarantee appropriate selection for the research involved. They were also individually interviewed after the field experience, a semi-structured participant-to-researcher discussion to elicit feedback after a period of time to reflect on the field experience.

Focus Groups

A focus group is basically a group interview and, as such, can take on as many forms as individual interviews create. They may be highly structured, moderator-led, or less structured, allowing the leader to take the role of facilitator with semi-structured questions that evolve and produce freer responses from the participants (Bogdan & Biklen, 1998). Generally speaking, a focus group consists of 4 to 12 participants and meets for about an hour to discuss a specific topic. Depending on the role taken by the leader/facilitator, the group may be directed toward a very specific outcome or allowed to comment as the event unfolds in a more naturalistic conversational manner (Lichtman, 2006).

One demonstrated advantage of focus groups is a *loosening effect* which manifests as a more relaxed sense among the participants than is typical in one-on-one

interview settings. It has been generally noted that group membership encourages more candid and reflective responses, producing comments or reactions that would not normally occur in individual interviews (Lichtman, 2006). The *wait time* for responses may be one reason for this behavior. It may also be that the lack of pressure to respond to every question (as exists in a one-on-one setting) may actually produce more considered responses, a greater variety of opinions and therefore richer, more valuable data from the participants (Vaughn, Schumm & Sinagub, 1996).

Focus group interviews were conducted during this study at two specific points. The first focus group interview was conducted prior to the field trip experience, after the participants were selected and agreed to participate in the research. During that time, participants were asked a series of open-ended and semi-structured questions primarily focusing on their collective inability to describe academic and workforce connections as well as their expectations of the upcoming field excursion. The second focus group interview was conducted as a debriefing session several hours after leaving the campus that was visited. Again, during this session, participants were asked to respond to a series of open-ended and semi-structured questions. The questions in this case involved what the students learned, remembered, or incorporated into their individual and collective understandings of science and future career options. In both focus group settings, the questions started as a formal set of consistent semi-structured inquiries and subsequently evolved into a series of open-ended and more fluid exchanges between the researcher and participants as well as between participants themselves in the focus groups (Yin, 2003).

Role of the Researcher

The role of the researcher in qualitative studies is quite different when compared with quantitative research. At the grassroots, quantitative research is driven by data collection and the role of the researcher is defined accordingly. Within the qualitative tradition, the role of the researcher can vary. At the most fundamental level, the researcher in a qualitative research design serves as the primary information gathering instrument. Regardless of the type of qualitative research design selected for any given project (ethnography, phenomenology, grounded theory, case study, etc.), there are basic qualities and/or skills which are considered a *best fit* for anyone considering a qualitative study. Qualities and requisite skills considered necessary for successful qualitative research include: good communication skills enabling appropriate interviewing tasks such as question asking and attentive listening, adaptability and flexibility as a study develops and may produce a change in emphasis, an adequate understanding of and sensitivity regarding the issues central to the study, a tolerance for ambiguity, and transparency or recognition when it comes to personal bias (Merriam, 1998; Yin, 2003).

The role as researcher in this research project would be most accurately described as participant-observer, one which provided the advantage of not only being located within the case, but also allowed the freedom to assign significance to the data as it was collected and considered (Hatch, 2002; Yin, 2003). As objectively as is possible, qualifications to serve in this role should be considered as adequate. As a teacher with 25 years of experience teaching science, numerous informal investigations have been conducted as would naturally occur for any teacher interested in improving classroom instruction, assessment instruments, or student outcomes. The researcher's experience

spans various age groups, various types of schools (private and public, for profit and nonprofit), and divergent locales within the United States. This wealth of experience provides considerable insight with regard to student achievement, as well as higher education aspirations and future career success. As a science teacher, personal experience with the narrowing of science curriculum as a direct result of NCLB has been disappointing. This research project offered an opportunity to formally investigate the effects of a single field experience on students self-identifying a specific deficit in light of the limiting science curriculum as defined by the Texas Education Agency (TEA). This research is a natural result of a desire to provide (positive) evidence for considering field trips as a pedagogical option for rural science teachers, allowing for greater possible success when teaching that which is required and deemed optimal for students in Texas public schools.

As the campus is both small and rural, limited scheduling options placed the participants in most academic classes with one another for multiple years. Three of the four participants were enrolled in the same 8th grade science class; as 11th graders, they were all enrolled in the same chemistry class. In both cases, the researcher was the teacher of record. The resulting familiarity with the students reduced the time required to gather data as well as the time required to adjust to unexpected events that occurred with data collection (such as conflicts with scheduled absences for sports or agriculture contests, forgotten permission slips, illness, and school cancellation due to weather). Finally, as none of the participants had visited any higher education campuses or technical schools at this point, acting as a disengaged observer was not an option. When on site, if this were to be a fruitful experience for the students involved, it would

necessary to serve as an advocate in an unfamiliar and potentially threatening environment (Yin, 2003).

Design Specifics

The research questions which form the study were best answered by students who initially self-identify difficulty describing connections between academic content and future careers. Because this study exclusively involved participants enrolled on rural campuses, the site selected for this study qualified not only because of its rural designation but also because of ready accessibility to the researcher, an employee of the school district for five years at the time of the research. As a result, issues of trust and comfort levels between the researcher and participants were high (Kvale, 1996; Merriam, 1998; Vaughn, Schumm & Sinagub, 1996). Through the use of a survey designed during a pilot study, all students who were eligible participants self-reported various levels of ease or difficulty describing connections. In order to qualify as a potential participant, a purposeful sampling design indicated which students were to be surveyed. In order to be considered eligible, potential participants would have been:

1. enrolled for and completed all of their high school science courses on the same campus, thus ensuring the same teachers and similar experiences for each of the three required science courses;
2. enrolled in the 11th grade at the time of the initial qualifying survey; and
3. enrolled in their third science course.

These students formed the sample population from which participants were purposively selected (Creswell, 1997; Hatch, 2002; Merriam, 1998; Mertens, 2005). Participants were purposively selected if they reported difficulty in describing

connections between two or more academic content areas (biology, chemistry, and/or physics) and future careers. The final selection was based on a follow-up interview during which students described their difficulties in order to further eliminate any student experiencing confusion with the initial survey instrument and whose answers therefore did not meet the initial criteria (difficulty with connections between two or more academic content areas).

Archived Records

Existing formal academic records of the participants were used in this study and include the following: attendance records, home language, family income (free- or reduced-lunch eligibility), family structure (one-parent, two-parent, or guardianship), parents' educational achievement and current employment status, current overall GPA, science-specific GPA, SAT/ACT scores, TAKS scores, class rank and participants' aspirations. These data provided a basis for comparison between participants, for comparison trends reported in the literature review, and created a more complete profile of each participant in the study.

Observations

Observations and resulting field notes during interviews, during the field trip/excursion interactions with on-site personnel, and during focus groups were an integral part of this study. Field notes were intended to serve as descriptive record of the physical surroundings, participants' body language, nonverbal cues, activities, informal interactions between participants, and any additional factors which impart significance to the events as they unfold (Creswell, 1997; Hatch, 2002; Merriam, 1998; Mertens, 2005).

Data Collection Methods

Stage One

As previously indicated, the survey was the initial instrument used to identify the most eligible participants for the study. The survey instrument is one which was designed and further refined during a pilot study (Appendix A). The participants of the pilot study were students enrolled in a senior level science class (anatomy & physiology). There were 12 participants in the pilot study. All of the students were college-bound, many with specific science-based careers in mind. The original survey was designed to check for their ability to draw connections between the academic content of the science course in which they were enrolled (an elective for college-bound students) and potential future medical careers. They were surveyed before and after an excursion to a commercial exhibit (BodyWorlds) on a Saturday, February 14, 2009. Semi-structured focus group discussions were conducted on two occasions, the first on the evening after the trip and the second on the following Monday morning during class. The students were congenial and willing to participate in the development of this instrument. As a result of those discussions, the survey was modified to its present form for use in this study (Yin, 2003). Table 1 indicates the alignment of survey items with the original research questions. A copy of the survey appears in Appendix A.

Table 1

Research Questions/Survey (S) Items Alignment

Research Question	Survey Items
1. How does the ability to describe connections between high school science academic content (biology, chemistry, and physics) and future careers change as rural student experience a purposeful excursion to a post-secondary facility providing vocational training?	S-3, S-4, S-8, S-11, S-14, S-16, S-19
2. When do connections between content and future careers become evident to the students?	S-5, S-7, S-14, S-16, S-17, S-18, S-20
3. What effects or impact do newly discovered connections have on rural students' aspirations with regard to future career or vocational options?	S-1, S-4, S-10, S-14, S-15

Stage Two

Semi-structured interviews and focus group discussions produced the bulk of data collected for this descriptive narrative multiple-case case study. Screening interviews were conducted initially to insure appropriate selection of participants. Students identifying difficulty in describing connections between academic content and future careers were selected as potential participants. After participants were purposively selected and agreed to enter into the study, the qualifying interviews included a review and discussion of the original survey questions that further revealed and defined their inability to describe connections between academic content and future careers. The following prompts were provided, allowing students to give as much or as little information as they felt was needed to clarify their perceptions:

QI-1. Tell me about your answers concerning the connection between science (name of the content area) and future careers.

QI-2. Tell me about some careers that interest you, even if there is no connection to science that you can describe.

QI-3. Tell me about some careers that you consider interesting, but feel that there might be too much science involved.

Table 2 indicates the alignment of the pre-excursion interview questions with the original research questions.

Table 2

Research Questions/Qualifying Interview (QI) Questions Alignment

Research Question	Survey Items
1. How does the ability to describe connections between high school science academic content (biology, chemistry, and physics) and future careers change as rural student experience a purposeful excursion to a post-secondary facility providing vocational training?	QI-1. Tell me about your answers concerning the connection between science and future careers.
2. When do connections between content and future careers become evident to the students?	QI-2. Tell me about some careers that interest you, even if there is no connection to science that you can describe.
3. What effects or impact do newly discovered connections have on rural students' aspirations with regard to future career or vocational options?	QI-3. Tell me about some careers that you consider interesting, but feel that there might be too much science involved.

Stage Three

Semi-structured focus group discussions were held twice during this study – one pre-excursion and one post-excursion. Focus groups allowed for a "loosening effect" among the participants, or a more relaxed experience than one-on-one interview, which provided more candid responses from group members. Without the need to respond to each question asked, participants were able to reflect as others answered, ultimately providing a greater range of opinions over a shorter period of time. Both sessions provided a much richer source of data through interactions between members than might have otherwise been possible through individual interviews (Creswell, 1997; Kvale, 1996; Mertens, 2005; Vaughn, Schumm & Sinagub, 1996).

The focus group met for the first time prior to the excursion to Waco's Texas State Technical College (TSTC) campus. The focus group discussion started in the high school computer lab. Students used the computer lab to access the website of the campus and selected two programs of personal interest from a list that purposely included only science or technology careers, directly related to or dependent upon one of the three areas (biology, chemistry, and physics). The information they viewed and downloaded was used for further discussion during the remainder of that focus group session. The following prompts were used to initiate discussion among the participants:

FG1.1. Tell me about the online information you've looked at – what scientific terms or other descriptions do you find in the program you picked?

FG1.2. Tell me what you understand about how science is needed for careers.

FG1.3. Tell me what you expect to discover when you visit the site ("take the field trip").

Table 3 indicates the alignment of the discussion questions from the first focus group with the original research questions.

Table 3

Research Questions/First Focus (FG1) Group Questions Alignment

Research Question	Survey Items
1. How does the ability to describe connections between high school science academic content (biology, chemistry, and physics) and future careers change as rural student experience a purposeful excursion to a post-secondary facility providing vocational training?	FG1.1. Tell me about the online information you've looked at – what scientific terms or other descriptions do you find in the program you picked?
2. When do connections between content and future careers become evident to the students?	FG1.2. Tell me what you understand about how science is needed for careers.
3. What effects or impact do newly discovered connections have on rural students' aspirations with regard to future career or vocational options?	FG1.3. Tell me what you expect to discover when you visit the site ("take the field trip").

Stage Four

The field trip was conducted on a Monday morning followed by lunch at a local restaurant selected by the participants. The second focus group was held immediately after lunch for the purpose of debriefing students and ascertaining a group response/reflection to the campus visit. At this meeting, the participants described their experiences (debriefing) while their recollections were still fresh. The semi-structured guiding prompts for this second focus group were as follows:

FG2.1. Tell me what you learned this morning about science needed in the programs we visited.

FG2.2. At what point did you realize that science was important to this job?

FG2.3. Tell me about some other programs you noticed that involved science but that we didn't visit.

FG2.4. How did today's experience help you identify some new options after you graduate from high school?

Table 4 indicates alignment of the second focus group (post-excursion) questions with the original research questions.

Table 4

Research Questions/Second Focus Group (FG2) Questions Alignment

Research Question	Survey Items
1. How does the ability to describe connections between high school science academic content (biology, chemistry, and physics) and future careers change as rural student experience a purposeful excursion to a post-secondary facility providing vocational training?	FG2.1. Tell me what you learned this morning about science needed in the programs we visited.
2. When do connections between content and future careers become evident to the students?	FG2.2. At what point did you realize that science was important to this job? FG2.3. Tell me about some other programs you noticed that involved science but that we didn't visit.
3. What effects or impact do newly discovered connections have on rural students' aspirations with regard to future career or vocational options?	FG2.4. How did today's experience help you identify some new options after you graduate from high school?

Stage Five

Individual semi-structured follow-up interviews were conducted on to two weeks later, allowing students time to process and reflect individually on the experience. Aside from gathering further insight into their perceptions of the field trip, this interview gave the participants a chance to review their records and correct any inaccuracies detected. The guiding questions for the final semi-structured individual interviews were:

FI.1. Tell me about connections you now see between science and possible jobs that you are interested in exploring, jobs we did not see during our field trip.

FI.2. We took this field trip in the second semester of your senior year. When would it have been more helpful to you to take this sort of trip and why?

FI.3. After you shared this new information (the field trip) with your parents, how did your plans and their support change?

FI.4. Please describe your experience (the field trip) in one word and then tell me why you chose that particular word.

Table 5 indicates alignment of the last individual interview questions with the original research questions; Table 6 indicates alignment of the original research questions with items from Table 1 through Table 5 (inclusive).

Post-Activity Data Management

Field notes were recorded as quickly as possible after each observation, attempting to provide the most accurate record while the incident was still recent and most easily recalled. Audio recordings made during the interviews and focus groups were transcribed at the end of each session. Entire conversations were recorded, again providing a more complete account of each meeting (Creswell, 1997; Merriam, 1998;

Mertens, 2005). Complete transcripts of interviews and focus groups indicate more accurately the actual amount of time devoted to each activity and may also reveal information regarding on/off topic discussion. Transcripts also revealed occasional difficulty participants experienced in answering questions (which assisted in the interpretation of data) and provided evidence of the focus group's effectiveness in answering questions (Vaughn, Schumm & Sinagub, 1996).

