

CASE STUDIES TO INVESTIGATE IF AN ALTERNATIVE EDUCATION PROGRAM IS
MEETING STUDENTS' NEEDS IN SCIENCE LEARNING

A Thesis by

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Submitted to the Department of Curriculum and Instruction
and the faculty of the Graduate School of
Wichita State University
in partial fulfillment of
the requirements for the degree of
Master of Education

May 2007

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I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirement for the degree of Master of Education with a major in Curriculum and Instruction

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DEDICATION

To my parents, my husband, my committee especially Dr. Yeotis, and the students that participated in this study.

ACKNOWLEDGEMENTS

I would like to acknowledge my professor, Catherine Yeotis, for her guidance and support. I would like to thank my committee for their help and suggestions. I would also like to thank the Derby Alternative High School students and staff for allowing me to complete this study.

ABSTRACT

This research study uses both qualitative and quantitative data to look at the effectiveness of the science program at an alternative high school in middle America. Descriptive case studies were used for the qualitative portion, and two Likert type questionnaires were used to collect the quantitative data. The case studies were developed on three students, selected for their various backgrounds. The students participated in one-on-one interviews with the researcher, completed two different questionnaires, and consented to be the object of classroom observations. Adam is a fifteen year-old white male who lives with his aunt. Betty is a 17 year-old Hispanic female who lives with her parents and is a mother to a two year-old son. Carrie is a 17 year-old white female who lives with her mother. Their unique life experiences provide insight into the importance of hands-on science with at-risk students. Information from the interviews is presented in a narrative format and the questionnaires and their results are provided in their entirety.

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CHAPTER 1

INTRODUCTION

In this day and age of standards based education students are forced to work towards high stakes tests. At the same time, teachers are held responsible for increasing test scores. What does this mean for the population of students that are underachievers? The No Child Left Behind Act requires all children to meet specific educational goals. One consequence of this act is the need for alternative education programs to assist at-risk and underachieving students. These programs have a long history and fit into many categories. Many alternative programs were formed to educate students that were underserved by the public schools, especially minority students. However, since no consistent definition exists, alternative programs vary from district to district and from state to state. Alternative schools provide educational opportunities for a population of students that would otherwise fail (Aron, 2003). Most research shows that students at alternative schools fit into a broader category of at-risk students. Although definitions are often broad and varied, they all usually include a few key elements. These elements are: students have failed at least one class, they read below grade level, they do not qualify for special education services, or they exhibit other at-risk social behaviors like truancy or engaging in drugs and alcohol (Aron, 2003).

Science education is also at a turning point. Educational research supports inquiry-based lessons but few teachers (especially early service teachers) possess the ability to implement this type of learning (Roehrig and Luft). The rigors of standardized testing often force many teachers to abandon inquiry lessons for *kill and drill* activities to prepare students for testing. Although

alternative schools provide an ideal setting for inquiry based learning, students often fight the initiation of inquiry because it requires different skills that they often lack or have not developed fully (Holbrook and Kolodner, 2000). Inquiry requires higher-level thinking, organizational skills, and curiosity. At-risk students are often below grade level in reading and comprehension skills. They lack organization in their thinking and in their personal lives. They have also experienced failure on some level and are less likely to try new things in the classroom. How can alternative school teachers implement inquiry activities and help students develop the skills they are lacking?

If we combine the difficulties of teaching at-risk students with the complications associated with inquiry-based education will we create a recipe for disaster? At-risk students would benefit greatly from this type of education, however, they will also fight it the hardest because it falls outside of their educational comfort level (Holbrook and Kolodner, 2000).

Many alternative programs lack the resources they need to implement inquiry lessons. Alternative programs often rely on grants and other outside funding sources. Some alternative schools start up in less than ideal buildings. Science teachers in these programs often teach multiple subjects but lack the lab equipment or funding to purchase necessary supplies (Anastos, 2003). How do alternative teachers address the inequalities caused by smaller facilities and less funding? How do students respond towards different educational strategies? What kinds of activities do they feel benefit their needs? Research in at-risk settings is limited at best and almost non-existent at the high school level. Class size in these programs creates a dilemma when developing a research project. My classes are quite small and I only teach one section of each subject. This leaves me with no repeatability as far as treatments are concerned. I took all of these factors under consideration when developing my hypothesis. I hope to find support for my

hypothesis that alternative science education is meeting the needs of science students at Derby Alternative High School.

Research Context: Derby Alternative High School

A description of Derby Alternative High School, DAHS, will help clarify the complications of my research. According to the Derby Alternative School Study Team, DAHS first opened to students on January 20, 1988. The faculty and staff consisted of two teachers, a secretary, and an administrator. The goal of the school was to provide an opportunity for students ages 16 to 19 to earn their high school diploma. Most of the students that attended in the early years had dropped out of Derby High School, DHS. The school now has two secretaries, seven teachers, and has relocated to a slightly larger facility. Discipline and curriculum policies have changed over time but DAHS has always been held to the same educational standards as DHS. However, public perception of the standards for DAHS was low. People in the community often saw the students as drug users, criminals, or behavior problems. In an effort to increase the perceived and actual rigor of DAHS, the Alternative School Study team was formed in 2003. This team consisted of teachers from the alternative school, DAHS students, counselors from DHS, and administrators from both schools. The results of the two-year study recommended a transition from self-paced curriculum to a more traditional educational format. The schedule became more structured and increased the number of credits a student could earn in a semester. This new block schedule was similar to the main high school except DAHS had 5 blocks per day instead of four. This transition has been a difficult one. Students applying to the school are often still under the impression that they will be able to work at their own pace. The major differences between DHS and DAHS are small class sizes, teachers trained in differentiated instruction, and

individual attention. The other tool offered at DAHS is Virtual Prescriptive Learning, VPL. This is a computer program that tailors lessons based on a student's performance on a pretest. The student must then complete each lesson at a level of eighty percent or higher before moving on to the next lesson. The program also consists of off-line assignments that must be graded by a certified teacher. VPL allows students to recover lost credits and provides DAHS with a few electives that we are unable to offer. It has been a year and a semester since this more traditional model of instruction was introduced. I am interested in studying how students are responding to it.

To answer these questions I used qualitative methods for my research. Case studies allowed me to delve deeper into individual students' opinions about their science education. I also used quantitative methods including class data, questionnaires, and academic histories.

The Researcher: Derby Alternative High School Science Teacher

Case studies rely on the investigator. It is important to know the background of the investigator when understanding the nature of the information presented. I graduated from Kansas State University in 1999 with a Bachelor's degree in Animal Science and Industry. I moved to Wichita to pursue a Master's degree in Biology at Wichita State University. After a year of studies and a graduate teaching assignment, I realized that I was not enjoying my program. I did enjoy teaching the undergraduate lab classes and decided to transfer to the College of Education's Alternative Certificate Program. With my strong science background I was able to enroll in the required education classes and work towards a secondary science endorsement.

In the fall of 2002 I started teaching at Southeast High School in Wichita. This was a terrific experience. Classes were large and boisterous, so effective management strategies were a must. The student body was culturally, ethnically, and socio-economically diverse. This diversity helped me develop appropriate and differentiated instructional strategies. I also worked with English Language Learners (ELL) and Special Education populations. All of these challenges helped me develop my teaching personality. After two years at Southeast, I discovered I really enjoyed working with challenging students who I would later define as at-risk. I developed good rapport with students other teachers struggled to educate. When the opportunity to work at an alternative school became available I made the switch. I started teaching at the Derby Alternative High School in the fall of 2004.

These two teaching opportunities have helped me develop my personal teaching philosophy. I incorporate diverse instructional strategies and a real world scientist perspective. I try to create a comfortable but structured learning environment. I have worked hard to increase the respectability of teaching at our alternative school. I work closely with the curriculum coordinator to insure my students are receiving the same standards based curriculum as the main high school students receive. As with many alternative programs ours has an undeserved reputation of low standards. We have undergone a fundamental shift away from a self-paced curriculum to a more traditionally structured system. At this point the data is only anecdotal, but I feel students' learning has improved in this new environment. I am interested in how our students are responding to this new structure.

Purpose of Study

At-risk students have special needs that must be addressed. Inquiry skills are not only a part of the state and national science standards, but also, a key element in a well rounded individual. The purpose of this study is to gather information from several sources to determine if our program is successfully meeting the diverse needs of our at-risk population by helping them meet the required science standards.

Definitions

To fully understand the problems stated above we must look at each component. First, the definition of at-risk students is an important starting point.

