ENVIRONMENTAL SERVICE-LEARNING IN AN AGE OF ACCOUNTABILITY: THE STORY OF A MIDDLE SCHOOL INTERDISCIPLINARY TEAM

by

TIMOTHY M. MULLEN

(Under the Direction of Deborah J. Tippins)

ABSTRACT

This case study sought to understand how an interdisciplinary team of middle school teachers collaboratively planned, negotiated, and implemented environmental service-learning, evaluated student learning, and assessed outcomes of their efforts. The study was framed theoretically through the lens of teacher belief, place-based pedagogy, interdisciplinary teaming and curricula, environmental education, and service-learning which provided unique insights into the team’s efforts to make learning more relevant for middle school students. In this qualitative case study, interpretive analysis was used to generate initial assertions which were revised based on supporting or refuting evidence. Data consisted of audio recordings of team planning meetings, reflection journals, autobiographies, lesson plans, and other archive materials; these were analyzed using constant comparative methods to generate themes for both within-case and cross-case analysis. The study took place in a rapidly growing suburban community where development was impacting the quality of life.

In an era of standards and accountability this interdisciplinary team believed environmental service-learning could be a useful pedagogy for fostering student understanding of mandated curriculum across their four subject areas: math, social studies, language arts, and
social studies. Team members had participated in an environmental service-learning professional development experience, that provided them with a common ground to participate equally. The interdisciplinary team began the planning of the environmental service-learning unit with good intentions but as they progressed, their work moved in directions quite different from what they initially envisioned. Findings of the study demonstrate some of the challenges the team confronted in their efforts to plan and implement environmental service-learning in an educational setting of mandated curriculum and high stakes testing. The key findings of the study were: a) the emphasis of the teachers was on preparing students for high stakes testing, b) teachers believed that environmental service-learning was good for their students’ learning yet they reverted to the default epistemology of teaching within traditional subject boundaries because of a multitude of pressures, c) when the teachers felt time pressures to accomplish all they felt necessary, the service-learning component fell to the wayside, and d) all teachers evaluated student learning using subjective observations of student behaviors.

Interdisciplinary team teachers considering environmental service-learning must anticipate obstacles to implementation and be realistic with regards to what they might achieve. This study demonstrates the need for a strong leader within the team, teacher professional learning, loyalty among team members, and involvement and support of school administrators. Of utmost importance, the teachers must acknowledge what they want students to achieve as a result of participating in environmental service-learning and develop methods for assessing learning.

INDEX WORDS: Environmental service-learning, interdisciplinary teaming, interdisciplinary curriculum, environmental education, service-learning, middle school, place-based pedagogy, interpretative analysis case study
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DEDICATION

This dissertation is dedicated to family and friends that supported me through the arduous Ph.D. process. My three daughters, Marti, Jackie, and Alex were in high school and starting college at the time of this dissertation. They saw me retreating to the ‘pit’ to write. They have said they want to continue their schooling to the Ph.D. level. I hope they are able to achieve their dreams. This dissertation is also dedicated to Loretta, my wife, who supported and encouraged me when I needed it most. Often, the only thing she would say early in the morning of our summer vacation was, “go write.” Thank you for supporting me in this six and half year adventure called “doctorate.” I love you all.

I wish everyone that contributed to my education were still with me to see this become a reality. To my parents, Michael and Catherine, I wish you could have seen this occasion, because you provided the upbringing that encouraged me to want to learn and help others. To Bob (brother) and Penny (sister), and their spouses: You were so much older than me but still took me under your wings in different ways that developed me into a more balanced individual. Each of you provided me opportunities to learn from your experiences and families.

Lastly, I dedicate this study to the teachers in middle schools that want to do what is best for their students but succumb to pressures they feel, whether real or imagined. Interdisciplinary curriculum is not easy so takes much more effort than teaching from the book. For all the teachers that want to do interdisciplinary curriculum but feel that they have failed their students when they don’t fully realize this goal, remember what Margaret said in this study, “any environmental service-learning is better than none.”
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A huge thank you goes to my three teammates (Mitzi, Lori, and Cindy) for participating in this study. They were introduced to environmental service-learning and practiced it in many forms before this study was conceived, but still agreed to participate once I started the Ph.D. program. They also encouraged me when I was overwhelmed or discouraged. It would have been great to conduct this study as an action research study but the ‘formal’ burden on them would have been too much. However, everyone walked away with ideas only gained by reflecting on one’s practice and learning from the experience, something my team mates did everyday – learn. A tremendous thank you is also extended to the administrators for supporting this study. I knew they supported interdisciplinary curriculum and understood the benefits for middle schools students. I also understood the tremendous pressures they were under to get our school off the state’s ‘needs improvement’ list.

Many professors contributed to my completing this dissertation. The process started with Dr. Elizabeth Pate introducing me to service-learning in a class, then inviting my interdisciplinary team to a common week-long training in June 2002. Up until that point, we had conducted various forms of environmental education and service-learning but the opportunity brought us together and the idea for this dissertation was born. Dr. Pate then provided guidance that enabled me to hit the ground running. When Dr. Pate moved to Texas, Dr. Deborah Tippins became my committee chair and pushed, pulled, and otherwise got me through the process. I could not have made it without the detailed edits, feedback, and sometimes ‘hints’ as to what I was trying to say when stuck. To Dr. Norm Thomson, I remember the scientist in Africa trying to
get the butterflies to come down from a ledge and the realization that science is not just ‘book knowledge.’ I tried to incorporate that basic understanding of science in my practice and in the environmental service-learning unit. And thank you Dr. Laurie Fowler for agreeing to be a part of my committee. You promote and practice balanced environmental activism, an important component of the environmental service-learning unit. We did not try to teach the students that development is all bad, it just needs to be smart.

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Thank you all for your dedication to the University of Georgia, commitment to fostering research in middle school settings, and willingness to help me reach the goal Doctorate of Philosophy in Middle Grade Education.
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CHAPTER 1
INTRODUCTION

There was once an interdisciplinary team of four middle grades teachers that had been together for quite some time. Many years before this study, they had an ‘experience’ with their students when a forest near the school was cleared and burned for a new housing development. Their students became emotional and wanted to do something about all the development that was occurring near their school. An ‘education moment’ presented itself so they pursued ad hoc lessons about development and environment issues. In the spring of 2002 one of the teachers experienced a graduate class on service-learning and in June, the four teachers had an opportunity to attend a professional learning together regarding interdisciplinary environmental service-learning, two years prior to this study. After the training, they conducted miscellaneous environmental and service-learning activities in each of their academic classes for two school years but never in a comprehensive manner. Confident in their abilities, with training and some practice with prior students under their belts, they started planning an environmental service-learning unit in earnest on January 4, 2005. This case study documents and interprets what happened with those efforts. The teachers started out with ideas for a comprehensive interdisciplinary environmental service-learning unit. However, things did not go as planned. As time progressed and the realities of their situations weighed upon them, what ultimately occurred did not look like what they initially intended. The service-learning components never occurred and the environmental portions were changed drastically. This is the story of those teachers’ attempt to conduct an interdisciplinary environmental service-learning unit.
Middle school age students, ages 11 – 14, have unique developmental and learning needs compared to elementary and high school age pupils. These students are transforming from individuals wanting to learn about the world around them, and pleasing others in their lives, to young adults who have begun to develop a purpose in life. Middle school students need a unique school environment that recognizes their needs and works toward providing the climate necessary for them to learn and mature. As a consequence, the popularity of the middle school concept began in the 1970s and 1980s as a way to meet the needs of the middle school learner.

Middle schools are a combination of building, organization, and people with the common purpose of teaching the unique student in the early adolescent stage of life. Middle schools are organized to help students transition from a learning environment characterized by a single elementary teacher for all subjects to one that has a different instructor for each subject. To meet this transitional need, teachers often organize into teams of two to five who are assigned to groups of students. They get to know the students personally so their unique needs might be met. Unlike elementary learning, where young students are anxious to learn the basics of reading, writing, and math, and high school with its emphasis on content laden courses needed for the next stages of life, middle school learning recognizes the sometimes chaotic nature of the early adolescent and stresses the need for instruction that makes learning relevant and engaging to students. In the interdisciplinary team structure of middle schools, teachers collaborate to plan and implement units of instruction so that as students travel between their assigned academic teachers, they recognize connections within the curriculum and begin to understand that the world does not work in alignment with compartmentalized, specific subjects. While it is generally believed that interdisciplinary instruction makes learning more interesting for middle school age students (Jackson & Davis, 2000), the national educational climate has shifted toward
greater accountability of schools, teachers, and pupils. More emphasis has been placed on testing
to determine progress toward established discipline specific standards. As the tests are
compartmentalized according to distinct academic subject areas, teachers and students feel the
pressures of performance in the individual academic subject areas. The climate of high stakes
testing and accountability may cause teachers to shift their emphasis from interdisciplinary team
instruction to compartmentalized teaching within individual academic subjects of expertise.

This study provides an overview of literature relevant to interdisciplinary teaming and
interdisciplinary curriculum in middle schools and a consideration of the ways in which the
educational climate may be affecting the core tenants of middle school philosophy. The literature
review describes research relevant to a form of interdisciplinary curriculum known as
environmental service-learning. Environmental service-learning is a method of interdisciplinary
instruction that engages students by connecting their learning to environmental issues within the
local community. Literature that documents environmental service-learning in middle schools is
summarized to provide an understanding of the status of interdisciplinary teaming and
curriculum as currently practiced in middle schools.

Purpose of the Study

Different models of environmental service-learning have been practiced in the United
States for nearly one hundred years (Dennis & Knapp, 1997), under various names:
environmental education, service-learning, and environmental service-learning. Environmental
education and service-learning are based on many of the same principles of involving students in
real learning activities to create a connection to their environment and community. This study
focused on what one middle school interdisciplinary team of four teachers’ believed regarding
environmental service-learning and how they planned, negotiated, implemented, and evaluated student learning in today’s educational climate of accountability and testing.

In-depth studies of interdisciplinary practice and environmental service-learning seem to be generally missing in the literature. Jackson & Davis (2000) note that many middle grade schools only implement the structures of interdisciplinary teams but teaching is not improved by simply changing the structures. They refer to middle schools as places where “structures become a foundation for a house that is never built” (p. 144). The few success stories of interdisciplinary teaching that can be found are encouraging, but limited. There are many books and articles that provide a descriptive account of how an interdisciplinary team should function and what curriculum should look like but there is little research that examines how teachers of interdisciplinary teams really plan and negotiate curriculum. This study examines how a team of middle school teachers collaboratively planned an environmental service-learning unit in the context of the current education environment of standards, mandated curriculum, and high stakes testing. A comprehensive profile of the teachers, the factors they considered when collaboratively developing interdisciplinary curriculum, and the ways in which they determined student learning all contribute to building the knowledge base related to interdisciplinary teaming, curriculum, and particularly to environmental service-learning. It is hoped that others will be able to see and use the experiences of this team to construct a better understanding of environmental service-learning juxtaposed with interdisciplinary teaming and curriculum.

Need for the Study

This study examined what a team of middle school teachers believed regarding environmental service-learning and how they planned, negotiated and implemented an interdisciplinary unit in a high stakes testing school district. It also considered how student
learning was assessed in the contexts of this unit. This study was deemed necessary for the following reasons:

1. Some researchers suggest that interdisciplinary teaming and units can meet the needs of middle grades students by engaging them in the curriculum (Jackson & Davis, 2000) and changing the way teachers think about assessing students (Murata, 2002). This study documented how a team of teachers conceptualized what is necessary when planning, negotiating, implementing and evaluating success of an interdisciplinary environmental service-learning unit.

2. Other research suggested that service-learning (Berv, 1998; Boston, 1997; Meyers, 1999), environmental education (Norris & Jacobson, 1997), and environmental service-learning (Cogswell, 2001; Springer, 1994) can meet both the academic and affective needs of students. As a case study, this research provided an in-depth account of how one interdisciplinary team used environmental service-learning to meet the needs of their middle school students.

3. In the current educational climate of accountability and standards, teachers fear that high stakes testing impacts student learning in negative ways (Moore, 1994). The No Child Left Behind legislation, which mandates testing, most likely produces harmful effects on children and schools (Popham, 2003). Jackson & Davis (2000) concluded that in the climate of accountability, although many middle grade schools utilize the structures of interdisciplinary teams, teaching and learning is not improved by changing the structure alone. This study examined how one team moved beyond the structure of interdisciplinary teaming to plan, negotiate, implement, and evaluate
student learning, with respect to environmental service-learning, in a high stakes testing climate.

4. While there is literature that examined service-learning (Burns, 1998; Meyers, 1999; Pate, 2001b) and environmental education (Dennis & Knapp, 1997; Sanger, 1997; Saul, 2000) few studies examine approaches to environmental service-learning (Cogswell, 2001; Springer, 1994). This study adds to the knowledge base surrounding conceptions of environmental service-learning.

5. There are many studies that focus on the design and implementation of interdisciplinary curriculum (Arhar, 1996; Jackson & Davis, 2000; Rottier, 2000); however, there are few stories of success or failure with respect to the process. Arhar (1996) attributed this to the complexity of investigating interdisciplinary teaming and curriculum planning. There may be many factors that contribute to success or failure, such as the teachers, school, content, students, time of year, and high stakes testing (Ellis & Fouts, 2001). Ellis and Fouts stated that “experimental research on interdisciplinary curriculum is very difficult to conduct and, therefore, rather rare” (p. 26).

6. This study investigated the intersection of interdisciplinary curriculum, interdisciplinary teaming, and environmental service-learning curriculum in a middle school with high stakes testing. Previous studies have examined one or two of these components; this is the first study to focus on the intersection of these three approaches.
Chapter 6 identifies how each of the needs for the study were achieved. It then expands on the needs and presents pedagogical, practitioner, and research implications of the study, expanding upon the needs identified.

**Research Questions**

This study was guided by the overarching research question: *What does an interdisciplinary team of middle grade teachers believe regarding environmental service-learning and how do they plan, negotiate, implement, and evaluate student learning?* In order to gain insight into the overarching question, four sub-questions guided the selection of data collected and methods of analysis.

*Sub-question #1 – What are the beliefs of seventh grade interdisciplinary team members regarding environmental service-learning?*

Beliefs of each teacher on the interdisciplinary team may influence how they plan and implement environmental service-learning curriculum (Corney, 2000; Warner, 2001). When analyzing data regarding how the interdisciplinary team planned, negotiated, implemented, and evaluated student learning, it was deemed useful to understand teachers’ individual beliefs concerning environmental service-learning. Trimble & Irvin (1996) emphasized that working as an interdisciplinary team includes “values, openness, trust, caring professionalism, personal priorities, and attitudes toward work and play” (p. 53). Thus, teachers’ individual beliefs inherently play a role in the team planning process. This sub-question sought to understand the beliefs of each teacher in relation to how they acted as an individual and as a team member.
Sub-question #2 - How does a seventh grade interdisciplinary team plan and negotiate an environmental service-learning unit?

This question focused on identifying aspects of the interdisciplinary team planning process as it related to the development of an environmental service-learning curriculum unit. It also shed light on issues, considerations, and methods of negotiation that are integral to the interdisciplinary team planning process. At the heart of this question was an interest in developing a better understanding of both the process (how) of curriculum development and the specific nature of environmental service-learning curriculum (what) that resulted.

Sub-question #3 - How does a seventh grade interdisciplinary team implement environmental service-learning?

How an interdisciplinary team of teachers implement environmental service-learning may vary from what they individually and collectively plan. This question sought to identify and understand patterns that influenced the implementation of the planned and negotiated curriculum.

Sub-question #4 - How does a seventh grade interdisciplinary team evaluate student learning with respect to environmental service-learning?

Evaluation of student learning in education is not clearly defined (Arhar, 1996; Springer, 1994). Some researchers defined student learning based on test scores (Bailey, 2003; Bandlow, 2001), others described it primarily in terms of grades (Springer, 1994), and some attributed it to less tangible factors, such as development of a sense of place (Gruenewald, 2002). In order to identify what guided this team of teachers, as a group and individually, it was important to understand their assumptions about learning and investigate how they ‘measured’ it during the implementation of the environmental service-learning unit. While each teacher defined learning
differently as an individual, how they reached a consensus for defining and measuring it in relation to the environmental service-learning unit was important.

Theoretical Perspective and Framework

Social constructivism served as the overall theoretical perspective which guided the framing for this research study. Social constructivist theory posits that a person’s construct of knowledge is greatly affected by one’s cultural environment (Bereiter, 1994) and prior experiences. Smith and Cowie (1991) stated that children acquire their abilities to think, learn, and construct knowledge from those around them. People, from birth, continue to actively develop knowledge throughout their life experiences. Constructivist theory suggests that people do not know everything and enter into situations wanting to learn more. However, as Guba & Lincoln (1989) pointed out, people often do not know what they do not know; this calls for adaptable methods of research. Social constructivism emphasizes the critical role of communication between people in the development of knowledge (Glasson & Lalik, 1992). Social constructivism was considered in the design of this study and subsequent data analysis. Prompts were included in the guidelines provided to participants with respect to the development of their personal autobiographies. These prompts were used to explore teachers’ beliefs about constructivist theory in relation to the environmental service-learning initiative. Calderhead (1996) and Pope (1993) acknowledged that social constructivist perspectives have become common components of research regarding teacher beliefs and their influence on teaching. In this study, an examination of each team member’s beliefs about environmental service-learning contributed to a better understanding of how they planned, negotiated, implemented, and evaluated student learning with respect to their interdisciplinary environmental service-learning curriculum.
The theoretical framework for this study was guided by assumptions surrounding the role of teachers beliefs and the importance of place in relation to how the team planned, negotiated, implemented, and evaluated student learning during an environmental service-learning unit. Teacher belief, as a theoretical framework, served as a tool for understanding the teachers’ actions. As Nespor (1987) would concur, it was important to understand teachers’ beliefs about curriculum, children, themselves, and team collaboration to holistically make sense of their actions. Place-based pedagogy (Gruenewald, 2003) also served as a theoretical framework for making sense of why teachers did what they did in the planning, negotiating, implementing, and evaluating learning during the interdisciplinary environmental service-learning unit. A brief explanation of these two theoretical constructs follows.

**Teacher Beliefs**

This study was not intended to investigate the complex relationships between teacher belief and action. However, the construct of teacher belief served as a useful framework for understanding why each teacher acted the way he or she did during the team planning and negotiation of the environmental service-learning unit. Teacher belief was a lens through which to examine the teachers, separately and together, as they planned, negotiated, implemented, and evaluated student learning in relation to the environmental service-learning unit. Teacher beliefs are defined as a combination of “attitudes, values, judgments, opinions, ideologies, perceptions, conceptions, conceptual systems, dispositions, and theories” (Lumoe, Haney, & Czerniak, 1998, p. 216). Richardson’s (1996) ideas that beliefs are not isolated from each other were useful when the researcher analyzed how the interdisciplinary team teachers collaboratively developed the environmental service-learning curriculum. Research indicates that teachers may, or may not, be aware of their beliefs or the difference between what they believe and what they do.
Furthermore, the beliefs that teachers hold are not always consistent, sometimes illogical, and may be difficult to alter (Nespor, 1987). The participants in this study were experienced teachers who, presumably, each held an entrenched sets of beliefs. Their beliefs were useful for understanding what was considered when they planned, negotiated, implemented, and evaluated student learning. Their beliefs reflected tensions between what they thought best, individually and collectively, for their students and what they hoped to implement in their classrooms.

With this premise, it is important to note that “belief systems can be differentiated from knowledge systems” (Kang, 2002, p. 31). Kang stated that beliefs are subject to dispute since “the believer is aware that others may think differently” and knowledge “uses facts.” He added that distinguishing between knowledge and beliefs can be difficult. Gess-Newsome (2003) described five cases depicting the interaction between knowledge and beliefs. These scenarios ranged from the idea that knowledge and beliefs stand alone to a view that knowledge effects all beliefs and vice versa.

Place-Based Education

Ward-Wendel (2000) stated that environmental service-learning was useful in improving learning in middle school students by connecting curriculum to the concept of “sense of place.” This researcher suggested that as our culture moves away from its agricultural roots, students do not have the feeling of belonging to the community in which they were raised. Agricultural roots of past generations created a sense of belonging to the land. Sanger (1997) stated that students sit in classrooms for thousands of hours receiving facts, formulas, and fiction but do not develop a sense of place in their own community. Schools contribute to this detachment by stressing the importance of individual success in today’s society instead of the collective good of the community. The modern-industrial world further detaches children from their sense of place
when frameworks are provided that guide thinking processes which are not their own. Sanger continued to say that detachment frameworks are projected to the students through television, magazines, and movies; thus students do not develop their own sense of place in the environment.

In order to help students develop their sense of place in today’s world, Sanger (1997) and Haas & Nachtigal (1998) emphasized building connections to the community through environmental education and service-learning methods. These authors believed that teachers must: (1) plan engaging curriculum that includes telling stories that are interesting and relevant to the students, educate experientially so that students learn from their successes and failures, (2) promote cooperative learning among peers, (3) create dialogue that students can expand upon in their own words and at personal levels of understanding, (4) involve the community to give experiences meaning, and (5) use local topics that are relevant so students make connections with their learning. According to Woodhouse and Knapp (2000), “place-based education is inherently multidisciplinary, experiential, and connects place with self and community” (p. 2). It is apparent in the literature that environmental service-learning is advocated as a method for developing a sense of place in early adolescents (Haas & Nachtigal, 1998; Woodhouse & Knapp, 2000).

The importance of sense of place or community within middle school learners seems to be more prevalent in recent literature (Gruenewald, 2002; Ward & Wolf-Wendel, 2000). Sense of place theory stated that many populations in the United States have become disconnected with their communities and no longer feel a part of the land where they live. When people lived on farms and in small communities, connections with the environment and people of the community were important components of their lives. As children increasingly stay indoors or travel from
one location to another, disconnected from their surroundings in a car, they do not develop a sense of place. According to Gruenewald (2002), the interdisciplinary unit is an excellent method for developing place-based education practices of experiential learning, constructivism, community, and democratic education in order to nurture connections to communities and regions. Murata (2002) noted that “interdisciplinary teams of teachers that practice place-based interdisciplinary units develop trust and respect in each other” (p.72). The notion of place-based education served as a theoretical referent for making sense of why and how the interdisciplinary team collaborated to plan and implement environmental service-learning in a climate of high-stakes testing and accountability.

Methods of the Study

A case study methodology was used to document how a seventh grade interdisciplinary teacher team planned, negotiated, implemented, and evaluated student learning during an environmental service-learning unit. Case study is suited for looking at a situation and social organization in detail (Silverman, 2000) as it is oriented to the timeframe in which the “story” occurs. It is also useful for answering questions associated with currently relevant issues (Isaac & Michael, 1995; Patton, 1999). As the researcher developed the scope of this study, he considered investigating more than one team of interdisciplinary teachers implementing environmental service-learning. Ultimately, the researcher chose to focus on an individual team and used Merriam’s (1998) approach of studying one case, to investigate a single phenomenon and uncover its meaningful components. The case study provides a snapshot of the interdisciplinary team in its real-life context (Myers, 1997) with detailed information about the situation and interactions (Patton, 2002) that occurred. Silverman (2000) emphasized that, “case
studies generally address a particular situation and no attempt is made to generalize beyond the single case or even build theories” (p. 103).

This study was an interpretive case study, in that “interpretive researchers start out with the assumption that access to reality is only through social constructions such as language, consciousness, and shared meanings” (Myers, 1997, p. 4). Interpretive studies attempt to understand a phenomenon by attempting to make sense of the meanings that people assign to it through a focus on the complexity of the human subjects in a given situation (Myers, 1997). A component of the interpretation concerned the “question of fit” between the acts of planning, negotiating, implementing, and evaluating student learning in relation to the environmental service-learning curriculum.

*Data Sources*

Multiple sources were collected to provide information from which to conduct an interpretive analysis. Data was collected actively from the participants (primary sources) and passively (secondary sources).

*Primary Data Sources*

*Written autobiography.* Each teacher responded to a series of prompts (Appendix A) which were used as a baseline for understanding each teacher’s background, thoughts, ideas, and beliefs regarding how they planned, negotiated, implemented, and evaluated student learning in relation to the environmental service-learning unit. Using these prompts as a guideline, each teacher constructed a personal autobiography.

*Oral interviews.* Oral interviews were conducted with each teacher to supplement and clarify information provided in their written autobiographies. A second set of interviews was conducted after each completed their summative reflection. The purpose of the second interview
was to gain further insight into themes or tensions and clarify weekly journal and culminating written reflections.

*Audio recordings of team planning meetings.* Weekly interdisciplinary team meetings were audio recorded to document on how the teachers planned, negotiated, and evaluated student learning in relation to the environmental service-learning unit.

*Friday team progress meetings.* Friday team progress meetings were conducted throughout the study. These meetings brought the interdisciplinary teachers together to discuss issues and progress in a systematic way. Unlike the team planning meetings, which focused on the process of how the teachers planned and negotiated the curriculum, the Friday team progress meetings served as a forum for reflection on actions relative to the weekly activities. Friday team progress meetings were audio recorded and transcribed.

*Focus group sessions.* A mid-unit focus group discussion was conducted and audio recorded to provide a snapshot of the collective thoughts of the interdisciplinary team on progress and needs in terms of environmental service-learning unit implementation. The final focus group discussion was a summative reflection guided by the prompts in Appendix D.

**Secondary Data Sources**

*Teacher lesson plans and team unit.* Individual teacher lesson plans documented what each teacher developed for their academic subject after the environmental service-learning curriculum was negotiated during the team meetings. The lesson plans shed light on how teachers interpreted and translated team planning with respect to their specific subject areas. The unit “plan” developed by the team demonstrated the collaborative effort that arose from the negotiation. The roles and responsibilities of each teacher of the interdisciplinary team were identified in the plan.
Anecdotal notes. Anecdotal notes were taken by each teacher during meetings and individually throughout all phases of the environmental service-learning unit. The anecdotal notes were collected and analyzed for additional insights into the process involved in planning, negotiating, implementing, and evaluating student learning with regard to the environmental service-learning unit.

Team meeting records. Team meeting records were formal minutes of every team meeting that the interdisciplinary team conducted during the year. Team meeting records were required by the school system for justifying the funding provided to the middle schools for extended planning. They were submitted to the administration for compilation and submission by the school district.

Reflective journals. Each teacher kept a reflective journal during the course of the study. The journals were semi-structured in nature and prompts were provided to guide weekly reflection (Appendix B) on the progress of the environmental service-learning unit.

Final written reflection. Each teacher developed a summative written reflection, using prompts provided (Appendix C) that considered their personal and collective efforts during the development of the environmental service-learning curriculum and the work of the interdisciplinary team.

Data Analysis and Interpretation

This study used an interpretive case study methodology to investigate what a seventh grade interdisciplinary team of middle grades teachers believed regarding environmental service-learning and how they planned, negotiated, implemented, and evaluated student learning. Critical autobiographies, interviews, audio recordings, reflective journals, and focus group discussions were used to inform analysis and interpretation. Constant comparative methods were used for
encoding and developing themes for subsequent within-case and cross-case interpretive analysis. Assertions were presented for each question before the research began. As data was encoded and analyzed, it was interpreted relative to the initial assertions. The initial assertions were then refined based on the interpretation of supporting or refuting data.

Definitions Relevant to This Study

For the purposes of this study, the following terms are defined:

*Interdisciplinary team* – Four teachers assigned to work together in a middle school setting where each is responsible for one academic subject and a remedial/enrichment class of math or language arts (Jackson & Davis, 2000). Each teacher maintained a homeroom of students who then moved among the team of teachers for all their academic core subjects (math, language arts, social studies, and science). In this study, approximately 115 were students assigned to the interdisciplinary team. The four teachers shared a common 70-minute planning time while the students were at exploratory classes (e.g., art, drama, physical education, technology education, health). During the common planning time, the teachers shared information about the students and worked together to develop interdisciplinary units of instruction.

*Middle grades teachers* - Middle grades are those that meet the needs of children ages 10 to 15 when they are undergoing “rapid and profound personal changes” (NMSA, 2003, p. 3). Children in this age range generally are considered grades six through eight, though may range from fifth through ninth, dependant on population characteristics of communities and physical facilities available. Teachers of middle grades students must be “educators who value working with this age group and are prepared to do so” (NMSA, 2002, p. 7). In this study, the teacher participants taught grade seven.
Negotiate – The dictionary definition of negotiate is “v. to bring about, or arrange, the terms of through negotiation. To conduct, manage, or carry on (McMillan, 1997, p. 687).” The term is usually associated with the business world where contracts are negotiated. In the education realm, teachers constantly negotiate in different ways. Teachers negotiate with themselves as they prepare for the day and determine whether to adjust their plans based on the moods of the students. Teachers negotiate with their students, developing lessons and assessments to facilitate learning, and then adjusting subtly in response to a multitude of factors in the education environment (Palmer, 1995).

For this study, “negotiating curriculum” referred to how a team of teachers used mandated curriculum from the school system to develop a unit of study designed to meet needs of seventh grade students. Palmer (1995) noted that teachers have personal needs and concerns that factor into their decisions regarding how they plan and implement curriculum. He added that when teachers work together in an interdisciplinary format, they must negotiate among themselves and adjust expectations to blend with teammates’ needs and desires.