Table 5

Research Questions/Final Interview (FI) Questions Alignment

Research Question	Survey Items
1. How does the ability to describe connections between high school science academic content (biology, chemistry, and physics) and future careers change as rural student experience a purposeful excursion to a post-secondary facility providing vocational training?	FI.1. Tell me about connections you now see between science and possible jobs that you are interested in exploring, jobs we did not see during our field trip.
2. When do connections between content and future careers become evident to the students?	FI.2. We took this field trip in the second semester of your senior year. When would it have been more helpful to you to take this sort of trip and why?
3. What effects or impact do newly discovered connections have on rural students' aspirations with regard to future career or vocational options?	FI.3. After you shared this new information (the field trip) with your parents, how did your plans and their support change? FI.4. Please describe your experience (the field trip) in one word and then tell me why you chose that particular word.

Table 6

Research Questions: Alignment with Tables 1 – 5

Research Questions	Survey Items	Qualifying Interview	Focus Group 1	Focus Group 2	Final Interview
1. How does the ability to describe connections between high school science academic content (biology, chemistry, and physics) and future careers change as rural student experience a purposeful excursion to a post-secondary facility providing vocational training?	S-3 S-4 S-8 S-11 S-14 S-16 S-19	QI.1	FG1.1	FG2.1	FI.1
2. When do connections between content and future careers become evident to the students?	S-5 S-7 S-14 S-16 S-17 S-18 S-20	QI.2	FG1.2	FG2.2 FG2.3	FI.2
3. What effects or impact do newly discovered connections have on rural students' aspirations with regard to future career or vocational options?	S-1 S-6 S-10 S-14 S-15	SI.3	FG1.3	FG2.4	FI.3 FI.4

Data Analysis

All qualitative research seeks to provide a descriptive component, but description is not a sufficient reason to conduct research (Merriam, 1998). The data provided in this

descriptive case study was reported as a collection of narratives, investigating the effectiveness of experiential education (EE) when applied to older adolescent participants (Creswell, 1997). The participants in this study are 17-19 years of age. While still enrolled in a rural high school setting, they also assumed adult roles outside of school and may have therefore experience positive effect of the treatment, based on the theoretical framework imposed an excursion experience.

Analysis under the qualitative framework tends "to work from the ground up", dealing with a specific problem(s) and eventually producing a hypothesis or solution to the problem under investigation. As such, it is considered inductive, rather than deductive, analysis (Lichtman, 2006). Interconnected data are collected and may be used to generate a theory that is grounded in said data (Bogdan & Biklen, 1998). In short, a picture is developed from the data as it accumulates and is examined. Inductive analysis of the participants' perceptions as they moved through the excursion experience provided evidence of EE effectiveness. The inductive approach proved effective when working with the data from this case which was analyzed as it was collected. The data collected included interview and focus group transcripts, official school records, parental/family data, and participant aspirations. Further, the data confirmed the effectiveness of EE in the form of a purposeful excursion for these participants and supports the inclusion of field trips as a pedagogical option for rural high school science educators in similar settings.

Verification of Interpretation

In order for the research to be valid and reliable, it should both address local concerns and provide explanations for long-term solutions to those concerns (Merriam,

1998). Internal validity, trustworthiness, and reliability are indicators of high quality research, especially important to some who express a level of uncertainty regarding qualitative research and its findings.

Measures included in this case study to establish internal validity included triangulation, member checks, participant involvement, and identifying researcher bias (Merriam, 1998). In this case, triangulation was established using transcripts of interviews and focus groups, participants' existing school records and parental/family information, participants' aspirations, and recorded observations from field notes. Member checks were performed after each interview and at the end of the study, allowing participants to review the accuracy of statements and observations made of their nonverbal cues at each setting (Hatch, 2002; Merriam, 1998; Vaughn, Schumm, & Sinagub, 1996). Participation by the members included their involvement in constructing the data used as well as an opportunity to include additional comments in the final report (Merriam, 1998). Triangulation, while not able to capture objective reality in any research effort, does combine a collection of methods that add depth to a study (Denzin & Lincoln, 1989). As will be revealed in Chapter Four, external validity is indicated as transferability to similar populations would be expected to render similar results (Yin, 2003).

Chapter Four contains a more detailed description of participant selection as well as the complete descriptive narratives of the individual participants. In Chapter Four, evidence is presented that all of the participants experienced a change in their perceptions with regard to connecting academic (science) content and future career options. The participants all expressed agreement that field excursions with career emphasis should be

an integral part of the science curriculum, generally starting in late middle or early high school. Additionally, they all identified at least one career option they had not previously connected with science knowledge as well as identifying at least one personally interesting alternative career path offered at TSTC's campus.

Conclusion

The dual purposes of this research were:

1. to explore the effectiveness of field trips as a pedagogical option for rural high school science teachers when confronted with students who perceive no connections between academic content and future careers; and
2. to increase the literature base for interested parties, classroom practitioners, and researchers.

As discussed in this chapter, the design chosen for this effort was a descriptive case study which provides multiple narratives of purposively selected students, chronicling changes in perception as they experienced one curriculum-driven excursion designed to address their self-reported lack of ability to identify such connections. The research was guided by three questions:

1. How does the ability to describe connections between high school science content (biology, chemistry and physics) and future careers change after rural students experience a purposeful excursion to a post-secondary facility providing vocational training?
2. When do the connection(s) between content and future careers become apparent to students?

3. What effects or impact do newly discovered connections have on rural students' aspirations with regard to future career or higher education options?

The data were gathered and analyzed as described within this chapter. Chapter 4 includes four separate narratives containing the data collected, discussion, and an analysis of each case, revealing the efficacy of field trips as a pedagogical option for the purposively selected participants in this study.

CHAPTER FOUR

Data Analysis

Introduction

Research focusing on rural high school students is lacking when considered in light of that which has been produced addressing students who attend schools that are classified as urban or suburban. Specifically, the goals of this research were two-fold. The primary goal was to answer the following research questions:

1. How does the ability to describe connections between academic science content (biology, chemistry and physics) and future careers change as rural students experience a purposeful excursion to a post-secondary facility providing vocational training?
2. When do the connection(s) between content and future careers become apparent to students?
3. What effects or impact does newly discovered connections have on rural students' aspirations with regard to future career or higher education options?

An additional and more global purpose of this study was to add to that research base for the general use of classroom teachers and other researchers interested in the topic of rural schools.

The participants in this study were chosen using purposeful sampling (Gay et al., 2006) and consisted of four male students from a rural high school, referred to as Gypsy High, in central Texas. These students were all enrolled in the 11th grade when initially identified as potential participants. They had been continuously enrolled at Gypsy High

since the beginning of their 9th grade year; consequently, all shared a common high school experience with the same teachers responsible for the three academic science classes required for graduation under the state's recommended plan. They ranged from 17-19 years of age through the period of the research. Each participant was eligible for free or reduced-price lunches; similarly, each had experienced achievement problems at some point (as indicated on existing academic records) and had consequently been identified as "at-risk" for graduating on time. Their selection for participation was based on their self-identified lack of ability to describe connections between academic science content and future careers. Demographic information for the participants can be found in Table 7.

The methodology selected for this project was a qualitative design as all data qualitative data during the research was used to create thick, rich descriptions in the form of narratives. Data collection was conducted from August of 2009 to January of 2010. Data was gathered using an initial qualifying survey, as well as from school records; data included overall GPA, science GPA, TAKS scores, class rank, ACT/SAT scores, and family economic data. Although it might be considered quantitative, this information was used to further develop the individual narratives of the participants. Further qualitative data included field notes and audio recordings of two individual interviews and two focus groups sessions as well as observations recorded through field notes during the off-campus visit (as audio recording was not a practical option). The data were initially coded using an open coding method, organizing collected information such that the three research questions served as focal points (Creswell, 1997). With those data so

organized, a cross-case analysis was then designed to further generalize the responses to the research questions (Merriam, 1998).

This chapter was organized to present a complete record of the project in a logical, linear sequence of events. The campus of Gypsy High is first described as is the process for selecting participants included in this project. Once the selection process is described, the events of the field trip are described and followed by the narratives of each of the participants. The narratives each follow the same sequence of events, starting with the initial interview during which participants described their answers on the qualifying survey and followed by the activities and responses of the first focus group. The effects of the field trip and subsequent reflections, as reported during the second focus group and final interviews, are then reported within each narrative. Analyzing the data across the cases allows for more generalized answers to the research questions to become apparent and also allowed inclusion of factors which were influential but not directly related to the questions (e.g., socioeconomic factors, parental educational/vocational achievements, and volunteer opportunities within the community served the school). Chapter 5 discusses the findings and implications for classroom teachers as well as recommendations for science curriculum revision to include field trips as a pedagogical option for rural (and possibly other) science teachers.

School Demographics

Gypsy High is classified under the new National Center for Educational Statistics (2007) as a "rural distant" school – that is, more than 5 miles but less than 25 miles from an urbanized area. The campus (at the time of this study) was described as "1A", the category reserved for the smallest schools when rated by the University Interscholastic

League (2009) for competitive activities including academic contests, music contests and athletics. For the past 3 years, the high school campus had received "recognized" status through the Texas Education Agency's (TEA's) accountability rating system (i.e., meeting a performance standard of 75% or higher on TAKS tests for each subject and student group, achieving an 85% completion rate and an annual dropout rate of 2% or less). Statistically, the four participants were selected from 39 students of a graduating class described as 5% African-American, 13% Hispanic, and 82% white; nearly 60% are classified as economically disadvantaged and 19.5% receive special education services. The longitudinal graduation rate is just under 84% (Texas Education Agency, 2009b)

Participant Selection

Stage One

Potential participants were enrolled at Gypsy High School and, at the time of the initial survey, were completing the 11th grade as chemistry students. Initial eligibility was determined by enrollment records; only those who had been enrolled from 9th to 11th grade with no break in attendance, or enrollment at another campus, were eligible to complete the initial screening survey. The survey (Appendix A) contained 20 descriptors to which the students responded on a Likert-type scale of indicators, ranging from "strongly agree to strongly disagree". Responses of "somewhat disagree" or "strongly disagree" to at least two statements indicating their ability to "see how (biology, chemistry, or physics) is important to future careers" were necessary to further qualify as a participant. Forty-one students were enrolled in chemistry in the spring semester; of the

41, 8 were immediately ineligible as they had transferred at some point during the range of grades onto the middle/high school campus.

Stage Two

The initial survey was completed by 15 male and 18 female students. Of that group, six males (40%) and five females (36%) indicated on their surveys that they had difficulties with describing connections between academic (biology, chemistry, or physics) content and future careers. Of this initial group, one male was Hispanic, one female was Hispanic, and one female was African-American; the remaining eight potential participants were white.

As this study was originally designed, participants reporting difficulty describing connections between academic content and future careers were selected. Of the initial 11 participants identified, all three of the minority participants were removed as a result of local policy at the end of that semester. The school system's policy and practice was to transfer students who had not earned a sufficient number of credits at the close of their 11th grade year. Students lacking sufficient credits were enrolled at an alternative high school setting for the purpose of credit recovery and completion of the state's basic diploma requirements. Therefore, before the first round of interviews was conducted, the set of eligible participants were reduced to five males and four females, all of whom were white.

The initial interviews took place during the last week of summer vacation between the 11th and 12th grade for the students. It was revealed that two potential participants were not appropriately identified through the survey instrument. In the first case, one of the male candidates had misunderstood the basic concept involved with each

of the content/career descriptors. Once realized, he responded, "I over-thought it". Three specific descriptors each contained the phrase "how (biology, chemistry, and physics) is important to certain future careers"; this participant further interpreted or expanded the descriptors to mean careers, assuming this referred to careers which were personally interesting. He was quite capable, as revealed during the initial interview, of describing how those selected sciences were important; they simply were not important with regard to his personal future plans. This individual was eliminated from the participant group as a result. In the second case, one of the female students revealed that she did not meet the requirement for consistent enrollment; she had "moved during the 8th grade to go live with her dad but came back in the middle of the 9th grade". She was thus removed from the pool of potential participants.

At this point, the participants included four males and two females. All six confirmed their responses as correct and expressed an interest in continuing with the study after receiving an IRB and discussing the purpose and procedures that would be followed to complete the study. The students agreed to return one week later with their IRB's signed (Appendix B), for the first focus group session.

Stage Three

The first focus group session was held in Gypsy High's computer lab. The participants all had full access to the internet through the school's computer lab. This system was the only one where broadband connection (high speed internet) was available to all of the participants. Typically, homes in this remote area did not have the option of high speed or broadband services commonly available to urban or suburban households such as cable television or fiber-optic phone services. During this session, the

participants were asked to access TSTC's website in order to identify programs which were of personal interest and had some connection to a field of science with which they had previous experience (i.e., earned credit).

When first contacted as a possible site for a field trip, the researcher found that TSTC no longer published written catalogs, brochures, or tracts for potential students to examine. Prospective students were encouraged to investigate programs by searching the website developed for such inquiries or by touring the campus. At the start of this focus group session, the participants accessed the website and asked to "just look around, see if you can find something interesting, something that might have a science in its name".

As the students began to search the website, it quickly became clear that the computer system (while providing high speed access) blocked several of the options available. In every case, where videos were embedded for more information, participants were unable to access those links to view additional information. As a teacher at Gypsy High with "full access" (implying more access than students were allowed), the researcher discovered that those links were blocked as well.

Although video access was blocked, all four male participants indicated they were interested in the diesel mechanics program. Each indicated that they would be interested visiting the campus to learn more about that specific program. The two female participants had greater difficulty selecting programs which were of personal interest and, in fact, had already indicated that they (despite the inability to describe connections between academic science content and future careers) were interested in pediatric nursing. The closest match offered was dental assisting. Both initially indicated that they were interested in visiting TSTC. However, less than a week later, they both dropped out

of the study. Reasons cited included work schedules but especially extra-curricular activities – both were senior cheerleaders and felt their schedules were already over-loaded. At the close of the first focus group, the study included four participants. Table 7 contains the demographics of those participants.