At-risk. The state of Kansas uses the number of students who qualify for free lunches to determine the overall number of at-risk students. However, the state goes on to identify students that are not meeting grade level requirements, students that fail courses, and students that have been held back or retained. Research conducted by Wells (1990) breaks down the term at-risk into four sub-categories; school related, student related, community related, and family related. Each of these sub-categories has several contributing factors. Any combination of these factors can lead to at-risk classification. Unfortunately, no tried and true formula identifies students so identification often falls on teachers and counselors (Aron, 2003).

At-risk programs. Most research on alternative programs defines alternative education as anything that falls outside of the traditional public school setting. This could include everything from charter schools, home schooling, magnet programs, gifted programs, GED preparation, and centers for troubled youth. For the purposes of this study I will operationally define an alternative program as a separate academic setting that allows for credit recovery, small class

size, and schedule of courses that allows for more credits per semester than the traditional high school. This definition describes the Derby Alternative High School program. Our program also includes an application process for which students must write an essay with full review by an admissions committee of teachers, principals, and counselors. This alternative program is geared towards students that have failed either classes or grade levels, or for a variety of reasons do not feel comfortable at Derby High School.

Inquiry. The definition of inquiry is important because the term will be used frequently. The National Science Education Standards define inquiry as “the diverse ways in which scientists study the natural world and propose explanations based on evidence derived from their work” (National Research Council, 1996). In the classroom inquiry is the simple act of making observations, asking questions, developing testable ideas, and testing them. Other vocabulary associated with science as inquiry includes: hands-on, minds-on, investigations, supporting evidence, and project based learning. Several of these terms are discussed in the literature review.

This study examined some important aspects of alternative education programs, science education, and student perceptions about their education. The introduction examines some key definitions and terms. It also provides a background on the investigator and the school program being investigated. The literature review covers two key elements including: instructional strategies in science, and an example of an alternative/ at-risk education program. The thesis also examines the individual student subjects and provides a detailed background about them. The results of the data collected are explained. Finally, a discussion of the results with conclusions drawn from the research, and recommendations for future proposals are presented.

Science education and alternative programs blend well. Both require students and

teachers to think outside the box. Unfortunately, they both often get pushed aside because of high stakes tests, a lack of funding, or public perceptions. I wish to investigate the importance of science education in alternative settings.

CHAPTER 2

LITERATURE REVIEW

The current literature barely touches on alternative education as a whole. Most projects and papers focus on unique alternative programs instead of general alternative education. More research has been done at the K-8 grade levels. High school and college alternative programs have far fewer papers written about them. The review of literature is divided into two main categories: science instructional strategies and alternative/at-risk education programs.

Science Instructional Strategies

Some of the research suggests changing the format of alternative schools from an independent study program to a more curriculum and standards rich program. Anastos (2003) suggests that districts with alternative programs provide their teachers opportunities to get involved in curriculum planning and content and standards discussions. He argues that these teachers have a unique perspective that would benefit the traditional learning environments. In addition, more involvement will decrease the inequalities in alternative education. Most of the research in this area is anecdotal at best. So far no major comprehensive study has been conducted on alternative education verses traditional education. However, several studies have examined aspects of the alternative concept. One large study in 2001 (Lawrenz, Huffman, & Wayne) focused on achievement differences by subgroups on alternate assessments. The purpose of the study was to determine if student subgroups performed differently on a variety of assessment formats. The types of assessments included multiple-choice, written open-ended responses, hands-on lab skills, and a full investigation using hands-on techniques. Researchers

chose schools to participate that used a particular standards based curriculum. Approximately 3,500 ninth-grade students from several states participated. The teachers taught a standard curriculum and the tests were formatted based on national science standards. At a certain point in the curriculum the various types of tests were administered. The researchers were very forthright in pointing out the limitations of the study. The curriculum was presented to a class, however, the data points were based on individual tests scores of students. Also, the assessment items were taken from national tests and no other bias analysis was conducted on the items. Finally, the study was not a random sample because the schools were chosen based on their participation in a particular science curriculum program.

The results were interesting. All students from the four racial categories; Caucasian, African American, Hispanic- Latino American, and Asian American preformed the best on the hands-on lab and full investigation. The subgroups performed the worst on the open-ended questions. All subgroups performed about the same on the multiple-choice tests. Lawrenz et al. (2001) found no significant difference between boys and girls. According to the researchers, different assessment formats may be measuring different things. The open-ended questions possibly required high level thinking skills, whereas, the hands-on assessments required fewer verbal skills.

According to research by Dalton Morocco, Tivanan, and Rawson (1994) lower achieving students tend to be less verbal and less motivated. This is also the case in many alternative settings. The study does not attempt to answer some important questions about the use of alternative assessments in standardized testing. Why did the subgroups perform better on the hands-on test? Perhaps it was easier but this should not matter because all subgroups performed better. Perhaps this form of assessment is more motivating or fun to take. Lower achieving kids

often need more motivation to perform well on an assessment. More research needs to be conducted in the area of alternative assessments. This study does imply the need to re-examine how students are tested and how standards are utilized.

Tamara Ivy (1994) details a classroom approach to meeting needs of at-risk students in her science classes. She struggled with many of the problems of at-risk students in a traditional setting. Her students were reading below grade level, had poor attendance, and had a limited science background. The composition of her eighth grade broke down this way: more than 93 percent of students were Hispanic, 75 percent were reading below grade level, and 70 percent received free or reduced lunches. The traditional science classroom atmosphere of labs, textbooks, and notes was not allowing her students to perform at their maximum potential. She decided to approach lab reports in a new format. She designed a class format based on *Gowin's Vee* and *In the Middle: Writing and Learning with Adolescents*. These two books focus on organization in thinking and writing. This new format allowed her students to individualize their own learning by choosing topics within the main science theme. By the middle of the school year the teacher became a facilitator, students were managing their own time, and some students became peer teachers helping their classmates finish their objectives. She developed multiple assessments but the only standardized testing came in the form of the Iowa Test of Basic Skills. The results show favorable improvement in three areas. First, scores improved by an average of four points on the science portion of the ITBS. Second, the Vee-map format allowed absent students to make up schoolwork without missing instruction time. This helped the absentee population stay on track in the class. Finally, student attitudes towards science and learning improved dramatically. Student responses on post activity surveys showed an overall improvement in their personal perceptions of their own abilities.

An Alternative Education Program

Researchers Tam, Rousseau, Nassivera, and Vreeland (2001) examined a small at-risk/alternative program called Holiday in the Museum. This program was a joint effort between the New York City Board of Education, the City College of City University of New York, and the American Museum of Natural History. This pilot program was specifically designed to meet the needs of inner city students and meet a portion of The New York State Department of Education requirements for 30 laboratory hours in science. The program also allowed teachers to collaborate with non-traditional educators to create standards based curriculum. New York alternative schools serve at-risk students, high-risk students who have struggled in more than one school, new immigrants, and older teens and adults. New York alternative school teachers worked as liaisons between the museum education staff and the schools. These teachers chose the participants based on interest and motivation not academic background. Since the program took place over winter break, motivation and interest were key elements. Nineteen students from five schools were chosen to participate. The students were separated into random corporative groups. All groups were assigned to investigate what happened to the dinosaurs by examining museum fossil specimens. Students developed hypotheses and conducted research to support their ideas. They used several tools of science to observe, measure, and analyze data from the fossils. All of this information was combined and the students created presentations, graphs, charts, and models to share their findings. The program coordinators created rubrics to evaluate the student products the rubric included three levels apprentice, investigator, and scientist. The rubric was used to evaluate presentation quality, methods, and valid content. At the apprentice level students were able to conduct basic experiments, make simple measurements, and write

about their observations in science journals. The investigator level included the apprentice skills and expanded on them. At the scientist level students were able to demonstrate critical thinking skills and analysis of data. The results of the study brought to light two problems. First, students were repeatedly interrupted by museum guests while conducting their research. Second, the English language learners struggled with instructions from the educators, therefore, requiring translators. The researchers suggested that the first problem actually helped students see the importance of the work they were conducting. The second problem was managed with help from translators. However, in a smaller town or city this option may be more difficult to offer. Very little data were presented in the paper to show student achievement or improvement. The researchers did not conduct any interviews or evaluations of the students to determine their enthusiasm for the project. They did provide one data table showing the results of the rubrics for twelve of the nineteen participants. Only three of the participants were evaluated at the scientist level. No explanation of the results was provided; instead the authors provided tips for conducting a similar activity in other locations. This program did allow for collaboration among professionals and it provided inner city students an opportunity they probably could not have experienced in any other setting. It would have been interesting to see follow-up data collected on the participating students in their regular science classes. Interviews and other data could have been collected to get a clearer idea of the impact this alternative program had on student learning.