Environmental service-learning - Environmental service-learning is a pedagogy of instruction that combines environmental education and service-learning, using a theme or issue as the focus for student involvement (Pate, 2000). In this study, the interdisciplinary environmental service-learning curriculum was planned, negotiated, and implemented by a team of four teachers. Each teacher contributed to the unit from the lens of his or her academic subject. For this study, the focus question for the environmental service-learning unit was, “Why should ‘they’ continue to allow development of housing subdivisions and shopping centers along Breadloaf Parkway? The clarifying questions were, “Who are they?” and, “Who lets them continue to develop?” This focus question was the result of several years experience, by the
teachers and students of the school. The Breadloaf Parkway is a four lane divided highway built as a cross county connector six years prior to this study. Shopping centers and housing subdivisions were then built, extending each direction from the middle school. Five years prior to this study, the teachers came across an ‘education moment’ when the trees of a neighboring forest were cut and burned, smoke drifting over the school causing a daily smell of burning trees. Students were outraged so the teachers changed their plans to teach about environmental issues and what they could do as individuals. Students learned about biodiversity and wrote letters to local government officials expressing outrage for letting developers cut the forest. When it came time to plan the interdisciplinary environmental service-learning unit studied, they ‘sampled’ students as to what the students felt about development near the school. Some students thought development (the ice cream shop and fast food restaurants were favorites) should continue along the Breadloaf Parkway while others thought nothing more should be built. From their prior years’ experiences and the sampling of current student opinions, the teachers developed their focus question. The teachers planned for students to research and collect data in science, analyze and plot data in math, debate and make community connections in social studies, and write or make oral presentations for language arts in order to support a particular stance. Community outreach, education, and action were aspects of environmental service-learning important to this interdisciplinary team of teachers.

Curriculum - For this study, ‘curriculum’ included what was to be taught, how it was to be taught, and the informal aspects of the learning environment, such as room locations, communication networks, and teacher preferences that affected how the teachers actually implemented and evaluated student learning with respect to the unit. Interdisciplinary curriculum was implemented across the team. The teachers used their common planning time to negotiate
the curriculum around the focus question and each contributed to the interdisciplinary unit within of their respective academic subject class. According to Palmer (1995), curriculum included the non-physical (academic) components, physical facilities of the school, and the personal needs and wants of the teachers within an interdisciplinary team.

Researcher Bias

The researcher’s passion, since his college days of more than 30 years ago, was environmental issues and activism. He worked initially as an environmental protection specialist, later as a consultant, and finally as middle school educator. This doctoral study was a merger of his long-term interest in environmental issues, personal belief that people need to serve others, and career as an educator. He taught as a member of the four person interdisciplinary team of middle grade teachers at the center of this study. The team had conducted many interdisciplinary and integrated units during their five years together. For each of those units, science was usually the focal subject. Science has always been accepted as the subject best to integrate and teach environmental topics, even since Dewey’s time (Dennis & Knapp, 1997). To improve interdisciplinary unit planning and implementation, all four team members attended a seven-day training session on the use of service-learning methods for conducting environmental education units in June 2002. Using a watershed wholly contained within the state as a thematic focus, the teachers learned about pollution and development issues affecting a major river system so that each discipline teacher (science, mathematics, language arts, and social studies teachers) could develop ideas for carrying out a team-wide interdisciplinary environmental service education unit.

The researcher had several biases that most likely influenced this research effort. First, he was both a member of the interdisciplinary team and the researcher. This dual role as teacher-
participant and researcher potentially presented some tensions so he consciously made an attempt to ensure that teacher responsibilities did not unduly influence researcher responsibilities and visa versa. He accepted the dual role and therefore used an emic approach. Throughout the dissertation process, he was conscious of the ‘issue of voice’ (Clough & Nutbrown, 2002) and made an attempt to separate the two roles.

Additional biases that influenced this research were beliefs that environmental issues and activism is good for students, that the subject interdisciplinary team worked exceptionally well together, and that the teachers would do whatever was best for student learning. Interdisciplinary teams have been shown to be good for students (Jackson & Davis, 2000; Murata, 2002). While the researcher believed this to be true of his team, he had no empirical evidence to support this case. Although beyond the scope of this dissertation, it would be interesting to evaluate the team as a high performing team (Trimble, 1995). Lastly, he believed interdisciplinary teams and units are based on philosophical and pedagogical assumptions that are best for middle grade learners. His teaching practices were not all empirically derived from research findings but often guided by instinct, intuition, and experience with what had worked in the past.

Organization of the Study

Chapter 1 provides an overview of the study by identifying the purpose, rationale, theoretical framework, research questions, methods of the study, definitions, and researcher bias. Chapter 2 reviews the literature on interdisciplinary teaming and interdisciplinary curriculum in middle schools, environmental service-learning curriculum, and environmental service-learning and interdisciplinary teaming. Chapter 3 describes the methodology used for the research, to include context of this study, participants, study design, data sources, procedures, and data analysis used to investigate the research questions. Chapter 4 presents a within-case analysis of
each teacher of the interdisciplinary team and provides evidence for themes that emerged as to what they believed regarding environmental service-learning and how they individually planned, negotiated, implemented, and evaluated student learning. Chapter 5 presents a holistic view, by use of emergent themes, as to what the team believed regarding environmental service-learning and how they planned, negotiated, implemented, and evaluated student learning with respect to the unit. Chapter 6 then provides implications for middle school practitioners and researchers, a conceptual model to explain the phenomenon of this study, and ideas for future research.
The purpose of this study was to examine how an interdisciplinary team of middle grades teachers planned, negotiated, implemented, and evaluated student learning with respect to an interdisciplinary environmental service-learning curriculum. To provide a foundation from which to conduct the study, this review summarizes relevant literature that contributed to a deeper understanding of the research questions and subsequent analysis and interpretation.

This literature review begins with the first section providing an overview of interdisciplinary teaming and curriculum in middle schools. The concept of interdisciplinary teaming is reviewed separately from that of interdisciplinary curriculum. The second section reviewed relevant literature with regards to environmental service-learning. It is subdivided into sections that address environmental education, service-learning, and environmental service-learning conceptualized as a singular and unique construct. Relevant literature regarding the combined practices of interdisciplinary teaming and environmental service-learning as interdisciplinary curriculum is discussed in the third section.

Interdisciplinary Teaming and Curriculum in Middle Schools

*Interdisciplinary Teaming*

The term ‘interdisciplinary teaming’ is comprised of two operative words. The term ‘team’ is commonly used in middle schools. Teams of teachers consist of two to five teachers that work together to teach a group of students assigned to them (Jackson & Davis, 2000). Usually, each teacher focuses on one or two academic subjects and coordinates efforts with
teammates during an extended planning time. Middle schools were originally established to provide a setting sensitive to the needs of early adolescent students transitioning from elementary to high school settings. The team structure is intended to provide students with an environment where they feel welcomed, cared for, and can develop into mature students ready to take on a more independent life. The early adolescent years (ages 11-15) can be turbulent and emotional for many children—thus it is believed that teams of teachers that know their students are better equipped to help them grow and develop. The placement of students on teams also provides these early adolescents with the peer associations craved at this age. According to Jackson and Davis (2000), “teams provide a psychological home within the school that reduces the stress of isolation and anonymity” (p. 125).

The term ‘interdisciplinary’ adds a social and academic dimension to the idea of teaming, which is intended to enhance the overall educational experience of the early adolescent. Interdisciplinary teams are intended to provide social and emotional support for students. For many students, an interdisciplinary team may provide a safe haven (Warren, 1993). Teachers who were active members of interdisciplinary teams also benefited from the structure. In Warren’s study of interdisciplinary teaming (1993), teachers commonly expressed feelings of isolation in the classroom and school. They did not interact with their colleagues to share teaching strategies or interact socially. Warren (1993) concluded that with an organizational structure that puts teachers together, they can enjoy camaraderie not common among elementary and high school teachers. Murata (2002) found that teachers that practice interdisciplinary teaming and curriculum integration changed the way they graded, scheduled classes, taught across curriculum areas, and developed a sense of community among themselves (Strahan,
Bowles, Richardson, & Hanawald, 1997). Middle school interdisciplinary team teachers had bonds among themselves that were often not visible in teachers from elementary or high schools.

“Interdisciplinary teaming” is therefore a team of teachers working together with a group of students to provide a safe community for learning curriculum in an interdisciplinary manner that meets the needs of the middle school child (Jackson & Davis, 2000). Interdisciplinary team teachers work together to assure that they cover mandated curriculum for each of their subjects and jointly develop plans to make connections between the subjects so that learning is real and engaging for the early adolescent student. In a study conducted by Homestead (1998) team teachers sharing issues of curriculum, discipline, assessment, and parent concerns showed reduced teacher isolation that in turn contributed to the team’s success. Teaming of teachers does not guarantee that instruction will be changed for the better; it is only an organizational tool to restructure how the teachers interact (Arhar, 1996). As of April 2000, more than 50 % of the schools for grades 6 through 8 in the United States were organized as middle schools that incorporated the teaming structure (Rottier, 2000). Some confusion exists with respect to defining the terms ‘team teaching’ and ‘interdisciplinary team teaching.’ Organizing into teams of teachers who share a common group of students does not necessarily mean that interdisciplinary teaching will occur, especially in middle schools that put less emphasis on curriculum and more on social and behavioral development (Wraga, 1997).

Interdisciplinary teaming in today’s educational climate

The theory and practice of interdisciplinary teaming in middle schools is a prevalent discourse in teacher education today. There are experts from universities, national teacher associations, and school systems that promote the concept for middle schools as the best thing since sliced bread. In my personal observations and in review of the literature, there is little
empirical evidence to support its true practice and success. Although a few studies detail successes of interdisciplinary teaming (Meister & Nolan, 2001; Murata, 1996; Springer, 1994), there is no definitive pattern to suggest that it is being practiced successfully in middle schools across the United States. There is even less published that documents and details programs or teams of teachers that have tried interdisciplinary teaming but were unsuccessful. Stories of success are easy and fun to tell but stories of struggle and failure are painful so not frequently written. Stories of failure are at least as useful as those of success because they provide insights that teachers, administrators, and researchers also need to investigate. Nevertheless, several studies addressed the implementation of interdisciplinary units within the realities of practice.

May (2000) conducted a study that revolved around planning and implementing of interdisciplinary environmental service-learning in grades 3 – 8. He found that success for implementing interdisciplinary environmental education units required the following elements:

a) Teaching conditions:

- detailed support (e.g., administrative, planning time, and community);
- resources (e.g., access, local biological, and local human);
- flexibility (e.g., curriculum and schedules);
- climate (e.g., collaborative learning and teaching environments);

b) Teacher competencies:

- knowledge base (e.g., ecological knowledge, sociopolitical knowledge, local culture understanding, teaching and learning theory);
- skills base (e.g., listening and questioning skills, computer proficiency, diverse instructional strategies, resourcefulness, creativity, alternative assessment abilities);
- Integration ability (e.g., facilitation skills, ability to make connections, understand global to local issues, ability to integrate curriculum);

c) Teaching practices:

- Teaching method or style (e.g., student-centered learning, utilize personal and student strengths, experiential teaching orientation, cooperative and inclusion learning, involves external resource persons, reflection in planning and application);

- Content orientation (e.g., environmental focus of teaching, nurturing sense of place);

- Personal behaviors (e.g., consistent ‘can do’ vision, infectious passion for environmental education and teaching in general, incorporates humor in the classroom, invests self and personal resources, practices environmentally responsible behaviors, risk taker, recharges self). (pp. 4-6)

May identified a strong interrelationship between these three elements – teaching conditions, teacher competencies, and teaching practices. He concluded that, “some seem to inherit incredibly supportive conditions, and others are skilled at creating those conditions from a less-than-desirable initial setting” (May, 2002, p. 7). He also noted that teachers of environmental education were overwhelmingly constructivists in their orientation. Teachers that held other philosophical orientations tended to not be as successful. From May’s perspective, the strongest conclusion to be derived from his study is that, “it all boils down to dedication. Is the teacher willing to go the distance” (p. 9)?

Additional studies related to interdisciplinary teaming can be categorized according to the major influence on the success, or failure, of interdisciplinary teaming and units of instruction as
follows: legislative policy, understanding administration, organizational factors, and mandated curriculum and high stakes testing. Many of the influences are beyond the individual teacher’s control but must be considered. Others are manageable if identified and understood. Though each of these influences is described separately, they usually are intertwined with each other.

Legislative and Policy

The Federal education legislation, Elementary and Secondary School Act (U.S. DOE, 2002) and the No Child Left Behind of 2001 (U.S. DOE, 2002), do not include a middle school component in the language of the legislation. Since the Federal law does not recognize middle school implementation, it must be a state or local initiative. With increasing acceptance of interdisciplinary teaming for middle schools, extended planning time is recognized as integral to planning interdisciplinary curriculum. However, implementing the extra planning time for middle school interdisciplinary teams requires extra funding. Since the Federal government does not officially recognize middle schools in their funding structure, states and school systems must finance the additional expense of planning with locally generated funding. Depending on the revenue available to the state or local school system, funding may not be available to provide the additional planning times. When principals were asked why they have a middle school organization but do not offer extended planning time, the primary response was lack of funding (Miller & Stayton, 1998). Since interdisciplinary teaming requires personal commitment, teachers that might be on the edge in terms of using it would most likely choose to use traditional isolated methods of teaching over interdisciplinary teaming (May, 2000).

Teacher Understanding

No matter how well a middle school program is funded and the importance put on its implementation, its success is directly related to the understanding of the model and having the
leadership needed to carry it out. Teachers often do not understand the purposes and functioning of interdisciplinary teams. While middle school teams of teachers seem intuitively to grasp the benefits for their students they usually do not use planning times for collaboration in curriculum development for interdisciplinary units (Jackson & Davis, 2000; Warren, 1993). Increased planning time for middle school teachers often becomes time to grade papers and talk about student issues, such as discipline or parent communications. However, though teachers may not be using the time for planning interdisciplinary units, Warren (1993) explained that the period spent on discussing student needs allows teachers to learn about their pupils and develop an increased interest that carries over into how they teach and communicate on a one-to-one basis.

According to Walthier-Thomas (1997), the single most persistent problem that was present over time for teams was finding time for planning interdisciplinary curriculum after completing the tasks of scheduling, sharing concerns over student achievement or behaviors, administrative requirements, and staff development issues. Principals reported that teachers used their planning time to discuss individual student needs (38%), develop integrated curriculum (22%), keep written records (21%), meet with students (6%), and meet with parents (5%) (Hackman, Patzko, Valentine, & Clark, 2002).

Irvin (1992) stressed the need for training in interdisciplinary teams to begin at the pre-service level. However, she noted that many middle school teachers do not prepare for teaching in a middle grades program. Most middle grades teachers completed elementary or high school education programs with little preparation for meeting the unique needs of working in middle schools on interdisciplinary teams with early adolescents. According to Gable and Manning (1999) “middle grades teachers must understand and stress the importance of formalizing the team organization to create an active communication system to foster a shared sense of
responsibility for educating the middle school child” (p. 184). In his research, Warren (2001) found three areas that are critical to middle school teacher preparation: the practice of small group decision making, the identification of expectations for team functioning, and the development of interpersonal skills unique to interdisciplinary team success. Preparing teachers for working in middle school on interdisciplinary teams is an issue of teacher self-perception and efficacy. As Warren (1993) explained, if teachers do not believe they have the ability or capacity to teach middle schoolers, with their unique characteristics, they will not effectively do so.

Besides training, teachers do not adapt well to the idea of middle school interdisciplinary teaming because of personal issues. Some teachers accept challenges and others do not. As Stevenson and Carr (1993) found, many teachers do not work toward interdisciplinary units because of fear of trying something different, level of difficulty in planning, inertia, or the unwillingness to take risks. Staff development may help teachers move outside of their comfort zone to try new approaches, but it does not generally address middle school teaching practices. As noted earlier, successful teams of teachers need to be personally committed and motivated to be successful.

Administration

As is the case in teacher preparation programs, most principals do not have professional development specifically designed for administering in a middle school setting (Murata, 2002; White, 1997). Administrators come to the middle school setting with no specialized middle school training. In White’s study (1997) many individuals were middle school teachers before becoming administrators and had experience but had no significant training in understanding the philosophies and practices of the interdisciplinary teaming and curriculum, especially since many of the schools did not practice true form of the pedagogy.
Murata (2002) explained how administrators usually had two options for organizing interdisciplinary teams, letting the teachers choose or assigning them to teams. When teachers chose their teammates, they weigh the strengths and weaknesses of colleagues before selecting, trying to choose those with similar philosophies and complementary strengths. Administrators must consider teachers’ abilities to work together for the good of the students when placing teachers on interdisciplinary teams. In addition, one teacher needs to be identified as the leader with the appropriate interpersonal skills to guide the others to act in the best interest of their students (Walthier-Thomas, 1997). However, most times administrators designate the teams using existing teachers and school resources that do not always result in the best composition of teams. Murata (2002) found that principals want to team teachers together that share similar philosophies and personal goals for the middle school learner so that interdisciplinary units are indeed implemented and try to create teams that are balanced in gender, race, and personalities. However, the realities of teacher content certification issues, contracts, and turnover leave gaps on established teams that complicate or threaten the likelihood of success. As White (1997) noted, “principals do not always have a choice when forming teams. You work with what you get and make the best of it” (p. 65).

Murata (2002) also found that as school populations and demographics changed, teacher turnover increased. This results in a sense of impatience on the part of teachers in relation to interdisciplinary teaming and planning. Maintaining team compositions over many years was difficult. Schools with low teacher turnover had an easier time keeping teachers together to give long-term interdisciplinary teaching a chance.

Throughout the 1970s and 1980s when middle schools became popular, departmentalization decreased, hitting a low in 1988 (McErwin, 1997). This was significant
because de-compartmentalization was systemic to implementing the principles of interdisciplinary teaming and curriculum integration. However, as the nation’s leaders have increased their emphasis on academic standards and high stakes testing, school departmentalization has increased in middle schools, as teachers are pushed to assure that their students master the mandated content curriculum for each subject. According to Strahan (1977), teachers wanting to participate in interdisciplinary teaming and curriculum must hold a high comfort level with respect to this form of teaching, such that they feel students will master the content within this particular format.

According to George (1982), involving stakeholders in the school’s planning and implementation of interdisciplinary units will improve the chances for success. An important operational phase of George’s (1982) guidelines for implementing curriculum is community involvement. Administrators and teachers that invite parents and community members to be active partners see an improvement in student learning. Kneip & Martin-Kneip (1995) described the success of a Yonkers, New York system that implemented interdisciplinary teaching and celebrated initial success. As time progressed, they reported the challenge in maintaining the effort to create holistic and student-centered curriculum, as one which was time consuming and required significant patience. The inclusion of parents and community stakeholders by the Yonkers school and district administrators to bring about organizational change brought increased long term success. However, as the interdisciplinary teams’ composition changed because of teacher turnover, the interdisciplinary efforts at the school declined.

Organizational Factors

Most experts agree that using interdisciplinary teams for teaching middle grade students is beneficial for early adolescent learning (Jackson & Davis, 2002; NMSA, 2003). However, as
noted earlier, not all schools practice the model. The 2002 National Association of Secondary School Principals (NASSP) National Study of Leadership in Middle Schools (Valentine, Clark, Hackman, & Petzko, 2002) reported that 79% of middle schools partially or fully implemented interdisciplinary teaming, compared to 57% from the 1992 NASSP study. Essentially, 21% of the schools for early adolescent students that are organized into a middle school do not use interdisciplinary teaming. Miller and Stayton (1998) found that when asked why they do not practice the model, the primary response provided by administrators was funding, since additional money is required to provide the planning time necessary for teachers to conduct joint planning. Within the schools that practice teaming, Miller and Stayton also found that the two greatest barriers to success were administrative constraints (37%) and interpersonal issues (36%). Since teaming required teachers to work together to plan curriculum and to help individual students who needed assistance, interpersonal issues were a critical component that had to be considered when placing teachers together. A third constraint identified by 22% of the respondents was limited time to plan logistical and scheduling issues.

There are many other organizational and interpersonal considerations involved when developing interdisciplinary teams of teachers and students. Structural considerations include the size of the teams, scheduling, and proximity of the classrooms within the building, ability for flexible scheduling for classes, and adequate planning time for the teachers. According to Walthier-Thomas (1997), there should be a heterogeneous grouping of students and, where necessary, inclusion of special education students and teachers.

*Mandated Curriculum and High Stakes Testing*

The standards movement in the United States has impacted the implementation of interdisciplinary units of instruction (Moore, 1994; Popham, 2003). As states define specific
content and processes that students must learn and demonstrate mastery of on standardized tests, there seems to be less practice of true interdisciplinary teaming. Jackson & Davis (2000) noted that while teams are still an organizational component of middle schools and mandated curriculum can be adequately addressed within this structure, teachers are increasingly becoming isolated in their content area and not planning with their teammates to deliver interdisciplinary instruction. Teachers understand that students learn information at different speeds and by different methods, yet they are uncertain about the effectiveness of interdisciplinary teaching for improving student learning, especially in relation to preparation for standardized tests. In a study conducted by Gordon & Reese (1997) most teachers believed that high-stakes testing did not improve student learning. Teachers may need to differentiate in their minds and among team members which mandated curriculum goals are adequately covered by their interdisciplinary instruction and which may require additional emphasis.

**Interdisciplinary Curriculum**

Interdisciplinary curriculum occurs when a common thematic unit is taught among a team of teachers, with each contributing to the planning and implementation of the unit from within their academic subject (Arnold, 1997). Though Messic and Reynolds (1992) noted that there were many interpretations and definitions of interdisciplinary curriculum, there is one pattern that emerges; the curriculum needs to be relevant and meet the needs of students and society at the time. According to Ellis and Fouts (2001), issues that need to be considered when developing interdisciplinary curriculum center around how much of each academic subject (math, science, social studies, and math) should be included, what societal desires need to be addressed, and the amount of time that will be required for implementation.
Interdisciplinary curriculum requires teachers to expand beyond their core subject and include academic standards of other subjects in their teaching. Team members can practice interdisciplinary curriculum by developing thematic units and coordinating with each other to address the mandated curriculum. Many studies revealed that students learned material better when it was presented in thematic units because the content seemed more real to them. They became more engaged when the theme was interesting and understood better why they were learning the material (Ellis & Fouts, 2001; Irvin, 1992; Jackson & Davis, 2000; Jacobs, 1991). Interdisciplinary curriculum usually revolves around a theme chosen by more than one teacher with each subject contributing to the overall goals related to the theme. In this study, the four teacher participants planned and implemented the environmental service-learning, each from the standpoint of their respective academic subject. Interdisciplinary curriculum commonly refers to teaching across traditional academic subjects (Jacobs, 1991).

*Disciplinary versus Interdisciplinary Curriculum*

Many articles reviewed referred to integrated curriculum and interdisciplinary curriculum interchangeably. Jacobs (1989) defined disciplinary as “a specific body of teachable knowledge with its own background of education, training, procedures, methods, and content areas” (p. 7). The disciplinary curriculum is generally designed to be taught as separate academic subjects during the day at distinct times. There is no attempt at including other content areas in disciplinary curriculum and it is taught during defined blocks of time. Disciplinary curriculum is considered the ‘traditional’ method of instruction; most people in the United States attended schools with curriculum of this nature.

Jacobs (1991) defined interdisciplinary as “a knowledge view and curriculum approach that consciously applies methodology and language from more than one discipline to examine a
centrality, issue, problem, topic, or experience” (p. 8). She expanded on the definition to include the term “parallel discipline design” (p.15) explaining that teachers participating in her studies generally included the curriculum they were required to cover during the year, but adjusted their academic instruction calendar to synchronize with the other teachers involved. According to Jacobs (1991), interdisciplinary design needs to address the concerns of teachers that must cover mandated material and must better meet the needs of students by showing them the connectedness of academic subjects. Learning should become more related to the interests of the students. Ackerman (1989) asked “could an enlightened educator really be against aiming to help students achieve a coherent view of things” (p. 26)? Meier and Hovde (1996) described how some teams use a cyclic approach to interdisciplinary units which give students an opportunity to explore, apply, and expand on a concept or application that interested them. In their study, they noted that the willingness of teachers to let students pick their own topics increased engagement for many.

Planning Interdisciplinary Curriculum

Ackerman (1989) presented a set of guidelines to use when evaluating the nature and need for interdisciplinary curriculum. He suggested that there is “intellectual criteria” for considering interdisciplinary curriculum but also “practical criteria.” Imbedded in Ackerman’s criteria is Roberts and Kellough’s (2000) belief that the curriculum must fit within the expected scope and sequence of the mandated curriculum for the school system. Some teachers use the mandated curriculum to help design the interdisciplinary curriculum. Others design the interdisciplinary curriculum, and then find which mandated curriculum is covered by the unit. Ackerman’s criteria for intellectual consideration of interdisciplinary curriculum states that it
should be:

- Valid within the discipline. Concepts identified for inclusion “must not only be related to their subject but be important to them” (p. 27).

- Valid for the discipline. Some concepts or skills are covered in more than one subject. Inclusion of them in an interdisciplinary unit will expose the students to the same concept or skill in multiple contexts, reinforcing it for the student better than if only presented in one subject.

- Valid beyond the discipline. Though learning requires content and skills, it is also important for students to experience this beyond the identified curriculum.

- Contribution to broader outcomes. Students should become broader thinkers by participating in interdisciplinary units. They should be able to analyze multiple sources of information across disciplinary curriculum boundaries better than if they learned concepts in isolation. Developing their own ideas and opinions of concepts and methods for learning will provide frameworks for future learning. Teachers considering interdisciplinary units should consider broad outcomes for the students that are not included in their formal curriculum.

Educators who want to implement interdisciplinary instruction must be aware of Ackerman’s “practical criteria” (pp. 31-33) on at least some level (conscious or subconscious). His “nuts and bolts” criteria emphasized that educators must be aware of the time required for curriculum development and implementation. According to Ackerman (1989), time is needed to plan among teachers, adjust assessments, and teach students how to participate in interdisciplinary units. Budgets need to be available to pay for “extras” required in developing and implementing interdisciplinary curriculum. Teacher and student schedules need to be
considered in planning interdisciplinary curriculum. Teachers need time to plan among themselves and to schedule blocks of time to implement the interdisciplinary curriculum. “Political support” criteria need to be considered because interdisciplinary units often are not included in traditional curriculum. Support from the local or district administration can make or break teachers’ efforts at doing something outside the normal box of academic curriculum. Lastly, Ackerman specifies that teachers must consider their “personal concerns.” Committing to interdisciplinary curriculum with other teachers requires a personal commitment and as with any commitment includes issues that need to be recognized. Will the other teachers embrace the ideas or ridicule them? Is the teacher ready to deal with failure or success? What is the teacher’s comfort level with being exposed to other academic subjects? (pp. 26-33).

Planning interdisciplinary curriculum among a team of middle grades teachers can be random or structured. Though no studies compared the benefits of random versus structured planning, middle school educators suggest that teachers increase their chances of success when they structure their planning of interdisciplinary units because it helps them stay organized and directed as they implement their plans. An interdisciplinary team of middle school teachers might follow Jacobs’ (1989, p. 54 – 63) step-by-step approach for planning interdisciplinary units as follows:

Step 1 – Selecting an organizing center. An organizing center is a focus point for curriculum development. It can be a “theme, subject area, event, issue, or problem” (p. 54). Interests of the teachers and students need to be included when selecting an organizing center so they are captured and maintained. The focus cannot be too broad or narrow; a median needs to be identified to give enough flexibility for students to explore their particular interests but not
become overwhelmed. Burton (2001) added that the inquiry process is essential in interdisciplinary curriculum so that students make connections to the subject and embrace their learning. This is an essential element in middle school for making learning relevant (NMSA, 2003).

Step 2 – Brainstorming associations. Jacobs suggested that teachers examine ideas for exploring the theme identified in step 1 by brainstorming activities for possible inclusion in the curriculum. She added that using graphic organizers to keep track of the many ideas will facilitate brainstorming sessions. Burton (2001) emphasized that teachers must accept that all disciplines are not equally taught in all interdisciplinary curriculums. Some subjects will be emphasized more than others so should be considered when the interdisciplinary team plans the scope and sequence.

Step 3 – Establishing guiding questions to serve as a scope and sequence. To increase success, the team of interdisciplinary teachers needs to establish a set of guiding questions to assist the students as they engaged in the interdisciplinary unit activities. The questions will focus the students and reduce the amount of off-task behaviors and drift in their research. An important element in developing the questions is knowing the students (Arnold, 1997). Considering the students’ different needs, abilities, and interests will increase engagement, ownership, and subsequent success.

Step 4 – Writing activities for implementation. Teachers and students must develop a plan with specific benchmarks, dates, and timelines and write them down. Having a written plan keeps students and teachers on track. Jacobs (1989)
recommends categorizing activities identified in the step 3 brainstorming session into charts correlated to Bloom’s taxonomy or a problem solving matrix (p. 60) to assure that there is a balance of higher order thinking skills and problem solving.

In addition to the procedures above, Heidi Hayes Jacobs (1991) offered many practical recommendations that stem from her research on interdisciplinary curriculum. Jacobs noted that implementing interdisciplinary curriculum is hard and teachers must be aware of what they are attempting. Two obstacles that she noted that particularly impact the implementation of interdisciplinary curriculum were the structures of the schools and the personal barriers that teachers brought into the effort. Schools are often organized by subject areas so that teachers have their particular subject and time block for teaching. Teachers consider themselves experts in their subject and are a part of an organizational culture where their subject is the most important and there are things that the students must know before leaving their class. But the biggest problem when teachers attempt interdisciplinary curriculum, according to Jacobs (1991), is trying to do too much, too fast; more than they would normally do in the established time frame. Teachers need to accept that change will take time, and that there can be a balance between their content area and interdisciplinary curriculum. Frustration from trying to do too much too fast will keep teachers from continuing their well intended efforts.

*Experiencing Interdisciplinary Curriculum*

There were many articles that described how to plan and conduct interdisciplinary curriculum units but few empirical studies documented their successes or failures. This may be because of the complexity of investigating interdisciplinary curriculum, or because there are so many factors that contribute to success, such as issues involving teachers, school, content,
students, time of year, and high stakes testing. Ellis and Fouts (2001) noted that “experimental research on interdisciplinary curriculum is very difficult to conduct and, therefore, rather rare” (p. 26). Highlights of the few studies found are summarized in this section.