Table 7

Demographics Divided by Case

Description	Allen	Doug	Lane	Stu
Ethnicity	Caucasian	Caucasian	Caucasian	Caucasian
Age (at initial survey)	17	18	17	17
Lunch Price Paid	Free/Reduced	Free	Free	Reduced
GPA	82.35	82.16	76.58	87.74
Science GPA	84.67	79.33	79.0	85.0
Class Rank (out of 39)	27	28	39	20
IEP in records	NO	No	Yes	No
SAT/ACT Scores	None	None	None	15

Campus Visit – Field Trip

The researcher contacted Waco's TSTC campus and made arrangements with a campus recruiter to provide the participants with a tour of the diesel mechanics program. The Waco campus is less than 10 miles from Gypsy High. The existing infrastructure was a former Air Force base which was closed in the 1950s. In the mid-1960s, some of the buildings were renovated and converted to classroom space; others were simply

updated to allow use as maintenance and training facilities for many of the programs offered on site. TSTC offers over 100 associate degrees and certificate programs available through this campus; all of the degrees and certificates were associated with one of six academic/technical career clusters. Those clusters were:

1. agriculture;
2. information technology and telecommunications;
3. engineering and manufacturing;
4. health and science;
5. business, commerce and service; and
6. aviation and transportation.

Having obtained the necessary permission from parents (Appendix C) and a van from the high school's transportation office, the field trip was conducted on a Monday morning in November. During the short drive, participants selected their own pseudonyms (Allen, Doug, Lane, and Stu) for use in reporting their narratives. The recruiter met the participants and researcher upon arrival and then spent several minutes with the participants, assessing their level of interest in the diesel mechanics program and offering the option of impromptu tours to several other programs. During his introductory remarks, the recruiter emphasized the need for students attending this campus to be self-motivated and responsible as most of their vocational training was a blend of online (self-paced) and lecture/lab formats. Collectively, the participants chose to visit the computer science and broadcast media programs as well.

Diesel Mechanics Tour

Housed in several large former airplane hangars, the diesel mechanics program offered a variety of program certificates with a total of nine different concentrations. The participants were shown several different classrooms and walked through the various labs in which training was observed. Students were learning to work on various components of large diesel motors used in various vehicles including trucks and farm equipment. As they became more comfortable with the surroundings and opportunities for discussion, the participants talked with one instructor at length about the job market, the need for trained mechanics, various corporations who hire trainees from this particular program and the need to continue training after they enter the job market. The instructor also gave them some of his personal work history to stand as an example for the need to continue to stay well-trained in order "to earn a good living as a mechanic".

Computer Science Technology Tour

The reason for choosing to investigate this program came from a question asked by the recruiter during the first few minutes of introductory remarks – "How many of you like computer games and would be interested in seeing how they are developed?" Since three of the participants indicated they were interested, this tour was added to the day's schedule. While the students were fascinated by the concept of designing a game of their own, the instructor with whom they met indicated that a "good amount" of math, especially algebra, was involved in the programming necessary to design computer games. In addition, the instructor described good computer programming students as being skilled at puzzles or problem-solving, proactive at trouble-shooting, and possessing a great deal of patience. A review of math scores and TAKS scores for these students

predicted that without considerable remediation, this would be a difficult program for any of the participants in this study. Records notwithstanding, comments recorded in their individual narratives later indicated this was not a likely career option for any of the participants.

Media and Telecommunications Tour

Inclusion of this program was the result of the recruiter's discovery that all of the participants were on both the high school's football and basketball teams. As the football team's season was over, interest in area play-off games remained high. When asked if any of the participants ever thought about the technology involved in broadcasting a sporting event, two of the participants expressed an interest in learning more about that technology; thus the third tour was added. Two instructors met with the participants and showed them two different studios used for broadcasting – one for televised programs, the other for radio programs. Any initial interest dissipated quickly when they discovered that the training offered was for the technicians "running things behind the scenes" and "not for the on-air personalities". It appeared, and participants later reported, they were overwhelmed by the sheer number of different roles needed to produce a program for public viewing and/or listening. In order to complete the program, training and proficiency at each of those roles was required. None of the participants appeared to consider this as an option as none requested further information regarding this program.

At the close of the tour, the recruiter met with the participants in order to address any final questions. The discussion included college and various program admission policies, financial aid, and employment rates after completion of a certificate or degree. TSTC has an open admissions policy, allowing anyone to enroll assuming they had

earned a high school diploma or general educational diploma (GED). Financial aid, he added, was available through traditional channels (Pell Grants, federally-insured student loans, etc.) but was also available in varying degrees through individual programs underwritten by industry and corporate partnerships. He concluded the tour with some job placement services information. As he explained, TSTC has a binding agreement with the state of Texas to provide job placement services for any students finishing a certificate or degree program. In accordance with that agreement, they are responsible for placing and maintaining an employment rate of 90% or greater. When asked, the participants had no further questions and thanked the recruiter for his time and information.

Post-Field Trip Lunch and Second Focus Group Session

The entire time on site was approximately 4½ hours. Participants then had lunch, allowing approximately 1½ hours for the students to disengage and relax before debriefing in the second focus group session. After lunch, the participants traveled to the office of a local attorney who was also a parent of students at Gypsy High. The researcher and participants were granted access to a conference room in order to reduce distractions that might have resulted if the session had been attempted after returning to school or in the restaurant after eating. The participants were seated around a large, heavy table in heavy, leather upholstered chairs as the second focus group session started. During this session, the participants discussed the information they obtained, how their concepts had been challenged, when they realized that science was useful in any of the programs visited or noticed while touring TSTC. All of the semi-structured questions were presented to each participant; as the discussion evolved, each contributed (or chose

not to contribute) as they felt necessary. For coherence in each of the narratives, the same questions were repeated in order to treat each case separately. The entire discussion took place over a period of 78 minutes.

The participants were asked at the end of the second focus group session to share their discoveries and feelings with their parents. A final one-to-one interview was conducted on the school campus during the two weeks immediately following the field trip to assess any lasting changes with regard to connections formed between academic content and future careers. The duration of the final interviews ranged from 15 to 19 minutes.

Data Analysis

Analysis of data was conducted on each case separately, following the design of multiple-case case study as defined by Yin (2003). As chronicled in each narrative, the research questions were addressed and responses were recorded. Demographic information obtained from school records was presented first in each of the narratives and allowed a more descriptive, detailed record of each participant than could be provided in Table 7. In an attempt to provide a thick, rich descriptive narrative, selected conversations were included in the qualitative section of each participant's case.

Case Study 1: Allen

At the start of this research, Allen was a white male, 17-year old student, enrolled as a junior (11th grade) at Gypsy High School. By the second semester of his 12th grade year, his academic records indicated that he achieved an overall GPA of 82.35 (out of a possible 100 points); his science GPA was 84.67 and he was graduating under the

recommended plan for Texas high schools; Allen was in the 3rd quartile of his class, ranked 27 out of 39. He had taken and passed the exit TAKS exams required for high school graduation but had not taken the ACT or SAT test; therefore, no score was available for consideration and/or comparison with other students in the graduating class.

Official academic records showed three separate entries from grades 7, 8, and 10 indicating that he did not perform satisfactorily on an assessment instrument administered to the student under the Texas Education Code (TEC) Subchapter B, Chapter 39, establishing the mandate for high-stakes testing. In addition, there was one entry indicating that Allen did not maintain a passing average (70 on a scale of 100) in two or more courses in the foundation curriculum during a semester in the preceding or current school year. After each entry was an exit comment indicating that Allen was considered "at risk". Additional documentation indicated that Allen and his family were considered economically disadvantaged; Allen had always been and remained eligible for reduced-price and free meals under the National School Lunch and Child Nutrition program during his entire attendance on the chosen campus.

Allen enjoyed an active schedule both in and out of school. He had five academic classes in his 12th grade year (the credits remaining for graduation) and also worked as a teacher's aide during one class period. He participated in various sports – football, basketball, and track – as well as other extracurricular activities – Future Farmers Association (FFA), Baptist church membership and church youth group meetings, Future Christian Athletes (FCA), and the school's marching band. As is fairly typical for some young men in this rural community, Allen joined the volunteer fire department in the summer after he turned 17.

Initial interview. During the initial qualifying interview, semi-structured interview questions initiated the discussion which evolved to include more information than anticipated. The first question ("Tell me about your answers concerning the connections between science careers") revealed that Allen had mostly enjoyed his science classes and saw science as useful. He felt science was very important to us as it provided lots of advantages and that it was important to learn science. Even though he did not experience science classes as anxiety-producing, Allen admitted that he did not always understand what was going on in class. When asked if he would consider taking an additional senior level science elective, he responded "probably not since I don't have to take one to graduate, but it would depend on what it was and who taught it". While he was aware that science was important, he was not sure how what he had learned would be needed (i.e., content) or how it would help him to find a job that he wanted.

The second question ("Tell me about some careers that interest you, even if there is no connection to science that you can describe") also produced additional information during the interview. As a result of his membership on the rural volunteer fire department, he was interested in fire-fighter training although he was not quite sure how science would be important. Like many of his peers, Allen was also interested in working on cars and trucks. While this also represented an area of possible career training, he again was not sure how science might be connected. As the discussion continued more open-ended in nature, Allen mentioned his mother's work history – she had recently changed jobs moving as an apartment manager from one facility to another but maintaining employment with the same owners. The step-father did home repair jobs as he was recently laid off from a local company; Allen did not know anything about his

biological father's education or career. Further discussion revealed that Allen thought his mother and step-father had both finished high school but neither had attended college. Allowing this strand of questioning to further develop, Allen was asked to describe what activities or props were present in his home to encourage further thinking about science or careers that require science. When supplied with a possible list of options, his response indicated that he watched some science shows on TV, that he did read magazines with some science articles (borrowed from the school's library), that the family did not receive a daily newspaper, that the family did not have a computer (and therefore no internet access), that he did not own a calculator, and that there were no encyclopedias, maps, or an atlas in the home.

When asked the third semi-structured question ("Tell me about some careers that you consider interesting, but feel that there is too much science for you to learn it all"), Allen did not have an answer. He reported that there really was not anything more that he was interested in. At this point, Allen was asked if he would like to participate in the research being conducted. He indicated that he was eager to participate ("a field trip…yes!") and was given an IRB for parental consent (Appendix B). He returned it the next day.

First focus group session. At the first focus group session, Allen logged onto the school's computer system in order to comply with the request to identify programs that would be of interest at TSTC. However, due to blocking software, it was not possible for Allen to access videos which were linked to each of the programs. Frustrated, Allen's response to this "dead-end" was "How am I supposed to know if I want to visit this program?" When asked about accessing it from home, Allen disclosed that he did not

have a computer at home and therefore no access to a system that would allow him to view more information.

At this point, when asked if he could locate anything that interested him, he responded “diesel mechanics, I guess”. As indicated in the first focus group questions, I opened with “Tell me about the information you’ve found – what scientific terms can you find indicating that science is important to the diesel mechanics program”, Allen’s response indicated that he did not recognize or recall several terms (hydraulics, pressure, analysis) that have specific scientific applications in physics. In fact, he expressed a very low opinion of the experiences he had had in physics, claiming to have learned little or nothing that would be useful in general and definitely not useful in a job situation. Allen had also identified fire fighting as a possible career as a result of his recent membership on the volunteer fire department and expressed his disappointment that there was no such program described on the TSTC website.

When prompted with the second semi-structured inquiry, “Tell me about problems you still have connecting the pieces, understanding how science is needed for careers”, Allen was sure that science was needed for jobs like engineering, but was not quite sure how engineers would use science, at least not the science to which he had been exposed. He had simply been told (by the physics teacher and the high school counselor) that science was important for some jobs and for the TAKS test (in order to graduate).

The third semi-structured question, “Tell me what you expect to discover when you visit the site”, produced a silent shrug and then, “I don’t know, isn’t that why we’re going?” When asked if this was his first campus visit, Allen indicated that this was his

first visit to a college campus although he had seen information in the career day presentations brought to the school in the previous year.

Second focus group. After settling into the conference room, the first question posed to the group was "Tell me what you learned this morning about science needed in the programs we visited." Allen did not respond initially as the other participants offered their answers first. When he did respond, Allen indicated that it surprised him that "you're gonna need for the diesel mechanics stuff, it's more of a physics equation thing, not just math". When asked if he realized any other science connections with the other programs visited (computer science or media/telecommunications), his response was "not really."

Responses to the second open-ended question, "At what point did you realize that science was important to the diesel mechanics program", prompted Allen to answer first, "When we walked into that one classroom with the formulas on the board…it looked just like the equations from the physics class at school." That comment evidently stirred a memory of the presenter's comments concerning his own career working on various engines. "The guy said he had trouble with the difference between metric tools and our (standard) tools and he ended up making his own conversion chart that he put in his wallet so he wouldn't keep getting confused. That was a BIG surprise to me."

When asked the third open-ended question, "Tell me about some other programs you noticed and are interested in that we didn't visit and would involve science", Allen responded, "the aviation program. It would be interesting to see how they (airplanes) are built, what goes where exactly, see the inside of it – you know, where all the different controls are." He continued, "and now that I understand what they have in the diesel

mechanics, I would be more interested in learning about working on lawn mowers and stuff like that with smaller engines, stuff not as complicated as the big rigs. And you can work on those things easier than the big trucks…more people own smaller stuff that they have problems with and you can work on those things without having to have a lot of tools or a big garage. It's too bad they don't have a fire fighter's school here because I know that's got some science to it…you have to know what to wear, what breathing mask to use in case you go into a chemical fire."

The final question, "How did today help you to realize some new goals, careers, or options after you graduate from high school", Allen was once again the first to respond. "No matter like what job you have, there's something else out there that can interest you. I would still like to do fire school, but if that doesn't work out or if I need to make more money at a second job, then the mechanics – not the diesel mechanics, but like the smaller engines".

Final interview. This one-to-one semi-structured interview took place 10 days after the field excursion to the off-campus technology center. During the days between the two events, Allen was reminded by the researcher between classes of the upcoming discussion and of his need to discuss the trip with his parents.

The discussion was opened with the first semi-structured question, "Tell me about connections you now see between science and possible jobs that you are interested in exploring, jobs we did not see during our field trip". Allen revealed that he was still very interested in firefighting. Although the school's basketball game schedule had forced him to suspend his membership from the local volunteer fire department, his desire to visit another local campus for fire training was obvious. "I have thought about this ever

since I was in elementary school. It seemed a lot different than what it was really like when I got on the department. One thing I like about is that it never gets old, 'cause you're always going to have something different. Most people want jobs for money. And you can't really say you want to be a firefighter because of money, because garbage people get paid more money than what firefighters do. There's a lot of danger…the adrenaline's running, so…I just like the idea of putting your life on the line to help people out."