In summary, the research shows that alternative programs come in a variety of designs. Teachers and schools are only limited by their imagination. Inquiry methods hold student interest and can bridge language barriers. At-risk students need high interest education to keep them involved. The best way to assess these programs is with well-developed qualitative research.

CHAPTER 3

METHODOLOGY

Qualitative research often meets with opposition by traditional researchers due to small sample sizes, lack of generalization, and difficulties in establishing reliability. In her book *Qualitative Research and Case Study Applications in Education*, Merriam points out that qualitative research allows the investigator to examine complex social interactions without disturbing the environment. She goes on to suggest that the main difference between quantitative research and qualitative research is that the latter looks at how all of the pieces fit together in the big picture. According to Soy (1997) of the University of Texas, case studies allow researchers to examine complex issues that encompass real life situations and issues. Tellis (1997) of Fairfield University notes the history of qualitative data is long and complex. He points out that case studies are most closely associated with sociology; however, medical education and law studies rely heavily on case studies. In fact, he goes on to explain the importance of case studies in researching the effectiveness of at-risk programs like drug prevention or after school programs. Quantitative data allows researchers to see trends, correlations, and even cause and effect, but case studies allow the researcher to understand the perspective of the participants. Tellis suggests that case studies can evaluate both process and outcomes as opposed to just outcomes.

Tellis details three major types of case studies. First, the exploratory study allows researchers to do fieldwork and data collection before they choose the research questions or hypothesis. This often occurs with the help of a pilot program so the investigator can test or change surveys and other data collection methods. Second, the explanatory cases provide

researchers an opportunity to examine complex and multivariate cases. The researchers can access large funded studies where the topics are consistent but the projects differ. The studies are used to determine why certain data become a part of the common understanding. The final type of study is the descriptive study. This study requires large amounts of descriptive data. This study is commonly used in education and social sciences. Usually the researcher starts with a problem or research question with the hope of finding cause and effect relationships. Case studies provide an opportunity to describe the entire situation.

Most traditional quantitative studies require strict controls and look at one variable at a time. This traditional method is often impractical in educational settings. In small schools or programs like the one described in this paper, traditional research is all but impossible. Repeatability in the traditional sense is difficult because two identical populations may not exist therefore no control group is available. According to Soy (1997), case studies can overcome the repeatability issue by detailing the procedures and data collection methods. This important detail allows the other researchers to conduct similar studies. The other key element, according to Soy, is to collect data from multiple sources not just surveys or observations.

Merriam (1998) explains that there are five main principles to qualitative research. The first goal is to understand the subject from the perspective of the participant. The second element is the instrument of data collection. In quantitative research, data can be analyzed by a computer and comparisons can be made based on concrete numbers. Qualitative data rely on a human to be the instrument of data collection. Merriam shows that this quality is important because the human researcher can adapt to the responses and consider all contexts of the situation. A survey or questionnaire is only as good as the questions. Third, qualitative data involve going to the participants. Investigators cannot sit back and wait for the data to come to them. Rarely are case

studies conducted with documents alone. Fourth, qualitative data are often used when no testable hypothesis exists. Sometimes these studies are conducted to help discover a new hypothesis and can lead to other kinds of investigations. Qualitative data rely on inductive reasoning so they often lead to the formation of a hypothesis instead of the testing of a hypothesis. Finally, the most valuable part of a qualitative study is its descriptiveness. Case studies are rich in detail and provide a great deal of insight into the research question.

Participants

This research utilized a descriptive case study method to study three individuals in the same alternative high school program, each with a very different background. The students selected differ in age, gender, race, family background, and reason for attending this school (DAHS). They each have a unique story to tell and their attitudes toward science are quite different.

Adam is a 15 year-old white male. He currently lives with his Aunt because his mother has had trouble taking care of him in the past. He started at DAHS halfway through first semester of the 2005-06 school year. He attended another high school about ten miles away prior to coming to DAHS. He is bright and enjoys science but he has some minor processing issues that are not severe enough to qualify him for special education programming. He is a sophomore and is working on recovering lost credits. DAHS offers more credits per semester than DHS plus we have Virtual Prescriptive Learning (VPL) for credit recovery.

Betty is a 17 year-old Hispanic female. She started with DAHS during the 2004-05 school year due to pregnancy. She has experienced this alternative school both as self-paced and the current more traditional format. She has also spent time at DHS. She was in a Catholic school

for some of her early education. Before she became pregnant she was an honor student and had dreams of becoming a doctor. She now has a one year-old son and lives with her parents, but has lived on her own and with the baby's father. The baby's father is now a college student at a major university in another state and she has broken off contact with him because her parents do not approve.

Carrie is a 17 year-old white female. She is new to DAHS this year. She transferred to DHS half way through second semester of the previous school year. She has moved six times in the last few years and came to our school because she was overwhelmed by the number of students at the main high school. She likes science and is on track to graduate with her class. I will examine how each of these three students perceives his or her alternative education with specific emphasis on science courses.

Materials

To fully investigate the problems information was gathered from both qualitative and quantitative sources. The main source of data came from one-on-one interviews I conducted with the students. A predetermined list of questions (see appendix A) was used with all three participants, however, as the conversation progressed it was often necessary to ask clarifying questions. To ensure accurate accounts the conversations were tape-recorded. In addition to my conversations, I examined the academic histories of the students, gathered data from two different Likert style questionnaires (see appendixes B and C), and made classroom observations both in science and other classes using a rubric for the observations (appendix D). During the observations I looked for all types of classroom interactions. I observed the students interacting with teachers, other students, and their own class work. The first questionnaire is a student

attitude survey with questions specific to science (see appendix B). The second questionnaire is a general school attitude survey similar to the one given to all students in the district (see appendix C).

Design and Procedure

The interviews were conducted at school in the conference room or library away from other students. The interviews were tape-recorded and depending on the time allotment took place over several class sessions. I conducted the interviews during Extended Learning Time XLT to avoid removing the students from academic time. These questions fit into five basic categories. First, the academic history questions focused on how the student became a DAHS student. Second, I asked questions about their first impressions of DAHS. I also asked the students to compare their experiences at DAHS to the other high schools they have attended. Third, I asked them to talk about what they like and dislike about DAHS. These questions included academics, personal observations, relationships, and feelings. Fourth, the memories questions focused on what the student remembers as a child. I was interested in how much they remember about science activities both in school and with their families. Finally, I asked the students about their future goals. I was interested in their plans after high school and if they think science would be important to them. For the complete list of questions see appendix A.

I evaluated the academic histories of the students to determine their strengths and weaknesses. The academic histories provided a quantitative data set to facilitate comparisons and contrasts among the three students. The questionnaires provided the second piece on quantitative data. These three types of data collection allowed for triangulation of the data.

CHAPTER 4

RESULTS AND FINDINGS

As explained in my methodology section, I chose three students on whom to focus my investigation. These students were chosen because they represent a variety of variables that will prove valuable in either supporting or disrupting my hypothesis that alternative education programs have a positive effect on students' science learning. Since the interviews yielded quite a large amount of narrative data, for clarity, I have arranged the information into categories. Each student's information will be presented individually and then I will cross compare the data for the three case studies as recommended by Merriam (1998). Each interview began by asking the students to tell me about their educational history. I asked them about their elementary school, middle school and, high school attendance. Where and when did they attend the various schools? Two of the students Adam and Carrie had moved several times and changed schools often. Betty spent all but three years in the same school system. I also examined the academic histories of these students. Betty has the most complete record while Adam and Carrie are sporadic and incomplete. Throughout the results, the students will be referred to by their pseudonym designations to protect their anonymity.

Case Study A

Academic history. Adam is a fifteen-year-old white male. He is in the tenth grade and currently on schedule to graduate with his class. As we began the interview I explained what I was doing and why I chose him. I gave him some time to get comfortable. He seemed a little more reluctant than Betty and Carrie to start sharing. I was surprised by this because he is very

gregarious and social in the classroom setting. The one-on-one situation seemed to take some adjustment. I asked him to tell me about where he went to school from kindergarten to the present time. He had trouble remembering all of the years because he changed schools several times, often in the middle of the year. He started elementary school in Newkirk, Oklahoma and moved to Kansas sometime during first or second grade. From Oklahoma his family moved to El Dorado, Kansas where he attended two different elementary schools. Sometime during fifth grade he moved to Emporia, Kansas so his mother could attend the university. After sixth grade the family moved again to Haysville, Kansas where he attended seventh, eighth, and a few months of ninth grade. Finally, he transferred to DAHS during the first semester of his ninth grade year. I asked him what caused the family to move so often. He explained that his mother and father had split up and reconciled several times and then finally divorced. His mother had cheated on his father and he was stuck in the middle of their fights. He expressed his desire for his mother to be happy but he said as a little kid he did not really understand the consequences of her happiness. His mother has had many struggles with maintaining relationships and employment so Adam now lives with his aunt and uncle. He still has a lot of contact with his mother.