In a study of seventh to twelfth grade teachers that practiced interdisciplinary curriculum in Canada, Harvey and Reid (2001) found that teachers who shared similar philosophical perspectives had an improved chance for success with respect to implementing interdisciplinary curriculum. When the philosophical differences of the teachers were taken into account along with the logistical barriers that must be overcome, the researchers found teacher success was based on the following elements: having a shared understanding, using a model based on student interest, having a team with energy and persistence, getting commitment and involvement of everyone, focusing on what is manageable, and taking small steps while making steady progress (Harvey & Reid, 2001, p. 609).

Meister and Nolan (2001) conducted a study to examine how a five member interdisciplinary team of ninth grade teachers conducted interdisciplinary units. They collected information on the teachers’ backgrounds through formal interviews and informal discussions, analyzed documents, collected artifacts, and observed the team teachers in action. They also investigated the decision-making process used by the teachers for designing the interdisciplinary curriculum. The purpose of their study was to determine how the interdisciplinary team of teachers planned and executed the interdisciplinary curriculum mandated by their administration. In contrast to the study of Meister and Nolan (2001) the team in this study was voluntarily participating with interdisciplinary curriculum; consequently, there should be differences in teacher motivations were expected. However, their conclusions were similar to the researcher’s
premise going into this study. Meister and Nolan concluded that “change is complicated because
beliefs, lifestyles, and behavior come into conflict” (2001, p. 608).

Gordon Vars (1996) made the claim after looking at more than 100 studies, that students
in interdisciplinary curriculum programs “do as well as, and often better than students in so-
called conventional programs” (p. 26). Ellis and Fouts (2001) questioned Vars’ conclusion,
saying that his review of the research was only a summary of the findings, not a review in terms
of research and design for validity. Ellis and Fouts noted that Vars does “warn against raising
unrealistic expectations in the minds of teachers, students, and parents” (p. 26). All of these
researchers seem to be asking how teachers know if their students will be better off by
experiencing interdisciplinary curriculum.

The coverage of required curriculum mandated by the school system or the state
department of education was also a theme found throughout many research studies (Bailey,
2003; Gordon & Reece, 1997; Moore, 1994; Rudowitz, 2003). This is not surprising since
teachers are being held more accountable for what they teach and increasingly monitored using
the testing being implemented by No Child Left Behind (NMSA, 2003).

*Implementing Interdisciplinary Teaming and Curriculum*

Interdisciplinary teaming for the purpose of planning and implementing interdisciplinary
curriculum units requires increased planning times and is an integral part of the middle school
structure (Alexander & George, 1981). The extra time granted to teachers for planning,
compared to elementary and high school, is essential for enabling middle school teachers to plan
interdisciplinary units across curriculum areas. Changes in schedules to accommodate
interdisciplinary units often require additional planning by teachers to provide time for each
subject to be adequately covered and factor in the ability and speed of the students to carry out
the interdisciplinary units (Hinckly, 1992). As schools get larger, this becomes increasingly difficult as students are typically cross connected with other programs in the school, such as special education, English as a second language, and gifted classes. Team planning often becomes a time for discussing issues of student behavior, social development, academic progress or a time to take care of housekeeping duties (Rottier, 2000). Parent meetings are often scheduled during planning times, even though Hinckly (1992) thinks that parent meetings should not be needed more than two or three times per month. Balancing team planning time between meeting with parents and discussing curriculum is important because it has been shown that effective teams generally do not have as many behavioral issues because of the nature and effectiveness of interdisciplinary units (Jackson & Davis, 2000).

Early in the middle school movement, George (1982) identified four “operational phases” needed within an interdisciplinary team to increase its chances for success. The first phase is the “organization phase” where the teams are initially placed together. Teams are organized and identified as interdisciplinary teams. The second phase is the “community phase” where the team identity is established and promoted among the team members and students. As the sense of community is established, teachers bond with each other and with their students, the students to the teachers, and students to students. The third phase is the “team teaching phase.” When teachers reach this phase, interdisciplinary units designed to teach content and meet the needs of the middle school learner are developed. According to Palmer (1995), this phase is not reached very often in middle schools of the United States. The difficulty does not seem to be “the result of ill-will or lack of effort, but rather a lack of understanding of the wholeness of the process” (p. 56). The fourth phase is the “governmental phase” when teachers and students jointly practice
participatory decision-making. For most teachers, sharing power and authority for developing curriculum and instruction decisions with students is very difficult.

George (1982) emphasized that the governmental phase is difficult to achieve with most teachers, as it requires them to give up some of their control and authority in the classroom. Students need to be trusted to take responsibility for their education and act responsibly. Research suggests that letting students have a role in developing interdisciplinary curriculum empowers and engages them in their learning (Jackson & Davis, 2000; Pate, Homestead, & McGinnis, 1997). There are many success stories in the literature for working with middle school students but not much about teacher failures. Though many articles offer guidelines for implementing interdisciplinary teams, Manning and Saddlemire (2000) identified ways to improve the chances of success for interdisciplinary teams, teachers, and administrators working together by doing the following:

1. Create a committee of concerned teachers to emphasize collaboration and ownership.
2. Teachers should seek administration support. Administrators need to give teachers encouragement and praise from the school level and the district level.
3. Everyone should engage in professional development to understand his or her roles and responsibilities. Many administrators and teachers never receive training in interdisciplinary teaming, collaborative planning, or team problem solving.
4. Implementing must involve all types of educators. Include as many teachers and administrators as possible so everyone knows expectations and roles.
5. Administration should expect resistance and plan experiences that lessen teacher concerns. Some teachers fear change, not the idea of interdisciplinary units.
6. The team should select an enthusiastic team leader. Choose someone who has
training and is respected by his or her peers (on and off the team).

7. The interdisciplinary team must develop an agenda for each team meeting and maintain a record of accomplishments.

8. Administrators and teachers must learn effective communication skills.

9. Administrators should develop, in collaboration with the teachers, an evaluation system that addresses individual and team performance.

10. Everyone needs to celebrate both large and small successes.

Another issue with respect to implementing interdisciplinary teams and curriculum that needs to be addressed is that of departmentalization. When asked what they teach, most teachers respond by saying what “subject” they teach. In the departmentalization of schools and respective teacher education programs, teachers consider themselves math, science, social studies, or language arts teachers. Curriculum needs to be coherent and real to students, requiring teachers to determine what pedagogy is best for connecting it to the student’s needs (Pate et al., 1995). Interdisciplinary team teachers that practice supradisciplinary curriculum (Brady, 1995) think beyond the traditional goals of teaching students information to the concept that everything is connected. Brady (1995) described a supradisciplinary curriculum as one that actively includes who, what, where, when, and why of learning so the students understand all aspects of the academics such that learning becomes a reality for them. Changing the way teachers think about how they develop and present curriculum will change instructional approaches and student learning. Interdisciplinary teaming requires teachers to think beyond their academic subject to find ways for students to understand the what, when, who, where, and why of curriculum with its subsequent student engagement and understanding.
There are several traits common to teachers of successful interdisciplinary teams but the most important seem to be communication, relationships, and patience. Pate et al. (1995) emphasized that communication must flow freely between teachers, students, parents, and administrators. Team members must develop relationships to honestly recognize strengths and weaknesses of each other, students, parents, administrators, and the community. Teachers must also be dedicated to doing what is best for the students and realize that it will take several years to feel comfortable working with each other and planning interdisciplinary curriculum. Once they develop relationships, the development and implementation of interdisciplinary curriculum becomes much easier. Strahan et al. (1997) pointed out that teams that develop relationships with each other and their students can better work with students on interpersonal skills. Teachers should not be expected to embrace and implement interdisciplinary curriculum overnight. Murata (2002) recommended that teachers adopt a three-step approach to interdisciplinary teaching. First, team members must make a commitment to collaboration toward curriculum integration. They should strive for some curriculum integration the first year of the team effort. For teachers to want to participate in interdisciplinary units in the first place, there must be high curricular content (Strahan et al., 1997), especially in today’s educational climate of content standards and high stakes testing. Once a yearlong program is implemented, the team should develop an articulated multiyear program that maintains coherence and continuity (Cross, 1995; Kneip & Martin-Kneip, 1995).

The idea of interdisciplinary teams “negotiating curriculum” (Palmer, 1995) is critical to this study. Palmer addressed the issue, saying that teachers who had done things their way for years, must be willing to give and take as in negotiating business contracts when placed on an interdisciplinary team. In negotiations, all parties do not necessarily get what they hoped for, nor
do they want to give up their prized processions. Teachers come to interdisciplinary teams with years of experience doing things their way or with favorite units at certain times of the year. When the interdisciplinary team starts to plan the themes and calendars, teachers need to shift, change, or drop certain activities and schedules they previously held important, or did year after year. Palmer (1995) stressed that negotiating requires give and take between the team of teachers, which is easier once they communicate and develop the relationships stressed above. In Palmer’s work, a common goal of doing what is best for the students became the motivator for developing the interdisciplinary effort, rather than personal interests.

Summary of Research on Interdisciplinary Teaming and Curriculum in Middle Schools

There are many underlying themes that emerged across research literature concerning interdisciplinary teaming and instruction (Jackson & Davis, 2000; Murata, 2002). When interdisciplinary teams perform as the literature said they should, everyone is a winner. Team teachers in Murata’s 2002 study found that when they focused on curriculum, they did not concern themselves with the theories of team teaching, but rather considered how they would organize their curriculum into a long-term effort. Jackson and Davis (2000) emphasized that when students participate in engaging curriculum, their behaviors improve. Furthermore, Cross (1995) added that when students see the relevancy of the curriculum and how they might benefit from participating, they became involved in their own learning; when interdisciplinary curriculum is coherent, it is successful. The coherency must be apparent to students, not just the teachers. Kneip and Martin-Kneip (1995) stated that when interdisciplinary curriculum is systematic and interconnected to include multiple views, students feel involved in their communities and the world. The interdisciplinary curriculum that is the focus of this study centered around the notion of environmental service-learning. The environmental service-
learning unit involved students in real community issues (Cogswell, 2001) and is reviewed in the next section.

Environmental Service-learning

Environmental service-learning is a composite term which integrates environmental education and service-learning. This section of the literature review examines environmental education, service-learning, and environmental service-learning. Significant research surrounding each topic is discussed, along with issues of implementation in middle schools.

Environmental Education

This section begins with an overview of the background and foundations of environmental education. What experts say about environmental education in the broad sense is highlighted. These introductory paragraphs are intended to describe the baseline from which environmental education researchers seem to be focusing their efforts.

Saul (2000) proposed that teachers expand their use of environmental education methods by first understanding misconceptions held by people involved in the field. Teachers of environmental education must be conscious of how people perceive the world based on their cultural contexts. In order to understand the cultural context of experience, teachers must first be knowledgeable of the constructivist premise that the learner actively constructs knowledge (Klein & Merritt, 1994). Learning is an adaptive process that develops as one has new experiences. According to Klein and Merrit (1994), environmental education models must include critical thinking skills where students synthesize their experience within their own cultural context. These authors noted that environmental education is different than traditional learning methods which sought to have students position themselves with respect to one side of an issue with environmental education; the emphasis is on developing an understanding of the
many facets of an issue or problem. For example, studying possible environmental impacts of a proposed construction project requires that students understand the physical, biological, and the social-economic aspects of the issue. They need to understand both the immediate and long-term social, economic, and environmental issues resulting from such a project.

Saul (2000), Dennis & Knapp (1997), and Sanger (1997) emphasized the common theme that environmental education needs to be relevant and realistic for students. Most educational theory and curriculum courses tell pre-service and in-service teachers to make learning “real.” After reading these perspectives and reflecting on my own teaching methods, I wonder why we still need to be told this simple, well known, and accepted theory of practice. What inertia continues to influence our teaching methods to not practice this idea in teaching?

Defining Environmental Education

A wide range of definitions can be applied to making sense of the concept of environmental education. Three definitions were particularly useful for defining the different purposes that teachers hold for practicing environmental education. Pooley & O’Conner (2000, p. 711) stated that the “focus of environmental education programs has been to change environmental behavior through increasing environmental knowledge.” A second definition summarized in a report to the United States Congress from the National Environmental Education Advisory Council in 1996 by Michael Sanera of the Earth Education Research Institute (1998) stated that environmental education consists of:

\[ \text{A learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address these challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action (p.14).} \]
A third definition was found in the National Environmental Education Advisory Council’s 1977 report to the International Conference on Environmental Education (UNESCO, 1977):

> Environmental education, properly understood, should constitute a comprehensive lifelong education, one responsive to changes in a rapidly changing world. It should prepare the individual for life though an understanding of the major problems of the contemporary world, and the provision of skills needed to play a productive role towards improving life and protecting the environment with due regard given to ethical values (p. 24).

Environmental education means different things to different people, as described above. The following section reviews the literature where the pedagogy was attempted in middle, elementary, and high school levels. The multi-level literature review provides a perspective for use when interpreting the differing reasons for wanting to conduct environmental service-learning provided by the teachers in this study.

*Environmental Education in Middle Schools*

Most of the literature with respect to environmental education in middle schools reviewed cases of specific environmental education programs that typically were stand-alone units, not integrated into the school’s curriculum (May, 2000; Van Matre, 1990). These studies focused on isolated experiences or informal locales, such as nature centers. Some writers reviewed environmental education efforts and expounded as to why they thought environmental education was a good idea that did not seem to be working with children. Steven Van Matre (1990), a researcher associated with the Institute for Earth Education, headquartered in Cedar Cove, West Virginia explained in his book *Earth Education … A New Beginning*, that “the term environmental education has been so misused and abused that we have given up on it and that
someday the field will sort itself out and become merely an umbrella for outdoors interests” (p. 55). Though written fourteen years ago, it seems that his words are still appropriate in 2006. One of Van Matre’s recurring themes in the book was that environmental education is a process, not content learning. He found that most teachers that think they are engaging in environmental education are usually just conducting what amounts to as outdoor activities. He noted that outdoor activities usually do not change how children view the world and its future protection. According to Van Matre (1990), teachers mistakenly frame the idea of environmental education as having fun with their students outdoors.

Van Matre (1990) recognized the limits of schools in terms of implementing environmental education. He pointed out that the common practice of teaching different academic subjects by various teachers is not how the world really operates. Accepting this reality, he agreed with Dewey that environmental education was best taught in the science curriculum (Dewey, 1980). He feared that too many teachers teach environmental education with worksheets, contrary to the premise that everyone is a part of the world’s environment and everything is interconnected and dependent. Van Matre (1990) emphasized that teachers should view environmental education as a process for developing students’ belief that they are a part of the environment.

Improving environmental knowledge and attitudes in children is an important purpose of environmental education efforts. In order to see if students were improving their knowledge and skills concerning the environment, Leeming, Porter, Dwyer, Cobern, and Oliver (1997) developed a study to measure changes in attitudes and knowledge. This study was designed to measure pre and post levels of environmental knowledge and attitudes of children in Tennessee, before and after environmental education curriculum implementation in schools. The survey
instrument used to measure learning of environmental practices was the Children’s Environmental Attitude and Knowledge Scale (CHEAKS). Parents of participating children and the control group were also surveyed to assess if the children’s learning of environmental knowledge and attitudes was carried into their homes. The results of the study showed that while students’ attitudes about the environment improved and many began to practice environmentalism at home to a small degree (e.g., recycling), science knowledge associated with the curriculum and action (e.g., outreach to others concerning environmental issues and actions) did not improve significantly.

Norris and Jacobson (1997) conducted a meta-analysis of existing research to justify approaches used in environmental education designed to achieve conservation goals. The objectives of the study were to identify factors that correlated with program success. They found that environmental education programs used formative, summative, and long-term evaluations to ascertain program success. The study indicated that the success of environmental education programs in helping achieve conservation goals were low. Less than half of the evaluated programs achieved their goals with respect to conservation. Norris and Jacobson (1997) state that most of the reports they reviewed on program effectiveness did not contain enough detailed information on how the programs were evaluated.

In order to evaluate what interventions might improve environmental behaviors, Zelenzny (1999), a physiologist, conducted a meta-analysis that compared the effect of educational interventions on pro-environmental behaviors. She defined these interventions as planned strategies that provided information or training to achieve predicted environmental outcomes. She found that the majority of educational intervention strategies did not improve student learning with respect to environmental knowledge and practice.
Samuel (1993) used a case study approach to specifically identify impediments to implementing environmental education in a single school in Ontario, Canada that was identified as an “environmental immersion school.” Even though the school had a mission of implementing environmental education and the teachers agreed to participate in the program when they were hired, success was limited. Samuel (1993) identified four primary issues that hampered the implementation of an interdisciplinary environmental education curriculum:

1. Conceptual problems with environmental education,
2. Poorly defined school philosophy and goals,
3. Difficulties in coordinating the project between individuals and departments,
4. A hiatus between administration and teacher perceptions.

Samuel (1993) noted that there was disagreement within the school about the primary reason for the environmental education program’s failure. Some individuals claimed that teachers did not understand the concepts of environmentalism and pedagogy and, therefore, could not effectively plan or assess the program. Administrators claimed that teachers were aware of well-publicized environmental issues but did not understand the importance of an environmental education discipline that focused on human-environment relationships. Specifically, Samuel (1993) stated that the human-environmental relationships that need to be included in environmental education programs are cultural, political, ethical, philosophical, and aesthetic interpretations that demand a problem-solving, inquiring, and action-oriented approach. In this study, administrators were convinced that the negative attitudes of teachers were the problem; conversely, the teacher director of the program believed that the lack of direction and leadership within the school was the problem.
In order to highlight the similarities and differences between environmental education, service-learning, and environmental service-learning the following section reviewed literature concerning each field. In reviewing the literature related to environmental service-learning, environmental education, and service-learning, many similarities were noted that will be discussed later in the environmental service-learning section.

**Service-learning**

*Defining Service-learning*

Burns (1998) described service-learning as an instructional model in which students learn and develop through active participation in thoughtfully organized service experiences that meet actual community needs. In this sense, it can be thought of as an educational philosophy. According to Burns (1998), it works best when conducted in an interdisciplinary model of instruction to facilitate the building of student knowledge and skills. The most crucial component of service-learning is that it is based on community collaboration to meet real needs within the community. In the context of service-learning, teachers, administrators, parents, and business leaders work to help students understand and accept civic and social responsibility (Burns, 1998). Service-learning is also described as a method “under which students learn and develop through active participation in thoughtfully organized service experiences that meet actual community needs and that are coordinated in collaboration with the school and community” (Meyers, 1999). The National and Community Service Act of 1990, as amended through P.L. 106-170, approved December 17, 1999, defines “service-learning” as a method:

A. under which students or participants learn and develop through active participation in thoughtful organized service that

(i) is conducted in and meet the needs of the community;
(ii) is coordinated with an elementary school, secondary school, institution of higher learning, or community service program, and with the community; and

(iii) helps foster civic responsibility; and

B. that

(i) is integrated into and enhances the academic curriculum of the students, or the educational components of the community service program in which the participants are enrolled; and

(ii) provides structured time for the students or participants to reflect on the service experience (National and Community Service Act of 1990, p.5).

Toole & Toole (1992) found that while many teachers believed that what they were doing was service-learning, in reality, they were practicing community service. Most teachers have experience with community service initiatives and project this experience to their students. In Toole & Toole’s study (1992), teachers believed to be conducting service-learning were really community service because it did not include an academic learning component or reflection on what was learned. Service-learning must include a reflective component so that students use their higher order thinking skills to process and make sense of the experience. The reflective process connects the service with the learning. An excellent comparison of Volunteerism, community service, and service-learning is provided by Pate (2001a) who stated:

- Volunteerism is the engagement of students in activities where some service or good is performed;

- Community service is the engagement of students in activities where some service or good is performed and where students learn how their service makes a difference in the lives of the service recipients;
• Service-learning is the engagement of students in activities designed to address or meet a community need, where students learn how their service makes a difference in themselves and in the lives of the service recipients, and where learning is intentionally linked to academics (Pate, 2001b).

Service-learning in Middle Schools

The Corporation for National Service administers funds issued under the National and Community Service Act of 1993 and is tasked to evaluate the effectiveness of service-learning. A product of the Corporation for National Service effectiveness report on service-learning in the United States was issued as *The National Evaluation of Learn and Serve America School and Community Based Programs interim report of 1997* (Corporation for National Service, 1997). The report concluded that with respect to service-learning (p. 8):

1. Academic impacts are strong. Students were more engaged, had higher grade averages, and had higher educational goals.

2. Measures of civic participation were high. Students were more active personally and socially with local issues.

3. Service-learning encouraged more participation, not less. Students became more involved after service-learning courses.

4. Participants gained psychological maturity. Gains in maturity were noted but not in personal or social development or communications skills.

5. Positive impacts are across the board. The students’ gender, race, ethnicity, socio-economic level, or education level did not matter.

The educational needs of early adolescents are different than elementary and high school students (Jackson & Davis, 2000; National Middle School Association, 2003). Elementary
children are still anxious to learn and want to please their teachers. Most high school students become focused on their future and see school as a step to help them; thus many are motivated to do well. Early adolescents in middle grades fit neither category. They are focused on themselves. Middle school students are trying to define themselves and figure out how they fit into their peer groups. Boston (1997) pointed out that instructional methods such as service-learning, which are cognizant of this issue, have a higher likelihood for success.

Meyers (1999) said that when service-learning is integrated into the curriculum, it provides students with opportunities to use new skills and knowledge in real-life situations, thus enhancing learning by extending the experience out of the classroom and into the community. Other educators have supported the concept of service-learning because of its constructivist nature. Berv (1998) suggested that service-learning supports constructivist forms of learning, as students construct their knowledge and understanding more thoroughly through experiential learning models. Dewey’s (1980) ideas of student learning from almost 100 years ago reflect a constructivist stance toward learning that can be seen when service-learning models are properly implemented. Duckenfield and Wright (2001) emphasized that academic content, as well as social and moral curriculum, is learned when students are provided a more inclusive and meaningful educational experience.

Boston (1997) noted that early adolescents are often difficult to motivate. Their priorities are not always focused on school or academic achievement. Boston (1997) found that students who participated in service-learning were more engaged in school, had a higher-grade average, and had higher aspirations for college. Boston (1997) also observed that service-learning students were more personally and socially responsible citizens than those that had never participated in service-learning. This is often a difficult extension for students in early
adolescence ages. While according to Boston (1997), middle school students in his study were characteristically self-centered, there was also a ‘soft spot’ in most, of caring and wanting to help others. Meyers noted that service-learning can bring out the caring side of students and give them a chance to shine. In the process, they will grow and mature into people that they might not become otherwise (1999).

As teachers learn about service-learning in staff development courses or professional publications, its popularity is spreading throughout the country. However, many teachers do not implement true service-learning. Programs or activities often become community service because teachers do not make explicit connections between service and learning (Toole & Toole, 1992). Teachers have stories of community service from their own experiences and have the knowledge for helping students learn. However, according to Billig (2000) they lack the ability to blend the service component with the learning component. In addition to understanding service-learning, integrating it into the curriculum requires teachers that are committed to the success of the program.

The purposes of service-learning range from improving student learning and test scores, to using it as a means for transforming public opinion. Westheimer, Kahne, and Gerstein (1992) proclaim that experiential learning opportunities play a significant role in: (a) unifying a highly fragmented curriculum, (b) revitalizing pedagogy, and (c) better serving at-risk student populations. They promote the idea that schools and teachers should use a service-learning model to revitalize teachers, and subsequently schools.

Burns (1998) suggested that service-learning works best when conducted as an interdisciplinary model of instruction which facilitates the development of students’ knowledge and skills in the process. Burns stressed that the most crucial component of service-learning is
that it be based on real needs of the community. Another important component is community collaboration to assure that the work meets an authentic community need where teachers, administrators, parents, and business leaders’ work together to help students understand and accept civic and social responsibility. Meyers (1999) explained that when service-learning is integrated into the curriculum, it provides students with opportunities to use new skills and knowledge in real-life situations, thus enhancing student learning by extending the experience out of the classroom and into the community. According to Meyers (1999), academic content, as well as social and moral curriculum, is learned when students are provided with a more inclusive and meaningful educational experience.

Service-learning is becoming an accepted tool for improving learning for at-risk students as well. The engaging nature of the model makes learning available to students of all ability levels, backgrounds, and interests. Meyers (1999) found that for at-risk students in California alternative schools, service-learning was a more appropriate model of engaging students in subjects ranging from basic literacy and math to biology. A repeated theme that continues to surface in Meyers’ work, as in others, is that service-learning must be planned and conducted in a deliberate and thoughtful manner that engages the students and provides for reflective time for learning to become a more permanent part of the students’ knowledge base.

Toole and Toole (1992) maintained that service-learning should not be implemented in a school without a thorough planning effort to assure that curriculum was fulfilled and could yield desired outcomes. The Student Service Alliance, established in 1988 by the Maryland Department of Education, advocated a cycle that includes preparation, action, and reflection. The Kentucky Learn and Serve Project emphasized that preparation, meaningful service, structured reflection, and recognition/celebration are central parts of the service-learning experience. These
guidelines are becoming common across the United States and are in place to better assure that student service meets mandated curriculum rather than simply fulfilling a graduation requirement. Schools, though they require community service, do not always make sure there is a connection with the curriculum. Since teachers must keep parents, administrators, members of the community, and school administrators involved, they often revert to the easier service model where action is taken in the community but there is no curriculum connection or student reflection on what was learned (Chapin, 1998).

In an effort to evaluate the effectiveness of service-learning, Chapin (1998) used the National Longitudinal Study of 1998 to sample 88 seniors (out of 24,600 eight graders sampled in 1992) that participated in service-learning in eighth grade, for their continued involvement in any type of service to their communities. She surveyed the seniors to find how many had conducted any type of service projects (e.g., church groups, social action groups, service clubs, or coaching little league) since their lessons on service-learning in eighth grade. Forty-four percent responded that they had participated in some service group or initiative, a number much higher than expected. Among those that participated in service-learning, young women were more involved than the men. Seventeen percent of the forty four percent who participated, said that their schools required a service project of any kind. Besides gender differences, Chapin also looked at ethnic differences. Black women participated more in political groups, Hispanic men more in church groups, Asian women more in hospital groups, and Caucasian women participated more in environmental movements. Chapin’s conclusion was that involvement in structured service experiences in school increased the likelihood of continued community involvement over the years as compared to involvement in one-time community service projects.
(Chapin, 1998). Participation in service-learning projects fostered the understanding and beliefs needed to permanently embed attributes of active citizenry.

Environmental Service-learning

Defining Environmental Service-learning

Environmental service-learning combines environmental education and service-learning, using an environmental theme or issue as the focus for student involvement. The roots of environmental service-learning can be traced to John Dewey, though he did not specifically call it by this name. There are some researchers who see John Dewey as an environmental educator (Dennis & Knapp, 1997). The National Center for Educational Statistics says that Dewey was “an advocate of service-learning, believed that students would learn more effectively and become better citizens if they engaged in service to the community and had this service incorporated into their academic curriculum” (NCES, 1999, p. 2). Dennis and Knapp (1997), applying Dewey’s essay of 1916, noted that Dewey predicted the urbanization of America would bring with it environmental problems and that teachers would be responsible for educating the masses for developing solutions. In my experience since the mid 1970’s as an environmental researcher, resource manager, and now as an educator, I have seen little progress in schools toward dealing with this issue. Maybe, as a global society, we need to consider more fully Dewey’s other belief that individual interests have to be curtailed in favor of the common good (Dennis & Knapp, 1997). This would require people worldwide to be more sacrificial for the common good of the earth, a concept that I do not see becoming a reality any time soon. Realizing that this would not likely happen, Dewey (Dennis & Knapp, 1997) identified the science curriculum as the most logical place for environmental education. This seems to be where it is most commonly implemented today, although environmental education is not just a
science theme; it needs to be an interdisciplinary or integrated thematic instruction that transcends all curriculum areas. Though Dewey wrote that service-learning should be integrated with the curriculum, it was not until the 1970’s that this was the case in some schools (NCES, 1999).

Combining environmental education and service-learning as environmental service-learning is a natural fit. Both require real issues with solutions that engage students in learning and outreach to their communities. Students must be involved in identifying the community needs and deciding what actions to pursue. In order to provide a structure for environmental service-learning, Pate (2001a, p.2) provides a nine-step process that involves students at every step;

1. Identify a real need within the community,
2. Know what curriculum will be addressed and learned,
3. Identify what students will be involved and their roles,
4. Involve community partners through collaborative arrangements,
5. Plan the project thoroughly before beginning so that everyone knows what is expected,
6. Perform the service and learning experience,
7. All participants need to reflect on the service to process the learning connections,
8. Evaluate student participation and learning from the project,
9. Publicize the project and celebrate the experience.

Environmental Service-learning in Middle Schools

Research studies regarding environmental service-learning in middle schools are few and far between. There are studies reporting results of environmental education and service-learning
programs and practitioners promoting their use. Many publications promote using environmental education only or service-learning models separately, but not combined as environmental service-learning. This might be because environmental education and service-learning as stand-alone methods have been practiced much longer than environmental service-learning. I also speculate that many practitioners and researchers do not want to report on environmental education, service-learning, or environmental service-learning efforts that do not produce expected results. There is a ‘pride factor’ that is difficult to overcome. Literature in support of environmental education and service-learning models conclude that both are effective methods of teaching to meet the social, emotional, and academic learning needs of the middle school learner.

A very successful program of environmental service-learning was carried out by Mark Springer (1994), although he did not refer to it in these terms. He called his program “Watershed” and its underlying theory revolved around developing a sense of place in students. To engage students in a meaningful topic, he involved a heterogeneous group of seventh graders in an integrated curriculum that studied a local watershed. School administrators granted the Watershed program exception from traditional teaching methods and supported its use of an integrated approach everyday for the entire school year. Math, science, social studies, and language arts classes were conducted together, with required curriculum for each covered throughout the year. While Springer’s students were not graded during the school year, he documented how the nature of the curriculum engaged the students and learning became intrinsic. Springer set up the Watershed program to strive for an educational setting where early adolescent students were not in competition with each other for grades, a situation which commonly occurs among students in a classroom. Springer (1994) provided evidence to suggest
that the needs of middle school learners using environmental service-learning were met in the Watershed project and fostered the “students’ self-motivation, self-discipline, and self-esteem” (p. 169).