Following up, the researcher read "We took this field trip in the second semester of your senior year." Then Allen was asked, "When would it have been more helpful to you to take this sort of trip and why?" After thinking about it for a few seconds, Allen offered this answer and explanation. "My sophomore and junior year. 'Cause my freshman year I really wasn't thinking about it. And I really wasn't thinking of college until people started talking about it…and then I started getting into it. 'Cause this whole thing goes by faster than you think." Allowing Allen a chance to follow this train of thought more fully, the researcher asked, "Do you think you would have wanted to take more than one trip?" Allen answered, "Uh, yeah. 'Cause the more stuff you go see, the more variety you have, so…" In an attempt to clarify his thought, the researcher offered, "So the more options you might know about?" To which he replied, "Exactly." Asking for further insight into Allen's perceptions at that time, "If you could describe this field trip in one word, what would that word be?" "Glad," he responded, "glad I took it because it's all like…I can almost have a second job. I was worried that if I did get a firefighter's job, what would I do on my days off? I've always wanted to have a second job, no matter what 'cause I didn't want to sit around the house and get bored."

Before the last question, Allen was reminded of his responses regarding parental support before the field trip. He had previously described them as "expecting him to go to college, expected him to do well in his high school science classes, and would like to see him have a career involving science or math". The last semi-structured question followed, "After you shared this new information with your parents, did your plans and their support change?" Allen responded, "They would support me in whatever I did and help me out…make sure I made the right decision on what college I go to, to get what I need to get any job". The researcher asked, "Where do you see yourself living after graduation from the diesel mechanics program or the fire academy?" Allen responded with, "I see myself moving off to a larger place…not someplace as big as Dallas, but maybe Austin or Waco."

Analysis of Allen's narrative by question. Allen's overall response to the off-campus excursion was a positive one. As indicated in the research design, Allen's inclusion as a participant was predicated on his self-reported difficulty in describing connections between academic (science) content and future careers. Whether the connections were present or not prior to the field trip, Allen was evidently unaware or unable to recognize or express them. The first research question focused on changes regarding this difficulty and whether, after his off-campus experience, he was able to describe an apparent awareness of emerging connections. Before visiting TSTC, he reported high school science classes as mostly enjoyable (with the exception of physics) and perhaps useful, but not valuable with regard to any career or training he might consider. His experience with physics had been reported as a particularly negative one, leaving him with little awareness of its future potential usefulness. After touring the

diesel mechanics program, he reported his surprise to learn that formulas (derived from physics principles) were an integral part of the academic training required for that program. This represented the first basic yet positive connection between academic (physics) content and training in a post-high school training program Allen had established. He also expressed a wish that this type of activity (i.e., field trips) had been provided at an earlier time in his school experience; perhaps as early has his 10th grade year. Allen's responses indicated he became aware that other students were beginning to formulate career and college plans around the 10th grade and felt that field trips would have been particularly impactful at that time.

Allen's response to the second research question, focusing on a point at which he realized that science was important, indicated clear recall of a singular incident. A diesel mechanics instructor had related his own difficulty with conversion between metric and standard tools, a concept which is generally troublesome for many middle and high school students. To solve that problem, the instructor had designed a personal conversion chart that he carried with his tools in order to minimize his confusion. The instructor's proactive solution had created another connection to content for Allen.

At the start of this research, Allen had only identified one potential career path (firefighting) but realized that there were other careers that he might find acceptable (diesel mechanics, small engine repair, and aviation) as well. With regard to the third research question, Allen reported that parental support had not changed after talking with them and that his parents (mother and step-father) still expected him to go to college or some type of training. Allen also stated that he believed that they would be able to provide adequate financial support for his education after high school. When considering

his future, he presented no definite plans concerning location of employment or living arrangements after vocational training, but believed he wanted to relocate somewhere. However, he also expressed a desire to avoid large metropolitan areas.

Case Study 2: Doug

At the start of this research, Doug was a white male, 18-year old student, enrolled as a junior (11th grader) Gypsy High School. By the second semester of his 12th grade year, his academic records indicated that he achieved an overall GPA of 82.16 (out of a possible 100 points); his science GPA was 79.33 and he was graduating under the recommended plan for Texas high schools; Doug was in the 3rd quartile of his class, ranked 28 out of 39. He had taken and passed the exit TAKS exams required by the recommended plan for high school graduation but had not taken the ACT or SAT test; therefore, no score was available for consideration and/or comparison with other students in the graduating class.

Official academic records contained one entry indicating that he did not perform satisfactorily on an assessment instrument administered to the student under the Texas Education Code (TEC) Subchapter B, Chapter 39. Another entry indicated that Doug was held back from one grade level to the next for one or more school years. There were also comments following each of those entries indicating that Doug was considered at risk and considered economically disadvantaged, Doug was consistently eligible for free meals under the National School Lunch and Child Nutrition program during his entire attendance on the chosen campus.

Doug enjoyed an active schedule both in and out of school. He had five academic classes in his 12th grade year (the credits remaining for graduation) and also worked as a

teacher's aide during one class period. He participated in various sports – football, basketball, and track – as well as other extracurricular activities – Future Farmers Association (FFA), Future Christian Athletes (FCA), and had attended various churches including a local Methodist church, a local Baptist church, and a local Jehovah's Witness congregation. As is fairly common for young men in this rural community, Doug joined the volunteer fire department in the summer after he turned 17.

Initial interview. During the initial qualifying interview, semi-structured interview questions initiated the discussion which evolved to include more information than anticipated. The first question ("Tell me about your answers concerning the connections between science careers") revealed that Doug had mostly enjoyed his science classes and saw science as useful. He felt science was very important to us, as it provided lots of advantages, and that it was important to learn science. Doug admitted that he did not always understand what was going on in class and found that created an anxiety-prone situation – "studying science sometimes makes me nervous". When asked if he would consider taking an additional senior level science elective, he responded "probably not since I don't have to take one to graduate, but it would depend on what it was and who taught it". While he was aware that science was important, he was not sure how what he had learned (i.e., content) would be needed or how it would help him to find a job that he wanted.

The second question ("Tell me about some careers that interest you, even if there is no connection to science that you can describe") also produced additional information during the interview. As a result of his membership on the rural volunteer fire department, he was interested in fire-fighter training although not quite sure how science

would be important. Like many of his peers, Doug was also interested in working on cars and trucks. While this also represented an area of possible career training, he again was not sure how science might be connected. As the discussion continued open-ended in nature, Doug mentioned his mother's medical training. She had attended a vocational program after which she received her Certified Nursing Assistant (CNA) license. She received this training after being widowed, a period of time recent enough for Doug to remember. She worked (at the time of this report) in home health care. She had not remarried. He did not offer to share any details pertaining to his father other than to respond that he did not know how far he had gone in school. His body posture and flat affect when answering questions about his father were taken as indicators that he preferred not to discuss any further information regarding his father. The researcher chose to honor those indicators and shift the discussion to his brother's influence.

Doug also had an older brother, a professional firefighter, whom he "really looks up to". Further discussion revealed that his brother had completed professional firefighter's training at a state-certified academy and Doug wished to follow in his footsteps. Allowing this strand of questioning to further develop, Doug was asked to describe, aside from his brother's influence, what activities or props were present in his home to encourage further thinking about science or careers that require science. Although he indicated that he did not think his mother expected him to pursue anything that would involve science, he admitted that he watched some science shows on TV. When provided with a list of possible sources of influence, he also offered that the family did receive a daily newspaper; however, the family did not have a computer (and

therefore no internet access), he did not own a calculator, and there were no encyclopedias, maps, or an atlas in the home.

When asked the third semi-structured question ("Tell me about some careers that you consider interesting, but feel that there is too much science for you to learn it all"), Doug did not have an answer. He reported that there really was not anything more that he was interested in (when asked to respond spontaneously). At this point, Doug was asked if he would like to participate in the research being conducted. He indicated that he was and signed his own IRB (as he insisted he could since he was 18). He was asked ("just for the researcher's peace of mind") to have his mother initial it as well. He complied and returned it with both signatures the next day.

First focus group session. At the first focus group session, Doug logged onto the school's computer system in order to comply with the request to identify programs at TSTC that he found interesting. It was not possible for Doug to access videos which were linked to each of the programs. Unable to access any of the links to additional information or videos, Doug's response to this "dead-end" was to stop trying to search the website. When asked about accessing it elsewhere, Doug disclosed that he did not have a computer at home or anywhere else and therefore had no access to a system that would allow him to view more information.

At this point, he was asked if he could locate anything that interested him. He also indicated that diesel mechanics would be a program "worth visiting". When prompted with "Tell me about the information you've found – what scientific terms can you find indicating that science is important to your program", Doug's response was negative. Even though there were several terms in the text visible (hydraulics, pressure,

analysis) that have specific scientific applications in physics, his recognition or recall was absent. In fact, he expressed a very negative opinion with regard to experiences he had had in physics, claimed to have learned little or nothing that would be useful in general and definitely not useful in a job situation. Doug identified fire fighting as a possible career as a result of his recent membership on the volunteer fire department, but also as a result of his brother's influence as a professional firefighter. He was disappointed there was no program described as such on the TSTC website.

When prompted with the second semi-structured inquiry, "Tell me about problems you still have connecting the pieces, understanding how science is needed for careers", Doug was sure that science was needed for some jobs like nursing (his mother had told him), but was not quite sure how it was necessary for firefighting or diesel mechanics, at least not the science to which he had been exposed. He remembered being told (by the physics teacher) that science was important because it was required for graduation.

The third semi-structured question, "Tell me what you expect to discover when you visit the site", produced a silent shrug and then, "I don't know," and indicated that this was the first off-campus visit to a specific program although he had also seen information in the career day presentations brought to the school by TSTC's visiting recruiters in the previous year.

Second focus group. After getting comfortable once again in an unfamiliar setting, the first question posed to the group was "Tell me what you learned this morning about science needed in the programs we visited." Doug did not respond initially as the other participants offered their answers first. When his initial response was given, he first

spoke about the media and telecommunications tour. "You have to know some math for sure because of the camera angles and other stuff they do there…and for the diesel mechanics, you need to know the equations for hydraulics and other stuff." When asked if he realized any other science connections with the other program visited (computer science), his response was "no."

The second semi-structured question, "At what point did you realize that science was important to this job", produced no new response from Doug. He repeated his response to the first question, the realization that math was used in both the media communications and diesel mechanics programs.

When asked the third question, "Tell me about some other programs you are interested in that involve science", Doug responded, "the auto mechanic program, 'cause I wanted to work on, like, automobiles and trucks instead of the big diesels. And I'd also like to know more about the auto-glass technician stuff". He wished TSTC sponsored a firefighter's school because of the policy regarding job placement. At this point, Doug included a comment indicating his concern over cost and job placement, "it's pretty cheap here, after all with a big college ticket…you're just paying for a name…and if you get fired 10 years down the road, you can go back to the school and they'll find you another job". When asked about the concept of job placement being like a "safety net", he responded, "yeah, just like the fire departments have" and laughed.

The final question, "How did today help you to realize some new goals, careers, or options after you graduate from high school", Doug waited once again to answer only after others had. "I don't know, could we come back tomorrow – I'd like to see some other programs…the auto-glass program…maybe visit another place that trains

firefighters?" He continued, "I mean this was good today, gave me some ideas for a back-up plan if things (the fire academy) don't work out".

Final interview. This one-to-one semi-structured interview took place 10 days after the field excursion to the off-campus technology center. During the days between the two events, Doug was reminded periodically of the upcoming discussion and of his need to discuss the trip with his mother.

The first semi-structured question, "Tell me about connections you now see between science and possible jobs that you are interested in exploring, jobs we did not see during our field trip", revealed that Doug was still very interested in firefighting. Because he was on the basketball team, the game schedule had forced him to suspend his membership from the local volunteer fire department.

> I have thought about this ever since my brother became a firefighter. I really look up to him, he's like a role model to me. It's rewarding…I mean, I like helping people, as much as I can. And, it's fun to do. If it gets tiring after a while, you just think about how you're helping someone else and not thinking of yourself. It's what people do. You can put yourself in a lot of dangerous places trying to help people out.

The following statement was read "We took this field trip in the second semester of your senior year." And then followed by, "When would it have been more helpful to you to take this sort of trip and why?" After thinking about it for a few seconds, Doug offered this answer and explanation. "Probably either my freshman or sophomore year. 'Cause by the time I was a junior, I was already set on the fire academy." Doug further explained that he had attended a career night presentation at the local community college during his junior year, meeting the director of the fire academy. While he had not toured the training facility, Doug had talked with the director briefly about enrollment in that

program. Taking out his wallet and showing the well-worn business card of the director, Doug expressed his determination to pursue this program after graduation.

When asked to describe this field trip in one word, Doug's response was "confused". When asked about the word "confused", he explained that "there's just so much stuff that I can take on and I just…I don't know…." Without continuing to press for more (Doug was visibly agitated), the researcher assured him that most college-aged students have the same reaction when they realize how "big" the world truly is and further expressed confidence in his ability to make good personal choices in the future. At that point, the final question, dealing with the subject of parental support, was discussed.

When reminded of his earlier responses regarding parental support, Doug agreed that he had previously described his mother as "expecting him to go to college, expected him to do well in his high school science classes (although she did not have much time to help him or reward his efforts to get good grades), and did not know if she would like to see him have a career involving science or math". The last semi-structured question followed, "After you shared this new information with your mother, how did your plans and her level of support change?" Doug's response indicated that his mother still expected him to go to some type of technical or vocational training, but not necessarily anything that would require science or math. When asked, "Where do you see yourself living after graduation from the diesel mechanics program or the fire academy?" Doug indicated that he really did not have a plan for living somewhere else, "just probably try to get on with Waco's fire department…like my brother."

Analysis of Doug's narrative by question. Doug's general response to the field trip was a positive one. As indicated in the research design, Doug qualified as a participant due to his self-reported difficulty in describing connections between academic (science) content and future careers. Whether the connections were present or not, Doug was evidently unaware or unable to recognize or express them prior to the field trip. The first research question focused on changes regarding this difficulty and whether, after his off-campus experience, he was able to describe an apparent awareness of emerging connections. Before visiting TSTC, he reported high school science classes as mostly enjoyable (with the exception of physics) and perhaps useful, but not valuable with regard to any career or training he might consider. He thought it was important to learn science, but also found it to be anxiety-producing in some instances. His experience with physics had been reported as a particularly negative one, leaving him with little awareness of its future potential usefulness. After touring the diesel mechanics program, he indicated that he did see connections to math as well as physics. This realization, his first positive connection to content, was the result of equations that were clearly displayed on the whiteboard in one of the classrooms visited. Additionally, Doug reported understanding the need for math in the media and telecommunications program. He also expressed a wish that this type of activity had been provided at an earlier time in his school experience; perhaps as early has his 9th or 10th grade year. By his 11th grade year, Doug reported having already decided to become a professional firefighter. He also reported that because of his brother's influence (as a professional firefighter) he would probably have chosen to pursue that career training first, but nonetheless would have

appreciated being made aware of other options through field trips emphasizing career and training options.