Adam started ninth grade at a high school about 10 miles away. According to him he struggled there because the classes were large and teachers did not have time to give him as much help as he needed. During the first semester he got into a fist fight with a student. He missed several classes and was seeing a social worker for the truancy issues. His academic records from that high school detail several academic warnings due to excessive tardies and absences. His aunt agreed to take him in and his mother gave up her legal rights to the aunt. It was decided that the large high school was not the ideal place for him. He had a few friends at

DAHS so he applied and was accepted in November of the previous school year.

First impressions and comparisons. I asked Adam what he thought about DAHS when he first arrived (see Appendix A for interview questions). He stated that the school was too small and he felt that it would not challenge him. His first semester was difficult because he transferred in with all failing grades. He felt like he was not going to have any chance to pass any classes first semester. However, he discovered that with hard work he was able to bring four of the failing grades up to passing. When I asked him about this he said that the alternative school was different from regular high school because he could work hard and actually pass. He said his previous experience had been to work hard and still fail. At DAHS he was finally feeling successful. When second semester started he was working with a clean slate. He said teachers at DAHS take so much more time with the students. “You [the teacher] don’t move on until everyone gets it” (Adam interview March 27, 2007). When I asked him to compare DAHS to his previous high school experience he told me that DAHS has more hands-on learning and more one-on-one instruction. He said he had not received that much help since he was in El Dorado where he participated in what he called special needs help. He said the other major difference between the alternative school and other schools is that the teachers know the students very well. “The teachers know your next move you can’t get away with anything” (interview March 27, 2007).

Likes and dislikes. The next phase of the interview focused on the student’s personal preferences towards school and science in particular. When I asked Adam what he liked about school he explained to me that he enjoyed learning new things. He said this was not always easy at other schools because he felt afraid to ask questions. When I asked him what he disliked about school he very quickly responded *lunches*. He said the school lunches were too small. I found it

interesting that he came up with this answer so quickly because he had been so thoughtful and careful about all of his other responses.

Next I asked about science specifically. He said labs were his favorite thing about science and he really enjoyed all of the hand-on activities we had done in class. I was also surprised by this response because I am concerned that I am not offering enough lab and hands-on lessons. He added after sometime passed, that he hated the way work piled up on him. He said that teachers did not always know that the other teachers were assigning so much work and he would begin to feel buried. He would try to get science work finished but then he would have English to finish or history and it was too much. I asked him if his attendance had any influence on the overwhelming pile of work. He smiled and said that it possibly could have something to do with it. During the current school year his attendance has become an issue. His schedule has even been shortened so that he does not have to arrive at school until nine o'clock. I asked him why it was difficult to get to school on time and he explained that his aunt moved to be closer to work. Now he has a thirty-minute drive to get to school. He also has a hard time getting up early. He said he worries about next year when he will have to return to a regular schedule and arrive at eight o'clock. I then asked what he disliked about science. He said that he really did not like the math in physical science. Math has been a struggle for him. He is not enrolled in any mathematics course this academic year and he failed the semester of algebra he attempted last year. He will be required to pass three credits of math to graduate. I asked him about this and he said he is afraid that math will keep him from graduating.

Childhood memories of science. I continued the interview by asking Adam about his science experiences outside of school. He could not remember any times as a child that he had gone to a museum or other educational venue. I asked him about zoos, parks, nature centers,

science museums, and other activities. After a long pause he said he remembered camping and fishing as a child but he did not remember anything specific about it. I started to move on to a different question but then he added that he had participated in the Civil Air Patrol. He explained that this program was similar to the Boy Scouts. He told me about a time when he and a group of kids were dropped off *in the middle of nowhere* and left to find their back. I could see by his body language that this gave him a sense of pride and accomplishment. When I asked if the program was similar to the Boy Scouts he said that it was and the Boy Scouts had participated with them on this particular occasion. He told me that his group was in charge of the Boy Scouts and he thought that was *pretty cool*. I also asked about field trips and special events specifically if he felt that these enhanced learning or if they are just an excuse to get out of school. He said he thought they were valuable because it lets the students see the science in action. He used Water Day as an example. Water Day is an activity I created in conjunction with World Water Monitoring Day. The entire alternative school travels to a local park where the students conduct water quality tests, learn about macro-invertebrates, water treatment, and conservation. He explained that he had no idea that there were *bugs* in the water or that water could be tested. He gave this as an example of how field trips have helped him. He knows that when he camps he needs to be careful with the water.

Future goals. I concluded the interview by asking Adam about his future goals and whether he thought science might play a role. He said he would like to be a police officer because he feels like he knows what kids are experiencing. Adam has a positive attitude about school and his future. He understands the importance of a high school diploma and wants to succeed. He hopes to get accepted into a vocational program at a local community college. This program focuses on automotive studies and has a strong hands-on component. He said science is

important after high school and he would use it in his work especially forensic science. He added that if he has children he wants to explain things to them and teach them about nature.

Adam is the youngest of the three students and the only male. His responses were measured and deliberate. He needed a lot of encouragement to answer the questions with more than one or two word answers. He answered questions willingly but I felt that he was uncomfortable during the interview. His body language was closed off. He sat with his arms crossed during the first part of the interview. Toward the end he seemed to be more comfortable.

Questionnaires and classroom observation results. Most of Adam's responses to the science attitudes survey supported his interview answers (see Appendixes B and E for questions and results). Question 19 asks about the difficulty of science assignments. Adam responded with a three implying that he prefers easy assignments to hard ones. This contradicts his claim that he wants to be challenged in school. However, this statement supports his feelings toward the amount of work teachers assign. He wants to be challenged without feeling overwhelmed. Question 24 asks about the difficulty of understanding ideas in science. Adam responded with a 2 saying that these ideas are hard to understand. He also mentioned this in the interview. He said that the difference between DAHS and other schools was how much time the teachers take to explain things. At DAHS the teachers do not move on until everyone understands the concept. The rest of the responses to this first questionnaire strongly supported his interview information. He enjoys science and wants to continue using it in the future. His responses to the questions about family activities, specifically questions 5, 18, and 28 all support his interview information. He does spend time with family members but they rarely participate in science activities or family trips. Question 28 asks about parents helping with homework. Adam responded with a 3 disagreeing with the statement. Since he lives with his aunt he might have taken the question

literally or he does not get very much help at home. His aunt is a nurse and works various shifts so she is not always available to help him. Adam is also the first to admit that he does not take schoolwork home very often. One interesting difference between Adam and the other two occurs in question 49. Adam prefers the space sciences both Betty and Carrie prefer the life sciences. This could be a difference in gender or perhaps a childhood experience helped shape his interest in space.

The second questionnaire focused on opinions of DAHS (see Appendixes C and F for questions and results). As with the science questionnaire, the majority of his responses supported the information gathered in the interviews. Adam responded positively to all questions except two. Question 11 asks if the teacher is responsible for what the student learns and he responded that he agreed. Question 22 asks if the student is doing his best at school and he responded with a strongly disagree. Both of these questions focus on the personal responsibility of the student for his on learning. During the interview he mentioned that his attendance affected his schoolwork so these responses could be associated with that issue.

I observed Adam during a science lesson using the rubric in Appendix D (see Appendix D for categories). Adam responds to questions and always suggests solutions. He helps other students when he is able and he actively seeks help when he needs it. He has trouble staying focused and often becomes sleepy in class. During the interview he explained that he does not get enough sleep. Again this might suggest a reason for his attendance issues. Adam usually comes to class prepared, although sometimes he needs to borrow paper. He has a good attitude about science class. However, after speaking with other teachers, that positive attitude does not always transfer to other subjects. He stated during the interview that he feels overwhelmed by the amount of work and the number of assignments. After observing him in other classes, I noticed

that he does not always ask for help. When I asked him about this in the interview he said sometimes he just wants to give up because he can't get it. Since I have completed his interview I catch myself spending a little extra time looking over his shoulder. It seems to be helping him get more work done.

Overall Adam's questionnaire data and classroom observations supported the information gathered during the interview. He has been able to overcome his struggles to learn through hands-on activities and the slower pace of the alternative school. His major difficulty appears to be attendance. He also worries about passing his required math classes. It would be interesting to observe how he overcomes these two struggles.