Cogswell (2001) conducted a study to examine the value of integrating environmental education and service-learning. For Cogswell, a key purpose of environmental education was to improve student attitudes and perception toward the environment. She used pre- and post-content testing, reflections, and interest inventories to measure whether student attitudes and perceptions changed after experiencing a combined environmental education and service-learning experience. Since she wanted to identify if service-learning was an appropriate approach to environmental education, she identified outcomes that she wanted to measure separately.

According to Cogswell (2001), the premise of service-learning was that students should have real issues to learn about and act upon. In order to establish a theme for the unit, Cogswell chose pollution in the Altamaha River and its effects on nature and people downstream. She surveyed students before teaching the unit to ascertain their beliefs and knowledge about pollution and the environment and administered the same survey after instruction to identify any areas of growth. Some of the concepts she asked the students to rank themselves on included team work, leadership, reflective teaching, community concerns, self awareness, environmental concerns, resourcefulness, and motivation (2001, p. 106). Cogswell (2001) concluded that service-learning pedagogy was an effective method for carrying out environmental education. Student attitudes and perceptions changed and they were engaged throughout the effort. Middle school students benefited from the holistic and integrated approach to presenting content and their sense of civic responsibility increased (Cogswell, 2001). This holistic and integrated approach can be practiced with an interdisciplinary team of middle grades teachers planning and
implementing environmental service-learning. The next section reviews the small sample of literature published regarding the combined practice of interdisciplinary teaming, curriculum, and environmental service-learning.

**Interdisciplinary Teaming, Curriculum, and Environmental Service-learning**

Environmental service-learning, interdisciplinary teaming, and curriculum pedagogies are a natural match for meeting the needs of the middle school learner. Environmental education, service-learning, environmental service-learning, integrated units, interdisciplinary teaming, and middle schools each seek to meet the needs of students in the early adolescent age group of ages 11 to 15. Looking at the history of the middle school movement, teaming was created to address the developmental and social needs of the early adolescent. The middle school model was developed to be a blend of the elementary and high school foci, but also included social and developmental needs of children. The use of interdisciplinary teams to meet these particular student needs has been described as a “signature practice” (Valentine et al., 1993) as it is not used at any other education level. Hackman et al. (2002) noted that interdisciplinary teaming “provides an organizational framework through which schools can design and deliver effective learning to every student” (p. 32).

The National Middle School Association’s *This we believe: Successful schools for young adolescents* promotes the idea that middle schools should engage students and teachers as active learning communities and should provide “curriculum that is relevant, challenging, integrative, and exploratory” and “multiple learning and teaching approaches that respond to their diversity” (NMSA, 2003). A requirement for environmental service-learning is that the curriculum should be linked across disciplines to make knowledge acquisition real for students. This important
NMSA document advocates interdisciplinary curriculum and recommends environmental service-learning as an excellent model in this regard.

According to James Beane (1993), interdisciplinary teams that use environmental service-learning meet the needs of the early adolescent middle school learner by being adaptive and being sensitive to development issues of the age group. Beane noted that middle school curriculum and interdisciplinary teams should:

1. focus on general education. Middle school teachers are not in a position to predict the paths of students at this age and they should not be tracked for future courses or careers; it is too early in their lives.

2. help early adolescents explore self and social meanings at this time of their lives.
   Middle schools should not be farm systems for high schools or careers. They should help early adolescents figure out what is going on around them in their lives.

3. respect the dignity of early adolescents. Adults should not characterize early adolescents as hormonal or going through a stage. Rather, teachers should listen to their students’ concerns about war, politics, and issues that they see in the world and facilitate their understandings.

4. be firmly grounded in democracy. Students should have a role in their education and become owners of their learning.

5. honor diversity. Students should be aware and respect diversity issues in learning styles, ethnicity, religious affiliations, and student interests.

6. be of great personal and social significance. Student of middle school age are
beginning to open up to the world around them and are forming impressions of right and wrong. Curriculum should have meaning to the students that excite them and help develop their social role in the world according to issues they confront.

7. be lifelike and lively. The learning should be relevant and integrated to take students from just learning material to living and understanding it. Curriculum should also be engaging, not just talking and memorizing.

8. enhance knowledge and skills for all young people. The knowledge and skills should be useful and appropriate for middle schoolers, not trivial or abstract (p. 17-21).

Irvin (1992) emphasized that environmental service-learning is sensitive to early adolescent developmental needs and social presence. It is an approach which helps students develop the basic knowledge and skills needed to form identities within their world and society. According to Irvin (1992), environmental service-learning curriculum is developmentally appropriate for early adolescents by including opportunities for working in groups (social needs), making connections to what is already known with new material, helping students feel better about themselves and heighten learner curiosities (intellectual and emotional needs), and providing opportunities to move about and change activities (physical needs)” (pp. 297-298).

Irvin (1992) argued that environmental service-learning was an excellent model for making learning real such that students could use information to form opinions and define their roles in society. Beane (1993, pp. 61-62) likewise concurred that “curriculum components that middle school teachers need to be emphasizing include reflective thinking, critical ethics, problem solving, valuing, self-concepting, social action skills, and searching for completeness and meaning rather than rote memorization of facts. The role of the middle school teacher becomes
one of a facilitator, helping the students develop their own realities within the school, community, and society in general.”

The role of multiple intelligences for meeting the needs of the early adolescent should not be overlooked in the critique of environmental service-learning. Students, ages 11 – 15, have a wide range of personalities, interests, and intelligences that environmental service-learning inherently provides. Gardner (1993) identified seven multiple intelligences of children as linguistic, musical, logical-mathematical, spatial, bodily, intrapersonal (relating to one’s self), interpersonal (relating to others), and naturalist. Environmental education provides for four additional intelligences that include environmental, emotional, intuitive, and spiritual (Caduto, 1998, p. 11). Middle school classrooms are a mixture of intelligences that teachers may find challenging to address in traditional curriculum settings. Gardner (1995) highlighted this point, emphasizing that “schools should cultivate those skills and capacities that are valued in the community and in the broader society. Some of these desired roles are likely to highlight specific intelligences” (p. 206). As many of the above educators suggest, environmental service-learning should provide multiple learning opportunities in diverse settings to assure that the early adolescent student have experiences learning through their strongest intelligence style.

*Environmental Service-learning in a Climate of Standards and Accountability*

An idea that repeatedly surfaced throughout the review of literature related to environmental education programs was the notion of “success.” In some cases, success with respect to environmental education was defined as an increase in student test scores for academic subjects (Wiggins & McTighe, 1998; Jackson & Davis, 2000); in other cases, it was defined by students’ perception as to whether they learned something important from a lesson (Dickerson & Erb, 1997; Walthier-Thomas, 1997). Other studies suggested that success was sometimes
measured by the subjective opinion of the teacher as to whether students met the desired environmental education goals (Van Matre, 1990; Leeming, et al., 1997; Springer, 2000; May, 2002,). A synthesis of these various perspectives concerning attributes of environmental success might include student understanding of mandated curriculum, the complex nature of environmental issues, and articulating a sense of place that may not have been experienced prior to the environmental education experience.

Environmental education, service-learning, and environmental service-learning have all been attributed, to some extent, to improving learning in middle school students. In studies conducted by Boss (1999) and Springer (1994) each pedagogy promoted justice and activism and a sense of place. Some researchers and practitioners claim that student engagement and learning of required curriculum improves when students participate in these activities. Likewise, some authors claim that student perceptions toward the environment and their communities are enhanced and they become more engaged citizens. It seems that everyone thinks environmental service-learning and its components are good for middle school age students when done correctly.

Throughout the perusal of environmental education, service-learning, and environmental service-learning literature quantifiable measures of ‘success,’ with respect to student learning received little attention. Grades and measures of academic achievement that teachers could use for reporting to parents and administrators were rarely mentioned. Springer’s study (2000), one of the few to “measure” success with respect to student learning, did not rely on grades as an assessment tool. Rather, he used lists and asked students to check tasks off as they completed them. There were no studies that examined what students learned using traditional normative grading. In today’s educational climate of standards, accountability, and testing, it is likely that
school systems and local school principals will find it difficult to approve environmental service-learning programs that do not include some measurement of student learning (Leeming et al., 1997; Klein & Merritt, 1994; Toole & Toole, 1992). Environmental service-learning will most likely only be accepted in middle schools if it includes quantifiable measures of student academic learning. Springer (1994) maintained that students do not need the pressures of grades to achieve; learning should and can be intrinsic. While this researcher agrees, in principle, teachers must still be accountable to a system that wants measured results. Therefore, planners of environmental service-learning must build in systems for measuring student learning.

Summary of the Review of Relevant Literature

Several issues and gaps in the research literature regarding environmental education have been identified and discussed to guide the researcher in the development of this study. In today’s political and educational climate, where students are required to demonstrate mastery of mandated curriculum through standardized testing, no studies clearly demonstrated that environmental education was successfully meeting this requirement. I can only speculate from my own experience and the writing of Gruenewald (2002) that perhaps this is why environmental education has not been widely used in classrooms. It seems that environmental education, in most cases, has been practiced as a side or enrichment activity to supplement science curriculum, but not as a primary organizer. Additional research needs to be conducted to explore the efficacy of using the environmental service-learning approach in teaching mandated curriculum.

The plethora of definitions surrounding environmental education was another concern that I continued to reflected on as I carried out this study. The ‘official’ definition, as published by National Environmental Education Advisory Council (NEEAC) in 1996 (Sanera, 1998), was holistic and stated that environmental education should increase people’s knowledge and
awareness of the environment, thus changing attitudes, motivations, and commitments. However, practitioners and researchers in the field of environmental education appear to have used a much narrower definition. Their definition often included one-time activities designed to supplement a science lesson, such as visiting a nature center, conducting an overnight camping trip, or participating in adventure experiences (Dennis & Knapp 1997; Sanger, 1997; Saul, 2000; Van Matre, 1990). While these activities may engage students, they do not meet the definition of environmental education as stated by the NEEAC.

Dovetailing with the issue of defining environmental education was the consideration of how educators measure student acquisition of knowledge with respect to environmental service-learning. There was research that described “successful” environmental education units, but it was apparent that different practitioners and researchers defined the learning that took place in various ways. Some environmental education units were considered successful in terms of student learning if children were engaged in the activities. Others were deemed successful if students had fun. Still others were deemed successful only if they led to students applying the environmental practice in their own lives after the conclusion of the unit.

May’s (2000) study was the one which most significantly influenced my thinking with respect to environmental service-learning. Her research identified many factors that influenced implementation of environmental education. She described how some teachers have a consistent ‘can do’ vision and an infectious passion for environmental education and teaching in general. According to May, teachers that invest themselves in their teaching do a better job of instilling the attitudes, motivations, and commitment toward work habits necessary to succeed in their students. Also, according to May, the more successful teachers practiced environmentally
responsible behaviors themselves, were risk takers, and made the effort to recharge themselves outside the classroom (p. 8).

No consistent thread of evidence in the literature supported a direct correlation between environmental education and improved student learning in any way. Studies indicated that students had fun or learned how to do something related to science, such as collect data, but there was little evidence to suggest that students developed new knowledge or awareness that they would carry throughout their lives to protect and preserve the environment. I was hoping to see evidence that environmental education impacts student learning and beliefs in ways that mirror my passion for the environment. It makes me wonder if the powerful impact of our society’s materialistic and consumer ways will ultimately dwarf the need to preserve our planet for its long-term survival. Also, through this literature review, I sensed an inertia in our schools where it may not matter if different methods of instruction are better than traditional methods. Without more empirical evidence, teachers, administrators, parents, and children will continue to shy away from interdisciplinary curriculum and continue to compartmentalize content areas as in the past. I hope that this study provides some useful insights regarding the efficacy of environmental service-learning that can serve as foundations for educating children in a socially responsible manner. It will be through the children, who grow up and become activists and decision makers, that our planet will have a chance.
CHAPTER 3
METHODOLOGY

This study used interpretive case study methodology to investigate the following question: “What does an interdisciplinary team of middle grades teachers believe regarding environmental service-learning and how did they plan, negotiate, implement, and evaluate student learning?” Critical autobiographies, interviews, reflective journals, transcriptions of team planning, Friday progress meetings, and focus group discussions were used to collect data that contributed to learning about each study sub-question and ultimately the overarching question.

This chapter described the context of the study, participants, study design, data sources (primary and secondary), and procedures for the data collection and analysis. Initial assertions were presented for each study sub-question and subsequently refined as supporting or refuting data interpreted in the cross-case analysis, Chapter 5. Constant comparative methods were used for encoding and developing themes subsequent within-case and cross-case interpretive analysis. Dual roles as researcher and participant were discussed, along with issues associated with the trustworthiness of the data.

Context of This Study

Rollander Middle School is located in a suburb of a large city in the southeast United States. The school had increased enrollment since 1997 from 1376 to approximately 2200 students in the 2004 – 2005 school year. At the time of this study, there were 26 sixth grade teachers, 30 seventh grade teachers, 28 eighth grade teachers, 14 special education teachers, 16 connections teachers, and eight ESOL teachers. Most team configurations at Rollander Middle
School consisted of four teachers, although there are a few with two or three members because of student numbers. Gifted students were pulled from interdisciplinary teams and placed in gifted academic subject classes (in seventh grade, gifted math, science, and language arts were offered). Special education students were pulled for their exceptionalities for language arts, math, and science instruction, as determined in their Individual Education Plan (IEP). Limited-English proficient (LEP) and Non-English proficient (LEP) went to an ESOL teacher for language arts (LEP and NEP) and social studies (NEP only).

The interdisciplinary team in this study consisted of four teachers, each specializing in a core academic subject (math, science, social studies, and language arts). The entire school used interdisciplinary teams of two, three, or four members. Most teams did not conduct team-wide interdisciplinary units, though many developed integrated units within their content area. This was the fifth year that the team of this study had worked together at Rollander Middle School.

Demographically, the student population had rapidly become more ethnically and socio-economically diverse (see Table 1). From the 1997-1998 to 2004-2005 school years, the Hispanic population had increased from 4% to 21% and the African American population from 12% to 36%. Caucasian student numbers had decreased from 79% to 33%. The percent of students receiving free and reduced lunch had risen from 22% to 54% of the school population.

High stakes testing issued by the school district and by the State’s Department of Education received much attention at the school. Seventh grade students had to pass a content competency test developed by the school system in order to be promoted to eighth grade; grades were not a factor in promotion. Students at all grade levels took the state’s criterion reference test in April, which was used by the State Department of Education for developing school reports
cards and monitoring Annual Yearly Progress per No Child Left Behind. The school principal wanted to increase test scores and recognized the benefits of interdisciplinary units for middle grade students (she noted directly to the teachers before the study began). In a pilot project conducted in the fall 2003, a unanimous decision among team teachers was that interdisciplinary units would still be used in spite of the pressures of ‘covering’ mandated curriculum. This study provides insights into what the interdisciplinary team believed regarding environmental service-learning and how they planned, negotiated, implemented, and evaluated student learning amidst the pressures for improving test scores.

### Table 1

**Rollander Middle School Demographics**

<table>
<thead>
<tr>
<th>Category</th>
<th>97-98</th>
<th>98-99</th>
<th>99-00</th>
<th>00-01</th>
<th>01-02</th>
<th>02-03</th>
<th>03-04</th>
<th>04-05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total enrollment</td>
<td>1376</td>
<td>1544</td>
<td>1637</td>
<td>1726</td>
<td>1905</td>
<td>2100</td>
<td>2200</td>
<td>2284</td>
</tr>
<tr>
<td>Free/reduced lunch (% total)</td>
<td>22%</td>
<td>26%</td>
<td>28%</td>
<td>35%</td>
<td>35%</td>
<td>44%</td>
<td>49%</td>
<td>54%</td>
</tr>
<tr>
<td>ESOL students (% total)</td>
<td>5%</td>
<td>5%</td>
<td>6%</td>
<td>8%</td>
<td>9%</td>
<td>11%</td>
<td>14%</td>
<td>17%</td>
</tr>
<tr>
<td>Mobility (% total)</td>
<td>24%</td>
<td>19%</td>
<td>19%</td>
<td>27%</td>
<td>26%</td>
<td>31%</td>
<td>32%</td>
<td>37%</td>
</tr>
<tr>
<td>White (% total)</td>
<td>79%</td>
<td>75%</td>
<td>67%</td>
<td>62%</td>
<td>53%</td>
<td>47%</td>
<td>41%</td>
<td>33%</td>
</tr>
<tr>
<td>African American (% total)</td>
<td>12%</td>
<td>13%</td>
<td>17%</td>
<td>20%</td>
<td>25%</td>
<td>28%</td>
<td>33%</td>
<td>36%</td>
</tr>
<tr>
<td>Hispanic (% total)</td>
<td>4%</td>
<td>6%</td>
<td>7%</td>
<td>10%</td>
<td>13%</td>
<td>16%</td>
<td>19%</td>
<td>21%</td>
</tr>
<tr>
<td>Other (% total)</td>
<td>5%</td>
<td>6%</td>
<td>9%</td>
<td>8%</td>
<td>9%</td>
<td>7%</td>
<td>6%</td>
<td>4%</td>
</tr>
</tbody>
</table>
The interdisciplinary team that served as the central focus for this study was one of the seven in the seventh grade. Science, math, and language arts classes on the team did not contain any gifted students, as all were pulled for separate service. All students on the team participated in Social Studies since none were pulled out for gifted, special education, or ESOL classes. In math, science, and language arts, some special education students were pulled out for some subjects, but not others. This was a concern during previous interdisciplinary units conducted by the team because the gifted students were present only for social studies and did not receive instruction from the other academic teachers. Likewise, special education and ESOL students often missed instruction given by team teachers when their special programs served them. Special education, gifted, and ESOL teachers did not participate in the interdisciplinary team structure.

In previous years, teachers had altered students’ schedules in order to conduct special interdisciplinary units. As the school had grown and interdisciplinary teams evolved to consist of primarily four academic teachers, there was less schedule alteration for interdisciplinary units. As the ESOL, special education, and gifted populations (all three) also increased, the school was further ‘locked’ into seven well defined periods that made special block scheduling of interdisciplinary teams difficult because so many students and other teachers were affected when any team altered students’ schedules.

Participants

Selection

The participants of this study were four teachers, all a part of an interdisciplinary team in grade seven. This team was selected as the focus of this study for the following reasons:
1. The researcher was a member of the team. As a member of the team who had worked in the school for seven years, he knew the organizational structure and workings of the school in ways not possible as an outsider. He had to remind himself of his dual role as insider and researcher throughout the study and believed that the benefits outweighed the risks, in terms of potential affects on the study.

2. As a team, they had done many interdisciplinary units over the five years of being together; thus studying how they planned, negotiated, implemented, and evaluated student learning was an extension of their on-going interests.

3. The team members were recognized hard workers. The team was chosen as Regional Team of the Year by the State Middle School Association for the 2002-2003 year. The team was nominated for the National Middle School Association’s Team of the Year in 2004. Thomas (science) had been certified by the National Board of Professional Teacher Standards (NBPTS) in Early Adolescent Science since 2000; the social studies teammate (Margaret) was NBPTS certified in 2003; and the language arts teammate (Catherine) was NBPTS certified in 2004. The math (Lisa) teammate was currently going through the NBPTS process and expected to be certified in 2005. Thomas had been chosen school level teacher of the year in 2001. Lisa and Margaret had each been nominated twice and Catherine once for the Teacher of the Year award.

4. All four teachers participated together in the same introductory environmental service professional learning opportunity at the University of Georgia in June 2002. Before this, only Thomas had any formal service-learning training. The professional learning was part of a project sponsored by the university to introduce teachers to
environmental service-learning using a major watershed as a thematic focus.

Teachers from schools across the state also attended. During the week-long training, everyone received the same exposure to environmental service-learning so that each could develop their own ideas for implementation when they returned to school. All the teachers in the workshop learned about environmental concepts and issues regarding the target watershed, and developed ideas for their subject area to use in developing an interdisciplinary environmental service-learning unit. The team used the time at the training to develop ideas for their interdisciplinary unit, then attempted various forms of environmental service-learning the next two years before this study began. It is worth noting that the attempts at environmental service-learning before this study were not “formally planned” but rather ad hoc. None-the-less, the efforts provided the teachers experience from which to generate ideas for use in the interdisciplinary environmental service-learning unit developed during this study.

5. There was administrative support for environmental service-learning and interdisciplinary units. The principal was a former science teacher who conducted many environmental units as a teacher and the administrative assistant for curriculum was experienced with integrated curriculum development. Though different than interdisciplinary curriculum, the administrative assistant for curriculum understood the value of making learning real for middle grades students.

It is interesting to note that none of the team teachers went to college to be teachers - all four had prior careers. Margaret (Social Studies) had a B.A. degree in Marketing and was a sports marketing specialist before deciding to become a teacher. She had taught for ten years and had since earned her M.A. in Education and her certification by the National Board of
Professional Teaching Standards. Lisa (Math) had a B.S. in Mathematics and worked for several years as a sales associate for a large motel corporation before becoming a teacher. Lisa had taught for thirteen years and had completed her M.A. in Math Education and was working towards certification by the National Board of Professional Teaching Standards during the study. Catherine (Language Arts) went directly into law enforcement after high school and was a police officer for fourteen years before earning her B.A. in Education. She had taught for seven years and attained her National Board Certification months before the study began. Thomas had a B.S. degree in Environmental Resources Management and an M.S. in Public Administration. He worked for seven years as an environmental protection specialist for the Federal government and seven years as a sales person and manager for a computer software corporation before changing to a teaching career. All the teachers’ prior careers often became a part of discussions when planning interdisciplinary units; all questioned how learning benefited the students in their future careers.

**Design of the Study**

This project used an interpretative case study approach to investigate what an interdisciplinary team of middle grades teachers believed regarding environmental service-learning and how they planned, negotiated, implemented, and evaluated student learning. Isaac and Michael (1995) noted that the case study methodology is generally useful for studying the backgrounds and interactions of a given group in a social unit, such as individuals in a school. These authors maintained that when case studies are done in depth, they can provide insight into interactions and variables that might not surface using other methods. When developing the scope of this study, the researcher considered investigating more than one team of teachers implementing environmental service-learning but chose to focus on a single team using
Merriam’s (1998) approach of studying a single case or phenomenon to uncover its meaningful components and provide a snapshot of the situation in its real-life context (Myers, 1997). The researcher also used the case study approach to provide detailed information that could be used as a springboard by others to continue research across multiple settings from which generalizations concerning environmental service-learning might then be made (Merriam, 1998). Silverman (2000) made a point of saying that, “case studies generally address a particular situation and no attempt is made to generalize beyond the single case or even build theories” (p. 103).

This study was interpretive, in that “interpretive researchers start out with the assumption that access to reality is only through social constructions such as language, consciousness, and shared meanings” (Myers, 1997, p. 4). Myers went on to state that interpretive studies attempt to understand phenomenon by attempting to uncover the meanings that people assign to it. Interpretive research does not predefine dependant and independent variables; rather it focuses on making sense of the complexity of human subjects in a given situation (Myers, 1997). Interpretive case study methodology was appropriate for learning about the overarching question of this study: “What did an interdisciplinary team of middle grades teachers believe regarding environmental service-learning and how did they plan, negotiate, implement, and evaluate student learning?” In order to investigate the over-arching question, four sub-questions guided collection and analysis of the data and contributed to better understanding the overarching question. The four study sub-questions were:

   Sub-question #1 – What were the beliefs of seventh grade interdisciplinary team members regarding environmental service-learning?
Sub-question # 2 - How did a seventh grade interdisciplinary team plan and negotiate environmental service-learning?

Sub-question # 3 - How did a seventh grade interdisciplinary team implement environmental service-learning?

Sub-question #4 - How did a seventh grade interdisciplinary team evaluate student learning with respect to environmental service-learning?

Researcher Role

In this study, the researcher was an insider and an integral part of the middle school team. Banks (1998) explained the four typologies of researchers as indigenous insider or outsider and external insider or outsider, with each role influencing how a researcher carries out his/her study. As a teacher conducting this study of an interdisciplinary team, the researcher was an indigenous member of the school community. As an indigenous insider, “this individual endorsed the unique values, perspectives, behaviors, beliefs, and knowledge of his indigenous community and culture and was perceived by people within the community as a legitimate community member who can speak with authority about it” (Banks, 1998, p. 8).

It would not have been appropriate for the researcher to try to conduct this study as a detached outsider, as would be the case using an “etic” approach (Patton, 2002). Therefore, the case study methodology was chosen because as an emic approach, it was useful for developing an awareness of insider influences in the study. The researcher was an insider and had to accept that fact because he had a personal stake with respect to the success of the teams’ efforts, along with the other teachers. Throughout the study, the researcher constantly checked the ‘issue of voice’ (Clough & Nutbrown, 2002). When evaluating methodologies for use in this study, possible roles of the other teachers were considered, since the study was about the whole team.
Action research, a suitable methodology, would have positioned all four teachers as co-researchers. However, case study was chosen so as to not place an additional burden of time on the non-researcher teachers. As participants in the study, they were already investing an additional amount of time beyond the scope of their daily responsibilities.

Data Sources

In identifying what data would be most useful in studying the research questions of interest, the researcher first considered several issues (Isaac & Michael, 1995; Patton, 1999). Three important questions guided data collection and analysis:

1. Who will be the target audience and who might use the findings?
2. How will the information to be used?
3. Why is the research being conducted?

This study was conducted with four audiences in mind. The first audience was teacher members of the interdisciplinary team. The interdisciplinary team teachers all had informal discussions about the nature of their collaboration. In the fall of 2003, the interdisciplinary team participated in a pilot project regarding how they planned previous environmental service-learning units. That pilot study provided the teachers and researcher with insight into some of the factors that might influence collaboration when developing environmental service-learning curriculum. From the pilot study, the team learned how to improve their planning and implementing of environmental service-learning. Second, the researcher considered how other teachers might use and build on the information gathered from this dissertation; this influenced the design of the study. Third, there was a recognition that other researchers might be able to use the findings of the study as a basis for informing larger sociological studies of collaboration and curriculum negotiation. Though this study was just a snapshot of one team, in one place, and at
one time, teachers and researchers might potentially use ideas generated from this study to inform their practice. Last, the study might be useful to administrators who could draw on some of the observations and conclusions of the study as a reference for putting together interdisciplinary teams. As noted in the literature review, “Principals do not always have a choice when forming teams. You work with what you get and make the best of it” (White, 1997, p. 65). Potentially the findings of this study could help administrators better place teachers on teams and improve the chances of success.

Primary Data Sources

In order to explore the sub-questions as well as the overarching research question, there were two phases of analysis. The first phase involved a within-case analysis in relation to each teacher and focused on identification of teacher beliefs regarding environmental service-learning; how each planned, negotiated, implemented environmental service-learning; and how each evaluated student learning. The second phase consisted of a cross-case analysis which identifying holistic themes or tensions surrounding the team’s beliefs and how they planned, negotiated, implemented, and evaluated student learning. Primary data sources used to inform both phases of this study included:

Initial Critical Autobiography

Each teacher developed a critical autobiography that reflected his/her life experiences. Autobiographies “focus the storyteller on issues, problems, and dilemmas of teaching and learning” (Bryan & Tippins, 2004). Teachers were provided with a series of prompts (Appendix A) to facilitate their reflection on life experiences, particularly as they related to environmental service-learning. The autobiographies were intended to shed light on their ideas and actions during the planning, implementation, and evaluation phases of the environmental service-
learning unit. Additionally, the autobiographies were used to identify and explain tensions (positive and negative) that surfaced during the course of the unit.

**Oral Interviews**

Oral interviews were conducted with each teacher after completion of his/her written critical autobiography. The questions for the initial interview were intended to clarify any of the autobiographical responses the researcher did not fully understand. In addition, the researcher used the interviews to fill in gaps in each teacher’s autobiographical responses so that the data was consistently present between all teachers for later cross-case analysis. A second set of interviews was conducted after each teacher had completed a summative reflection. The purpose of the interviews was to gain further insight into each teacher’s written words of their autobiographies, weekly journals, and culminating reflections.

**Team Meetings**

The team meetings conducted before and during the planning and implementation phases of the environmental service-learning unit were audio recorded and transcribed. These transcripts were used to examine how the environmental service-learning curriculum was planned, negotiated, and implemented and how teachers assessed student learning. Meetings of the interdisciplinary team were expected among middle grades teachers and extra planning time was provided for this at Rollander Middle School. Planning times were 75 minutes per day. The transcription of team meetings where environmental service-learning curriculum was discussed informed assertions in relation to what the team believed regarding environmental service-learning and how they planned, negotiated, implemented, and evaluated student learning. Interactions between teachers, methods of negotiating, and tensions were identified.
**Friday Progress Meetings**

Friday team progress meetings were conducted throughout the duration of the study. These meetings brought the interdisciplinary teachers together to discuss issues and progress in a systematic way. Unlike the team planning meetings, which focused on the process of planning and negotiating the curriculum, the Friday team progress meetings were intended to serve as a forum for reflection on actions relative to the weekly activities. Friday team progress meetings were audio recorded and transcribed.

**Focus Group Sessions**

Two focus group discussions were conducted during the course of the study, at the midpoint, and once the environmental service-learning unit was completed. All members of the interdisciplinary team participated in the focus group discussions. The midway focus group discussion questions (Appendix B) concentrated on attempting to understand teachers’ perceptions as to what was working, or not, as individuals and as a team. While the focus groups were evaluative in terms of documenting how the team was progressing, they were also useful in helping the teachers make sense of their own actions relative to planning, negotiating, and implementing the environmental service-learning curriculum. The focus group sessions were intended to get at deeper issues that extended beyond organizational and structural problems that could potentially dominate weekly team meetings and Friday progress meetings. The final focus group discussion was summative in nature and intended to document the team’s views on successes and failures once the unit was completed. Discussions from this focus group were useful in providing a collective reflection concerning the work of the interdisciplinary team. Prompts used in the final focus group session to direct and facilitate the discussions are included.
in Appendix C.