Doug's response to the second research question, focusing on a point at which he realized that science was important, produced a less specific response. He vaguely described understanding that working formulas would be important if pursuing training either in the media or diesel mechanics program. When prompted, he offered no further explanation and rephrased his original response, as was indicated in his narrative, providing no indications of new insights.

At the start of this research, Doug had only identified one potential career path (firefighting) but realized that there were other careers that might prove interesting (automotive repair and auto-glass installation) as well. With regard to the third research question, he considered this experience valuable in that he realized other options were available to him and had discussed these with his mother. Doug reported that parental support had not changed after talking with his mother. Regardless of his chosen path, she still expected him to go to college or some type of training although her expectation was that he would not pursue anything requiring much science or math. Doug also stated that he believed that she would be able to provide adequate financial support for his education after high school. Assuming that he would finish the firefighter's training program, he expected that he would likely stay in the Waco area, following in his brother's footsteps and joining the Waco Fire Department.

Case Study 3: Lane

At the start of this research, Lane was a white male, 17-year old student, enrolled as a junior (11th grader) at Gypsy High School. By the second semester of his 12th grade

year, his academic records indicated that he achieved an overall GPA of 76.58 (out of a possible 100 points); his science GPA was 79.0 and he was graduating under the recommended plan for Texas high schools. At the time of his kindergarten enrollment, Lane was tested and determined to be eligible for special education services every year and into high school. His Individual Education Plan (IEP) provided for modifications in all high school academic classes except language arts and mathematics. For those two core content areas, he received academic instruction in the special education resource classroom. Lane was in the 4th quartile of his class, ranked 39 out of 39. He had met all of the requirements specified in his IEP, including assessments on modified versions of the exit TAKS exams, but had not taken the ACT or SAT test; therefore, no score was available for consideration and/or comparison with other students in the graduating class.

Official academic records show entries from grades 7 through 12 indicating that he did not maintain an average equivalent to 70 on a scale of 100 in two or more subjects in the foundation curriculum during a semester of the preceding or current school year. Official academic records also contained two separate entries each from grades 7, 8, and 10 indicating that he did not perform satisfactorily on an assessment instrument administered to the student under the Texas Education Code (TEC) Subchapter B, Chapter 39, establishing the mandate for high-stakes testing. Prior to administration of the 10th grade TAKS assessment, Lane was qualified for a modified version of the TAKS assessment (TAKS-M) under the provisions of his IEP. One exit comment, following the first TAKS assessment entry indicating lack of satisfactory performance, showed Lane was considered “at risk”. Considered economically disadvantaged, Lane had always

been eligible for free meals under the National School Lunch and Child Nutrition program during his entire attendance on the selected campus.

Lane enjoyed an active schedule both in and out of school. He had five academic classes this year (the credits remaining for graduation) and also worked as a teacher's aide during one class period. He participated in various sports – football, basketball, baseball, and track – as well as other extracurricular activities – Future Farmers Association (FFA), Future Christian Athletes (FCA), and attended the Christian Cowboy Church. Lane joined the volunteer fire department in the summer after he turned 17.

Initial interview. During the initial qualifying interview, semi-structured interview questions initiated the discussion which evolved to include more information than anticipated. The first question ("Tell me about your answers concerning the connections between science careers") revealed that Lane had mostly enjoyed his science classes and saw science as useful. He felt science was very important to us as it provided lots of advantages and that it was important to learn science. Lane admitted that he did not always understand what was going on in class but that he did not experience his science classes as anxiety-producing situations. When asked if he would consider taking an additional senior level science elective, he responded "I don't know". While he was aware that science was important, he was not sure how what he had learned (content) would be needed or how it would help him to find a job that he wanted.

The second question ("Tell me about some careers that interest you, even if there is no connection to science that you can describe") also produced additional information during the interview. As a result of his membership on the rural volunteer fire department, Lane was interested in fire-fighter training although "not quite sure how"

science would be important. He was also interested in working on cars and trucks, although he was not sure show science might be connected. As the discussion continued open-ended in nature, Lane mentioned his mother's recent job loss. She had been recently laid off from a medical equipment supplier. With regards to his father, Lane offered that his "real dad" had graduated from high school, but did not go to college. He had been employed for some time as professional driver but quit. After a period of joblessness, he went to work for a motel chain as a general maintenance/repairman. Lane went further to explain that his parents had divorced when he was about 4 years old and his mother subsequently remarried. His step-father (present in the home) had been a warehouse worker in the Sherwin-Williams plant but had returned to college in order to take an office job. Lane described him as "a good guy…him and my mom do a lot for me". When asked if he knew what his step-father had studied while in college, he answered, "I don't know really…just something to make him ready to work in an office".

Lane also had an older brother, enrolled at the time in a vocational school specializing in motorcycle repair. Lane was obviously impressed by his brother, bragging that he had "actually just, uh, doubled up on his classes…that way he can graduate in June". Further discussion revealed that there had been some financial aid problems but that he was set to graduate and probably move to some bigger city for his first job. Allowing this strand of questioning to further develop, Lane was asked to describe, aside from his parents' and brother's influences, what activities or props were present in his home to encourage further thinking about science or careers that require science. Among the options presented on a prepared list, he reported his favorite TV shows were things about "like trauma and ER and stuff like that; it just always interested

me". He also reported that the family does receive a daily newspaper as well as a computer linked to the internet. He also had a calculator but did not have an atlas, maps, or a globe.

When asked the third semi-structured question ("Tell me about some other careers that you consider interesting"), Lane did not have an answer. He reported that he could not think of anything else (when asked to respond spontaneously). At this point, I asked Lane if he would like to participate in the research being conducted. He indicated that he would and returned with a signed IRB three days later.

First focus group session. At the first focus group session, Lane logged onto the school's computer system in order to comply with the request to identify programs that would be of interest at TSTC. It was not possible for Lane to access videos which were linked to each of the programs. Unable to access any of the links to additional information or videos, Lane indicated that he could probably look at it at home (as his home did have internet access) but that it would probably take a long time as their service was provided "through the phone company and was pretty slow".

At this point, Lane was asked if he saw anything else that interested him. Lane indicated that diesel mechanics would be a program "okay to visit". Again, opening with "Tell me about the information you've found – what scientific terms can you find indicating that science is important to your program", Lane's response was also a negative one. Terms present in descriptive text (hydraulics, pressure, analysis) did not generate any recall or recognition on his part. When commenting on the physics class, Lane felt he had learned little or nothing that would be useful in general and "definitely not useful" in a future job. Lane indicated that he was considering fire fighting as a

possible career due to his involvement as a member of the volunteer fire department and added that “my dad used to be a firefighter, but when I was a baby”.

When prompted with the second semi-structured question, “Tell me about problems you still have connecting the pieces, understanding how science is needed for careers”, Lane was sure that science was needed for some jobs but was not sure that the science he had learned would be important for firefighting or diesel mechanics. He remembered being told that science was important because it was required for graduation, but could not remember who (on the school campus) had said that to him.

The third semi-structured question, “Tell me what you expect to discover when you visit the diesel mechanics program”, produced, “This is my first time to go anywhere, so I don’t know”.

Second focus group. After choosing a chair and settling in around the conference table, the first question posed to the group was “Tell me what you learned this morning about science needed in the programs we visited.” Lane did not respond initially as the other participants offered their answers first. When his initial response was given, he mentioned the diesel mechanics program. “You might have to know a little bit of math because of the equations on the board,” he offered. When asked if he realized any other science connections with the other program visited, his response was “no.”

The second semi-structured question, “At what point did you realize that science was important to this job”, produced no initial response from Lane. I rephrased the question, “Did you notice any science being used today in any of the programs”. He generally repeated the same response as given by the other participants, that math was seen being used in the diesel mechanics programs.

When asked the third semi-structured question, "Tell me about some other programs you noticed and are interested in that we didn't visit and might involve science", Lane responded, "I wish I would have known that they had airbrush painting classes. I would probably be interested in taking that class. Well…see, I like airbrush painting, really". When asked further about what experience he had with airbrush painting, Lane continued,

> I do it in ag class, whenever we have built trailers. I sort of figured it out after Mr. Geyser told me how to do it. But, I mean, it wasn't that hard to do once I got to do it. But they could probably teach me a lot of stuff I'd like to do…how to do stencils on cars, how to make my own designs, how far to hold back the airbrush from whatever you're painting.

When asked if there were any other programs, Lane indicated, "Um, not that I know of".

The final question, "How did today help you to realize some new goals, careers, or options after you graduate from high school", Lane reconsidered his answer to the last question and presented it here,

> I wish I'd asked about diesel pickups…if they teach you to work on those. There was something said about performance mechanics and I would want to work on my own truck, you know, installing performance packages and stuff. All they seemed focused on was the bigger trucks and then there was the stuff for Caterpillar. That seemed pretty good. The guy said the economy is bad right now so they (Caterpillar) aren't sending any classes. But that was a pretty good deal. They pay you to go to school for 8 weeks and then come back, work on stuff for 8 weeks and then come back to learn more. And all their stuff is the same, so if you can work on one thing, you can work on anything they (i.e., Caterpillar) make. You don't have to learn a lot of different systems, just one way to do stuff for everything. That's pretty good. They get a lot of hands-on training and I like that.

Final interview. This one-to-one semi-structured interview took place 10 days after the field excursion to the off-campus technology center. During the days between

the two events, Lane was reminded by the researcher of his need to talk with his parents before the final interview.

The first semi-structured question, ("Tell me about connections you now see between science and possible jobs that you are interested in exploring, jobs we did not see during our field trip"), revealed that Lane also remained very interested in firefighting. Lane had suspended his membership from the local volunteer fire department until the end of basketball season because of scheduling conflicts between game dates and required meetings.

> I like firefighting because it's just like a big rush…being paged out to a fire, getting ready, jumping on the back to the engine, not knowing what's going to be thrown at you…it's the idea of helping people, maybe saving someone's life…maybe your buddy's life. You just never know. And I also like the idea of the diesel mechanics because on days when I'm not at the fire station, I can work on something that will be part-time and make some extra money for my family. The schedule at the fire station would help with the part-time job because it's 2 days on and 3 days off. So that would give me 3 days of time to work on stuff for people.

Reading the following statement "We took this field trip in the second semester of your senior year," Lane was then asked, "Tell me when you would have liked to go on field trips about careers. When would it have been more helpful to you to take this sort of trip? And why?" After thinking about it for a few seconds, Lane responded,

> I would say junior high. It would be kind of hard with junior high kids because they really just don't think about this kind of stuff that young. I don't think they would go to be actually looking into what they want to do for the rest of their lives. But they could start seeing stuff so they could start thinking about it. And then in their freshman or sophomore year, it would be more important if you'd already seen things.

Then he added,

> Don't get me wrong, what you did for us changed a lot of stuff for me too because I was actually wondering about something to do after firefighting. You can't do that kind of work after a while, it's just too hard. So I thought about doing diesel

> mechanics before, but going out there and actually seeing it helped me out on decision-making. And it's a lot cheaper to go there than any other places. What's the difference between that place and Baylor? It's pretty much just the name. You can get the same thing there and save a lot of money.

When asked to provide one word that would describe his feelings about the field trip experience, he asked, "One?" He laughed and said, "Accomplished." Seeking further clarification, the researcher offered, "You feel like you accomplished something by going on the field trip?" Lane's response was, "Yes, because I saw all the stuff they have for programs."

Before asking the last semi-structured question, Lane was reminded of his description with regard to parental support before the field trip. He had previously described his parents as "expecting him to go to college, often help you with homework and reward his efforts to get good grades, not sure if they would like to see him have a career involving science or math". The last open-ended question followed, "After you shared this new information with your parents, how did your plans and their support change?" Lane's answer indicated that his family was happy to find that he was contemplating several career options,

> My family said they would support me no matter what choice I made. They always support me no matter what. They really don't care which thing I choose…whatever I feel like doing. They said they'd help me out any way they could, like with the financials and all. If I have problems, they'll encourage me to keep going.

When further asked, "Where do you see yourself living after graduation from the diesel mechanics program or the fire academy?" Lane said,

> I see myself running into burning buildings, trying to put out fires. I just don't know where, I always thought about moving off somewhere, like to a big city so I can always have more action. But I don't know if I can do the whole big city thing. I'd rather be in the country than in a city somewhere. I never have lived in

> a big city so I could see myself living in the country and working in a city close by.

Analysis of Lane's narrative by question. Lane's reaction to the field trip was a positive one. As indicated in the research design, Lane's responses on the initial survey instrument indicated he had difficulty describing connections between academic (science) content and future careers. As was further indicated in the initial interview, Lane was evidently unable to recognize or express connections prior to the field trip. The first research question focused on changes regarding this difficulty and whether, after his off-campus experience, he was aware of and better able to describe connections. Before visiting TSTC, he reported high school science classes as mostly enjoyable (with the exception of physics) and perhaps useful, but not valuable with regard to any career or training he might consider. Lane thought it was important to learn science, but was also aware that his requirements differed from peers as a result of his IEP. His experience with physics had been reported as a particularly negative one, leaving him with little awareness of its future potential usefulness. Once exposed to information resulting from the field trip, he recognized the need to learn math and science particularly when seeing the media communications and diesel mechanics program presentations. Lane also indicated that he felt this type of field experience was important to include in science classes, perhaps even as early as junior high or middle school. Lane believed that exposure to information at an earlier age would encourage students to be more aware of the workplace and of their options therein. Appreciative of the opportunity at this point in time, Lane indicated that this trip had been helpful because he had found other programs (diesel mechanics and air-brush painting) attractive and potential career

avenues. Although he had decided to pursue training as a firefighter, Lane accepted that this might not be his actual profession (worried that he might not be able to complete the academic part of the training) and needed another option. Of particular interest was the plan by Caterpillar where employees were paid while training and then worked, thus providing a safety net for living expenses while away from the job.

Lane's response to the second research question, focusing on a point at which he realized that science was important, produced a very little variation on the responses already given. He generally repeated the same information, describing how important it was to understand how to work formulas. When prompted, he offered no further explanation as was indicated in his narrative.

At the start of this research, Lane had only identified one potential career path (firefighting) but realized that there were other careers that might prove interesting (diesel mechanics and air-brush painting) as well. With regard to the third research question, he had enjoyed the field trip and had discussed his newfound options with his parents. Lane also reported that anticipated support from his mother and step-father had not changed after the field trip. Regardless of his chosen path, they were encouraging him to explore any career path in which he was interested. Assuming that he finished the firefighter's training, Lane expected to move to a larger city where he would get more experience than a smaller fire department had to offer. He also thought that he would prefer living in the country, commuting to a larger city for work.