Case Study B

Academic history. Betty is a seventeen year-old Hispanic female. She is the daughter of Mexican immigrants and has two younger brothers. She started kindergarten at a local Catholic school and attended there until third grade. Her family moved into the suburban school district and she began attending a public elementary school in fourth grade. It is interesting to note that her two brothers still go to a Catholic school but she has attended public school since fourth grade. She continued through the same school system attending the Sixth Grade Center and Middle School. Even though she is the daughter of immigrants she did not struggle academically. She excelled in reading and language arts in elementary and middle school. In high school she earned better than a C in all classes. She maintained a 3.0 grade point average until her sophomore year. She started her freshman year of high school at a different high school in a very large school district. Until this point she had been academically successful but she described that school as difficult. Her father was not satisfied with her performance there and transferred her to

the main high school in the original suburban district. Once back in the suburban district, she was experiencing the same success from previous years .She enrolled in honors English and earned no grades below a C in any classes her ninth grade year.

Tenth grade brought many changes. She began dating a twelfth grade student. Her family knew the male student's family and they did not approve of them. Her father did not even know that she was dating this person. Over Christmas break she went on a trip with her boyfriend. When she returned to school in January she was not feeling well. She told me about one particularly embarrassing moment in her English class. She had missed several days in a row because she was sick. The teacher took her aside and expressed her concern about Betty's progress. This was an honors class and the teacher was concerned that Betty could not keep up. Betty began to feel very ill and she threw up all over the desk, her teacher, and the floor. She was sent to the nurse and the nurse asked her if there was any chance she was pregnant. Betty told me she was terrified. Her father did not know she was even dating this boy much less having sex. Now she had to tell her father and he was furious. He disowned her and told to get the things she had paid for and get out of his house. Her mother was more understanding but she had no power to change the father's mind. She had no place to go so she stayed with a friend for a few days. Eventually she moved in with her boyfriend's family and lived there for about two months. She was unable to make up all of the schoolwork she had missed so the school suggested that she transfer to the alternative high school. At this time the alternative school was still self-paced so she was able to enroll at mid semester. Her father refused to come to the school and help enroll her so she had to call her mother to sign the paperwork.

She started at DAHS in April when she was about five months pregnant. She was able to complete several credits by May and stay on pace with her class. She returned to the main high

school for the fall of her eleventh grade year. She said she tried to go back to the way things had been before she got pregnant but it was not easy. Her old friends only wanted to talk about her pregnancy and the baby. She said her priorities had to change she couldn't be a *girly-girl* anymore. She was also having trouble with the baby's father. He had left the state to attend school at a major university and did not have much contact with the baby. Betty had assumed that they would get married because they both come from strict religious families but the baby's father was not interested. She had finally decided to move on with her life and raise her son alone. She moved back in with her parents even though the relationship between her and her father was strained. School was still very stressful. She was not able to return to her previous level of academic success. She missed a lot of school to attend to the baby and her grades were suffering. Her parents decided to send her to Mexico to live with family during second semester of her junior year. Eventually, she returned to the U.S. because the baby's father filed custody papers.

After sorting through all of the legal troubles, she decided to return to the alternative school for her senior year. With the added credits and Virtual Prescriptive Learning (VPL) program she has been able to recover the lost school time and she is scheduled to graduate on time. The VPL program has allowed her to take classes online using the computer and frees up her schedule so she only has to come to school every other day. She is the first to point out how much her life has changed because of the baby. She said she did not even know how to do laundry until last year. Her priorities have completely turned to her son and his future.

First impressions and comparisons. Betty's situation forced her to transfer to the alternative school. When I asked her about her first impressions of the school she said she thought it was a school for bad kids (see Appendix A for interview questions). She remembered

seeing the students when she attended the sixth grade [we share a cafeteria] but she never thought she would end up at the alternative school. Her baby's father did not approve of the school either. He asked why she would ever want to go there. When she came to the school and met with the principal she felt better. She said the school was too small but it was better than her alternative. After the first few days, she felt like this was a good place to be. She explained, "everyone is here for the same reasons nobody judges you" (Betty interview March 15, 2007). This feeling became even stronger when she tried to return to the high school her junior year. Her friends acted differently toward her and she was different too.

She explained that science classes at the high school crammed a lot of information into one class period. She felt overwhelmed and said that the teachers would keep going and if students did not get the information they were just out of luck. She said she didn't even remember what she studied at the high school she was just doing what she had to do to pass the class. At the alternative school she feels like she has time to process the information and "really learn it" (interview March 15, 2007).

"Once I had him I quit on so many things", she said (interview March 15, 2007). She now had to focus on school and her son. She no longer had time to go shopping or put on make-up. She said when she returned to the alternative school it was easier to be herself. She had friends who were going through similar situations. Two of her best friends from elementary school also attend our school and have young babies.

I also asked her to compare the alternative school now to when it was self-paced. I think this quote sums up that comparison. "I like it the way it is now better because you can walk through the day and remember what somebody else told you and not just what you told yourself"(interview March 15, 2007). She added that the new system was nice because it had

more structure. She has also benefited from Virtual Prescriptive Learning. This self-paced component has allowed her to recover the credits she lost while she was in Mexico.

I think this extended description is important to truly understand the responses that Betty gave during her interview. She was very open and honest and even a little tearful at times. She expressed herself very well and painted a vivid picture of what life was like. Dealing with this situation is the main variable in her story.

Likes and dislikes. Betty says she always loved school. She would wake up at five o'clock and wait for everyone else so she could talk about what she learned. She is especially fond of math and numbers. She is taking business classes and really enjoys working with numbers. She dislikes English but her response to this question was interesting. She does not like English because she doesn't like to listen to the teacher explain everything. She said if she could just write the whole period she would be fine. She likes the family atmosphere of the alternative school most. She said the teachers know everyone and all of the students know each other.

She likes all kinds of science and still thinks about being a doctor or going into the medical field. She especially likes studying how plants and animals are similar. She thinks it is amazing that two things as different as a plant and a person can have so much in common. She does find some difficulties in science. She explained that she never really felt comfortable with chemistry. The structure of the atom was a difficult concept for her until she came to the alternative school and then she finally started to understand it.

Childhood memories. Betty's most vivid memory of elementary school occurred in second grade. Her class went to an air force base, met some of the military personnel, and toured several planes. She also remembers having a pen pal in Saudi Arabia. Her pen pal was a U.S. soldier stationed there and she said she still has the postcards he sent her. When I asked her about

other family science experiences she said her mother used to take her to Riverside Park. This park has a small zoo and she remembers looking at the animals. She takes her son to this same park often. She says she wants him to learn about the world. She reminisced about a trip to St. Louis to visit a friend. They went to several museums and she told me about seeing a woolly mammoth. She could not always remember every detail but she remembered far more than anyone else I interviewed.

Future goals. Betty has told me several times in the past that she wants to be a doctor. However, as I interviewed her she expressed her concern for her future. She will be graduating in about six weeks and she is not sure where to go next. Her life has changed completely because of her son and all of her priorities center around him. She is interested in visiting some colleges and hopes to enroll in the fall. She attended a field trip to one of the state universities first semester and she really liked the college atmosphere.

She knows that science will be important to her in the future no matter what career she chooses. She wants to teach her son that science is all around. She says it is especially important to teach him about nature. She takes him to the park often. She tells him about the animals at the zoo. Her plans revolve around what is best for him. She has the support of her parents but she says the relationship is still strained. She doesn't think things will ever be the way they were with her father.

Questionnaires and classroom observation results. Betty's responses to the two questionnaires supported the information in her interview. She had only a few different responses from the other two students (see Appendixes B, C, E, and F for questions and responses). First, on question 19 of the science attitudes questionnaire, she responded that she liked science assignments to be very challenging. Question 36 asked about the student's preference to group

work and she responded that she did not enjoy group projects. The other two students gave favorable responses to group work. Finally, in response to question 50 she was the only student that responded that her plans after high school included an advanced college degree. This supports her desire to become a doctor. The DAHS questionnaire responses also supported her earlier interview. She rated DAHS favorably on all questions. The only exception is question 27. This question asks if other students know her very well. She responded that she disagrees. This is most likely due to her schedule and VPL classes, which limit her interactions with the other students. Nothing in her interview would suggest that she feels unhappy at school or socially withdrawn.

My observations of Betty are limited. She is enrolled in one *traditional* class of Business Law. All of her other classes are on VPL and offer no chance to observe her classroom behavior. This may also help explain some of her questionnaire responses about group work and social interactions. However, I have observed that she comes to class prepared with all of her necessary supplies. She asks questions when she does not understand something and she is always willing to help the other students around her. She has a strong work ethic and a good attitude toward her classes.