Final Written Reflection

Each teacher wrote a final reflection after the unit was complete using prompts to facilitate their responses (Appendix D). The final reflection asked the participants to reflect on themselves and their interdisciplinary team. The final reflection was used to examine each teacher’s beliefs regarding individual and team efforts to plan, negotiate, implement, and evaluate student learning with respect to the environmental service-learning unit.

Secondary Data Sources

Reflective Journal

Each week, the teachers wrote reflections focusing on thoughts relevant to how they planned, negotiated, implemented, and evaluated student learning as the unit progressed. Bryan and Tippins (2004) stated that reflective journals can contribute to prospective teachers’ knowledge construction. This study used the reflective journals as a tool for gaining insight into teacher beliefs throughout the course of the study. The journals were semi-structured in nature, guided by weekly reflection prompts (Appendix E).

Environmental Service-learning Unit Plan

The unit plan shed light on the “what” and “how” aspects involved in the team’s overall conceptualization of the environmental service-learning unit. This data source provided information on the planned and negotiated curriculum. It was a useful tool for considering what actually happened during the implementation phase of the unit.

Copies of Lesson Plans

In addition to the team’s environmental service-learning unit, each teacher developed daily lesson plans. The plans were collected and analyzed on a weekly basis.
**Team Meeting Notes**

Team meeting notes were official written records of all interdisciplinary team meetings and submitted to the school’s administration to document time and topics discussed. They were used to cross-reference items the team recorder deemed important discussion items with the audio-recordings.

**Anecdotal Notes**

Each teacher kept anecdotal notes throughout the study. The teachers took notes during team meetings and lessons, as well as the day before and after lessons. Anecdotal notes from each teacher were copied, analyzed, and interpreted relative to the questions of interest.

**Procedures**

Throughout the study, I was cognizant of my dual role as researcher and participant in this study. This awareness was critical to maintaining the integrity of the research. Team planning meetings were conducted as usual, where responsibilities for recording, leading, and negotiating were shared among the teachers. Team member roles varied from meeting to meeting depending on the topics discussed. The sequence of data collection is illustrated in Table 2.

**Trustworthiness of Data**

Trustworthiness of the data is critical for acceptance of the study. Merriam (1998) and Patton (2002) suggested using multiple sources to triangulate and validate across data sets. This study used primary and secondary sources of data in the form of written autobiographies, oral interviews, transcriptions of weekly team meetings, copies of anecdotal notes and lesson plans, weekly written reflections, and focus group meetings. Different data sources were used in the analysis process to support or refute initial assertions. The overarching study question required a holistic, rather than piecemeal approach. For example, positive and negative tensions among the
Table 2

Sequence of Data Collection

<p>| Planning and negotiating of environmental service-learning curriculum |</p>
<table>
<thead>
<tr>
<th>Week</th>
<th>Data from individual teachers</th>
<th>Data from team</th>
</tr>
</thead>
</table>
| One  | - Initial critical autobiography  
|      | - Oral interviews to clarify   | - None         |
| Two  | - Weekly journal #1           | - Team planning meeting #1  
|      | - Team planning meeting #1     | - Anecdotal notes #1      |

<p>| Implementation of environmental service-learning curriculum |</p>
<table>
<thead>
<tr>
<th>Week</th>
<th>Data from individual teachers</th>
<th>Data from team</th>
</tr>
</thead>
</table>
| Three| - Teacher lesson plans #1     | - Team planning meeting #2  
|      | - Reflective journal #2       | - Anecdotal notes #2       
|      |                                | - Weekly Friday progress meetings #1 |
| Four | - Teacher lesson plans #2     | - Team planning meeting #3  
|      | - Reflective journal #3       | - Anecdotal notes #3       
|      |                                | - Weekly Friday progress meetings #2  
|      |                                | - Midpoint focus group session |
| Five | - Teacher lesson plans #3     | - Team planning meeting #4  
|      | - Reflective journal #4       | - Anecdotal notes #4       
|      |                                | - Weekly Friday progress meetings #3 |
| Six  | - Teacher lesson plans #4     | Team planning meeting #5   
|      | - Reflective journal #5       | - Anecdotal notes #5       
|      |                                | - Weekly Friday progress meetings #4 |

<p>| Reflecting on environmental service-learning curriculum |</p>
<table>
<thead>
<tr>
<th>Week</th>
<th>Data from individual teachers</th>
<th>Data from team</th>
</tr>
</thead>
</table>
| Seven| - Final individual reflections  
|      | - Oral interviews to clarify   | - None         |
| Eight| - None                         | - Summative focus group session |
teachers sometimes varied and appeared inconsistent based on context; what a teacher said in a group setting sometimes varied from what he/she wrote in the privacy of the weekly reflective journal. My subjectivities, researcher role, and biases were revisited throughout the study to recognize and reduce influences which may have impeded the study’s progress.

Data Analysis

Using the case study approach, an interpretive methodology (Merriam, 1998) was used to explore what the interdisciplinary teachers believed regarding environmental service-learning and how they planned, negotiated, implemented, and evaluated student learning associated with the environmental service-learning curriculum. This choice was based on Guba and Lincoln’s (1991) four basic paradigms for qualitative research: positivism, post-positivism, critical theory, and constructivism. Acknowledging that the study was grounded in a constructivist (social) paradigm, there were several possible research epistemologies: positivist, interpretive, and critical (Myers, 1997). In order to understand the researcher’s choice of the interpretive epistemological stance, the following summary of Myers (1997) is offered.

- **Positivists researchers** generally assume that reality is objectively given and can be described by measurable properties which are independent of the observer (researcher) and by his collection instruments.

- **Interpretive researchers** generally attempt to understand a phenomenon through meanings that people assign to them and interpretive methods of research are aimed at producing an understanding of the context of the system and the process whereby the system is influenced by the context.
Critical researchers focus on the oppositions, conflicts, and contradictions in contemporary society and seek to be emancipatory (i.e., it should help to eliminate the causes of alienation and domination (pp. 3-4).

The interpretative research method was believed to the best for trying to learn what the interdisciplinary team of teachers believed regarding environmental service-learning and how they planned, negotiated, implemented, and evaluated student learning. In seeking to understand the phenomenon of the teachers working together, data collection included components of contextual setting, beliefs of the teachers, and the process teachers followed to negotiate and evaluate student learning. As data was analyzed, positive and negative tensions surfaced. Knowing that as humans, everyone has their own reality, this study sought to understand how each teacher contributed to the process of negotiating curriculum in this single time and place of Rollander Middle School in the winter of 2005.

As an interpretive case study, preliminary assertions were developed regarding each sub-question. These assertions remained in the “background” during the study and were refined throughout the process of data analysis and interpretation. Initial assertions were followed by a description of data encoding and within-case and cross-case analysis.

Assertions

Sub-question #1 – What were the beliefs of seventh grade interdisciplinary team members regarding environmental service-learning?

Assertion #1 – I asserted that each teacher of the interdisciplinary team believed in the need for students to have more a feeling of belonging to the community in which they were being raised. However, I expected that the degree of conviction
for practicing environmental service-learning to vary, such that negative tensions would surface in subsequent discussion and analysis.

*Sub-question # 2 - How did a seventh grade interdisciplinary team plan and negotiate environmental service-learning?*

*Assertion # 2 –* I asserted that the planning process would not be totally systematic and at times might appear ‘chaotic’ in nature. The interdisciplinary team of teachers met with the expressed purpose of planning the environmental service-learning unit but would drift off topic, be interrupted, and often not finish what they intended for each planning meeting. Personal and professional issues would surface and influence how one or more of the teachers might act when interacting with the others. Pressures from mandated curriculum would also influence the time each teacher was willing to ‘give’ to the environmental service-learning curriculum in his/her academic class.

*Sub-question # 3 - How did a seventh grade interdisciplinary team implement environmental service-learning?*

*Assertion # 3 –* I asserted that all four teachers would deviate from the plans as developed and make frequent adjustments to instruction during implementation. Teachers would not have everything planned and ready to implement as teacher preparation programs require but would have to create and adjust much of their teaching during the implementation phase. How they physically or emotionally felt on a given day, how they perceived the moods of the students, unplanned school events, and last minute interruptions would require the teachers to adjust,
each to differing degrees based on their underlying beliefs about environmental
service-learning identified in sub-question 1.

*Sub-question #4 - How did a seventh grade interdisciplinary team evaluate student learning?*

*Assertion # 4 –* I asserted that teachers would find it difficult to negotiate a way of
assessing student learning that crossed disciplinary boundaries. I believed that the
teachers would ultimately use different methods of evaluating students’ learning
during the environmental service-learning unit, based on their beliefs about
grading as either process or product oriented. The product oriented teachers would
use more pen and pencil type assessment methods while the process oriented
teachers might use more observation and judgment oriented methods of
evaluation.

*Data Review*

Before beginning the analysis process, all data (audio recordings of meetings, interviews,
of focus groups, lesson plans, meeting notes) were transcribed to text form and copied four times so
that a clean set of each was available for each sub-question analysis. By starting with a clean set
of data for each question, it was easier to focus solely on each sub-question and not be influenced
by prior coding, or overwhelmed by the quantity of information collected.

For each study sub-question, both within-case and cross-case analysis was conducted.
The within-case analysis was aimed at providing an understanding of each teacher’s beliefs
related to environmental service-learning and how each planned, negotiated, implemented, and
determined student success individually. The cross-case analysis sought to develop a holistic
understanding of what the team believed regarding environmental service-learning and how they planned, negotiated, implemented, and evaluated the success of the unit as an entity in itself.

A four step constant comparative method was used in the data coding process; open coding, axial coding, selective coding, and development of themes (Merriam, 1998; Strauss & Corbin, 1990). Qualitative data analysis requires spoken, implied, and written words to draw conclusions. Miles and Huberman (1984) view qualitative data analysis as a concurrent flow of data reduction, display, and conclusion development. For these reasons, the researcher assumed that all data sources contributed to learning about the research sub-questions and coded each separately. The coding and within-case and cross-case analysis processes are described below.

*Open Coding*

The first step reviewed each data source from beginning to end and identified concepts as possible units of data (Merriam, 1998). The units included phrases, sentences, or paragraphs that addressed the respective sub-question. As units were reviewed, categories of themes began to emerge (Strauss & Corbin, 1990) which supported or refuted initial assertions. This process was repeated several times with each data source for each teacher until the researcher was satisfied that no new categories were possible.

*Axial Coding*

The second step examined all the categories identified by the open coding and began to collapse them into themes (Merriam, 1998) relative to each sub-question and corresponding assertion. Since many categories surfaced from the open coding, the axial coding process created a manageable number of themes.
Selective Coding

Themes that surfaced from the axial coding were scrutinized for uniqueness and contribution to informing the research questions and supporting or refuting assertions. These themes were such that no single unit of data fit into more than one category.

Development of Themes

The final step was to take the themes from the previous step and collapse them into overarching themes. At this point the initial assertions were refined through the analysis and interpretation of emergent themes. This made the number of themes to be analyzed and supported with a preponderance of evidence manageable.

Within-Case Analysis

This study involved four teachers interacting in an interdisciplinary team setting to plan, negotiate, implement, and evaluate student learning in the context of an environmental service-learning initiative. As Myers (1997) pointed out, interpretive studies attempt to understand phenomena by seeking the meanings that people assign to it. With this in mind, data was used to construct an individual interpretation of responses and actions relative to each study sub-question.

Cross-Case Analysis

A cross-case analysis was conducted for each sub-question, using a chart to organize the analysis, assigning a column to each teacher, and listing common categories that emerged from the constant comparative analysis. The organizational process (Table 3) assisted the researcher in developing an analysis of the similarities and differences, thus contributing to the holistic response to each research sub-question. Once the emergent themes were identified and supported
in the cross-case analysis, each assertion was rewritten based on the evidence that supported and refuted the research sub-question.

Table 3

Cross-case Analysis

Sub-question #1
What were the beliefs of an interdisciplinary team of middle grades teachers regarding environmental service-learning?

<table>
<thead>
<tr>
<th>Lisa</th>
<th>Margaret</th>
<th>Catherine</th>
<th>Thomas</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Holistic response to the research question</td>
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</tbody>
</table>

Sub-question #2
How did an interdisciplinary team of middle grades teachers plan and negotiate environmental service-learning?

<table>
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<tr>
<th>Lisa</th>
<th>Margaret</th>
<th>Catherine</th>
<th>Thomas</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Holistic response to the research question</td>
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</tbody>
</table>

Sub-question #3
How did an interdisciplinary team of middle grades teachers implement environmental service-learning?

<table>
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<th>Lisa</th>
<th>Margaret</th>
<th>Catherine</th>
<th>Thomas</th>
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<td></td>
<td>Holistic response to the research question</td>
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Sub-question #4
How does an interdisciplinary team of middle grades teachers evaluate student learning during environmental service-learning?

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<th>Lisa</th>
<th>Margaret</th>
<th>Catherine</th>
<th>Thomas</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Holistic response to the research question</td>
<td></td>
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</tbody>
</table>
A Holistic Summary of the Environmental Service-learning Initiative

The overarching question of the study, “What did an interdisciplinary team of middle grade teachers believe regarding environmental service-learning and how did they plan, negotiate, implement, and evaluate student learning?” required a cross-case analysis to explore how similarities and differences among team members’ beliefs and actions impacted the negotiation process. The essential words in this question were, *what did the teachers believe and how did they plan, negotiate, implement, and evaluate student learning?* While each teacher had his/her own beliefs and styles, the researcher used the interpretive methodology (Myers, 1997) to understand and explain the holistic phenomena of what the team believed regarding environmental service-learning and how they planned, negotiated, implemented, and evaluated student learning. The interpretive methods were aimed at producing an understanding of the beliefs and processes, combined with an attempt to explain how they were influenced by the contexts present during the study. Ultimately, through the process of within-case and cross-case analysis, initial assertions were refined and revised assertions were constructed.
CHAPTER 4
WITHIN-CASE FINDINGS

The purpose of this study was to investigate how an interdisciplinary team of middle grades teachers planned, negotiated, implemented, and evaluated student learning in the context of an environmental service-learning initiative. This case study involved interpretive qualitative analysis of primary and secondary data sources of four teachers. A four step constant comparative method (Merriam, 1998; Strauss & Corbin, 1990) was used to construct individual profiles of four teachers through interpretation of data relevant to the research questions of interest.

Themes that emerged through the within-case analysis with respect to each of the four teachers are presented in this chapter. The research questions were:

1. What were the beliefs of seventh grade interdisciplinary team members regarding environmental service-learning?
2. How did a seventh grade interdisciplinary team plan and negotiate an environmental service-learning unit?
3. How did a seventh grade interdisciplinary team implement environmental service-learning?
4. How did a seventh grade interdisciplinary team evaluate student learning in the context of an environmental service-learning initiative?

The first question attempted to identify the teachers’ beliefs regarding environmental service-learning in order to understand why each participated in this initiative. The second question
explored how each teacher planned and negotiated environmental service-learning individually and with his/her teammates, with a focus on interpreting actions. The third question focused on how each teacher implemented environmental service-learning, with an emphasis on analyzing how each contributed in relation to his/her beliefs and roles in planning of the unit. The fourth question attempted to understand how each teacher evaluated student learning in relation to environmental service-learning.

The researcher was also a participant in this study. As an “indigenous insider” (Banks, 1998), recognizing the ‘issue of voice’ (Clough & Nutbrown, 2002) was important to conducting, analyzing, and reporting the findings of this study. The researcher and participant roles ‘physically’ were separated as much as possible for time management and to reduce influences on the study. Though never totally separable, the mechanics of focusing on teaching duties at school and dissertation at home, helped with time and task management. When home, the researcher would conduct tasks related to the study. When at school, the teacher would carry out “teacher responsibilities” as normal as possible. Conscious of the dual roles, the separation was intended to reduce possible manipulation of actions that may have impacted how the unit was planned, negotiated, and implemented.

Multiple themes emerged with respect to each research sub-question in the within-case analysis. Table 4 illustrates emergent themes for each teacher in relation to his/her beliefs regarding environmental service-learning. Table 5 provides an overview of themes with respect to how each teacher planned and negotiated the curriculum. Table 6 presents the themes in relation to how each teacher implemented the environmental service-learning. Table 7 lists emergent themes with respect to how each teacher evaluated student learning in relation to the environmental service-learning unit.
Table 4

*Teacher’s Belief regarding Environmental Service-learning: Emergent Themes*

<table>
<thead>
<tr>
<th></th>
<th>Lisa</th>
<th>Margaret</th>
<th>Catherine</th>
<th>Thomas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Relevance</strong></td>
<td>“Real data” as a context for learning math</td>
<td>The need for relevant lessons</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Environmental awareness</strong></td>
<td>Creating environmental awareness</td>
<td></td>
<td>Building student awareness of community</td>
<td>Environmental activism as an important goal of environmental service-learning</td>
</tr>
<tr>
<td><strong>Activism</strong></td>
<td>Activism: At the heart of learning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Motivation</strong></td>
<td>Motivation as a dimension of student learning</td>
<td>Motivation as a dimension for learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Student involvement</strong></td>
<td>Creating agency in the students</td>
<td></td>
<td>Involving students in their own learning</td>
<td></td>
</tr>
<tr>
<td><strong>Moral and character development</strong></td>
<td></td>
<td>Environmental service-learning for moral and character development</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Importance of “place”</strong></td>
<td></td>
<td></td>
<td>The importance of ‘sense of place’ for student learning</td>
<td></td>
</tr>
</tbody>
</table>

Table 5

*Teacher’s Planning and Negotiating of Environmental Service-learning: Emergent Themes*

<table>
<thead>
<tr>
<th></th>
<th>Lisa</th>
<th>Margaret</th>
<th>Catherine</th>
<th>Thomas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Confidence and self-perceptions</strong></td>
<td>The role of teacher confidence in planning interdisciplinary curriculum</td>
<td>A teacher’s self perception effects his/her participation</td>
<td>From ‘empowerment’ to ‘received knower’</td>
<td></td>
</tr>
<tr>
<td><strong>Mandated curriculum</strong></td>
<td>Covering the mandated curriculum</td>
<td>When the mandated curriculum does not match the planned environmental service-learning</td>
<td>Matching curriculum and students: The challenges</td>
<td>Covering the mandated curriculum</td>
</tr>
</tbody>
</table>
Table 5 (continued)

*Teacher’s Planning and Negotiating of Environmental Service-learning: Emergent Themes*

<table>
<thead>
<tr>
<th></th>
<th>Lisa</th>
<th>Margaret</th>
<th>Catherine</th>
<th>Thomas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being ‘realistic’</td>
<td>The importance of setting realistic goals</td>
<td></td>
<td></td>
<td>Rethinking what is ‘manageable’ and ‘doable’</td>
</tr>
<tr>
<td>Feeling pressures</td>
<td>The life worlds of home and school: Living with the tensions</td>
<td>Feeling the pressures from external demands</td>
<td>A teacher’s perspective of the demands placed on her</td>
<td>The mediational role of external constraints</td>
</tr>
<tr>
<td>Tangent focus</td>
<td>The quest for National Board certification</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Leadership</td>
<td></td>
<td></td>
<td></td>
<td>Taking a leadership stance</td>
</tr>
</tbody>
</table>

Table 6

*Implementing Environmental Service-learning: Emergent Themes*

<table>
<thead>
<tr>
<th></th>
<th>Lisa</th>
<th>Margaret</th>
<th>Catherine</th>
<th>Thomas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of environmental service-learning to fulfill needs</td>
<td>Conducting differing environmental service-learning to fulfill other requirements</td>
<td>Connecting environmental service-learning to the mandated curriculum</td>
<td></td>
<td>Using environmental topics to teach life science</td>
</tr>
<tr>
<td>No grades</td>
<td></td>
<td></td>
<td>Implementing environmental service-learning without the pressures of grades</td>
<td>Implementing environmental service-learning without the pressures of grades</td>
</tr>
<tr>
<td>Working together</td>
<td>Conducting environmental service-learning as a concurrent team effort</td>
<td>The need for teachers to be flexible</td>
<td>From plan to implementation: Imitating her teammates</td>
<td></td>
</tr>
</tbody>
</table>
Table 7

Evaluating the Success of Environmental Service-learning: Emergent Themes

<table>
<thead>
<tr>
<th></th>
<th>Lisa</th>
<th>Margaret</th>
<th>Catherine</th>
<th>Thomas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engagement</strong></td>
<td>Student engagement as a measure of student learning</td>
<td>Student engagement as a measure of student learning</td>
<td>Student on-task behavior as a measure of student learning</td>
<td></td>
</tr>
<tr>
<td><strong>Students shining</strong></td>
<td>Shining moments for at risk learners</td>
<td>Shining moments for at-risk learners</td>
<td>Shining moments for at-risk learners</td>
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</tr>
<tr>
<td><strong>Observation</strong></td>
<td></td>
<td>Observation as a ‘tool’ for assessing student learning</td>
<td>Observation as a ‘tool’ for informally assessing learning</td>
<td></td>
</tr>
<tr>
<td><strong>Meeting goals and expected outcomes</strong></td>
<td>The importance of meeting goals</td>
<td>The fit between student outcomes and teacher expectations</td>
<td></td>
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</tr>
</tbody>
</table>

The timing of the data collection scheduled for this study varied from the original plan presented in Table 2. The interdisciplinary team took longer than expected to plan the environmental service-learning unit and this caused adjustments to the data collection schedule. How and when the data was collected is detailed in Table 8. The original primary data sources were the initial critical autobiography, oral interviews, team meetings, Friday progress meetings, focus group sessions, and final written reflection. The original secondary sources were reflective journals, environmental service-learning unit plan, lesson plans, personal calendars, team meeting notes, and anecdotal records. One situation not anticipated was team members missing meetings and occasions where two or three team members met separately from the others to discuss environmental service-learning. These situations are noted along with who attended, either ‘all’ teachers present, or by their names initials (L – Lisa, C – Catherine, M – Margaret,
Table 8

*Data Collected During Study*

<table>
<thead>
<tr>
<th>Study week</th>
<th>Primary data sources Collected</th>
<th>Secondary data sources collected</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Week One</strong></td>
<td>- Initial critical autobiography (all, written)</td>
<td>- Copies of lesson plans (all)</td>
</tr>
<tr>
<td>January 3 - 7</td>
<td>- Scheduled ESL team meeting, 1/7 (all, audio recorded)</td>
<td>- Copy of personal calendars (all)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Team meeting notes (all)</td>
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<tr>
<td></td>
<td></td>
<td>- Anecdotal records (all)</td>
</tr>
<tr>
<td><strong>Week Two</strong></td>
<td>- Copies of lesson plans (all)</td>
<td>- Copies of lesson plans (all)</td>
</tr>
<tr>
<td>January 10 – 14</td>
<td>- Copy of personal calendars (all)</td>
<td>- Copy of personal calendars (all)</td>
</tr>
<tr>
<td></td>
<td>- Team meeting notes (all)</td>
<td>- Team meeting notes (all)</td>
</tr>
<tr>
<td></td>
<td>- Anecdotal records (all)</td>
<td>- Anecdotal records (all)</td>
</tr>
<tr>
<td><strong>Week Three</strong></td>
<td>- ESSL team meeting, 1/21 (all, audio recorded)</td>
<td>- Copies of lesson plans (all)</td>
</tr>
<tr>
<td>January 17 – 21</td>
<td></td>
<td>- Copy of personal calendars (all)</td>
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<tr>
<td></td>
<td></td>
<td>- Team meeting notes (all)</td>
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<tr>
<td></td>
<td></td>
<td>- Anecdotal records (all)</td>
</tr>
<tr>
<td><strong>Week Four</strong></td>
<td>- Copies of lesson plans (all)</td>
<td>- Copies of lesson plans (all)</td>
</tr>
<tr>
<td>January 24 – 28</td>
<td>- Copy of personal calendars (all)</td>
<td>- Copy of personal calendars (all)</td>
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<td></td>
<td>- Team meeting notes (all)</td>
<td>- Team meeting notes (all)</td>
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<tr>
<td></td>
<td>- Anecdotal records (all)</td>
<td>- Anecdotal records (all)</td>
</tr>
<tr>
<td><strong>Week Five</strong></td>
<td>- Scheduled ESL team meeting, 2/2 (all, audio recorded)</td>
<td>- Copies of lesson plans (all)</td>
</tr>
<tr>
<td>January 31 –</td>
<td></td>
<td>- Copy of personal calendars (all)</td>
</tr>
<tr>
<td>February 4</td>
<td></td>
<td>- Team meeting notes (all)</td>
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<tr>
<td></td>
<td></td>
<td>- Anecdotal records (all)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Environmental service-learning unit plan (February 1 version, appendix G)</td>
</tr>
<tr>
<td><strong>Week Six</strong></td>
<td>- Copies of lesson plans (all)</td>
<td>- Weekly reflective journals (T only)</td>
</tr>
<tr>
<td>February 7 - 11</td>
<td>- Copy of personal calendars (all)</td>
<td>- Copy of personal calendars (all)</td>
</tr>
<tr>
<td></td>
<td>- Team meeting notes (all)</td>
<td>- Team meeting notes (all)</td>
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<tr>
<td></td>
<td>- Anecdotal records (all)</td>
<td>- Anecdotal records (all)</td>
</tr>
<tr>
<td></td>
<td>- Unscheduled ESL meeting (L, M, &amp; T, notes)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Unscheduled ESL meeting (C &amp; T, notes)</td>
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<tr>
<td></td>
<td>- Unscheduled ESL meeting (L &amp; T, notes)</td>
<td></td>
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<tr>
<td><strong>Week Seven</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>February 14 – 18</td>
<td>- Scheduled ESL team meeting, 2/14 (all, audio recorded)</td>
<td>- Weekly reflective journals (C, M, &amp; T)</td>
</tr>
<tr>
<td></td>
<td>- Unscheduled ESSL meeting, 2/17 (M &amp; T, notes)</td>
<td>- Copies of lesson plans (all)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Copy of personal calendars (all)</td>
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<tr>
<td></td>
<td></td>
<td>- Team meeting notes (all)</td>
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<tr>
<td></td>
<td></td>
<td>- Anecdotal records (all)</td>
</tr>
</tbody>
</table>
Table 8 (continued)

Data Collected During Study

<table>
<thead>
<tr>
<th>Study week</th>
<th>Primary data sources Collected</th>
<th>Secondary data sources collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week Eight</td>
<td>- Midway focus group, 2/18 (all, audio recorded)</td>
<td>- Weekly reflective journals (L, M, C, &amp; T)</td>
</tr>
<tr>
<td>February 21 – 25</td>
<td></td>
<td>- Environmental service-learning unit plan, as modified, appendix H.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Copies of lesson plans (all)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Copy of personal calendars (all)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Team meeting notes (all)</td>
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<tr>
<td></td>
<td></td>
<td>- Anecdotal records (all)</td>
</tr>
<tr>
<td>Week Nine</td>
<td></td>
<td>- Weekly reflective journals (L, M, C, &amp; T)</td>
</tr>
<tr>
<td>February 20 – March 4</td>
<td></td>
<td>- Copies of lesson plans (all)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Copy of personal calendars (all)</td>
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<tr>
<td></td>
<td></td>
<td>- Team meeting notes (all)</td>
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<tr>
<td></td>
<td></td>
<td>- Anecdotal records (all)</td>
</tr>
<tr>
<td>Week Ten</td>
<td>- Final Focus group (all, audio recorded)</td>
<td></td>
</tr>
<tr>
<td>March 7 – 11</td>
<td>- Final written reflection (all teachers, written)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Clarifying oral interviews (all, audio recorded)</td>
<td></td>
</tr>
</tbody>
</table>

and T – Thomas). Another modification involved the scheduling of separate team planning and Friday progress meetings. For time management purposes, the team decided that the meetings would be combined into a single session (decided at the January 21 meeting).

The schedule for data collection changed in response to circumstances within and outside the team’s desires. For example, the team meeting planned for Thursday, January 6 was changed to Friday when no one showed for the scheduled 10:30 meeting. Thomas went to his teammates’ classrooms and saw Lisa unpacking boxes from her move in from the trailers, Mary at her desk trying to get grades done so she could email them home that day, and Catherine nowhere to be
found. Lisa and Thomas decided to change the meeting to Friday and informed the others. The February 1 team meeting that had been planned well in advance was rescheduled because Lisa forgot to register on-line with the National Board of Professional Teaching Standards for her portfolio retake, missing the deadline of January 31. Lisa, together with Thomas, spent the entire planning period on the phone and on-line dealing with the registration process. When they finished with about 15 minutes left in the planning period and walked to Margaret’s classroom, she asked, “Where have you been?” When they told her what they were doing, Margaret’s reply was, “that’s OK, I had a lot to do anyway. How about we just meet tomorrow?”

Meeting times were also impacted by ‘early release parent conferences.’ All elementary and middle schools in this school district released students for two half days (Wednesday and Thursday, February 9 and 10). The teachers were required to meet with parents of any child with a potentially failing grade or behavioral issues. This interdisciplinary team scheduled 62 parent conferences, each 20 minutes in duration. However, only 43 parents came to their conference, and 19 parents did not show at scheduled times. The teachers had to reschedule the conferences, which further complicated their schedules. Of the 19 conferences rescheduled, only nine parents arrived at their specified time. The rescheduling and no shows caused many 20 minute segments before, during, and after school to be unproductive times of sitting and waiting.