Case Study 4: Stu

At the start of this research, Stu was a white male, 17-year old student, enrolled as a junior (11th grader) at Gypsy High School. At the beginning of the second semester of

his 12th grade year, his academic records indicated that he achieved an overall GPA of 87.74 (out of a possible 100 points); his science GPA was 85.0 and he was graduating under the recommended plan for Texas high schools. Stu was in the 3rd quartile of his class, ranked 20 out of 39. He had taken and passed the exit TAKS exams required for high school graduation and had taken the ACT with a composite score of 15 on that assessment. This score indicated that 13% of students taking the test scored the same or below him.

Official academic records contained three separate entries from grades 7, 8, and 10 indicating that Stu did not perform satisfactorily on an assessment instrument administered to the student under the Texas Education Code (TEC) Subchapter B, Chapter 39, establishing the mandate for high-stakes testing. After each entry for the three grade levels, there was a comment showing that Stu was considered "at risk". Considered economically disadvantaged, Stu had always been eligible for reduced-price meals under the National School Lunch and Child Nutrition program during his entire enrollment at Gypsy High School.

Stu enjoyed an active schedule both in and out of school. He had five academic classes this year (the credits remaining for graduation) and also worked as a teacher's aide during one class period. He participated in various sports – football, basketball, baseball, and track – as well as other extracurricular activities – Future Farmers Association (FFA), Future Christian Athletes (FCA), and high school band. Stu indicated that he was a member of the First Baptist Church and also coached little league softball for his younger sister's team.

Initial interview. During the initial qualifying interview, open-ended or semi-structured interview questions initiated the discussion which, evolved to include more information than anticipated. The first question ("Tell me about your answers concerning the connections between science careers") revealed that Stu was not sure if he had enjoyed his science classes, but saw science as challenging and useful. He also felt it might be possible that science could do more harm than good so it was important to learn science. Stu further indicated that he usually understood what was going on in class. When it was required, he had participated in science fairs while in elementary and middle school, but had not visited any museums with science exhibits. Asked if he would consider taking an additional senior level science elective, he responded "I might but I don't have to take one to graduate". While he was aware that science was important, he was not sure how what he had learned (i.e., content) would be needed or how it would help him to find a job that he wanted.

The second question ("Tell me about some careers that interest you, even if there is no connection to science that you can describe") also produced additional information during the interview. To this question, Stu's answered, "I'm interested in automobile mechanics and welding work." When asked, he was not sure how science might be connected to these two career paths. As the discussion continued open-ended in nature, Stu mentioned both parents' jobs and his family's dynamics. His mother worked for the city of Waco in the water department, saying "I think she's a manager, but I really don't know what she does". His father worked for the post office. Both parents had graduated from high school but he did not recall either of them mentioning going to college. His parents divorced when he was "6 or 7, maybe 8. That's when we moved here". The

conversation was redirected to ask about activities or props present in his home to encourage thinking about science or careers that require science. From a prepared list of options, his response indicated that he watched some science shows on TV, that he did read magazines with some science articles, but did not read about science careers. He also reported that although the family did not receive the daily newspaper, they did have a computer but no internet access and he did have his own calculator. However, there were no encyclopedias, maps, or an atlas in the home.

When asked the third semi-structured question ("Tell me about some careers that you consider interesting, but feel that there is too much science for you to learn it all"), Stu reported that he did not think about science as a career option; he was interested in going to college for a degree in business. When asked if he would still consider participating in the research, he indicated that he would like to go on the field trip. Although he had planned to go to college, he had not made a campus visit of any type at that point and this would be his first chance to do so. He was given an IRB for parental consent (Appendix B). He returned it the next day, signed by his mother.

First focus group session. At the first focus group session, Stu logged onto the school's computer system in order to comply with the request to identify programs that would be of interest on the TSTC campus. He immediately noticed there were no courses connected to a business certificate or degree. However, he did wish to visit the campus to see if there was anything related to welding or automobile repair offered.

The first semi-structured question, "Tell me about the information you've found – what scientific terms can you find indicating that science is important to the diesel mechanics program", elicited responses from Stu that indicated he did recall that the

terms “pressure” and “analysis” had been used in class. He did not remember in what context, simply that he remembered hearing them. He described science classes taken at Gypsy High as “interesting” but that he didn’t get much out of them. Again, when asked, he referred to his plans to get a business degree and couldn’t see how those courses could apply – they were “not likely to help him find a job”.

When prompted with the second inquiry (“Tell me about problems you still have connecting the pieces, understanding how science is needed for careers”), Stu continued with the same line of thought. “I said the classes were interesting and I got mostly B’s. I probably could have done better but I only did enough to keep my grades up because I just don’t see how it’s going to help me…aside from needing it to graduate.”

The third semi-structured question (“Tell me what you expect to discover when you visit the site”) prompted him to respond with “I don’t know; it’s a chance to see a school…haven’t visited one yet.” He indicated that he had attended the career day programs held on the high school campus…but “it was a chance to get out of class” and he “didn’t really get much useful information at those events”.

Second focus group. After taking a seat at the conference table, the first open-ended question posed to the group was “Tell me what you learned this morning about science needed in the programs we visited.” Stu responded almost immediately, “They pretty much use math and science in everything they do out there. I didn’t know you had to have so much math for those computer things (programs) that we saw at the last building”.

In response to the second semi-structured question ("At what point did you realize that science was important to the diesel mechanics program"), Stu observed that "the formulas on the board…it looked like the stuff from physics."

When asked the third semi-structured question ("Tell me about some other programs you might have noticed during the tour that would involve science"), Stu indicated that he found the video gaming program interesting. "I got interested in the whole video game thing. I didn't know there was that much to it…like the computer technology and all that. It was pretty interesting. It's a possibility, I think."

The final question, "How did today help you to realize some new goals, careers, or options after you graduate from high school", Stu answered, "It made me realize that there's more out there than what I expected. So if, like, I'm going for one thing, it can always change…like, I have all kinds of options".

Final interview. This one-to-one semi-structured interview took place eight days after the field excursion to TSTC. During the days between the two events, Stu was reminded by the researcher of the upcoming discussion and of his need to discuss the trip with his mother.

The first semi-structured question, "Tell me about connections you now see between science and possible jobs that you are interested in exploring, jobs we did not see during our field trip", revealed that Stu had a very definite goal in mind. "I want to own my own trailer store. I have thought about this since I was really young, maybe around 7 or 8 years old. I have always wanted to own a flatbed trailer store." Pursuing this unexpected discussion, he was asked if he was still interested in going to college. He indicated that he wanted to get a

> 4-year degree, probably at McMurry. I applied and they want me to play basketball, but I have to retake the ACT. My score was 15, I think, or something like that, and it needs to be higher. They have special money to help pay for it…they can't give out scholarships, so you can't call it that but they want me to play…so I may go there.

When asked about an apparent lack of enthusiasm, he indicated that McMurry would be a long way from home and his girlfriend – they have "been together" for the past 3 years. When asked about the comment he made regarding computer programming in the second focus group session, he responded, "That computer thing or whatever? There were so many codes, so much math…stuff like that for games? It's ridiculous".

Without any definitive answer to the previous question, the following statement was read, "We took this field trip in the second semester of your senior year. When would it have been more helpful to you to take this sort of trip and why?" With little hesitation, Stu offered this answer and explanation. "The freshman or sophomore year. Earlier than that, you don't really know what you're going to do. That's about when you start to get an idea about what you'd be doing." When asked further about the number of field trips, Stu indicated he thought that students ought to go to different places. He had just visited Sam Houston State University.

> They got a really big program on criminal justice and stuff. I kind of thought about that before I went there. I don't know, I think I have my mind pretty much set now. But it (criminal justice) might be pretty interesting. I wouldn't want to be a cop but they have stuff like you see on CSI and that's pretty interesting.

When asked, "If you could describe this field trip in one word, what would that word be?" "Varied," he replied, "meaning there's so many opportunities".

Before asking the final semi-structured question, Stu was reminded of his responses regarding parental support before the field trip. He had previously described them as "expecting him to go to college, expected him to do well in his high school

science classes, and would like to see him graduate from a 4-year college". The last semi-structured question followed, "After you shared this new information with your parents, did your plans and their support change?" He responded, "Considering that nobody in my family has gone to college and they want me to finish, they would support me. They wouldn't mind doing whatever it takes to help me out". When asked, "Where do you see yourself living after graduation from college?" Stu responded with, "I see myself coming back here. This is where my family is. I can't see myself wanting to be any place else. I don't want to live in another town and not a big city. I'll have my trailer store in Waco and drive home every night."

Analysis of Stu's narrative by question. Stu's general response to the field trip was a more neutral one. He qualified as a participant because he lacked sufficient ability to describe connections between academic (science) content and future careers. The first research question focused on changes regarding this difficulty and whether, after his off-campus experience, he was able to describe an apparent awareness of emerging connections. Whether the connections were present or not, Stu was evidently unaware or unable to recognize or express them prior to the field trip. Before visiting TSTC, he reported high school science classes as mostly enjoyable (with the exception of physics) and perhaps useful, but not valuable with regard to any career or training he might consider. He thought it was important to learn science, had participated in a science fair, and generally understood what was going on in class. His experience with physics was reported as a negative one, leaving him with little desire to take additional classes unless they were required. After the tour, without referencing any program specifically, Stu identified the need for math and science in each of the programs visited, but was

particularly impressed with the amount of math and equation solving involved with computer programming. With regard to usefulness, he suggested inclusion of field trips into the 9th or 10th grade science classes. In addition, he felt that students should be taken to a variety of sites in order to increase exposure to a variety of possibilities.

Stu's response to the second research question, focusing on a point at which he realized that science was important, produced a response which was identical to Allen's – the sight of formulas on the whiteboard of a classroom in the diesel mechanics building. He offered no other response when prompted for further information.

Stu reported being interested in diesel mechanics, automobile repair, and welding as potential training programs, but claimed to be most interested in owning his own business. With regard to the third research question, he considered this experience valuable in that he realized other options were available to him and had discussed these with his parents. Stu reported that parental support had not changed after talking with his parents (mother and step-father), although they were not excited about the technical school as an option. Unlike the other participants however, his family expected him to attend a 4-year college and graduate with a bachelor's degree. He and his parents held a desired goal that he get a business degree and hopefully play basketball during his college experience. If this were possible, the bulk of his financial aid for his education after high school would be covered.

Cross-Case Analysis

Comparing the unique responses to the individual research questions reported in the narratives was the next step in this project. There was evidence of patterns that emerged from the narratives through this process and are summarized in Table 7.

Research Question 1

The first research question asked about the changes that the participants experienced as a result of a purposeful field trip with regard to their individual inability to describe connections between academic science content and future careers, a desired outcome listed in the state's curriculum for all science courses required for graduation. The participants all indicated an initial inability to describe connections prior to the excursion to Waco's TSTC campus. When compared, their narratives reveal common elements which might, to varying degrees and combinations, account for individually as well as commonly experienced difficulties. One common element reported by Allen, Doug, and Lane was a lack of understanding basic content. While this did not present any anxiety for Allen or Lane, Doug did experience his lack of comprehension as "anxiety-producing". While Stu reported science as challenging, a common point reported by all of the participants was the need for science in the careers they were considering.

With respect to their academic records, all of the participants were ranked in the lower half of the graduating class and all had at least one comment in their academic records; they were considered "at risk" because of a failure to perform adequately on at least one subject-specific state administered assessment in grades 7, 8, and 10. All of the participants were eligible for partial or complete subsidy under the National School Lunch and Child Nutrition Program and had been on that program throughout their respective enrollments at Gypsy ISD.

Their narratives concerning classroom experiences were also similar. They each reported that they did not want to take more science than was required for graduation as

they saw no possible connection between science (referring the content taught) and careers they were considering at the time of the initial survey and first interviews. Reporting that "studying science sometimes makes me nervous," Doug further commented that "I probably wouldn't take another science class because I don't have to take one to graduate, but it would depend on what it was and who taught it". The other participants expressed similar responses when asked about taking a senior science elective, reporting that they believed science was only important due to graduation requirements. When asked about specific vocabulary common to science content (e.g., hydraulics, pressure, analysis), participants either vaguely recognized or had no recall of vocabulary introduced in previous science classes. None had experienced any field trips that were science- or career-specific (e.g., museums, zoos, or available local industry) nor had any of the participants visited any colleges or vocational training facilities at the time of the initial surveys and first interviews. Typically comments included, "a field trip – yes!" and "it's a chance to see a school – haven't visited one yet", when asked initially about a potential college visit. With regard to career plans or paths, all reported an interest in careers that were physically demanding and labor intensive (e.g., welding, automobile/diesel repair, fire fighting, and air-brush painting).

Common issues were also found when considering the home environments of each of the participants. None of the participants resided with both biological parents, but each reported an adult male with potential influence in their lives. All had experienced divorce or death of a parent before the age of 12; two had step-fathers living in the home at the time of this study and two were living with a single parent only (mother, in both cases). All of the parents had high school diplomas; one had vocational

training beyond high school and none had college degrees. Three of the households experienced periodic unemployment resulting in limited resources being available to the participants for after-school use. All reported that they had cable television and watched some science shows, with CSI specifically indicated as a science show that two of the participants enjoyed.

A final dynamic present in all of the narratives was volunteer activities. Three out of the four joined the volunteer fire department when they reached the age of 17. The final participant volunteered as a coach for his younger sister's softball team. The close-knit nature of the community served by Gypsy ISD was such that involvement in any activity outside of school was certain to be witnessed and acknowledged. Both of these arenas offered an esteem-building option and camaraderie for the participants, possibly offsetting what they perceived as lackluster performances in another public forum.

Research Question 2

There were patterns of response found in each of the narratives with regard to question two which asked the participants to identify a point during the field trip at which they realized a connection between academic science content and future careers. As a result of their shared experiences, comments made during and after the excursion were similar and echoed from one narrative to the next. Across all of the narratives, the most commonly cited examples were the classroom with formulas on the board and the instructor from the diesel mechanics program. Realizing the connections with formulas which were introduced in their 10th grade physics class, Allen's comment, "When we walked into that one classroom with the formulas on the board…it looked just like the equations from the physics class at school," was similarly reported by the other three

participants. Also repeated in most of the narratives were comments about math needed for the computer programming and media/telecommunications programs.