Case Study C

Academic history. Carrie is a seventeen year-old white female. She started pre-school in Mulvane, KS but her family lived in Derby. She attended kindergarten through fifth grade in Valley Center, KS. Her parents were divorced during her fifth grade year and this caused her to transfer to the Derby Sixth Grade Center. She kept moving back and forth between her mom's house and her dad's house and this caused a lot of stress. She was afraid to move on to the ninth

grade at DHS because the school was so large. She moved into the Andover school district and attended Andover Central for a short time. She felt out of place at this school because the students were better off financially than she was. She wanted to return to Valley Center so she moved in with her older sister and brother-in-law. She spent first semester of her tenth grade year at Valley Center but when her sister became pregnant she moved in with her grandparents. This situation did not work out because she missed her mother so finally she moved back with her mother. She attended DHS for the last two months of her sophomore year. She described this as a miserable time and she was desperate to leave the high school.

She had heard something about the Derby Learning Center, a computer based program for degree completion. Unfortunately, to attend this program the student's class must have graduated and she had two years before that would happen. A counselor at the high school suggested the alternative school to Carrie. She was very reluctant to even visit the school. Finally, after her visitation she enrolled for the fall of the 2006-07 school year.

First impressions and comparisons. Carrie did not even want to tell her mother about DAHS. Her only experience with the school was similar to Betty. I asked her about her first impressions of the building and students (see Appendix A for interview questions). She remembered seeing older students leaving the building when she was at lunch in sixth grade. She assumed that they were behavior problems or bad kids. When she toured the building she thought it was way too small and she would not be challenged at all. She decided to give DAHS a try because she did not want to be a drop out. She remembered making friends right away and began to change her mind about the school. She says the curriculum is challenging and she really likes the small class sizes. As with the other two students I interviewed, she expressed an appreciation for all of the hands-on and one-on-one instruction.

When I asked her to compare DAHS to the main high school and her experiences in another school district, she spent most of the time focused on class size and teacher attention. She felt lost at the main high school. Teachers would write something on the board and not explain what it meant. She also said “I was afraid to ask questions because the teachers made me feel stupid” (Carrie interview March 16, 2007). She felt like the only reason she passed any classes there was because the teachers liked her. When she transferred to the alternative school she felt free to ask questions and get extra help where she needed it. She also pointed out that this was the first school she had attended where the teachers would wake students up. She said the social studies teacher here at DAHS, cares so much about the students she would get really mad when they tried to sleep. At the main high school, she felt like teachers didn’t care if the students learned anything. She does miss some things about the main high school. She was in the choir at DHS and it was a hard decision to leave that opportunity behind. She also wishes that the school had more electives like art.

Likes and dislikes. Carrie was very forth coming with her likes and dislikes about school. She expressed more than once how much she felt like part of a family at DAHS. She spoke about the cliques at the main high school and compared this to DAHS. “We have cliques here too but everybody knows everybody else. I feel like I could sit with anybody I want to at lunch. No more prep pit like the main high school”(interview March 16, 2007). When I asked her what she liked most about school she said she liked to learn new things and feel challenged. She also liked being at school because it takes her away from her family problems at home. The thing she disliked was the idea of turning eighteen but still being in school. She said eighteen is supposed to be the time to be on her own and making her own decisions but she won’t be finished with school.

When I asked her about science specifically she said she loved working with microscopes and doing labs. Her favorite things to study were zoology and geology. She said the hardest thing about science was chemical equations. She didn't feel like she had a good grasp of it until she came to the alternative school. She said the main difference was that at DAHS the teachers wait until the students understand a concept before they move on to new material.

Childhood memories. Carrie struggled to remember any family trips or science activities from her childhood. After several minutes of thought, she shared a memory of traveling to Mt. Rushmore. She remembered being curious about how the mountain was carved. I asked her if she looked up the information when she returned home. She explained that Mt. Rushmore was a small part of a larger trip and she had forgotten about it until during the interview. The only school memory she had was planting trees in elementary school. I asked her why the class had planted the trees but she could not remember. She could not remember any field trips other than the ones she had been on at DAHS.

Future goals. Carrie wants to become a massage therapist. She knows that science will be important in this career. She participates in a volunteer program at DAHS where some of the students visit a local elementary school twice a week. The DAHS students work with students at different grade levels, some tutor, some help with music classes, and some help with reading enrichment. She has thoroughly enjoyed this program and has considered becoming a para-educator or an elementary teacher. She likes working with young children and this volunteer program has opened her eyes to other career opportunities.

Questionnaires and classroom observation results. Carrie responded very similarly to Betty on both Questionnaires (see Appendixes B, C, E, and F for questions and responses). Her response to question 5 on the science attitudes questionnaire is noteworthy. She responded to the

question that asks whether parents talk about science topics negatively. She responded that her parents never talk about science topics. This might explain why she struggles to remember science experiences from her childhood. She could remember visiting Mt. Rushmore on a family trip but she never researched her questions when she returned home. Her responses to the second questionnaire were very similar to Adam and Betty. She responded favorably to all of the questions.

Of all three students Carrie is the most interesting to observe. She is extremely curious. She often asks several questions during a lecture. During her interview she mentioned in the past she did not always feel safe to ask questions. She works with other students very well and will always try to help her classmates. She is a positive influence on the entire class. She always comes to class prepared and rarely has to borrow supplies from other students. She offers answers to questions and actively solves problems. However, Carrie is easily distracted from the task. She spends a lot of time talking to the people around her. She is very social and friendly and sometimes this causes problems. She accepts correction without complaint and returns to the class work. Carrie is full of energy and curiosity. She struggles with family issues and these problems sometimes affect her schoolwork, however, she is aware of this and trying to cope with it.

CHAPTER 5

CONCLUSIONS

I have presented the three students separately to allow for individual analysis followed by cross-case analysis as suggested by Merriam (1998). Each student has a unique story and perspective. To help maintain the organization set up in chapter four, I will begin with Adam and discuss my analysis. I will follow with the other two students and finish with a cross comparison of the information.

Adam

Adam is the only male so his interview involved different non-verbal cues and a different flow to the conversation. He struggled the most to remember childhood memories. He also appeared to have the most difficult childhood in terms of the family dynamic. He and Carrie both suffered through divorce but his story involved a parent that cheated on her spouse. Adam was aware of the trouble and struggled to deal with it at a very young age. Adam had the most incomplete academic record because he moved into the district in high school. The record does support his memory of his grades and attendance. He still struggles with attendance and he admits that this affects his grades. Since he has been at DAHS he has passed all classes except for algebra. This is a concern because he needs three credits of math to graduate and he has not passed any as of this school year. He stated during that the interview that he feels overwhelmed by the amount of work and the number of assignments. As I mentioned in chapter four, he often gets tired during class. I would be interested to know how much sleep he gets at night. Perhaps a lack of sleep spirals into poor attendance and less focus in class.

I found the lack of childhood memories most interesting. Adam struggled to remember a time when he traveled with his family. This information leads me to hypothesize that family outings are important for developing a love of learning. I would be interested in surveying the entire school to see if all students in this alternative setting had similar childhood experiences. Adam expressed a feeling of constant struggle and this appears to be related to moving and family breakup. Carrie had a similar childhood filled with parental breakup and moving from school to school. Betty is the only one with both parents still together and she experienced the least amount of movement.

Adam benefits from hands-on and inquiry lab activities. He is more willing to participate in class and asks more questions if he can physically manipulate the information. He mentioned several times in the interview that he felt like he learned more during lab activities. My classroom observations support this statement. He stays more involved in the class in an inquiry situation. When the class involves more traditional bookwork he does not always complete the assignment.

I found his responses on the questionnaires the most telling. He responded that the teacher is mostly responsible for what he learns. He also admitted that he is not doing the best he can do in school. Adam is still young but he shows a low level of maturity. On one hand he holds the teacher responsible for his learning but he also admits that he is not trying his hardest in school. He is also aware of what he needs to graduate. I found it interesting that he worries about the future and what credits he still needs. This shows some personal responsibility that I do not always see in students his age.

Betty

Betty has been my student for two years so she was quite at ease during the interview. She had no problem telling me about the more difficult times in her life. She was very open and candid. Her childhood was the least eventful of the three students. She did not suffer from any parental break ups or other major family changes. Her academic record is the most complete of the three students because she spent most of her school career in the same school district. When she became pregnant and started missing classes, her grades seem to be directly tied to the amount of absences. She admitted that she just did not go to school because she was so confused about the pregnancy. Transferring to DAHS allowed her to salvage tenth grade.