Two other issues significantly impacted all four teachers’ planning and warrant some discussion before proceeding with each teacher’s within-case analysis. The first issue centers on the principal’s 30 minute faculty meeting presentation held on the teachers’ first day back from the winter break (January 3). The principal opened the meeting with the following remarks:

“There are 57 days until testing season start in April. The school is in its second year of not achieving Annual Yearly Progress (AYP)” (as defined by the state Department of
Education). The April tests will determine whether our school achieves Annual Yearly Progress. If we do not make AYP this year, that means that the state can come in and take over the school to make the improvements that they say we are not doing. You must prepare the students for the tests. Seventh grade teachers, remember that students must pass the ‘pass/fail’ test to determine whether they are promoted to eighth grade. It is true that the grades they earn during the year do not matter. If they pass the test, they are promoted. If they fail, they are retained. This next item is for all teachers, all grades. On the state’s test in April, once the seventh grade “pass/fail” test is done; the state will use our results to determine adequate yearly progress. The students must do better this year so that we meet AYP. It is important that your students know how to answer open response questions. Teachers, do not collect tests with open ended responses unless all the questions are answered. Do not let them not answer questions because they say it is too hard. Encourage them to try, emphasizing that they get no points if they do not answer the question but have a chance of some points if they try.”

The principal placed a very high priority on having the teachers do whatever was necessary to ensure that students would be successful on the various tests given in April. The principal’s priority for testing was apparent throughout the all phases of this study.

The second issue that emerged early during the first environmental service-learning planning meeting (January 4) involved the team’s worried concerns for students’ progress. First semester report cards were being prepared that week and the four teachers discussed their students’ performance. Going around the table, Lisa said that 44 of her students had failed math class during the second nine week grading period. Thomas reported 34 students failed science, Margaret indicated that 36 students failed social studies, and Catherine noted that 41 students
had failed her language arts class. Lisa asked everyone, “What do we do? They seem to just not care.” Thomas added, “They sit in class and it looks like they are getting it. They answer questions, are making eye contact. Then, on the tests, even the ones that were participating fail the test miserably.” Catherine continued, “I asked a kid if he cared about failing, all he did was shrug his shoulders.” It was a consensus among the four that hopefully environmental service-learning would be a tool for motivating the students. It should be noted that none of the teachers said that they wanted to do environmental service-learning so that their students would perform better on the high stakes tests in April.

Lisa – Math Enthusiast

Lisa was the team’s math teacher. She was certified to teach grades four through eight math and social studies, but her first love was math. She decided to pursue a degree in teaching after obtaining an undergraduate degree in communication and working as a sales person for many years. With her sister’s encouragement, she returned to school and completed her master’s degree in Math Education. Lisa had been a member of the interdisciplinary team for six years and was the seventh grade math curriculum chair and remediation/enrichment coordinator. Her additional duties as coordinator required a significant time demand on her daily schedule. Lisa’s daily schedule started with the school-required work hours of 8:30 AM to 4:30 PM. After the official reporting time for teachers at 8:30, she had 25 minutes each morning to prepare before the students started entering the building. While some teachers came in early or stayed late to complete tasks, Lisa seldom did because of responsibilities for her daughters. See Appendix J for her daily schedule. This within-case analysis describes Lisa’s beliefs concerning environmental service-learning, and how she planned, negotiated, implemented, and evaluated student learning during the environmental service unit.
Question 1 – What were Lisa’s beliefs regarding environmental service-learning?

Lisa wanted her students to learn math in ways that were fun and real. Repeatedly, Lisa emphasized that, “If the students have fun, they will remember it.” Extending the idea to environmental service-learning, Lisa believed that if the curriculum utilized actual data about the environment, students would learn math better than simply relying on samples provided by the text. Lisa’s beliefs regarding environmental service-learning centered on three themes: (1) “real” data as a context for learning math, (2) creating environmental awareness, and (3) motivation as a dimension of student learning. Throughout the planning, implementing, and evaluating student learning phases of the environmental service-learning unit, data consistently emerged to support these themes.

Theme 1: “Real” Data as a Context for Learning Math

Lisa saw environmental service-learning as a way to make math more interesting for her students. She sought real-life data to practice math instead of using fabricated information presented in the textbooks. When prompted to describe in her autobiography why she wanted to do environmental service-learning, she responded, “Have the students use problem solving skills to find solutions to their questions by using knowledge gained from the classroom.” This belief became a premise she applied to her math planning within the environmental service-learning unit. When the team discussed the possibility of collecting stream data, she responded “I have always wanted to use stream data from a local stream to use when I teach them statistics. I want the data to be real for them so they can relate it to their world.” When planning the environmental service-learning unit at the first meeting, the team discussed using the biodiversity data collected in the fall to teach mean, mode, median, quartiles, and ranges. Lisa responded,
I just need to know what direction we want to go with the environmental service-learning, and then I can figure out what I want to do with the biodiversity data. That data is real to the students since they collected it on the field trip so it is real to them. This would be a good time to use it to tie into the environmental service-learning unit and my statistics unit.

Lisa had used the biomass and biodiversity data collected at the park in the fall to practice statistics in her math class in early February. She planned to use the stream data in her lessons for the environmental service-learning unit. When discussing at a planning meeting how the practice lessons went, Lisa emphatically stated

I like that data. It makes them think. When you talk to them about the relationship between biomass and biodiversity of ecosystems, then they come to me and I have them do statistics on the data, I can see them struggling. I could see that they really learned something.

Her enthusiasm for using environmental data that students could relate to continued and was evident in her comments during the final interview as she reflected on how the unit went in relation to her responsibilities.

I would listen to them argue in their groups and they would figure things out. I could hear them put the pieces together, such as ‘oh yea, Mr. Jones said that the other day’ and that would help them explain why the temperature of the stream would go up. That showed me that they were bringing lessons for their classes to this unit.

Lisa’s comment demonstrated the importance she attributed to real data for statistics as a tool for helping students apply or transfer knowledge to situations in their lives. She also wanted
to make her students aware of the environment and help them understand how to use the data to make sense of concepts and applications of math to the real world.

**Theme 2: Creating Environmental Awareness**

Lisa was interested in issues concerning the environment in the community surrounding the school. She often asked Thomas during planning meetings about issues regarding land use, development, pollution in a local stream, and political actions at the local and state levels regarding environmental issues. Lisa’s interest stemmed from her participation in an environmental service-learning course she took with her teammates.

Since that staff development, I notice more about the environment. I was conscious before but now think more about how to teach the students. One thing I would like to do is to test a steam somewhere to show the students some things about water quality. I really liked when we went to the stream during the class and collected samples, I still think about that. I think the students would remember forever doing that if we took them to a stream and collected, then analyzed the water quality.

When asked in the initial interview if she had any general goals for environmental service-learning, her response was

I am not quite sure what everyone else’s goals for the environmental service-learning are but I want to make the kids more environmentally aware of what is going on. You know, if we can do that, we will meet my goal. Show them the environment; show what they can do to help keep the environment clean.

Beyond using the environment as a tool for teaching all her students, she particularly considered the new students in her class. Lisa reflected on the school’s changing demographics, noting
Socio-economics is an essential factor of my students’ success, especially, transient students. They often have gaps in their educational background and lack support at home. If I can connect with the students and have them connect to local issues, like pollution, it may help them learn more math of the math I have to teach them.

Lisa’s comfort level with the environment had increased since the staff development but she was still not comfortable enough with environmental concepts to take her students beyond a basic understanding of the issues. The year following the training, Lisa used data from a Tribal Mill ecosystem field trip to practice statistics analysis and interpretation, but did not engage her students in any environmental discussions. Each year, she added questioning to her lesson plans, wanting students to explain their understanding of the biodiversity data collected on the annual field trip. The environmental service-learning unit in this study was her third effort since the joint training, and she still asked most of the questions in the team’s planning meetings regarding environmental topics. She deferred in-depth environmental discussions with the students to Thomas, as indicated in an interview, “I still do not feel totally comfortable discussing environmental issues with the students. I do not understand the science or the politics of the issues. I would rather Thomas go into those discussions with the students.” In her autobiography, she explained her need to better understand the issues in order to be able to do more with students. Many of the planning meetings involved in-depth teacher discussions about local environmental issues; Lisa asked the most questions. As noted, she did not feel comfortable with discussing environmental issues but recognized that she needed to learn more about them. Lisa stated in her autobiography that one of her goals was

For students to become more aware of how the environment is affected by outside factors and have students use problem solving skills to find solutions to their questions. I will
need some help for me to understand some environmental stuff so I can work with the students better. If I understand it better, then I can use the knowledge and help them apply it to pollution in the stream.

When she planned her portion of the environmental service-learning unit for her math classes, she focused on student analysis of local stream data, with an emphasis on variations of the data as a reflection of the local environment around the stream. Reflecting on her attempt to use authentic data to stimulate student awareness, she shared her thoughts during a focus group meeting,

A question I ask myself is: OK, How can I incorporate environmental issues into math? I figure they could relate to the stream data since you taught them about each parameter collected and how they are pollution if not at the correct levels. Also, since many of them live in the subdivisions that the stream goes through and have played near, or in the creek, it would be very relevant to their lives, it makes it personal.”

Lisa waited to use stream data for her environmental statistics portion of the unit until the aerial photos and maps were received from the city planner. She wanted to time her unit to best capture the interest of her students. She knew that if she just presented the stream data to the students without some type of ‘hook,’ they would find it more difficult to make connections with the data. She explained to the team,

I wanted to wait until the aerial photos came in so the students could see where the stream was and some of them could point out their homes near the stream. It added relevance to their doing the math and made them think about the environmental issues since many of them could see their homes in the aerial photos.
When reflecting on how her students handled the data, she pointed out that “the students kept going up to the aerial photos on the board. I could tell that taking them beyond knowing about issues to ‘that is my house and there is pollution nearby’ made them more interested in learning.”

Later in the final interview, Lisa noted that she could see students taking ownership for their learning. She explained “the students drove the learning after they saw the aerial photos, instead of me. They will when they feel connected to the data,” referring to the fact that the stream data ran through several subdivisions where many of the students lived.

Lisa wanted her students to make connections to the environmental data, learn statistics, and develop a deeper understanding of how an issue impacted their lives on a personal level. To accomplish this, Lisa believed that it was important for the students to understand the relationship between specific data and the statistics concepts in math, in order for them to take action on the environmental issues they were studying. The following dialogue demonstrates Lisa’s belief that environmental service-learning should foster student awareness and action on environmental issues,

Lisa: I believe environmental service-learning is when the students get an activity that deals with the environment. Whether it is going out and painting storms drains or walking through the woods. They become more aware of the issues of how the environment works and how it gets damaged. They can then start thinking about how they can help protect it.

Researcher: Why do it?

Lisa: Well, if we want to keep our environment around, when they grow up, they are going to have to protect it.”
Researcher: So this is a way to make them more aware?

Lisa: Yes, get them more aware. I think exposing them to these opportunities will only help make them more aware, where maybe before they would not have had a clue. I mean, look at the storm drain stenciling we did a couple years ago. Catherine won’t throw a cigarette butt down the drain now, so it is not just the kids that get thinking when exposed, it is the adults also.”

Researcher: Like the essay the students wrote last spring about pollution around their homes, one kid said that his uncle now takes used oil to the recycle center instead of dumping it in the back yard.

Lisa: There you go. So just by exposing them to situations, making them think, whether it is writing a paper, taking them to the park for the hike and ecosystem data collection, or having them talk about planting trees, whatever it is – we have to make them more aware because it is an important issue. Otherwise they are not exposed to environmental issues and they do not learn anything about it.

In parallel with using real data to teach math was Lisa’s desire to motivate her students. She believed that if data used to practice statistics was real, the students would learn math better. Furthermore, she also believed that if the students made a connection with the data, they would be more motivated to learn statistics. The next theme explains how Lisa saw motivation as a dimension of student learning.
**Theme 3: Motivation as a Dimension of Student Learning**

Lisa believed that environmental service-learning was an instructional method for teaching students about the environment, as well as a tool to motivate them to learn math. She valued a motto that came from her first years of teaching in her home state, “what they learn with pleasure, they seldom forget.” Several times in her weekly reflections she noted that “the students had fun.” When asked why she equated “fun” with student learning, she always referred back to the motto, “What they learn with pleasure, they seldom forget.”

An important component of Lisa’s belief in the value of environmental service-learning was her feeling that it was an effective way to engage students in mathematics. She believed that if students developed an interest in what she was teaching, they would become involved and this would lead to learning. She said that she wanted to

Provide students with an opportunity to engage in education, to be a participant in the concept being addressed and to be able to transfer that knowledge to other concepts, by their level of participation and enthusiasm for the task. This can be different for each individual student.

In a section of her autobiography, Lisa wrote, “I have enjoyed doing games and having fun in math. The kids need it, they need to enjoy math. When they have fun and use manipulatives or learn about things like the environment around them, they are more motivated.” In a weekly reflection, she wrote, “Environmental service-learning should actively engage the students in their learning.” When asked in the initial interview, “what do you want the students to get out of environmental service-learning?” Lisa’s response was

Well, if it is fun, they will learn it. If they have fun learning, they remember the lesson. I truly believe that. And sometimes I feel like I get so stale doing the same thing all the
time. Also, taking math concepts and linking them to things the kids will relate to like the environment makes sense and gives meaning to the math. I just want them to go away, and years down the road say, I remember that because it was fun or interesting. I truly believe that if they have fun and can relate to what I am teaching, they will remember it."

Linking fun with engagement and student learning was an idea that surfaced repeatedly throughout Lisa’s writings and discussions. Emphasizing her belief that using methods that students perceive as fun provides motivation for learning, Lisa said in the final interview, “Like I have said before, if you have fun doing something, you will be motivated, and you remember it. There are a bunch of things from school that I remember and it was because I had fun doing the lessons. I will never forget those things.”

Lisa also believed that environmental service-learning could be a valuable instructional pedagogy for teaching math concepts to students using real life environmental issues. Together with her belief that data used when learning math should be real and that learning should be fun, she included the idea that authentic issues and data enable students to have a more active role in their own learning. The seriousness of her beliefs is summarized by the following quote. “You know, if the students drive the learning, instead of us always, they will be more motivated and want to learn. We need to do that more often.” Lisa wanted to use real data in her math lessons, make students aware of environmental issues, and use environmental service-learning as a way to motivate everyone to learn; these beliefs influenced how she planned and negotiated environmental service-learning with her team mates.
Question 2 - How did Lisa plan and negotiate environmental service-learning?

Lisa was an active member in planning the environmental service-learning unit. In the beginning, Lisa saw her role as an integral part of the team’s activities, but the nature of her participation in the process changed when she registered to redo her National Board certification on February 1. She shifted her contributions in planning meetings from, “We could do” to “I need to do.” The other team members responded in ways designed to help accommodate Lisa’s requirements. This change in how she participated in negotiating environmental service-learning curriculum and other themes identified and supported in this section are: (1) the role of teacher confidence in planning interdisciplinary curriculum, (2) covering the mandated curriculum, (3) the quest for National Board certification, (4) bottom line: teacher accountability, and (5) the life worlds of home and school: living with the tensions.

The primary planning of the environmental service-learning unit began on January 4 and continued until February 7, though there continued to be efforts to plan during the implementation phase that ran from February 14 to March 4. The interdisciplinary team first met on January 6 to plan the unit and agreed that it would probably start in three weeks, by January 24. The delay in implementation was due to the many demands on the team for their planning times. Of the 43 planning segments during this study, Lisa attended:

- Three scheduled environmental service-learning meetings,
- Two unscheduled environmental service-learning meetings,
- Nine segments for parent conferences (during planning),
- Three faculty meetings,
- Two student support team meetings (team teachers, assistant principal, counselor, and parent),
- One curriculum meeting,
- Three staff development meetings,
- One absence due to illness,
- One absence due to a curriculum meeting at another school.

Although she had nineteen segments during her planning period with nothing recorded as scheduled, they were used for developing her math curriculum, non-environmental service-learning team meetings, and other routine activities normally conducted during planning.

Planning segments during the first week of January were also used to unpack and get settled from the move from her trailer to inside the building (new addition opened the day before winter break).

The lack of time to do everything she needed weighed heavily on how Lisa planned environmental service-learning. In the middle of the final interview, she raised her hands in frustration and said, “There just isn’t time to do everything we have to do.” Unlike Catherine and Margaret, Lisa could not count on having time before or after school for meeting or working by herself. Lisa’s home responsibilities required that she get her young children ready for school; thus she arrived at school at 8:30AM most mornings. With students entering the school at 8:55 for homeroom and attendance, Lisa used the 25 minutes before the students arrived was used to prepare for the day. In the afternoon, teachers were permitted to leave at 4:30PM. Though classes ended at 4:00, all students did not leave campus until 4:30 because of the size of the school and number of buses needed to load and transport the students. Lisa occasionally stayed to catch up on work but usually left when all the students were gone to take her daughters to their after school activities.
All the teachers in the school were required to plan lessons in accordance with a scope and sequence published for each academic subject. The math scope and sequence outlined the topics to be taught each week and all teachers were required to cover the same material for the end of nine-week exams. The math scope and sequence for January, February and March is provided in Appendix J. It shows that statistics was scheduled for February, so when Lisa was planning her portion of the environmental service-learning unit, she tried to correlate unit activities with the time statistics was scheduled to be taught. Though she said she ‘decides to do something, then does it,’” in the first planning meeting, she preferred to let the statistics lessons she planned for the environmental service-learning coincide with the already scheduled unit in the mandated scope and sequence.

The math scope and sequence is presented to provide a sense of what was in the back of Lisa’s mind throughout the planning of the environmental service-learning unit; she was required to cover the designated material within the given time frame. Lisa did have some flexibility in terms of the specific days she taught the material. However, Lisa commented several times on how the nine weeks test scheduled for the end of the quarter was a direct reflection on her ability, as the administration compared the scores of the students across all the teachers.

Theme 1: The Role of Teacher Confidence in Planning Interdisciplinary Curriculum

Lisa had been a member of the interdisciplinary team for five years. During those years, the team conducted varying versions and scopes of environmental service-learning. Being familiar with environmental service-learning, Lisa’s response was very ‘matter of fact’ when asked “how do you plan and do environmental service-learning?

OK, it is like, I want to do this. Everyone agrees that they want to do environmental service-learning. We sit down and talk about it when we have time. Then we sit down
and come up with ideas, and from those ideas, in the time we have, we take it from there and run with it.

Her response also indicated that she included the team as a part of the planning effort,

We are willing to do whatever it is to get things done, to make it work. Flexibility is a big, big key in making an interdisciplinary team plan and work together. I think my part will work as long as we sit down as a team and figure out what it is, what is our goal for this project? It won’t work if I don’t know what the goal is, because I’m the type of person that I need to know, OK, what direction are we going to? What expectations do I have? OK, now I can do this.

Lisa’s confidence seemed high entering into the environmental service-learning planning phase. She discussed her strengths and weaknesses with respect to environmental service-learning and noted her aptitude for, “knowledge of math content, being able to approach a concept from many angles, and provide students with ‘hands-on’ experiences.” These strengths complimented her belief that environmental service-learning can be a motivator for otherwise unmotivated students. They also were a reflection of her high comfort level in terms of planning interdisciplinary units. She noted her “lack of science knowledge” as a primary weakness. Nevertheless, her confidence in her math teaching prevailed over the lack of understanding regarding science. She asked many environmental questions during planning sessions to learn and understand science concepts that would help her teach math content through an interdisciplinary approach. She asked Thomas many times to explain some aspect of environmental science during the team meetings. While Lisa seemed confident and committed to the environmental service-learning effort throughout the study she remarked that there was not enough time to plan, ‘when we have time to sit down and talk about it’ and, ‘in the time we
have.’ Struggles with time were evident with all the teachers who were committed to environmental service-learning. Her feelings regarding the lack of time seemed to be driven by a belief in the need to cover mandated curriculum, as will be discussed in the next theme.

**Theme 2: Covering the Mandated Curriculum**

Lisa projected a comfort level with respect to using environmental service-learning curriculum as a vehicle for teaching math content. This comfort level connected well with the belief that her mandated curriculum was important and environmental service-learning was a tool to use to teach her students math. “I think that curriculum’s important because I think there’s something that when the kids leave you they should know certain objectives. Environmental service-learning is a good way to teach the students what they need to know.” The required scope and sequence described in Table 10 required Lisa to teach statistics the second week of February. However, Lisa’s confidence allowed her to offer the team, “you need me to start my stream analysis and statistics, so I will.” Though she offered to change her teaching sequence to meet the team’s needs, they were not ready to implement the environmental service-learning unit. As the planning phase progressed, she seemed to get very excited about her plan for teaching statistics using the stream quality data. At a team meeting in February, as the start date was delayed, she said, “It looks like this is going to work out well. I will be able to do my National Board portfolio retake, teach statistics, and do environmental service-learning when we are ready to start next week.” As discussed in the introduction to Lisa’s within-case analysis and a later theme, her National Board portfolio requirement later entered into the curriculum negotiation process.

Lisa’s goal was to cover the mandated math curriculum within the context of the environmental service-learning unit. As will be discussed in Lisa’s theme regarding teacher
accountability, she felt the pressures to keep pace with the required scope and sequence. However, when reflecting later about her teaching in relation to the environmental service-learning unit, she noted,

Researcher: Do you feel like you had to give up anything to do the environmental service-learning unit?

Lisa: No. I just had to switch around the order that I was going to teach something. I didn’t have to give up anything, though I do wish that I had more time to do more things with the environmental service-learning and the kids. Unfortunately, the demands of high stakes testing influences the pace and tasks I offer my students. I wanted to do more.

The tension between her desire to do more environmental service-learning with her students, while still fulfilling the requirement to cover the mandated curriculum, was evident in this closing reflection.

Theme 3: The Quest for National Board Certification

Lisa was in the process of redoing a portion of her National Board of Professional Teaching Standards certification portfolio during the time for planning and implementing the environmental service-learning unit. She had submitted her portfolio two years prior to this study but did not attain certification. Subsequently, she redid a portion of the portfolio the following year, yet still failed to attain certification. The resubmission period, which happened to correspond with the environmental service-learning unit, was her last attempt to attain certification and weighed heavily on her mind throughout the planning and implementation phases of the study. The National Board resubmission needed to show that she had the ability to teach students in small groups and use student discourse and technology to improve learning.
Since Lisa had attended the same weeklong class as her teammates, and had conducted some versions of environmental service-learning before, she planned her National Board resubmission around the environmental service-learning unit. In her words, “killing two birds with one stone.”

Lisa’s need to complete her National Board submission was a significant factor in how she planned and implemented the environmental service-learning unit. She started the planning effort in January, discussing plans for the unit as an equal contributor. When she brainstormed ideas for the unit, there was never any mention of the National Board requirement. However, after she registered for the resubmission, her contributions to the planning process changed from how she could participate with the rest of the team to, “I need to do small group discussions for the National Board video.” In one weekly reflection in February, she wrote, “looks like the data will work for my National Board.” She said in the February 14 planning meeting, “I need to show the students disagreeing and discussing the stream data in the National Board video.” The environmental service-learning unit became a method for her to use to collect the necessary video and archival evidence she needed to submit to the National Board. Gathering the necessary information needed for her submission was front and center during all the February planning meetings and in her classroom.

Lisa and the other teachers knew that she needed to take steps to manage the outcome of her National Board video portfolio. The two biggest factors in managing the outcomes for Lisa were selecting the students she needed to videotape for her portfolio entry and determining the data she wanted to use for teaching statistics. To increase the chance of showing student achievement in her videotape, the teachers collaborated at the February 14 planning meeting and agreed to let Lisa hand pick the twenty-two students that she wanted for her remediation. Her teammates randomly divided the others among themselves for the last remediation/enrichment
cycle. As for the information to use for teaching statistics, Lisa wanted to make the results of the data analysis portion of the environmental service-learning unit as predictable as possible. Thomas never finished putting together the stream data collection portion of his planning, so Lisa and Thomas worked together to “create” stream data that would assure desired results. When the aerial photos and maps of the watershed arrived, Lisa and Thomas chose four locations that would be easy for the students to identify (road crossings). They collaborated and agreed that dissolved oxygen, water temperature, number of bacteria colonies, and sediment lead would be good measurements to use since Thomas had discussed these parameters in his science class when teaching a unit on fish. Weather data needed to be included so that some of the variations in stream data might be explained. Neither Lisa nor Thomas had stream monitoring equipment or any historical data from the stream so they decided to “create” data that would work for her intended statistics lesson and tell the students that it was real data. To guide the student analysis, they also generated guiding questions. The data and questions are included in Appendix K.

The portfolio entry that Lisa had to complete became the focus of her effort, though she never directly stated this anywhere in her reflections. Later, in describing how she evaluated student learning, her requirements for compiling a National Board portfolio never surfaced. However, the discussions in planning meetings and the ways in which her teammates changed plans to help Lisa meet her requirements were obvious. In terms of negotiating curriculum, the National Board requirement gave Lisa leverage over what the team ultimately did for the environmental service-learning unit.

Theme 4: Bottom Line--Teacher Accountability

Throughout the planning process, Lisa frequently brought up school pressures that affected how she planned her portion of the environmental service-learning unit. The pressure
she felt surfacing most frequently was the need for her students to pass the four academic subject tests administered by the school district (language arts, math, science, and social studies) in April in order to be promoted to the eighth grade (grades for the year did not count toward promotion). Additionally, the State Department of Education administered a criterion-referenced test for all schools in the state in order to develop report cards for school compliance (No Child Left Behind). Lisa also felt the pressures of a mandated scope and sequence for each subject around which success is measured by the end of nine week tests (the school’s administration used the end of nine week tests to compare teachers within the building). The required parent conferences in November and February (for all students with academic or behavioral issues) also created pressures from Lisa’s perspective.

The pressures of high stakes testing started for her at the ‘welcome back from winter break’ faculty meeting on January 4, when the principal reminded everyone that testing began in 57 days. Lisa was concerned for her students but also for the other math teachers since she was the department chairperson. At one team-planning meeting, when it was obvious that the environmental service-learning unit planning was progressing slower than anticipated, and Thomas asked if the unit could further slip into March, Lisa’s reply was, “NO. I am thinking April testing, no environmental service-learning then.”

Every academic subject teacher had to administer the end of nine weeks exams to assess student comprehension of the required curriculum. The tests were standardized for the entire grade level, according to subject, so that the administration could compare student scores for each curricular strand to identify strengths and weakness of all teachers. The end of nine weeks math exams were scheduled for March 17. Lisa planned to conduct environmental service-learning during her math academic period but had to reduce the amount of time to be sure that
she covered the curriculum that was to be included on the end of nine weeks exam. Lisa explained the pressures she felt concerning these tests in the final interview. When asked, “If Thomas was not pushing the environmental service-learning unit, would you do it yourself?” She responded

  I would continue to do something like it – yes. But stress wise right now, I’m telling you, I do not know. We are sitting there (in math meeting) and they (administration) are looking at the scores of our finals, and it is like you got to teach, you got to teach, got to teach. I feel like I have lost my originality because I have to teach this one day and the next day I have to go on to the next section. And all the fun stuff I used to do? I feel like I’ve lost that. That is why I am seeing their success goes down. So when I see and do stuff like service-learning, I see how beneficial, it makes realize how I … don’t care what it is, I need to get back to this type of thing.

‘March Madness’ testing preparation weighed heavily in Lisa’s planning. As the seventh grade math curriculum chair she was responsible for planning the review program for the April high stakes testing. March Madness was the principal’s initiative to prepare students for the April high stakes testing by rotating them between each of the interdisciplinary team teachers, school-wide. Each student spent an additional four to five days with their academic subject teachers to review and prepare for the testing. March Madness took place during the remediation/enrichment period at the beginning of each day so subject teachers could continue with their scope and sequence in the regular academic period and have the additional time to review and prepare the students. Lisa’s role as grade level curriculum math chairperson gave her the added responsibility of preparing standard review packages for the eight other seventh grade math teachers.
Lisa was equally involved in ‘early release conferences’ (required parent conferences) scheduled system wide for Wednesday and Thursday (February 9 and 10), when all middle (20 in system) and elementary schools (approximately 60 in system) had to conduct parent conferences for students with academic and/or behavioral issues. As noted previously, Lisa and her teammates determined the need to meet with 62 of the students’ parents. Conferences were planned to be 20 minutes in length, with as many as possible scheduled for the early release days (February 9 and 10) when the students left at 1:30 instead of the normal 4:00. The remaining were scheduled before or after school and during planning periods. Lisa actively participated in twelve segments of parent conferences before and after school, even with her need to be at home for her daughters. The time to prepare for the conferences with parents and the actual time meeting consumed many hours that could have otherwise been spent planning environmental service-learning. As Lisa said in her final interview, “I wanted to do more environmental service-learning but there just was not enough time to plan everything I wanted to do.” The tensions between home and school life were obvious in her reflections, the team planning meetings, and final interview.

*Theme 5: The Life Worlds of Home and School--Living with the Tensions*

Lisa was the mother of three daughters, two of which were still at home, in fourth and eighth grades. The third was attending school at a nearby college. The girls required time and energy from Lisa many times throughout the environmental service-learning unit. Her fourth grader was on a different daily schedule so Lisa would often arrive at school just in time for the 8:30 AM required reporting time after getting her daughter to school in the morning. In the afternoon, Lisa would leave once phase II of the bus call was completed (at 4:30) so that she could get home to her fourth grade daughter whose school let out an hour before hers. In
addition, her eighth grade daughter had tennis practice and matches that required her to rush home. At an unscheduled meeting, Thomas and Lisa were talking in the hall about how behind they were with grading and gathering information the administration wanted the teachers to input into the main student management computer system. Thomas said that he planned to stay until 7:15 PM that evening until he had to leave to pick up his daughter from soccer. Lisa’s response was, “I wish I could but Martha has a tennis match and it is on the other side of town.” In the final interview, the stress that Lisa experienced was obvious by the look on her face and in her comments when asked if her home life affected what she did at school. Her reply was very direct.