All of the participants indicated that they saw connections in each of the three programs visited. It was evident from comments and body language (heads nodding and shaking, shifting on their feet and rolling their eyes) that they understood math and science reasoning were heavily involved in the computer science program. Once that program had been fully explained, none of the participants considered it a viable career option, with Stu's comment – "That computer thing or whatever? There were so many codes, so much math…stuff like that for games? It's ridiculous" – best summarizing the collective feelings of the participants. The media and telecommunications program met with similar reactions from all participants. Once they discovered the heavy reliance on instrumentation when working with sound, light, and projection (and their lack of "face time" in front of the camera), each participant dismissed this career as an option as well. The diesel mechanics program proved a positive influence in the search for a single point where connections between content and career was immediate and impactful. The faculty member conducting the classroom tour explained the need for equations and metric conversions to the participants – two critical points in most science classes, but particularly physics. While physics had represented a very negative experience (as mentioned in each of the narratives), this instructor demonstrated a practical, common sense use of knowledge and skills that was recalled by all of the participants in their interviews. Particularly impressed with his presentation, Allen's comment – "The guy said he had trouble with the difference between metric tools and our (standard) tools and he ended up making his own conversion chart that he put in his wallet so he wouldn't

keep getting confused. That was a BIG surprise to me" – drew immediate agreement from Doug, Lane, and Stu.

Research Question 3

The central theme of the third research question was changes in the participants with regard to career training or higher education plans in light of the field trip. In addition there were the questions of parental support and plans after completing whatever training or college they anticipated.

All of the participants anticipated some type of career training or college prior to the field trip. Three of the participants were considering firefighter's training, hoping to become professional firefighters. Two of the three had family members who had been or were employed as firefighters at the time of the study. The fourth participant anticipated college attendance contingent upon scholarship due to his high school basketball career. After the excursion, all of the participants indicated an interest in at least one field of technology offered by TSTC. They also seemed surprised to discover that they actually had other interests, likely due to their previous lack of opportunity for campus visits. Doug, Lane, and Stu responded similarly when asked about new insights after the excursion, with Allen best summarizing their comments – "No matter like what job you have, there's something else out there that can interest you."

Regarding campus visits, all agreed that this should be a "connecting piece" included in science (and other) academic content areas allowing students to begin understanding the need for said content in the workplace. Their suggestions for appropriate grade level inclusion ranged from 7th to 10th grade, with the most common grade level reported as the sophomore or 10th grade. The most commonly reported

comment, “That’s about when you start to get an idea about what you’d want to be doing for the rest of your life.” All felt that by the time a student reached 11th grade, he or she would likely have already decided on a career path or picked college campus to attend.

Parental support was reported consistently across the cases and throughout the study. Participants all perceived their parents as supportive before the field experience. After the excursion, Allen and Doug reported that parental support had not changed and Lane reported that his parents were “pretty happy” to find he was considering several other career options. Stu, the college basketball prospect, indicated that his parents were not as supportive of the technical/vocational college programs as they were of the 4-year college and a potential bachelor’s degree in business, “considering that nobody in my family has gone to college and they want me to finish, they would support me. They don’t mind doing whatever it takes to help me out”.

When asked about their long-term plans, Stu anticipated returning to the community to live in his “hometown”, citing “This is where my family is. I can’t see myself wanting to be any place else.” Allen, Doug, and Lane expressed a desire to live and/or work in larger communities, with Allen perhaps best summarizing their responses, “I see myself moving off to a larger place…not some place as big as Dallas, but maybe Austin or Waco”.

Conclusion

This chapter has been designed to provide the descriptive narratives of the participants in this multiple-case case study and to consider their narratives in light of the research questions regarding the efficacy of field trips as a pedagogical option for science teachers, particularly those in rural schools. There were positive results reported in all of

the narratives to the extent that the experience of a singular purposeful field trip to a vocational campus impacted the ability to describe connections between academic science content and future careers. This was an ability reportedly lacking in all of the participants prior to the excursion. All were able to point to a singular incident which helped them to realize those connections. After the field experience, all were able to identify possible alternative career paths of personal interest that were not previously considered and expressed confidence in parental support of their aspirations.

Table 8

Summary of Cross-Case Analysis

	Question 1 Describing Connections		Question 2 Recognizing Connections	Question 3 Impact on Future Plans	
Case	Pre-Field Trip	Post-Field Trip	During Field Trip	Participant	Parental
1 – Allen	-	+	+*	+	+
2 – Doug	-	+	+	+	+
3 – Lane	-	+	+	+	+*
4 – Stu	-	+	+	+	-

Note: - = Negative Response
+ = Positive Response
* = Greatest Increase in Positive Response

In the next chapter, the narratives will be reviewed in order to consider the findings in this study and to connect these findings to research cited in the literature review. Additionally, limitations of this research as well as directions for future research will be suggested.

CHAPTER FIVE

Summary and Discussion

In this study, participants visited a technology training center for a career-focused field excursion. Narratives of their experiences were recorded and analyzed using a multiple-case case study design. The four participants (referred to as "Allen", "Doug", "Lane", and "Stu") were treated as individual cases with a cross-case analysis following the individual case analyses. The research questions were posed with Experiential Education (EE) serving as the theoretical framework. In this final chapter, the implications of the study in terms of rural students and efficacy of field trips will be considered. Limitations of this research and recommendations for future research will also be outlined.

Summary of the Study

Narratives of four purposefully selected participants were developed and presented in this narrative multiple-case case study of 12th grade students from a small rural central Texas high school (Merriam, 1998). All four participants were male and between the ages of 17 and 19. They had all been consistently enrolled since middle school at a common campus serving students grades 6-12. All had the same class schedule from year-to-year with regard to science instruction, the same sequence of academic science courses, and the same science teachers for each of their high school years. They also received no other formal science instruction during their enrollment as either middle or high school students.

The data collected for this study was take from an initial qualifying survey (Appendix A), as well as school records and included overall GPA, science GPA, TAKS scores, class rank, ACT/SAT scores, and family economic data; all qualified for enrollment in the National School Lunch and Child Nutrition Program. Additional data sources included audio recordings of two individual interviews and two focus groups sessions, as well as field notes taken during the off-campus visit as audio recording was not a practical option.

The collected data were initially coded using an open coding method. Each narrative was treated as a separate whole case, analyzing information found in each such that the research questions served as the focal points (Creswell, 1997). A cross-case analysis was then designed to further generalize the responses to the research questions (Merriam, 1998). Internal validity, defined by Merriam (1998) as "research findings matching reality" (p. 201), was established through data triangulation and member checks as the narratives were evaluated by the participants for accuracy of interpretation on the part of the researcher.

The first research question dealt with participants as they experienced a change in the ability to describe connections between academic science content and future careers as a result of one purposeful, career-focused field trip. Classroom experiences can lend much to student's awareness and perceptions, particularly with the inclusion of computers and the internet; however, academic content most often stands as mere representation of reality (Oppenheimer, 2003). The influence of Thorndike's mechanistic view of education (Gibboney, 2006) and Freire's (1992) banking concept of education stand in stark contrast to experiential education (EE), the theoretical framework for this

study (Baker et al., 2000). Current classroom climate leaves little time for discussion and reflection, a critical component of EE. A well-designed field trip provides students with rich, lived, conversation-driven social events that Dewey believed were critical to true education; presenting a chance to transform thinking, break down stereotypes, and helping students see relevance in their academic courses (Rone, 2008; Scarce, 1997).

The second research question asked if participants could recall a singular incident or situation during the field trip when they recognized academic content and its implications with regard to future careers. As this field trip concentrated on vocational training, connections could be anticipated in classrooms, lab settings, and in conversations with faculty, staff, and other students. The programs selected for this particular excursion included the diesel technology program, the computer science technology program, and the media and telecommunications program. While there were additional programs to consider, the three selected contained requirements for basic curriculum content similar to content introduced in the participants' high school academic science courses.

The third research question explored possible changes in the participants' career or vocational plans, having realized some connection between academic content and possible careers. As none of the students had experienced a campus visit prior to this field trip, their awareness of multiple options was expected to surface. If typical of the achievement-aspiration gap (Gandara et al., 2001; Ishitani, 2006), the parents of these students would react favorably to career options discovered while on the field trip to the technology campus.

The study specifically provides positive evidence of the efficacy of field trips as a pedagogical option, particularly when working with high school students who are "at-risk" for graduation. When practical application or conceptualized cognition is not easily demonstrated by the teacher or solicited from the student, the need to forsake the classroom for the real world is reinforced. In addition, the study expands the research available on rural schools and rural students for those interested in that particular setting. Furthermore, this study expands the application of EE to a little-researched population, students in grades K-12.

Summary of the Results

Describing Connections between Content and Career

The first research question examined the changes experienced by 12th grade participants on a career-focused field trip. Common characteristics of the participants included step-parent or widowed parent households, economically-stressed households (allowing enrollment in the National School Lunch and Child Nutrition Program), active participation in multiple extra-curricular activities, local church membership and/or attendance, and membership in volunteer after-school organizations. Academically, all were ranked in the lower half of their graduating class, found science content confusing and/or incomprehensible at times, and were not interested in science classes beyond that required for graduation.

Selected based on a self-identified inability to describe connections between academic science content and future careers, these participants had failed to develop a specific knowledge and/or skill listed in all creditable science courses in the state of

Texas. They were expected, in all of the courses, to be able to describe connections between content and future jobs. While they could not produce a suitable description, they all had similar comments with regard to the science as an academic discipline. All of the participants reported to some degree, as Doug did, that "studying science makes me anxious" and an overall agreement that "I probably wouldn't take another science class because I don't have to take one to graduate, but it would depend on what it was and who taught it". When asked about specific science vocabulary that would be expected from students with three years of science instruction, they either vaguely recognized or had no recall of vocabulary introduced in previous years' instruction.

This project involved providing participants with a single field trip experience, designed to ensure exposure to previously taught science content in multiple vocational training settings. When initially asked about visiting the vocational training facility selected for the excursion, common responses included, "a field trip – yes!" and "it's a chance to see a school – haven't visited one yet". By observing their reactions and recording their responses in later interviews, it was expected that the participants would develop some degree of descriptive connection between their science knowledge and future careers.

Realizing Connections

The second research question focused on a specific instance that participants could identify as central to creating connections between academic science content and future careers. The participants all reported connections were created in one particular setting, during the diesel mechanics program tour. Less obvious connections, while

negative in nature, were inferred by two participants after visiting both the computer science technology and media and telecommunications programs.

The diesel mechanics program proved a positive influence in the search for a single point where connections between content and career was immediate and impactful. The faculty member conducting the classroom tour explained the need for equations and metric conversions to the participants – two critical points in most science classes, but particularly physics. "When we walked into that one classroom with the formulas on the board…it looked just like the equations from the physics class at school," commented Allen during the debriefing focus group interview immediately following the field trip. The other participants agreed enthusiastically with Allen continuing, "The guy said he had trouble with the difference between metric and standard tools and he ended up making his own conversion chart that he put in his wallet so he wouldn't keep getting confused. That was a BIG surprise to me". While their high school physics class was reported as a very negative experience for the participants, this instructor demonstrated a practical, common sense use of knowledge and skills that was recalled by all of the participants in their interviews. While the participants as a group were less impressed by them, they also repeated comments about math needed for both the computer programming and media and telecommunications programs. All of the other participants agreed with Stu's assessment, "That computer thing or whatever? There were so many codes, so much math…stuff like that for (creating computer) games? It's ridiculous".

Future Career Options

The final research question dealt with potential changes in students' plans or perceptions with regard to career options not previously realized or identified. All of the

participants anticipated some type of career training or college prior to the field trip. Because of their involvement with the community's volunteer fire department, three of the participants were considering firefighter's training, hoping to become professional firefighters. The fourth participant anticipated college attendance contingent upon scholarship due to his high school basketball career. After the excursion, all of the participants indicated an interest in at least one additional field of technology. They also seemed surprised to discover that they actually had other interests, likely due to their previous lack of opportunity for campus visits. Summing up the feelings of the group, Allen as well as the others seemed rather pleased to discover, "No matter like what job you have, there's something else out there that can interest you".

Regarding campus visits, all agreed that this should be a "connecting piece" included in science (and other) academic content areas allowing students to begin understanding the need for said content in the workplace. Their suggestions for appropriate grade level inclusion ranged from 7th to 10th grade, with the most common grade level reported as the sophomore or 10th grade year. Hinting at the imperative to start early was Allen's comment,

> I would have liked this in my sophomore and junior year. 'Cause my freshman year, I wasn't really thinking about it. And I really wasn't thinking until people (peers) started talking about it…and then I started getting into it. 'Cause this whole thing goes by faster than you think".

Relating Results of the Research to Relevant Literature

Like many small rural school systems in central Texas, Gypsy ISD has historically experienced difficulty attracting and retaining high quality teaching staff (Zimmer-Gembeck & Mortimer, 2006). With mandates from NCLB requiring highly

qualified teachers in every classroom, Gypsy High School experiences a high turnover rate each year particularly in high-need areas such as math and science. In the science department each year, there is one teacher hired for each of the three (high school) disciplines required at the time of this study – biology, chemistry, and physics. Middle school positions are usually staffed by teachers with generalist certification (lacking science endorsements). In addition, the high school teachers are typically assigned one to two other subject areas (usually one or two different middle school grade science classes). In the four years the participants were enrolled at the high school, there were four different physics teachers and three different chemistry teachers who were hired, stayed a year (or two) and then resigned. Because the district's policy does not pay science teachers any additional money for high-need content areas, the compensation is considerably less than that of an urban or suburban counterpart who teaches only one subject at one or possibly two levels, in districts fewer than 10 miles away (Hardre, 2007; Hardre et al., 2007).

Gypsy High School has an enrollment that ranges from year to year around 200 students. Because of its small student population, ADA monies are extremely limited. The result of this limited funding is a reduced curriculum and few program options. All students are expected to graduate following one option provided by the state of Texas, referred to as the recommended plan. The term "recommended" refers to the requirements for potential college students. All students therefore, regardless of ability or lack thereof, are expected to complete the requirements under that plan in order to graduate (Gandara et al., 2001; Hooker et al., 1996). Students at the extremes are left to fend for themselves. This often results in special needs students falling behind, becoming

"at-risk" for graduation and ultimately placed in an alternative high school setting where the basic, more appropriate, diploma plan becomes an option.

All four participants in this study were from homes that were considered economically disadvantaged as all were eligible for some degree of federal subsidy under the National School Lunch and Child Nutrition Program. In three of the households, step-parents were in residence while the fourth consisted of a widow and her younger son. In all but one case, the adults went through cycles of employment and unemployment at jobs which were seasonal and/or required little to no vocational training. These conditions are all more common in rural schools than their urban or suburban counterparts (Gandara et al., 2001; Hardre, 2007). Three of the participants, while anxious about their respective futures, had made no preparations for training after high school graduation. This too is typical in rural home environments where the value of education may not be understood or appreciated (Cobb et al., 1989; Hardre, 2007).