She feels that hands-on labs and inquiry activities are far more beneficial than more traditional teaching. She compared an anatomy class at the main high school to the one at DAHS. At the main high school she remembered taking notes in anatomy but she couldn't remember what the notes were about. As she described the DAHS anatomy class she could remember several bones and parts of the body. She also remembered several of the lab activities. Perhaps her attendance at the other school was the main contributor to the lack of participation and understanding in that class. However, she says there is a difference in the teaching styles between the two schools.

Betty has the most vivid childhood memories. I would suggest this is related to her more stable family structure. The field trip in second grade also made an impression perhaps because the teacher emphasized repeatedly that they needed to be on their best behavior. I thought it was interesting that she still has the postcards from her military pen pal. Making a connection with an adult seemed to create a strong memory. Even with this strong memory she struggled to

remember going to museums or other science related activities.

Betty was forced to change her personal plan because of the baby. She still wants to become a doctor but she admits to being scared of the future. Her life changed dramatically not only academically but personally. Her relationship with her father was destroyed and she feels less sure of herself. This part of her life invades her academic life. She misses school because she lacks childcare or if the baby is sick. Sometimes she is so tired she falls asleep at her desk. Her shortened schedule has helped her keep up with school. She also works part time at a local restaurant because her father will not help with expenses. She stated several times that this was never in her plans.

Carrie

Carrie felt comfortable and free to speak during the interview. I found her to be articulate and forthright. She was the most animated during the interview. Even when she spoke about painful memories she was upbeat. She moved several times similar to Adam. Her academic record supports her memories of educational difficulties. Her grades and attendance also seem to be related. In middle school she failed a semester of math. At the same time she was bouncing back and forth between her mother's house and her father's house. She also struggled to remember any major science activities as a child. The few memories she had lacked any detail or follow up. I think this supports the idea that family structure plays a role in life long learning.

Carrie had the same opinions about hands-on learning as the other two students. She said it is harder for her to learn when teachers just put information on the board without a lot of explanation. In class she asks lots of questions and seems to have a genuine desire to learn new information. She struggles with new information similar to Adam. They both seem to take a

longer time to process information.

Cross Case Analysis

These three students all have a unique story and perspective. They all have experienced personal and academic hardships. For all of their differences they all described the same three ideas. First, they all feel hands-on activities and inquiry-based learning have benefited them. Second, they all mentioned the personal family atmosphere of the alternative school. The small size and one-on-one connection with the staff has helped. This was not limited to their science classes but true throughout the school. All three students said the teachers at DAHS care about them and their future. Finally, all three were very open about the problems in their lives that have brought them to DAHS. Even though these issues differed from student to student, they all pointed out that students at DAHS are more sympathetic and less judgmental compared to students in their previous experiences. I was pleasantly surprised to hear that they think DAHS science classes are full of hands-on and inquiry opportunities. In chapter one I mentioned several of the disadvantages our school has compared to the main high school. This makes teaching science a challenge and the students seem to appreciate the activities and lessons.

I expected the questionnaire responses to be more varied. For the most part the three students rated each of the questions the same. The only differences occurred in four questions on the science attitudes instrument and only three questions on the DAHS survey (see Appendixes B, C, E, and F for questions and responses). All three students agreed that science was important both now and for the future. They also agreed that their overall experiences at DAHS have been the most positive of their academic careers. I believe the different responses are related to the childhood. Betty has had the most consistent parental involvement. Her survey responses

reflected this, especially the questions that focused on family involvement in science activities. I was also surprised how closely their answers supported their interview information. I administered both of these questionnaires several weeks before I conducted the interviews. Other than the research permission slip they signed they had no detailed information about what I was trying to study. I believe these answers were honest and reliable because of the time between the two activities.

The differences between the students were far smaller than I had anticipated. I chose these students because they were very different from each other on paper. After interviewing them, observing them, and evaluating their academic histories I found far more similarities than differences.

Future Research

This case study was limited in size and scope. It provides a starting point for more in depth research. I believe as far as these three students are concerned, I proved my original hypothesis that alternative science education is meeting the needs of science students at this alternative high school. More research would need to be conducted to determine any long term affects on these students. It would be valuable to follow these three students for the next five or ten years and see where they go from here. It would be interesting to see if they succeed in their career choices. I would especially like to see if Betty becomes a medical professional. If she accomplishes that goal she will have truly overcome some major obstacles. I would also like to see if they participate in more science experiences outside of school. I found the lack of childhood memories to be significant. I would like to see more research conducted in this area. It would be interesting to compare these three students' responses to students that do not meet the

definition of at-risk. Do gifted students have stronger childhood memories or more science experiences? Does divorce and family turmoil really provide as substantial an affect as I observed or was this result unique to these three students?

I think it would also be valuable to expand this study and incorporate all of the students at DAHS. These students have interesting stories to tell. By studying the personal feelings and perspectives of these students we might be able to create a better alternative program. Case studies provide such unique information that is impossible to gather in any other way. If I had relied solely on survey data I would have been able to analyze the entire student body of the alternative school. Relying on just the survey data would have created an incomplete picture. Without interviewing and observing these students I would not have been able to understand their quantitative responses as fully.

In conclusion, alternative science education rich in hands-on and inquiry activities seems to meet the needs of science students. A small environment with a family atmosphere allows students to feel safe to ask questions and be curious. Students that have fallen behind academically can get the help and support that they need. Traditional education programs are limited by large class size among other factors. In the case of these three students, the smaller school has allowed them to find a niche. They have been able to improve their academic records, recover lost credits, and find a sense of accomplishment. Most importantly alternative science education has allowed these students to develop or rekindle a love of learning that will hopefully follow them for the rest of their lives.

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APPENDIXES

APPENDIX A

Interview Questions

1. What do you like most about school?
2. What do you like least about school?
3. How is this school different from other schools that you have attended in the past?
4. Are these differences good, bad, or no big deal?
5. What do you like about science?
6. What don't you like about science?
7. Describe a time in elementary school when you really liked school.
8. Describe a time in elementary school when you really disliked school.
9. Describe a time in middle school or high school when you really liked school.
10. Describe a time in middle school or high school when you really disliked school.
11. Why are you at the alternative school? Explain.
12. Do you think the alternative school has helped you? Explain.
13. Can you describe any science experiences that you have had with your family? (museums, camping, building stuff)
14. Do you think science will be important to you when you leave school? Why or why not?
15. Compare the science classes here to other schools you have attended.
16. Do activities like Water Day (a special science day) help you understand the science?
17. Do field trips help you understand science or are they just a chance to get out of school?

APPENDIX B
Science Attitudes Questionnaire

1	Science is helpful in understanding today's world	Very helpful	1	2	3	4	Not helpful
2	I like watching science programs on TV	Don't like at all	1	2	3	4	Like a lot
3	My friends and I talk about our science projects out of class	Lots of times	1	2	3	4	Never
4	Science classes are	Very hard	1	2	3	4	Very easy
5	My parents talk to me about current research in the news	Often	1	2	3	4	Never
6	My teacher makes learning about science	Very interesting	1	2	3	4	Not interesting at all
7	When someone tells me something, I like to find out for myself if it is true or not	Strongly agree	1	2	3	4	Strongly disagree
8	I like to help other students in my science class	Don't like at all	1	2	3	4	Like a lot
9	Being a scientist would be	A fun job	1	2	3	4	A boring job
0	When I go to science class, I feel	Very nervous	1	2	3	4	Very comfortable
1	I get bored listening to my science teacher	Always	1	2	3	4	Never
2	Science assignments are usually	Too hard	1	2	3	4	Too easy
3	People can get along perfectly well in everyday life without science	Strongly agree	1	2	3	4	Strongly disagree
4	I think my teacher likes to teach science	Very much	1	2	3	4	Not at all
5	I find science	Very interesting	1	2	3	4	Not interesting at all
6	All people can do basic science	Strongly agree	1	2	3	4	Strongly disagree
7	My science teacher encourages me to question new ideas	Strongly disagree	1	2	3	4	Strongly agree
8	I have used what I learned in science class outside of school	Many times	1	2	3	4	Never
9	I like science assignments to be	Very challenging	1	2	3	4	Very easy
0	My friends and I like science	Don't like at all	1	2	3	4	Like a lot
1	I look at nature and the world differently because of what I learn in science	Strongly agree	1	2	3	4	Strongly disagree
2	I would rather go to science than any other class	Strongly agree	1	2	3	4	Strongly disagree
3	For most jobs, the need for learning about science is	Not necessary at all	1	2	3	4	Very necessary
4	I think the ideas in science are	Hard to understand	1	2	3	4	Easy to understand
5	I enjoy talking to other people about science	Strongly agree	1	2	3	4	Strongly disagree

APPENDIX B (continued)