Getting the kids here and there after school is a lot of stress. My middle daughter is very good at tennis and her matches are right after school, all over the metro area. I rush out of school to pick her up and get her to the match on time. My youngest calls me and asks when I will be home. Her school gets out more than an hour earlier than ours and she wants me home. When my husband is home early, that helps but he usually has to make his sales calls when his customers want him there. Then he travels out of town often, which makes it harder for me after school getting everything done. Yes, my home life impacts how I teach.

Lisa’s role in the planning and negotiating process was somewhat different than the other teachers. She had many of the same constraints and requirements placed on her as the other teachers, but also had the added weight of the National Board requirement, which impacted how she negotiated with the other teachers and how they reacted to her needs. Lisa’s children factored in to how she planned and implemented the environmental service-learning unit as well. Thomas also had children at home, so the two shared common pressures they felt from commitments to
their families. Personal needs, while not a part of Lisa’s school duties, weighed heavily on how
she participated within the context of the interdisciplinary team. The fact that Lisa had been a
part of the team for seven years probably reduced the negative impact of these factors;
nevertheless, they were still significant. The manner in which Lisa implemented the
environmental service-learning unit will be described in the next section.

**Question 3 – How did Lisa implement environmental service-learning?**

This particular team of teachers worked in a unique situation, with an administration
supportive of environmental service-learning, something that many other schools may not have
at their disposal. Interdisciplinary units conducted within a team of teachers usually means that
each teacher contributes to the overall implementation of the unified theme in his or her
academic class (Jacobs, 1991). Lisa conducted environmental service-learning lessons in her
math class two times during the execution of the unit. At the beginning of the planning phase,
Lisa planned to do more in her math class, but as January passed, she talked less of doing
environmental service-learning in her math class and more during the morning remediation
period. The shift in the focus of implementation towards her math remediation class appeared to
be related to the deadlines imposed on her by the National Board and the rigidity of the math
scope and sequence used by the seventh grade teachers. Lisa needed to conduct her National
Board unit before March in order to write and submit it by April. Her National Board unit
focused on small groups and statistics application (e.g., mean, mode, median, range, bar graphs,
line graphs), using the stream data. On February 11, Lisa came to Thomas’ classroom to tell him
that she “got the stream data into a spreadsheet. My math classes are starting statistics this week.
The data and timing is perfect.” Her enthusiasm and belief that things were working out was
obvious.
Knowing that the team had special permission to use their academic and remediation/enrichment classes for environmental service-learning, each teacher was able to plan his/her parts of the unit for different time segments. Lisa chose to integrate the environmental service-learning into her remediation class and regular math classes. She included environmental service-learning portions in her math academic class two days and eleven days in her math remediation class. Lisa implemented some of the environmental service-learning unit activities at the same time as others teachers did, as well as some during her math class. Some of her environmental service-learning activities were different than her teammates, however, because of the National Board certification requirement and her strong desire to analyze stream data from the nearby creek. While many of the environmental service-learning activities she conducted were the same as the other teachers, the things she did differently were significant.

When initially planning the environmental service-learning unit in January, it seemed that all the teachers would do similar environmental service-learning activities in their remediation/enrichment classes and customize the unit in each of their academic classes as identified in the approved plan. However, as noted in how Lisa planned and negotiated environmental service-learning, her National Board requirement took her on a route the others did not follow. This tangent was not disruptive to the interdisciplinary team’s effort. As Margaret said in the January 25 planning meeting, “Everyone does not need to do the same thing for the environmental service-learning unit. The kids will just experience different things, which is also good.”

**Theme 1: Conducting Environmental Service-learning as a Concurrent Team Effort**

Lisa was an integral part of the interdisciplinary team. She planned the environmental service-learning unit with the others throughout the study and implemented many of the same
activities in her class. Lisa conducted environmental service-learning concurrent with the other interdisciplinary team teachers in two ways. The first way involved implementation of the unit activities in her math class. The team planned for each teacher to conduct a portion of the activities in their academic class so that students would see the cross-curriculum nature of the interdisciplinary unit. Secondly, during her math remediation period in the morning, she implemented lessons which were similar to those of the other teachers. For the remediation/enrichment period, all the teachers wanted to do similar activities in order to emphasize the importance of the lessons and make connections between content areas.

There were two specific activities implemented in Lisa’s math class that demonstrated to students interdisciplinary connections. The first was Lisa’s use of biomass and biodiversity data collected in the fall during a science field trip to a local park. During this field trip, Thomas taught the students how to collect data from three ecosystems to estimate the biomass and biodiversity of each. The students collected the data knowing that Lisa was going to use the data during their statistics unit. Lisa had the students calculate mean, mode, median, range, and inter-quartile ranges using this data. She then had them triple bar plot the data for a visual comparison of the ecosystems. Lastly, she had the students plot the data in line graph form. Using the three data analysis methods, she had the students interpret their findings and write responses explaining their understanding of the relationship between the two variables for each ecosystem. The data and directions for this activity are included in Appendix K. The interdisciplinary nature of the assessment was demonstrated to the students when Lisa scored the math portion of their work, Catherine the writing portion, and Thomas the explanation of the relationships.

The second specific instance of Lisa’s implementing interdisciplinary curriculum concurrently with the other teachers involved her analysis of the stream data lesson (Appendix
K). Though the numbers were not the authentic data collected, Thomas taught the students about the parameters supposedly derived from the stream and what varying ranges of the data meant. For example, he explained that when the water temperature increased, the dissolved oxygen levels decreased with hope that when students plotted the data in math, they would make connections with what they learned in science. As the students conducted their statistical analysis of the data over several days in Lisa’s class, many students asked Thomas for insights or ideas as to what specific patterns in the data might indicate. He would then give them ideas to consider with respect to statistical applications. The students were able to see how the subjects they historically had learned independent of each other were really connected. Lisa commented in a planning meeting, “When we were talking about the water quality data, there were students in each class that said that they talked about pH, dissolved oxygen, and turbidity in science so knew what I was talking about. It made my job easier, especially since I do not understand the science behind the water quality data.”

The interdisciplinary team agreed to use the eleven days of remediation and enrichment classes to conduct environmental service-learning between February 16 and March 4. Several of the activities were planned for everyone so the students saw their classmates doing the same thing. The three activities that Lisa implemented with students during the eleven remediation days were the NIMBY position posters, presentation design for the city planner’s culminating activity, and an environmental word find. Lisa said that she struggled with trying to include her students in the activities the others were doing. She wanted them to have as much time as the other students to prepare their NIMBY posters for the city planner’s culminating activity. “I feel bad that they can’t spend as much time on the posters as the others but I have to get the National Board video done.” When Thomas indicated during the team meeting that it was okay if Lisa’s
students did not do the posters, she responded, “I want my students to be able to participate with the city planner when he is here next week. I will work some time in so they can do their posters and prepare for his presentation.” She did provide time for her students to prepare NIMBY position posters and present them to the city planner on the final day of the unit.

**Theme 2: Conducting Differing Environmental Service-learning to Fulfill Other Requirements**

Lisa conducted several environmental service-learning activities that were not concurrent with her teammates in any way. These activities were solely in response to her requirement for the National Board certification portfolio. Though the other teachers could have done these activities with their students, it seemed they preferred to let Lisa do them on her own. The other teachers did not want to take class time to do what Lisa wanted to do for her portfolio requirement, no matter how good they thought it would have been for their students.

Lisa did two activities with her students during the remediation period that the other teachers did not conduct with their students. When asked why she chose to do the two activities during remediation instead of math class, Lisa explained,

I could have done more of the statistical analysis in math class. It would have been more difficult but I could have done it. But remediation time is not a graded period and with all the stuff I had to cover before the nine weeks test, the remediation period was the best time for me to do it.

The first activity involved preparing the students for understanding the idea of an emotional response to an environmental issue. Lisa introduced the topic of subdivisions and shopping centers and initiated a lively discussion of the pros and cons of development. She described the lesson the next day at a planning meeting.
I took what you did with them Thomas for predicting environmental impacts and had them debate the pros and cons of development. It was going fairly well until I asked them if they thought it was right or wrong to be building so much? That is when it got pretty emotional and heated at times. Most were against developing but had a couple that did not see anything wrong with it. If it was their land, they should be able to do anything they want with it.

She then gave all the students a copy of a newspaper article about the ethics of development and gave them a few minutes to read it. When talking about the class discussion in a meeting later in the week, she said

They surprised me. I know that seventh graders are big on what is right and wrong but I didn’t think they cared about the development as much as they showed me the other day. They made good, strong arguments for their positions concerning the growth issue, whether they agreed with the guy in the newspaper or not.

The ethics discussions laid the groundwork for Lisa’s introductory lesson on analysis of the stream data. Lisa explained

I wanted the students to see how they could use real data to figure out if development was right or wrong. The subdivisions the stream flows through were about twenty years old so the students could see if the stream was being polluted or not, an issue they brought up during their arguing the day before, by development.

The reason Lisa used this progression in planning her environmental service-learning unit was directly related to her National Board certification. She was required to show discourse among her students in math class and illustrate how she could use data to facilitate discussion and development of conclusions among her students. The stream analysis lesson is included in
Appendix K. Reflecting on how the stream data analysis went in her final interview, she commented,

They did a good job predicting what was causing the variations in the stream data from station to station. When we video taped them on the last day, I got several of them on the tape arguing and you could see them changing their ideas as they listened to the other explain their ideas about what the data revealed.

Lisa’s ideas of success with respect to student learning and the environmental service unit will be discussed in the next section. Lisa wanted to see her students engaged in the lessons and take an active role in their own learning.

*Question 4: How did Lisa evaluate student learning during the environmental service-learning unit?*

Lisa seemed to love math and numbers, so much so that the original assertion of this study was that she would evaluate student success within the environmental service-learning unit using a quantitative method, such as grades. However, Lisa said that she measured student learning by observing if they were engaged and seemed to be internalizing the concepts. Another criteria Lisa used to “measure” student learning was the participation of students who were not usually high achievers, as evidenced by moments when they got to shine. She did not mention grades or any quantifiable measures that the math teacher in her might have used to evaluate success. In essence, Lisa evaluated student learning during the environmental service-learning in terms of three criteria: (1) student engagement as a measure of learning, (2) shining moments for at-risk learners, and (3) the importance of meeting specific goals. Each of these themes is described and supported with evidence in the following sections.
Theme 1: Student Engagement as a Measure of Learning

Lisa wanted to see her students actively engaged in lessons and activities in her classroom. Lisa described her criteria for learning as, “If the student is a participant in the concept being addressed and by their level of participation.” When she evaluated how her lessons went in her weekly reflection journal, she repeatedly noted that she could tell students were learning, “because they were engaged.”

When Lisa reflected back over the entire environmental service-learning unit, she evaluated student learning in light of the lessons where they analyzed the stream data changes from one sampling station to the next. Lisa responded, “Yes, they were all engaged.” When asked how she knew that students were learning simply by being engaged, Lisa responded, “They were arguing over there (pointing to the other side of the room). They were discussing different things about the creek, where it went, and what could cause the pollution. I could tell they were learning.” For her, engagement demonstrated that learning was taking place and measuring the extent of learning was not important.

Lisa did not take any math grades during the environmental service-learning unit. There were three days where she conducted lessons on statistics using environmental data but student work during this period was not graded. The remediation/enrichment class was not a graded class. When asked about the need for grades, Lisa’s response was:

Researcher: To measure success with environmental service-learning, do you need a paper and pencil test?
Lisa: NO!
Researcher: You did not even hesitate.
Lisa: Well no, definitely not. They were engaged in the discussions. My motto
is ‘things that you learn with pleasure, you remember’

Lisa repeatedly said that she evaluated success of environmental service-learning by looking for student engagement. During an interview, she shed further light on her belief that student engagement signified learning was taking place.

Researcher: How is being engaged evidence of learning?
Lisa: They were up front discussing different things about the creek, and where it went and what could cause the changes to the stream data. They were looking at the scatter plots to predict things. They were showing me mathematically that they knew what the scatter plots meant. Things that were not black and white, they were figuring out. I would listen to them argue in their groups and they would figure things out. I could hear them put the pieces together – “Oh yea, Ms. Jones said this the other day, etc.” They were answering the questions on the prompt sheet without asking me many questions.

Researcher: Did you look for anything else?
Lisa: Yes, how well they backed up their cases.

Lisa’s definition of learning, as described in her initial autobiography was, “participating in the concept being addressed, by the level of participation and enthusiasm for the task, and it can be different for each individual student.” Based on this definition of learning and her use of engagement to assess it, her reply when asked the following question may have her rethink her assessment ideas in the future.

Researcher: How do you know that one did not answer the question and the others just copy it?
Lisa: They were discussing it, but that is a good question. I mean, did one person say, “I think it is this” and they all write it down? I don’t know, I really don’t know.

In Lisa’s final reflection, when asked how she felt the environmental service-learning unit went, as a whole, her response was, “mostly successful, they were actively engaged by the activities. Statistical analysis went well. I could tell by responses students gave from the activity.”

It was obvious that the most important method Lisa used to evaluate student learning during the environmental service-learning unit was observation of her students and the degree and intensity with which they engaged in the material. However, there was another aspect of engagement that was important for Lisa – the extent to which students who normally do not participate or demonstrate success in class are able to excel during the environmental service-learning activities. She described the moments where students excelled beyond their normal demonstration of success as “shining moments.” When these invisible learners were able to brag, show enthusiasm for class activities, and take pride in demonstrating understanding to their peers, Lisa considered this an example of student learning. This theme, shining moments for at-risk learners, is discussed in the next section.

**Theme 2: Shining Moments for At-Risk Learners**

The shining moments displayed by students were a very important form of evidence that Lisa used for assessing learning. As noted above, there was a hesitancy to admit that she knew all students were learning simply by observing their engagement. Lisa acknowledged that some students were just writing answers given to them by group members. However, when Lisa talked about individual students and how she knew each was learning, she would smile and beam with
pride for the student. One exceptional shining moment that she discussed centered on the story of Jonathan.

Jonathan, he is not a high achieving student. He was sitting with some kids in his group that are high achieving and he was arguing with them about how the pavement heated the water and that was why the stream water temperature was rising and they did not agree with him. So when I said “Yes” that is why, he yelled “Yes” and said, “You all thought I was stupid.” Whereas I had a high achieving student (Richard) I really had to pull it out of him. He wasn’t connecting it all together. Maybe it puts the lower kids up the upper level since it is a different way of learning. It allowed Jonathan to shine.

Lisa also discussed “shining students” in relation to the culminating activity for the environmental service-learning unit. During this activity, the city planner had visited the classroom and the teachers opened the folding walls between two of the classrooms so that all 100 students on the interdisciplinary team could participate in the discussions. Students had an opportunity to speak for or against a hypothetical rezoning request in front of the city council (made up of three students). While several students presented their cases to the city planner, the council members listened and voted to approve/not approve the rezoning request. In this example, Lisa’s perception of student learning was explained:

The session with the city planner was great. The students that presented their cases were NOT (emphasis) the ones I expected, the slow versus fast learners. What impressed me were the people that got up and spoke. And they did a good job! (As if she was surprised). Not the ‘smart’ kids – because they are not worried about not looking right. The kids that got up just enjoy being the center of attention. They voiced their opinions well.
Shining moments for students that normally did not get to experience success told Lisa that she was effective in facilitating student learning for her parts of the unit.

For Lisa, another form of shining moments was when students who typically had difficulties internalizing concepts demonstrated to her that they understood a particular idea and believed in it. As noted earlier, Lisa determined success by the level of engagement, and frequently took her observation of engagement as evidence that students could relate to the information. In her terms, “they were able to internalize the content.” When asked how she knew that a student had internalized the content, her reply reflected a sense of pride.

Mainly by observation. The maps in my room, the kids could see where they live. ‘I live here, I live here.’ They were totally into the maps. We made it personal and relevant to them. Having Mr. Planner come in – it really added relevance. The questions they asked him the first time compared to the questions they asked the second time were so much better. You knew the students had gained some type of understanding, they had grown.

Lisa looked for evidence of ownership by looking for enthusiasm among the students. When the students were not showing enthusiasm for the initial focus question, “Why should ‘they’ continue to allow development of housing subdivisions and shopping centers along Breadloaf Parkway?” (Appendix H) and the teachers changed the focus question to “Are you a NIMBY or NOT?” Lisa felt that the students suddenly took ownership for their learning. Lisa noted that after the change of focus question, “when discussing issues of NIMBY or NOT A NIMBY, students quickly chose sides and enjoyed discussing issues.” She said in the final interview that, “They were at discourse with each other. I mean, they were actively discussing it.” For Lisa, student discourse pointed to ownership. According to Lisa, if students felt strongly
enough to argue a particular position, they must have developed a sense of ownership with respect to that issue.

*Theme 3: The Importance of Meeting Goals*

The only math academic goal that Lisa identified for her students during the environmental service-learning unit was to master statistical analysis (mean, mode, median, range, inter-quartile range, and graphing) by using real environmental data. However, because she believed students should extend their knowledge beyond environmental awareness and be motivated by the lesson, she implied other goals beyond academic. As noted earlier, Lisa felt that students demonstrated motivation and learning by the level of their engagement. The following evidence supports Lisa’s need to see her students meet implied curriculum goals, as well as the stated academic goals.

Lisa noted that through “statistical analysis of Pew Creek data – students used their knowledge and successfully transferred it to the service-learning unit.” She did not explain how she decided this and whether students were successful. When reflecting on student learning, Lisa tended to generalize, speaking in terms of all or none. With over 100 students on the team, it seems unlikely that all 100 were successful in meeting the goals for the math component of the environmental service-learning unit. When asked for her definition of learning, Lisa wrote, “being a participant in the concept being addressed and being able to transfer that knowledge to other concepts.” After completing the environmental service-learning unit, she was asked to share her perspective on student learning.

**Researcher:** Were your students successful?

**Lisa:** Their answers were good

**Researcher:** So, is good successful?
Lisa: It depends on what your learning goal is. Did I want them to use statistical analysis to look at the environmental service-learning lesson and make predictions about the future? As a future taxpayer – so they had to think down the road, and they did do that – YES that part was successful. I wanted the students to become involved and apply what the learned to a ‘real world’ issue, like the environment.

Later in the interview, Lisa elaborated further on her definition of student learning

Lisa: When the kids did all that data analysis and discussions, I saw in their responses that the kids were thinking analytically and connecting science with math. I had some really arguments. Even the ones that I originally thought were not that good, when I went back and watched the video tape I made for National Board of their table talk, examined it, there were things that the kids got that I didn’t realize that they had gotten. They were making connections, even though they could not state it very well mathematically. And they did the math right. Doing the math, then communicating it, was hard for them.

Researcher: There were some tough concepts there, connections that you were asking them to make.

Lisa: There were, but I was surprised at how well they made the connections. It didn’t feel like last year, when I led them a lot into answering. This group really did well, some of them I would not have guessed, really got it.

Lisa was very excited because she felt that her students had made connections and understood the importance of using real data and math analysis to develop personal conclusions and
positions on issues. Environmental service-learning was a method for her to extend her students’
thinking and from the evidence above, Lisa thought students had demonstrated learning in this
regard.

Within-Case Summary: Lisa

Lisa saw environmental service-learning as a way to make students aware of
environmental issues as well as a tool for motivating her students by making math lessons real
(Haas & Nachtigal, 1998; Sanger, 1997). Lisa’s passion was math, and she wanted her students
to enjoy her subject. She felt they would learn along the way if they participated in her lessons.
She saw environmental service-learning as a way to use real data that the students could relate to
so that they would become more interested in learning statistics and trend analysis. The outside
pressure that she had for completing her National Board certification retake was significant but
probably not as much as it appears in the themes discussed in this within-case analysis. Lisa was
the grade level math chair and took the mandated curriculum very seriously. She modeled for
other math teachers the importance of presenting concepts to students in terms that they could
understand and relate to. She used stream data from a local stream (though created for her) and
aerial photography of the watershed to make the curriculum relevant for students. She
participated in the whole team activities, as determined appropriate, to prepare her students for
the simulation activities with the city planner.

Lisa said that she was successful as a teacher when she was able to determine that her
students were learning math concepts and applications. She often determined her success at
teaching by the rate at which her students were engaged and taking ownership in their learning.
She said in her autobiography that learning is, “different for every kid.” Seeing students shine
where they otherwise would not touched her tremendously. Jonathan’s remarks during a group
lesson, “Yes! You all thought I was stupid” may have been enough in itself for her to decide that she was successful in facilitating student learning during the environmental service-learning unit.

Margaret – From Africa to the Far East

Margaret was the social studies teacher for the interdisciplinary team. She had teamed with Thomas for eight years, Lisa for six years, and Catherine for five years prior to this study. Margaret was in her tenth year as a teacher. She came into teaching after becoming disenchanted with the sports marketing career that she had prepared for as an undergraduate. Her mother was a teacher and Margaret had thought about the idea, but as she said, “I had to find out for myself what I wanted to do.” Going directly into a fourth grade classroom without a teaching degree, she then completed her master’s degree in middle grades education. Margaret was certified for grades four through eight in social studies, language arts, and math. Her favorite subject was social studies and she received National Board of Professional Teaching Standards certification in Early Adolescent (ages 11 – 15) social studies in 2003. In addition to her teaching responsibilities, Margaret was the seventh grade chairperson, seventh grade teacher representative on the principal leadership council, and a Teacher Support Specialist mentor for first year teachers. For a detailed profile of Margaret, see Appendix L.

Margaret’s workday usually started before the required 8:30 AM start time. Appendix M details Margaret’s daily schedule, showing she officially had 25 minutes before school to prepare for the day and a 75 minute planning period that started at 10:25AM. She liked to arrive early to catch up on paperwork and was usually available for meetings called by the administrators or for conferences with parents that could only occur at that time. She often represented the rest of the team members at early meetings until the others could arrive.
This within-case analysis describes Margaret’s beliefs concerning environmental service-learning, how she planned, negotiated, and implemented the curriculum, and how she evaluated student learning during the environmental service-learning effort. Each of the four research questions and relevant themes that emerged is discussed and supported with evidence.

**Question 1 – What were Margaret’s beliefs regarding environmental service-learning?**

Margaret’s beliefs regarding environmental service-learning centered on three themes: (1) activism: at the heart of learning, (2) the need for relevant lessons, and (3) creating agency in the students. Each theme is supported by evidence collected through primary and secondary data sources. Margaret expressed strong beliefs in the value of environmental service-learning. She was passionate about her teaching and wanted her students to leave her class knowing that they could make a difference in the world. She noted, “environmental service-learning allows the students to kind of pull together ideas and synthesize in their own minds. It is another way of teaching. And it shows them they can learn, not just in a classroom, no matter where they are.” The following discussion of emergent themes illustrates Margaret’s beliefs regarding environmental service-learning.

**Theme 1: Activism--At the Heart of Learning**

In chapter two of this dissertation, three definitions of environmental education were discussed. The first definition centered on changing people’s behaviors toward the environment (Pooley & O’Conner, 2000), the second definition emphasized “increasing people’s knowledge and awareness (Earth Education Research Institute, 1997, p. 14), and the third definition stressed the importance of creating lifelong education that causes people to understand and remain active in their role for environmental improvement (UNESCO, 1977). Margaret’s beliefs were consistent with the third definition - to remain active in the role for environmental improvement.
She wanted her students to become involved in their community, not just learn about it. In her autobiography, she wrote “environmental service-learning is getting the kids active, interested, and involved. So that they can see the relevance and they can actually get involved, other than in the classroom.” This call to action was a thread in Margaret’s planning for environmental service-learning. She wanted students to debate local environmental issues, write letters, and try to convince the city planner what was good, or not good, for their community. She expanded on this idea in the initial interview, “I want to make them aware, make them care. These are things that are hard to measure, make them care, get them involved, get them talking about the environment, get them questioning, and wanting to research more on their own because they want to do their part in saving the environment.”

Margaret said that she wanted to conduct environmental service-learning because, “I want my students to feel motivated and want to be a part of something bigger, better than themselves. I want them to get involved and care about the world/community around them.” Her initial autobiography identified one goal for environmental service-learning as helping students understand “how they can make a difference in the world around them.”

As the teachers were reflecting on what each of them had done so far that year, as baseline information that could be built upon in planning their environmental service-learning unit, Margaret brought up the ecosystem biodiversity study students conducted at a local park. She lamented the fact that students did not ‘get out much’ in their neighborhood, commenting on the value of environmental service-learning.

A good thing for any kid, especially with the population of kids we have. I think that it is even better to help with their motivation and exposure to their community. A lot of kids read about the environment but have never walked in mud, never seen a lake or stream
close up, or never gone out into the woods. I want to do it because it’s something new, that the kids have never been exposed to before. So many of these kids don’t know anything about environmental issues. I think it’s good to expose them if nothing more, just like taking them on the field trip to sample ecosystems at the Tall Trees Park. I mean, so many kids have never been to a park like that before and I can see them thinking, what an environment is and maybe they can do something to protect it.

Though Margaret probably did not know about Sanger (1997) and Haas & Nachtigal (1998), her beliefs reflected these scholars’ ideas that connections could be built to the community through environmental education and service-learning methods which in turn improves learning in middle grades students. She concluded this segment of the interview by noting that

A lot of kids just get on the bus everyday, come to school, and sit in the classroom all day. Then they go home and watch television or play video games. They have no sense of the environment. Where I am from, a small town in the mountains, you knew all families. Kids had never even been to the big city. The town was the center of a farming community that their parents always lived and worked there, been there for a hundred years, my family had always been there. Up there, if someone came on their land and cut down the trees like around here, you know there would be a fight. Up there, they have a stake in that land, because of their relatives. Yeah, I believe that.

With the belief that the kids need to get outside and make connections to the land and their community, Margaret saw environmental service-learning as a way to make lessons relevant for her students. The next theme explains why Margaret believed that her desire to create a sense of activism in students could be a foundation for creating lessons that were relevant.
Theme 2: The Need for Relevant Lessons

Relevance is the second reason Margaret wanted to conduct environmental service-learning with her interdisciplinary team. Margaret emphasized during the planning phase that if what was planned and implemented was not relevant, she did not want to do it. She noted in her autobiography that when she planned, she wanted the students to be able to answer these questions: “Why am I doing this? How does it apply to me? How does this affect me in my everyday life? Why the heck should I care about it? When I walk out of here, why should I care about what we are studying in class?” In the initial interview, when asked to clarify what she meant by the term “relevant” as used in her autobiography, she responded, “I think environmental service-learning is getting the kids active, interested, and involved in something, some topic related to the environment. So they can see relevance, and they can actually get involved, other than just in the classroom. Margaret added during an interview, “that since I completed National Board certification two years ago, I ask myself these questions for all my lessons, not just environmental service-learning.”

Margaret believed that making lessons relevant meant helping students become more connected to their community. She felt environmental service-learning could provide the relevancy needed to help the students perform better in their regular classes.

I think it definitely would help them. If they are involved and looking forward to coming to school because they’re doing a service-learning project or because they’re doing something environmental, I think they’re more apt to pay more attention in science class or pay more attention in whatever class because they know, ‘I need to know this for what we’re doing next week at the stream’ or ‘I need to know this so I don’t mess up when the city planner comes in to talk with us.’ Whether they write it on paper as notes during
class, or turn it in on a section review, they’ll know it up here, they’ll be listening more, I think ‘because they’ll take more stock in it. So, inadvertently yeah, they’re going to absorb a little more knowledge. And when they can learn about the stream that Lisa will be studying about with them and they figure out that the stream ends up at the ocean. Then in Social Studies and Math, whenever we pull out a map of our state and discuss that this is where it is by our school and here’s where it ends up. When you throw that trash or dump that chemical here in our town and it can end up down here, that’s why we don’t have a lot of shrimp in the stores. I think the kids will just be more involved, because it’s more personal to them.

Margaret and Thomas had been teammates before the other two teachers joined the group to eventually become a four-member team. During the initial interview, Margaret discussed an environmental lesson they had collaborated on many years prior. Margaret reflected on one example where trees were cleared behind the school and burned to build a subdivision. Margaret remembered how the students

Were all fired up that they were burning the trees next to the school. They could see it when they came into school. When we talked about it in class, they were mad and motivated because it was real to them. They wrote letters to the mayor and the county commissioner. That was the year the commissioner came in to speak to them because he received so many passionate letters from our kids. Yes, those letters made them feel like they had a voice.

Margaret’s belief that curriculum needed to be relevant was closely related to the value she placed on developing agency in students. She wanted students to feel that they had the power to act and make conscious choices regarding their learning, what Roth & Tobin, (2005) describe as
agency, rather than merely reacting to the context of her classroom. The following theme describes how she attempted to build this sense of empowerment in her students.

**Theme 3: Creating Agency in Students**

Margaret saw environmental service-learning as a means for developing students’ agency, “the power to act and make conscious choices regarding their learning rather than merely reacting to the context of the instruction (Roth & Tobin, 2005, p. 5)”. She wanted her students to have a sense of purpose for what they did in school and take responsibility for their learning rather than just respond to her lessons in the traditional sense. In her autobiography, she emphasized, “I want my kids to be active and wanting to learn, discover, and act on their own.” In a weekly reflection, when asked how she perceived the environmental service-learning was progressing for the week, she wrote, “I want my students to feel motivated, to want to do the work on their own, not because I told them to do it.” As will be shown in how she planned for her parts of the environmental service-learning curriculum, she tried to relate all lessons to something that had meaning for seventh graders. Her goal was to provide opportunities for students to react in their own way, rather than following traditional teacher expectations; she wanted them to take ownership for their learning and become self motivated learners. Likewise, Roth & Tobin (2005) emphasize that ownership is an important aspect of developing a sense of agency.

When discussing why she wanted to participate in the environmental service-learning unit, she brought up an example from another year that demonstrated how she saw environmental issues as a motivator.

In terms of environment issues, I think when you make the kids aware and they take the initiative to do something about it on their own accord. That is powerful. Like the water
thing we are talking about doing; they will take that and run because the creek runs through many of their neighborhoods. Like when I did news reviews about environmental issues in the past, they chose articles out of the newspaper about pollution and conservation without me prompting them. Then their reactions to the articles were much better than students that chose articles about politics in the Middle East. I think when they chose articles they felt passionate about and they take a stand, you know, when they’re aware of it and it means something to them, they work harder.