In all cases, the parents lacked any traditional college experience. College, however, was an expectation for one participant. His parents (although divorced) held jobs that required on-the-job training, provided medical benefits, and optional retirement plans. Although his parents had no personal experience with college, their son had been offered a scholarship based on his athletic ability (basketball) to a private, Christian four-year college. While research has shown that the educational achievement of parents is critical to the achievement and aspirations of their children (Gandara et al., 2001; Ishitani, 2006), these parents envisioned more for their son. In his own words, Stu reported, "considering that nobody in my family has gone to college and they want me to finish, they would support me. They don't mind doing whatever it takes to help me out".

There is no question that field trips are a casualty of NCLB. These participants were 12th grade students in a rural school setting who, except for athletic and/or other extracurricular events, had experienced no off-campus academically-driven excursions during their high school years. And although their school was located within 15 miles of two such institutions, they had not visited any college or vocational training campuses, as was reported in each of the initial interviews, "it's a chance to see a school – haven't visited one yet". The pressure on teachers and school districts across the country to reduce the achievement gap and produce academically successful students is enormous (Wilczenski & Coomey, 2007). Each spring in February, it was their experience that TAKS review started in each of the four areas tested and continued until the testing was finished in late April. In rural schools, this narrowing of the curriculum and intensive training are particularly common and go on for months prior to the TAKS test (Ives & Obenchain, 2006).

Implications of This Study

In concert with traditional educational theory and practice, the purposely-designed field excursion proved a positive experience for the participants involved. It made such an impression on Doug that he suggested at one point during the debriefing focus group, "…Could we come back tomorrow – I'd like to see some other programs…or maybe visit another place that trains firefighters?" He continued, "I mean this was good today, gave me some ideas for a back-up plan if things don't work out" (referring to his plans to train as a firefighter). The field trip was designed with an emphasis on careers requiring some degree of science content commonly taught in middle and high school science classes. The positive impact of a single purposeful field trip suggests that some students can

successfully develop connections between academic content and future careers when placed in real-life contexts. This may be particularly true for students who are academically challenged or described as "at-risk" due to low performance on high-stakes tests or performance in the classroom and, like these participants, have little to no opportunity for academic field trips.

Experiential education (EE), in the form of field trips or off-campus excursions, deserves further investigation in K-12 settings. With its successful application at the corporate and higher education levels, it stands to reason that basic learning styles remain fairly unchanged. In simpler terms, what works when you are an adult is quite likely what worked when you were younger. At one point, Lane revealed his preferred learning style while discussing a particular corporate program at the vocational campus; Lane, who required special education modifications throughout his K-12 education, shared his awareness of what works for him saying "All their stuff (referring to Caterpillar diesel equipment) is the same; so if you can work on one thing, you can work on anything they make. You don't have to learn a lot of different systems, just one way to do stuff for everything. That's pretty good. They get a lot of hands-on training and I like that." For someone with reading difficulties, his previous experience with "hands-on" training in agriculture classes developed a passion for airbrush painting. And while there are likely volumes available on technique, "I sort of figured it out after Mr. Geyser *told me how to do it*." For Lane, "hands-on" training had an expectation of conversation.

The overall positive results from this study, from describing connections to increased parental support, would indicate that field trips should be further studied as effective pedagogy in rural high school science classes. If this is indeed an effective

intervention for "at-risk" students, field trips may represent an effective pedagogy for all high school science students. However, it must be noted that even though these results appear promising, there are limitations on the research conducted in this study.

Limitations of the Research

Participant Selection

The participants in this study were only male 12th graders on a rural high school campus who had received all of their science academic instruction from a specific set of teachers as a cohort. Given the diversity of the students enrolled on this campus and the overall diverse nature of rural high schools, the purpose of this study was to more fully explore and explain the particular problem on this high school campus with regard to the students' inability to describe connections between academic content and future careers (Merriam, 1998).

Characteristics of the Participants

The results of this study due to the particular nature of the population would be difficult to generalize, even though that is not a particular goal of qualitative research (Merriam, 1998). The sample size was small, male only, all white and consisted of only 12^{th} grade students with a self-identified deficit with regard to a particular knowledge and/or skill included in all creditable high school science courses for the state of Texas. They were also all identified at some point as "at-risk" academically with regard to high school graduation and all qualified for federal economic assistance through the National School Lunch and Child Nutrition Program.

Ongoing Support of Field Trips as Pedagogy

This research focused on participants experiencing an academically-purposeful field trip, specifically designed to provide access to a postsecondary setting not previously explored by the students. The effects of the field trip on their capacity to describe connections between academic science content and future careers provided a measure of effectiveness (Yin, 2003). While experiential education provided the theoretical framework for this study, the effective classroom practitioner is typically more concerned with viable pedagogical choices which are proven effective, regardless of theory. Therefore, careful evaluation of the results herein may provide other rural high school science teachers with supporting evidence for choosing purposeful field experiences when teaching in similar settings with similar students.

That being stated, however, the process of planning and implementing effective, purposeful field trips is a time-intensive one. Depending on local support and the campus culture, it may require multiple requests to the school board and campus administrators to secure permission for a field trip. Simply arranging an excursion at some point on the academic calendar can be problematic as some, particularly those teaching in other disciplines, may question the need for students to be away from campus for an extended day. Field trips also usually require a planning session on the part of the teacher, wherein the teacher visits the proposed destination and designs the field trip with the help of personnel onsite; this planning session most often occurs after school hours or on weekends, without the benefit of compensation on the part of the teacher. In the final analysis, given the current climate of high-stakes testing, a lukewarm or negative

response from the campus administrator may eliminate considering field trips as a pedagogical option altogether.

Recommendations for Future Research

The case has been made repeatedly that research on rural schools and their students is paltry when compared to that of urban and suburban school. This study was designed with a specific objective, investigating the effectiveness of field trips targeting a deficit on the part of students to describe connections between academic content and future jobs. Continuing to research this particular pedagogy in other academic content areas would seem obvious. In the process of conducting this study, multiple future research possibilities became evident.

This study also included participants who were all 12th grade students. Following suggestions made by the participants, it would be worth expanding the research to include younger grades. As science instruction containing the specific requirement to describe connections appears as early as 9th grade required content, expanding and researching field trip pedagogy at this level would be a logical decision.

This study also focused on male participants only. A traditional campus environment is possibly the reason that girls chose not to participate in the study. The vocational campus selected would have been the same if a mixed group or only girls had been selected. All of the potential female participants at the beginning of this study had been cloistered on this particular rural campus with more traditional expectations (imposed by family and reinforced on campus) as emerging young adult women. Discovering effective strategies on rural campuses to encourage them to consider careers would be another area to explore.

Service learning and volunteer opportunities which are available and easily accessed on many suburban and urban campuses simply do not exist in schools like Gypsy High School. On Gypsy's campus, the only opportunities to participate in activities, other than extracurricular ones, exist in the form of a peer-assistant leadership (PALS) program the function of which is to mentor at-risk elementary students. The other alternative is serving on the student council. Requirements to participate in either of these two options are grade-, interview-, and teacher recommendation-dependent. Needless to say, students who are struggling or problematic on any front are automatically excluded. Establishing an effective, attractive alternative and then researching the effects of such an option on this campus (or, most likely, any rural campus) would be another area worth investigating.

Sadly, a suspicion was confirmed during this investigation regarding the ineffectiveness of the "recommended" graduation plan to adequately address the needs of struggling students on this campus. At Gypsy Middle, it is standard practice to dismiss the most profoundly impaired students from special education services at the end of their 8th grade year. Those still receiving modifications in high school courses are students who will likely graduate as a result of those (limited) modifications. Those who are dismissed from special education services are placed in traditional high school classes without the supporting structure of modifications present in their middle school classes. Without sufficient strategies to cope, these students typically run short of the credits required for graduation by the end of their sophomore (10th grade) year. With no other option available, they are transferred to an alternative educational setting where they can complete the basic requirements for a diploma. While former special education students

do not account for the entire number of students transferred to the alternative setting, they are a large percentage (over 80%) of that population. Investigating the causes behind this trend would be advisable. This may be an attempt to control for the imposition of unrealistic testing requirements under NCLB. There may be other causes. This may not be a trend on other rural campuses. If it is not, uncovering the methods used to deal with the same student populations and comparing efficacies across rural districts would be advisable.

While this study dealt with field trip pedagogy on rural campuses, students who are described as "at-risk" are identified on every campus whether rural, suburban, or urban. Although the literature suggests that students in rural settings may suffer the most from lack of enrichment opportunities, it should not be assumed that proximity assures exposure. Expanding the research to include field pedagogy on all types of campuses, particularly with "at-risk" students, should be considered as well.

As a final note, field trips have been largely abandoned due to the demands of high-stakes testing nationwide. The state of Texas has recently updated science and other secondary curricula, preparing for a new high-stakes testing system that will replace the current Texas Assessment of Knowledge and Skills (TAKS) tests. The new system, the State of Texas Assessment of Academic Readiness (STAAR), consists of 12 end-of-course tests in four core content areas – science, math, social studies, and language arts. While further curriculum alignment (i.e., narrowing) will no doubt follow this latest testing requirement, the ability to describe connections between academic content and future careers remains a desired knowledge and/or skill in all of the high school science curricula. Further research should be encouraged as all teachers explore the efficacy of

field trips as a pedagogical option, in order to help students develop connections between academic content and future careers which they can then describe.

Conclusion

Providing the opportunity for relevant, valuable, and impactful learning is the function of a well-designed, curricular field trip. Rural students board buses every day coming to school. They often come from homes where the value of education and the opportunities it can provide are not well understood. Their opportunities and worldview are already limited due to the isolation rural living inherently brings. Restricting their opportunities to a single classroom or campus further limits their lived experiences. Field trips represent an effective remedy for limits over which students and their teachers have no control. Allowing students to expand their horizons and to gain the skills necessary to effectively live is a fundamental expectation in education. This researcher would argue that it is not just an expectation, it is a right.

APPENDICES

APPENDIX A

Initial Student Survey – Science and Careers Connections

Place an X in the box that best describes you today.

Statements	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
S-1 I am planning on going to college after I graduate.					
S-2 I feel "stressed out" at school most of the time.					
S-3 Most of our class work is getting ready for TAKS tests.					
S-4 I am not interested in most of my classes.					
S-5 Most of what I learn will be important in the future.					
S-6 I have not enrolled for college or done my FAFSA yet.					
S-7 It's easy to see that biology is important in lots of careers.					
S-8 I get bored and feel tired most of the time at school.					
S-9 I don't know how to get organized so my assignments aren't always ready on time.					
S-10 I have high expectations for my future.					
S-11 Time just seems to "fly by" when I am at school.					
S-12 I get motivated to finish things easily.					
S-13 I get disappointed with my progress at school.					
S-14 I am sure that what I am learning at school will be valuable in the future.					
S-15 I think I can accomplish just about anything I decide to do.					
S-16 School is not very important to me.					

Statements	Strongly agree	Agree	Unsure	Disagree	Strongly disagree
S-17 It is easy to how physics is important in lots of careers.					
S-18 It's hard for me to interested in most of the classes I am taking at school.					
S-19 If something is important to me, it's easy for me to get motivated.					
S-20 It's easy to see how chemistry is important in lots of careers.					

APPENDIX B

Informed Consent Form

B A Y L O R
U N I V E R S I T Y

June 2009

Informed Consent to Participate in Rural School Research Project - Fall 2009

To Participant and Parent(s)/Guardian(s) of Participant,

You are receiving this request because your student has been invited to participate in a research project focusing on science courses taken by students in rural schools. This form asks your consent for your student to participate in this educational research study. The purpose of this study is to investigate high school science student perceptions of connections between science classes and future careers options. This study is a collaboration between Baylor University and *** ISD. Should you be interested, additional information about the study and the background of the researchers can be provided. There are no known physical, psychological, and/or sociological risks involved. All data collected will be completely anonymous to insure the privacy of the students, teachers and their schools. All data will be disposed of upon completion of the study. The demographic information of participants and schools will remain confidential when cited in the study.

The following outlines the various components your student is asked to participate in within the study:

- The student will participate in one-on-one interviews with the researcher
- The student will participate in group discussions with other students and the researcher
- The student will participate in field trips to TSTC investigating vocational programs related to science

You may desire to share this information with your minor student. While only you as a parent or legal guardian are capable under the law to consent to your student's participation in this study, it is preferable that your student be made aware that they are part of a study. If you discern that your student is not comfortable with participating in the study, you may consider (as a parent or legal guardian) not consenting to your student's participation in the study.

Your signature below constitutes your consent and willingness to participate in this study. There is no penalty for non-participation and your participation may be withdrawn from the study at any time also without penalty. If you choose to participate in this educational research study, please return the signed consent form via your student to the student's science teacher by **July 1, 2009**. If you have any questions or concerns, please feel free to contact Tommye Hutson by office phone at 254-863-5301 or by email at tommye_hutson@baylor.edu. Inquiries regarding the nature of the research, your rights as a subject or any other aspect of your participation can be directed to Baylor's University Committee for Protection of Human Subjects Research through the chairman Dr. Matthew Stanford, Department of Psychology and Neuroscience, One Bear Place # 97334, Waco, TX 76798, with phone number 254-710-2236.

I have read and understand this form and am aware of my rights as the parent of a participant, and have agreed to allow my son/daughter to participate in the study based on the information provided. A copy of the signed form will be provided to the parent.

_____
Parent/Guardian Signature

_____
Name of Student

APPENDIX C

Parent Approval Letter

Dear Parent(s):

On January 25, 2010, several senior students are scheduled to visit TSTC in order to gain additional information concerning programs offered on that campus. These programs have been selected by the students are areas of possible interest after graduating in May.

We will travel by school van. Following the campus tour and presentations at TSTC, the students will go to Waco for lunch and a discussion about their findings. The information gathered by the students and their comments regarding the campus visit will the focus of the discussion and may take up to 2 hours. Lunch will be provided at no cost to the students selected for this research project.

We will leave Gypsy High School at 8:15 A.M. and return at approximately 3:00 P.M. If you have any questions, please call *Tommye Hutson* at the school (863-5301) or home (230-7919). **No student will be able to attend without a permission slip. All school rules are in effect. Field trips make us a school on wheels. Any student who violates school rules will be eliminated from the research project and any further activities associated with that effort.**

Thank you again for allowing your student to participate in this research project – improving rural public schools in Texas is critical to all of us.

Sincerely,

Tommye Hutson

I give permission for _____to attend the field trip to TSTC on January 25, 2010.

_____

Parent/Guardian Signature

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