6	I think learning about science is	Very useful	1	2	3	4	Not useful at all
7	I like to read about science outside of class	Don't like at all	1	2	3	4	Like a lot
8	My parents help me with science homework	Strongly agree	1	2	3	4	Strongly disagree
9	Science classes are usually	Lots of fun	1	2	3	4	Very boring
0	When I do science homework, I need	No help at all	1	2	3	4	A lot of help
1	I am a scientist	Strongly agree	1	2	3	4	Strongly disagree
2	I do not like anything about science	Strongly agree	1	2	3	4	Strongly disagree
3	In science class, I feel	Very curious	1	2	3	4	Not curious at all
4	Most of the ideas in science are	Not useful at all	1	2	3	4	Very useful
5	I understand what I am supposed to do in science class	Strongly agree	1	2	3	4	Strongly disagree
6	I enjoy doing science projects with my classmates	Like a lot	1	2	3	4	Don't like at all
7	I like to document science experiments	Don't like at all	1	2	3	4	Like a lot
8	Most people should study some science	Strongly agree	1	2	3	4	Strongly disagree
9	I enjoy doing science experiments	Strongly agree	1	2	3	4	Strongly disagree
0	I like the way my science teacher teaches	Strongly disagree	1	2	3	4	Strongly agree
1	My friends think science is	Very interesting	1	2	3	4	Very boring
2	I would rather be told scientific facts than find them out from experiments	Strongly agree	1	2	3	4	Strongly disagree
3	I think the vocabulary in science is	Hard to understand	1	2	3	4	Easy to understand
4	My science teacher is	Lots of fun	1	2	3	4	Very boring
5	Sometimes in science, class time goes by really fast	Always	1	2	3	4	Never
6	Science is useful for solving the problems in everyday life	Not useful at all	1	2	3	4	Very useful
7	I am often bored in school	Always	1	2	3	4	Never

48	My favorite subject in school is	1 Language Arts	2 Math	3 Science	4 Social Studies	
49	My favorite science subject is	1 Chemistry (acids & bases)	2 Earth (rocks, volcanos)	3 Life Science (biology, animals)	4 Physical (forces, motion)	5 Space (planets, stars)
50	My plans after high school include	1 Vocation or Trade School	2 Military Service	3 College Degree	4 Advanced College	5 No further education

APPENDIX C

Derby Alternative High School Questionnaire

This questionnaire is designed to assess your personal feelings about school and your education. Please answer the questions honestly. Your answers will have not affect your academic record and only the researcher will see the results.

Read each statement carefully and circle the number that best expresses your feelings.

1 = strongly disagree 2 = disagree 3 = agree 4 = strongly agree

- | | | | | |
|---|---|---|---|---|
| 1. I feel safe at DAHS | 1 | 2 | 3 | 4 |
| 2. I feel like I belong at DAHS | 1 | 2 | 3 | 4 |
| 3. I feel academically challenged at DAHS | 1 | 2 | 3 | 4 |
| 4. I understand how to apply what I learn at school to real life situations | 1 | 2 | 3 | 4 |
| 5. I feel like I am responsible for what I learn | 1 | 2 | 3 | 4 |
| 6. Teachers encourage me to review my work | 1 | 2 | 3 | 4 |
| 7. I review my own work | 1 | 2 | 3 | 4 |
| 8. I am treated with respect by teachers at DAHS | 1 | 2 | 3 | 4 |
| 9. I am treated with respect by administrators at DAHS | 1 | 2 | 3 | 4 |
| 10. I am treated with respect by DAHS students | 1 | 2 | 3 | 4 |
| 11. My teachers are most responsible for what I learn | 1 | 2 | 3 | 4 |
| 12. The work at DAHS is challenging | 1 | 2 | 3 | 4 |
| 13. I feel successful at DAHS | 1 | 2 | 3 | 4 |
| 14. I am the most responsible for what I learn | 1 | 2 | 3 | 4 |
| 15. School is fun here | 1 | 2 | 3 | 4 |
| 16. I like DAHS | 1 | 2 | 3 | 4 |

APPENDIX C (continued)

17. DAHS is a good school	1	2	3	4
18. I like the students at DAHS	1	2	3	4
19. Students at DAHS like me	1	2	3	4
20. I like to learn	1	2	3	4
21. Doing well in school makes me feel good about myself	1	2	3	4
22. I am doing my best in school	1	2	3	4
23. My teachers expect students to do their best	1	2	3	4
24. My teachers understand when students have personal problems	1	2	3	4
25. My teachers set high standards	1	2	3	4
26. My teachers know me well	1	2	3	4
27. Other students know me well	1	2	3	4
28. My teachers listen to me	1	2	3	4
29. Other students listen to me	1	2	3	4
30. My teachers care about me	1	2	3	4
31. My teachers make learning fun	1	2	3	4
32. My teachers are excited about the subject they teach	1	2	3	4
33. My teachers are willing to help me	1	2	3	4
34. My teachers challenge me to do better	1	2	3	4

APPENDIX D
Classroom Observation Rubric

CATEGORY	4	3	2	1
Contributions	Routinely provides useful ideas when participating in the group and in classroom discussion. A definite leader who contributes a lot of effort.	Usually provides useful ideas when participating in the group and in classroom discussion. A strong group member who tries hard.	Sometimes provides useful ideas when participating in the group and in classroom discussion. A satisfactory group member who does what is required.	Rarely provides useful ideas when participating in the group and in classroom discussion. May refuse to participate.
Problem-solving	Actively looks for and suggests solutions to problems.	Refines solutions suggested by others.	Does not suggest or refine solutions, but is willing to try out solutions suggested by others.	Does not try to solve problems or help others solve problems. Lets others do the work.
Attitude	Never is publicly critical of the project or the work of others. Always has a positive attitude about the task(s).	Rarely is publicly critical of the project or the work of others. Often has a positive attitude about the task(s).	Occasionally is publicly critical of the project or the work of other members of the group. Usually has a positive attitude about the task(s).	Often is publicly critical of the project or the work of other members of the group. Often has a negative attitude about the task(s).
Preparedness	Brings needed materials to class and is always ready to work.	Almost always brings needed materials to class and is ready to work.	Almost always brings needed materials but sometimes needs to settle down and get to work	Often forgets needed materials or is rarely ready to get to work.
Focus on the task	Consistently stays focused on the task and what needs to be done. Very self-directed.	Focuses on the task and what needs to be done most of the time. Other group members can count on this person.	Focuses on the task and what needs to be done some of the time. Other group members must sometimes nag, prod, and remind to keep this person on-task.	Rarely focuses on the task and what needs to be done. Lets others do the work.
Working with Others	Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together.	Usually listens to, shares, with, and supports the efforts of others. Does not cause "waves" in the group.	Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player.

APPENDIX E

Science Attitudes Questionnaire Results

Question Number	Adam Response	Betty Response	Carrie Response	Question Number	Adam Response	Betty Response	Carrie Response
1	1	1	1	26	1	1	1
2	4	4	4	27	3	4	4
3	3	3	3	28	3	4	3
4	3	2	2	29	2	1	1
5	2	4	1	30	3	2	2
6	1	1	1	31	2	2	1
7	1	1	1	32	3	4	4
8	3	4	3	33	1	1	1
9	2	1	1	34	3	3	4
10	3	4	4	35	2	1	1
11	3	3	4	36	1	3	1
12	3	2	3	37	3	2	4
13	4	4	4	38	1	1	1
14	1	1	1	39	1	1	1
15	1	1	1	40	4	4	4
16	1	1	1	41	2	1	2
17	4	4	4	42	3	4	4
18	2	1	1	43	2	1	3
19	3	2	1	44	1	1	1
20	3	4	3	45	2	1	1
21	1	1	1	46	4	4	4
22	2	1	1	47	3	3	4
23	4	4	4	48	3	3	3
24	2	3	3	49	5	3	3
25	1	2	1	50	3	3	4

APPENDIX F

Derby Alternative School Questionnaire Results

Question Number	Adam Response	Betty Response	Carrie Response	Question Number	Adam Response	Betty Response	Carrie Response
1	4	4	3	18	3	4	4
2	3	4	3	19	3	4	4
3	3	4	4	20	4	4	4
4	3	3	4	21	4	4	4
5	3	4	4	22	1	3	4
6	4	4	4	23	4	4	4
7	3	2	3	24	4	4	4
8	4	4	4	25	3	4	4
9	4	4	4	26	3	4	3
10	3	3	4	27	3	2	4
11	3	1	1	28	4	4	4
12	3	3	3	29	3	2	3
13	3	4	4	30	4	4	4
14	3	4	4	31	4	4	4
15	4	4	3	32	3	3	3
16	4	4	3	33	4	4	4
17	4	4	3	34	4	4	4