Margaret continuously looked for ways to vary how she taught students social studies, either on her own or as a part of the interdisciplinary team. She viewed teaching as “a collaborative effort between students, teacher, fellow teachers, and parents,” noting that, “I would feel successful as a teacher if I instill in my students a lifelong desire to learn, keep seeking information.”

Margaret strongly believed that environmental service-learning was the best way to motivate students because of the interdisciplinary nature of the approach, emphasizing the importance of “showing kids how the subjects can relate (interdisciplinary).” As Ackerman (1989), Jacobs (1989, 1991), Burton (2001), and the National Middle School Association (2003) emphasize in their writings, it is important for students to see that subjects are interconnected for real learning to occur. Margaret’s own views on the relationship between interdisciplinary learning, motivation, and agency echo the sediments of these authors and Roth & Tobin (2002) with respect to students feeling the power to act and make choices regarding their learning.

When she discussed her social studies class and how she generally planned her lessons, Margaret responded, “Yes, activities. I try to do things that keep them engaged, get them moving around, keep them involved, and play games. There are many ways I can work environmental things into my class, active things.” Margaret’s beliefs concerning the use of environmental service-learning
as a means of creating agency surfaced later in the same interview, “If I can create an atmosphere in my classroom that the students have fun and see me as an expert on Asia, Africa, and the environment as well, they will be more inclined to take on their own learning. For example, when we were talking about the Tsunami last month and I mentioned the water borne diseases affecting the people, Josh asked if people in our community ever got sick from the diseases there. I told him ‘probably’ but when I saw his genuine interest, I prompted him to check it out on his own. As he walked away, I could tell he was going to get on his computer that night. Sure enough, he came to me during homeroom the next day with his findings.” As Roth & Tobin (2005) note, when teachers gain the trust of their students, agency is more likely to occur among the students. “I want my students to feel comfortable in my classroom and to ask questions that interest them, not just response to questions I ask from the curriculum.” Margaret wanted to create agency in her students, which she believed would in turn foster environmental activism.

Margaret’s beliefs regarding environmental service-learning were supported by additional themes that emerged from the data related to how she planned, negotiated, implemented, and evaluated the success of environmental service-learning. The following section describes her method of planning environmental service-learning curriculum and her role in the negotiation process among the interdisciplinary team.

**Question 2 – How did Margaret plan and negotiate environmental service-learning?**

Margaret was an active participant in the planning of the environmental service-learning unit. The emergent themes and supporting evidence suggest that Margaret had a great enthusiasm for environmental service-learning, but felt constrained by many obstacles that impeded her progress. She said many times throughout the planning phase of the unit that there was “not enough time” to plan the environmental service-learning unit. The other teachers brought up time
as a constraint, but it appeared more often in Margaret’s case. Referring back to Table 11, she had 25 minutes before school and a 75-minute planning period every day. This study encompassed 43 school days from January 4 to March 4, 2005. Using Margaret’s daily planning calendar, the use of her planning time can be accounted, as follows:

- Five scheduled environmental service-learning meetings;
- Three unscheduled (spontaneous) environmental service-learning meetings between one or more of her teammates;
- Nine planning periods for one or more parent conferences;
- Three planning periods for faculty meetings (whole faculty and just seventh grade);
- Two student support team (SST) meetings with the whole team, assistant principal, counselor, and parents;
- Three curriculum and staff development sessions;
- Two absences due to illness;
- Three planning periods for mentoring a new teacher assigned to her.

Although she had fourteen open segments during planning with ‘nothing’ scheduled, they were used for laying out her social studies curriculum, non-environmental service-learning team meetings with one or more teammates, and other routine activities normally conducted during planning. When asked if there was any one thing in particular that consumed her time during the study, Margaret responded, “Besides all the meetings and required tasks, moving my classroom in from the trailer took more energy than I expected.”

All teachers in the school were required to plan lessons in accordance with a scope and sequence published for each academic subject. The scope and sequence outlined what topics were to be taught each week so all teachers covered the same material for the end of nine week
exams. The social studies scope and sequence for January, February and March is listed in Appendix M. It shows that Asia was the curriculum topic scheduled for February. Thus, when Margaret was planning her portion of the environmental service-learning unit, she remembered the student that asked if people in their community could get the same diseases. He then connected the tsunami that had occurred in the Indian Ocean December, 2004 together with its water borne diseases with contaminants, to pollution in the local streams caused by leaking septic tanks. Surprisingly, Margaret had the most difficult time connecting her curriculum to the environmental service-learning unit, even though social studies included community and civics type objectives well suited for environmental service-learning.

Theme 1: A Teacher’s Self Perceptions Effect His/Her Participation

Margaret had conducted some form of environmental service-learning over the previous seven years, so she brought experience into this study. Her previous experience with environmental service-learning had both positive and negative effects on how she planned this unit. There were times that she demonstrated confidence and other times when she did not know how to proceed. Margaret’s self-perception varied with the circumstances which seemed to impact her overall role in the environmental service-learning.

Margaret appeared to be very comfortable with planning an environmental service-learning unit in the beginning. She was the only teacher to state that she does what she wants, when she wants, in spite of the mandated curriculum. In her autobiography, she said:

I enjoy the flexibility of doing what I want, how I want, each and every day. No two days are the same. I enjoy being the boss of my class and planning choices. I expect respect, good manners, and general politeness from my students. As a middle school teacher, this
is sometimes difficult; as they enjoy put-downs and often do not like themselves, much less an authority figure.

Margaret described her strengths as being “humor, sensitivity, organization, enthusiasm, and love of subject.” There were five times during the first two environmental service-learning planning meetings that the discussion stalled. When it seemed that no one knew what to say, Margaret would laugh and pull the others back into the conversation with an unrelated joke, bringing a renewed sense of energy back into the meeting.

In her initial interview, Margaret discussed ways in which the she and the team negotiated curriculum, noting, “I think we are pretty honest with each other. And we are willing to give up things from our subjects to help each other.” She was approaching the environmental service-learning unit with optimism based on awareness that the four teachers historically had worked well together planning interdisciplinary units and she expected this effort to proceed without incident.

I don’t think that any person’s a weak link. I think some of our subject areas might be weaker than others in terms of relating it to this project. When I try to relate the environmental service-learning to my mandated objectives, I can think of many ways to make it work.

Her confidence was demonstrated when she summarized her role as the social studies teacher

I don’t know what I will be doing yet, we still have to meet and figure that out. But I will be able to fit the environmental issues with my curriculum so that I am still able to get what I need to get done and tie this in so the students see that it’s relevant and important.

It was evident in this statement that Margaret was not worried about fitting environmental service-learning into the required scope and sequence.
Margaret’s confidence for planning environmental service-learning seemed to diminish as the process continued. In mid February, Margaret began to show the weaknesses she identified in her autobiography, “sometimes lack of patience, weakness in knowledge of math and science, and time management.” Her lack of patience was evident when she discussed the pace at which the team was planning the environmental service-learning in a written reflection, “the planning is taking much longer than I thought it would. There are so many other things we have to do, it seems like the environmental service-learning is the lowest priority of everything.” Her impatience was manifested in frustration toward the high stakes testing, nine weeks testing, and the lack of time to do everything (as described in the pressures theme previously). Her lack of confidence with respect to science content was summed up as she pondered the question of a team member, “without a strong science teacher, would environmental service-learning work?” Margaret’s reply was, “I don’t know how it would work without a strong science teacher being behind it. It (environmental service-learning) relates to all subjects because we show them how it relates but it is basically science, more than anything.”

In an unscheduled meeting, Margaret and Thomas discussed their part in the progress of the environmental service-learning unit. Margaret felt that she was not doing an adequate job of implementing her parts of the unit. She told Thomas, “If you just told us what to do it would be easier.” Thomas responded that he did not want to simply “tell” them, especially since all four teachers had participated in the same weeklong environmental service-learning training in June of 2002. Margaret was the grade level representative for seventh grade and had held other leadership roles over the years. Thomas told her

Remember last week in the meeting when you and Catherine volunteered to develop a mock up of the report to show the kids what they were expected to do? I had a bunch of
ideas but did not say anything on purpose. I was hoping you and Catherine would
volunteer and come up with something.

They did volunteer but Margaret’s reaction was, “I thought something like that, you just sat there
and didn’t say anything.” Margaret saw herself as a valued member of the interdisciplinary team
with input into its function. Even though she had participated in environmental service-learning
activities over the years, she saw Thomas as the leader and wanted him to tell her what to do.
Margaret believed in environmental service-learning and wanted to carry out the plans the team
developed. However, with the pressures she felt, she implied that she might have been able to do
more if Thomas had simply told her what to do. Margaret wrestled with the tension and irony of
wanting students to develop agency regarding environmental service-learning but when given the
opportunity herself to accept agency for her choices in planning the unit, she preferred to follow
Thomas’ lead.

In Margaret’s final interview, she was still committed to environmental service-learning
but felt strongly that the team should have conducted the unit as a thread that continued
throughout the entire year.

Researcher:  Are you satisfied with how we planned?

Margaret:  No. We tried, we did our best and we would get together on Fridays but
we were pushed. We got all these other meetings; each of us has our own
curriculum stuff to tend with.

Researcher:  So how should we have done this (planning)?

Margaret:  Start back in August, before school began. And I think lead up to it in
chunks. We could have, you know, instead of trying to squeeze it all into a
four-week time span, expose them to the words, and vocabulary. I think
we could have made a more of a yearlong thread. We didn’t because we are so busy doing other things.

Margaret was obviously committed to doing environmental service-learning as a part of the interdisciplinary team and her social studies class. However, when she reflected on what had been accomplished with the environmental service-learning unit, she expressed a wish that she could have done more.

Researcher: Did you give up anything (social studies) to do environmental service learning?
Margaret: Not as much as I initially planned because we did a lot more in the remediation/enrichment class period.

Researcher: If we did not have the remediation/enrichment class period, would you have done environmental service-learning?
Margaret: Yes, I would have done it.

Researcher: Would it have been harder?
Margaret: Yes.

Researcher: Why?
Margaret: Because we have testing in this county. It is a huge thing, it affects how I teach. It affects what the kids are exposed to. You know, I don’t care what subject you teach, there are great projects and great hands-on things that I used to do. I now try to squeeze as many as I can in May, after the tests. This is unfortunate because who suffers? The kids.

Frustration with the system was evident in her voice - she thought environmental service-learning was good for her students but was unable to do more because of high stakes testing.
Theme 2: When the Mandated Curriculum Does Not Match Planned Environmental Service-learning

Margaret started planning for the environmental service-learning unit at the beginning of January with enthusiasm. She started with a confidence that seemed would make the environmental service-learning unit come to life in her social studies class. In the initial interview, she explained, “I mean, I feel comfortable with the environmental service-learning. I think, ‘OK, how can I make this fit? Or ‘What do I have to do to relate it to the local community?’ I have no problem doing that and asking for help.” When the topic of bacterial borne diseases in local streams due to leaking septic tanks was discussed during the January 21 environmental service-learning meeting, she jumped in and said,

We are currently studying Southeast Asia and the tsunami that just happened (December 2004). I can discuss water borne disease in Indonesia because the people are dying from cholera, diphtheria, and dysentery. I can relate it to the lack of sanitation there and how human waste can get into the streams around here from septic tanks.

The meeting continued with her adding

Debates, I have to work with the students as to how to process discourse in cultures, there are several environmental issues, like when they cleared the woods for the subdivisions behind the school, we could debate that or the new supermarket just built near the school, and I can hit the required objectives with those.

In the February 4 planning meeting, she continued to jump in as the discussions progressed with possibilities for meeting her required objectives. “I do not have all the nitty-gritty yet. I need to work on that. I know I am going to tie some of our environmental ideas in to the Yangtze River dam in China. The students will be able to relate the loss of farmland, and communities to the
When we were talking about Israel this week, water issues came up. I related Israel’s water shortages to our state’s water issues and the talk of possible shortages in the next ten to twenty years. The kids seemed to tune in when I mentioned our home state right in the middle of the discussion about Israel. I don’t think any of them knew there is a future water shortage in our metro area.

Margaret felt that connecting the hydrologic issues of the Middle East with the projected water shortages in the metropolitan area of the school would catch the students’ attention. The school was in a region of the United States which historically was not associated with similar shortages, but was predicted to be faced with the problem in the near future.

As the planning progressed into action, Margaret had more difficulty relating the global Asian issues to the local environmental service-learning topics. The seventh grade social studies curriculum covered geography, history, current events, and map awareness of Africa, Asia, and the Middle East. The environmental service-learning unit focused on the local environment and service work. In the midway focus group, Margaret told the others, “I could teach Middle East all year long. I could teach Africa all year long. I have to squeeze each of those into three months. That is my challenge, squeezing it all in.” When another teacher commented, “width versus depth,” her response was, “yes, and I try to do things that keep them interested and engaged, get them moving, play games, and that takes more time.” She seemed to become more frustrated in the February planning meetings. In the February 14 planning meeting, when Thomas asked if there were any community action mandated objectives, she said
there are, but they are map and globe objectives for processing global information. I have
to dig deep to make them our local environmental ideas. Eighth grade would be so much
easier for this. Their curriculum is about our state, communities, maps, and history. I
could make this work if we were in eighth grade so much easier.

When the environmental service-learning unit was completed March 4, Margaret felt like
she was not successful in planning and implementing her portion of the unit. In the final
interview, when asked how she thought her portion of the unit went, Margaret commented “not
as well as I hoped.” In discussing the possibility of doing environmental service-learning in the
future, Margaret commented in a reflective manner, “Well, honestly, my goal is to figure out
how to make this work with my social studies curriculum. I have to cover Asia, Africa, and the
Middle East but we are talking about the environmental service-learning locally. I need to figure
out how to integrate the idea and pollution problems for locally to the continents I need to
cover.” When asked if she felt the environmental service-learning effort was successful, she
maintained the belief that the unit as a whole was successful, but her responses illustrated a
dissatisfaction and frustration with her portion of the unit. When directly asked, “Are the state
and local curriculum objectives that you have to meet a help or hindrance for doing
environmental service-learning in your social studies class?” her response was, “hindrance. My
objectives are so far from local environmental issues that it is hard to take regular social studies
class to do it. I am glad we have the remediation/enrichment period every morning so we could
do environmental service-learning, otherwise I am not sure I would have done much else.” The
lack of fit between her mandated curriculum and environmental service-learning slowed her
planning; however, other pressures further added to her frustration.
Theme 3: Feeling the Pressures from External Demands

Margaret started the environmental service-learning planning effort with enthusiasm and plenty of ideas for herself and her teammates. As time progressed, the impact of other teaching duties and demands began to take their toll. She frequently noted the pressure of not having enough time to cover everything before testing in April. As the unit planning continued into February and one of the team teachers brought up March Madness’ (where all teachers have to use the morning 9:30 to 10:20 remediation/enrichment period for preparing for the April high stakes testing), Margaret stopped the meeting and said in a loud, almost frantic voice, “when does that start? I better email Kathy right now and find out because we cannot do anything after that starts.” The March Madness had a mandatory start date of March 8 so all environmental service-learning planned for the remediation/enrichment period had to be completed by March 4. The team was forced to set a deadline, therefore, of Friday, March 4 for the culminating environmental service-learning simulation activity with the city planner where students would present their cases for and against development.

During a focus group discussion, Margaret described several issues that she felt caused the interdisciplinary team to plan for the unit slower than she originally had expected,

The planning went slower than expected because we did not have enough time to work on it, my mentoring duties, several of us got sick (three out of four one day), unsure exactly how and what to plan for, wait time for Mr. Planner to get back to me, harder than expected to fit into my curriculum, and too big. We tried to do too much too fast.

Initially, Margaret was looking forward to taking her students to the computer lab for in-depth research into the environmental issues near the school, to assist them in conducting debates about the pros and cons of development along the highway. When these ideas were discussed at the
first environmental service-learning meeting, she enthusiastically shared her ideas for doing all these activities (see Appendix G for the plan that developed from this meeting). Later, however, Margaret frequently noted that she did not have enough time to plan and do everything in both her comments during meetings and written reflections, as the following three journal commentaries indicate:

Weekly reflection February 18, “Maybe wait until May (after testing) to implement so that we can really give it the time it needs to be implemented effectively.”

Weekly reflection February 24, “We do not have enough time! We are pushed to get in all our required objectives before the nine weeks tests.”

Weekly reflection March 7, “Not enough time to appropriately plan.”

She wrote these comments in her reflections and said it often in the environmental service-learning planning meetings.

When asked in the final interview what the team should do differently in the future with respect to planning and implementing environmental service-learning, particularly in light of all the high stakes testing and mandated curriculum, Margaret responded:

I think we should have started in August, like when we do curriculum mapping, and integrate the environmental service-learning topics all along the way, all year in all subjects. Like when I am talking about Africa, here is how I will do the environmental service-learning.

A consensus emerged during the final focus group when the team discussed why they had not implemented as much environmental service-learning as originally planned. Margaret summed up the team’s perspective when she said
I cannot do any environmental service-learning in my social studies classes anymore. I have to make sure I cover everything before the testing starts. We cannot do anymore in the remediation/enrichment class now because of March Madness, so I guess we are done until after the tests.

The team agreed with Margaret and the environmental service-learning was put on hold until after the high stakes testing in April. In the final interview, she expanded on her comments from the focus group meeting, noting,

Test scores. The administration is worried about test scores. The idea that my students need to do well on the nine weeks tests, the seventh grade pass/fail test and the state curriculum tests was always in the back of my mind as I got closer to trying to implement the ideas we planned.

In another portion of the interview, Margaret commented on how the school administration had approved the environmental service-learning plan February 1,

Because they know it is good for the kids but the test scores are also on their minds when they say it is OK to do this. They trusted us to do what we thought best to do both, the environmental service-learning unit and prepare the kids for the tests.

**Theme 4: The Importance of Setting Realistic Goals**

The original environmental service-learning plan was very aggressive and included more ideas than the team thought they could realistically implement in the three to four weeks planned for the unit. However, as Margaret said in the first planning meeting, “let’s list everything we might want to do, then figure out what we really want to do.” As January passed, issues of setting realistic goals for themselves and their students became a more important issue. Margaret volunteered in the February 14 planning meeting to find data that the students could use to
identify patterns in growth of the community. She continued to describe this idea, noting “I really want the students to find information on population, school sizes, per capita income, and other stuff like that. Maybe if they see numbers, they might see how the area is changing.” She told her team teachers that she would get on the internet and find data the kids could access. At another meeting, Margaret acknowledged that she did not think she could do what she planned, “There is too much information. I cannot figure out how to manage it, organize it for the kids. If they go online, they are going to be totally lost.” The dialogue continued in the meeting and the other teachers suggested cutting and pasting the best data and copying it for the students. Margaret agreed and said she would work on that approach. Later, in the February 18 team meeting, she admitted that she, “started to get data but there was so much, I was confused. Then someone came in the room to complain about something (she was grade level representative) and I never got back to it.” The idea was good but it was more than she could manage at that time.

Having students conduct research in social studies and write a research paper (in collaboration with Catherine) was important to Margaret. However, as shown in the above example, Margaret realized that she had taken on more than she could complete realistically. While discussing plans to have students gather socioeconomic data that would also be used for analyzing and writing a research paper, Margaret hesitated and softly said (almost embarrassed to mention what she was thinking to the others), “averaging 28 students per class in a computer lab with 20 computer stations may be trouble. That means that eight students will not have their own computer and will have to share. Those eight students will be hard to keep on task while their partner searches the internet. I am not sure I want to deal with them.” After the other teachers heard Margaret’s comments, it was clear that the plan was not going to happen as laid
out and a discussion followed. Margaret threw out to the others, “what can we realistically do in
the time we have left. We must be done with environmental service-learning by March 4th.”

Margaret and the other teachers began a whole new approach to their planning after that
question. The team had a firm deadline for completing the environmental service-learning unit.
When Margaret said, “I do not think that I can get the lab and the target websites together by
next week,” Catherine quickly volunteered to help with whatever Margaret was not able to
finish. Thomas suggested that “maybe we can get the data, cut, and paste it so that it is easier for
the kids to use.” Margaret replied, “Yea, that is possible. I could do it in the evenings this week
so we would have it by Friday.” When Thomas asked if she really thought she could get it done
by Friday, Margaret hesitated again, embarrassed to admit that she probably could not.

In the final reflection and interview, Margaret did not hesitate when asked how she would
plan an environmental service-learning unit the next time.

The next time, I want to start at the beginning of the year, from day one. Environmental
topics needs to be a thread throughout the entire year, surfacing in each class from time to
time so the kids see that they are related to all our curriculum. We should do some things
outdoors with the students in the fall when the weather is good and we do not feel the
pressures of the high stakes tests coming on us in April, like we did this year when we
tried environmental service-learning in January and February. Maybe Catherine could do
some of her language arts writings around environmental topics throughout the year but
the really time consuming service-learning topics, we need to do those after the April
testing season. The environmental service-learning should be mapped to each of our
subjects, so we know what we are doing throughout the year. For example, I should be
able to say, ‘I am going to be doing Africa this month, so I will be sure to do this or that
with the environmental service-learning.’ Also, since it is hard to give grades for the service-learning parts since they do not relate to any of our mandated curriculum, we need to just figure on doing those things in May. Trying to do this environmental service learning in two months just did not work.

This statement seemed to summarize Margaret’s ideas about conducting the environmental service-learning unit. Later she discussed how she evaluated student learning, focusing on her belief that any experience was better than nothing for students. The next section will describe what environmental service-learning activities Margaret accomplished, as well as, those that were planned but never implemented.

**Question 3 – How did Margaret implement environmental service-learning?**

Margaret implemented environmental service-learning differently than originally planned. Her plans changed from those approved February 1 (Appendix G) with respect to what she implemented and accomplished (Appendix N). As discussed in the previous section, the defining moment for her and her teammates was at the February 14th planning meeting when she said, “What can we realistically do in the time we have left. We must be done with environmental service-learning by March 4th.” This section focuses on what she actually accomplished and why she chose those specific lessons. Three themes emerged for Margaret in relation to her implementation: (1) connecting environmental service-learning to the mandated curriculum, (2) implementing environmental service-learning without the pressures of grades, and (3) the need for teachers to be flexible. Margaret ended up conducting environmental service-learning five times in her social studies classes and thirteen times in her language arts enrichment class. The following sections detail what she did and the reasoning behind her actions.
Theme 1: Connecting Environmental Service-learning to the Mandated Curriculum

Margaret implemented environmental service-learning in her social studies classes five times during the months of January and February. The remainder of her implementation effort took place during her language arts enrichment class; however, this was much less than she had originally planned. Many of her plans for social studies involved collecting and analyzing socioeconomic data to use as building blocks for the other teachers. Margaret ended up not doing any of the data collection or analysis in her social studies classes. The only form of environmental service-learning that she conducted in her social studies classes was adapting existing curriculum and lessons on the Far East region of the world to local issues. The tsunami near Indonesia had occurred the month before; since Margaret was discussing cultural impacts of this disaster, she saw an opportunity to include environmental issues that could be connected to local pollution. The people in the tsunami-impacted regions were suffering from water borne diseases because of sanitation problems. Margaret talked with Thomas about local water borne diseases, and he told her about the leaking septic tanks and the problems they were causing in the local county. She was able to relate her lessons to local water borne diseases, and in turn help the students understand the circumstances of the tsunami victims. Margaret noted that Lisa came to her after the students worked on the stream quality data and bacteria counts and told her that several students said, “These are like the bacteria we talked about in social studies, the people getting sick after the tsunami.” Margaret was pleased that students were able to transfer information from their social studies class to math class. Margaret was also able to integrate environmental issues into her social studies lessons when discussing the dam China had been building on the Shanghai River that was flooding large land areas and displacing local inhabitants. The students had already started to create their NIMBY posters in the
remediation/enrichment classes so were able to share and discuss their opinions about the construction of the dam in China. Margaret turned the China dam lesson into a debate that students took seriously.

They were almost all against the dam once they understood what would happen to the people. Only one or two took sides for the dam. Kind of like when the students were working on the NIMBY posters, not many took positions of not being a NIMBY and not caring what was built near their home or school.

Including environmental service-learning in her lessons did not impact the way in which Margaret graded the students in relation to the mandated curriculum. She treated the environmental topics as supplements to her curriculum, not an integral part of the curriculum. When asked why she did not grade the students on the environmental topics discussed, she replied

Since the curriculum was for Asia, all my tests focused on Asia issues and geography. I included the water borne bacterial diseases and controversy of the dam to local issues into social studies because I wanted to tie into local issues since we were doing the interdisciplinary environmental service-learning unit. I may have included it anyway to make the issues more real to the students but local issues near the school were not the main goal of the lessons.

Margaret included local environmental topics in her social studies unit on Asia because the team agreed to do environmental service-learning. However, this was not integrated into the main body of material she taught with respect to Asia.
Theme 2: Implementing Environmental Service-learning without the Pressures of Grades

Early in the planning process, the teachers saw that they could use the remediation/enrichment period in the morning for environmental service-learning. Teachers were required to conduct language arts and math remediation and enrichment only, nothing else. Margaret reflected at the end of the study, “I do not know how much environmental service-learning I would have done if I had to do it all in my social studies class. The enrichment period allowed me to do what I wanted without having to worry about losing social studies class time.” This was evident in the first planning meeting when the teachers were discussing when each would start environmental service-learning. Margaret quickly volunteered, “Since my morning period is for enrichment and the students have already shown that they have mastered the target content, I can use the whole segment for this environmental service-learning.” Margaret used her enrichment period thirteen times for the environmental service-learning unit. In her enrichment period, Margaret conducted the following environmental service-learning activities:

- Gave the students the choice of writing persuasive letters to the local mayor about development along Breadloaf Parkway or letters to pet owners concerning the relationship of pet waste in yards to bacterial pollution in the creeks.

- Debated the pros and cons of development.

- Brainstormed ideas related to NIMBY and had students illustrate posters to reflect their positions.

- Developed and practiced arguments for and against a hypothetical chicken processing plant being proposed for development next to the school. The students then presented their arguments to the city planner when he visited the team.

- Created a word find using environmental terms.
- Participated with the city planner when he discussed zoning, development, and how a student could become involved in local land use issues.

- Participated in the culminating activity with the city planner. Students presented their stances on NIMBY and their position concerning the proposed chicken processing plant.

The tension within Margaret between what she originally intended for her component of the unit and what she ultimately conducted emerged when the team implemented the environmental service-learning. She planned to have students do research, prepare reports, and conduct debates in her social studies class. Except for the three minor instances of relating environmental issues to her mandated content, she did not conduct any environmental service-learning in her social studies classes. In the final interview, when probed as to why she did not conduct more environmental service-learning in her social studies classes, Margaret explained, “I kept thinking about the end of quarter tests and how I needed to cover the material. If I had given up more social studies classes, I would not have had the time to cover the material and I do not think that is fair to the students, to test them on material that I did not cover.” She added, “I must admit, that without the extra free period each day, I do not think I would have done near as much activities as I did.”

**Theme 3: The Need for Teachers to be Flexible**

A statement frequently heard among middle school teachers is the need to be flexible. These interdisciplinary teachers were flexible. During the study, Margaret responded several times to conflicts or “hiccups.” In the afternoon of February 24, Margaret realized that Lisa and Catherine were both going to be out the next day for curriculum meetings at other schools and personal business. She found Catherine and Thomas and said,
I just realized that two of us will be out tomorrow. I don’t think the substitutes will be able to do the posters with these kids. The sub you have Catherine had trouble managing the classes last time she was here. We need something simple that we can give the kids so the subs can keep the students busy and focused to keep them out of trouble. We can give it to Lisa’s sub too so that everyone is doing the same thing in remediation/enrichment.

Margaret and Thomas developed a one-day activity that contributed to the environmental service-learning unit (environmental word identification and definitions) and all three substitutes and Thomas used it that Friday.

Margaret noted that a part of being flexible was, “taking a reading on your students once-in-a-while and see if they are responding to your lessons.” She added, “They have bad days, just like we do so we need to be sensitive to their interests and adjust as necessary.” The biggest adjustment she initiated during the study came about during the scheduled team meeting on February 18. The team planned the environmental service-learning unit around the focus question, “Why should ‘they’ continue to allow development of housing subdivisions and shopping centers along Breadloaf Parkway?” Margaret started the meeting with, “my kids are bored with the videos.” That comment started a discussion about the progress of the unit and student interest. All the teachers agreed that the focus question was not working and something needed to be done to pull the kids into the unit. Thomas described a discussion about NIMBY (Not In My Backyard) that took place in his science class, noting how quickly the students became interested in the topic. Margaret said, “In social studies, when we draw, they really get into it. We have a bunch of artists. How about we have them take a stand and draw a poster?” She and Thomas proceeded to develop a plan for the NIMBY posters and how the students would use them in their presentations to the city planner.
Margaret continuously monitored the students as they did each environmental service-learning activity to observe their progress and learning. As she walked around the classroom or reflected on the week’s activities, she processed information to decide herself how the environmental service-learning was progressing. The following section describes the issues Margaret considered in evaluating student learning.

*Question 4: How did Margaret evaluate student learning during the environmental service-learning?*

Margaret did not enter into planning with a preconceived idea about how she would evaluate student learning during the unit. When asked how she planned to evaluate student learning, her response was “evaluating success that is a tough one.” This section will describe how Margaret evaluated student learning during the unit, as well as perceptions of her own success as a teacher. Margaret evaluated learning regarding environmental service-learning as reflected in two emergent themes: (1) student engagement as a measure of learning and (2) observation as a “tool” for assessing student learning.

*Theme 1: Student Engagement as a Measure of Learning*

Margaret did not record any social studies grades during the environmental service-learning unit. There were five days where she conducted lessons that integrated environmental service-learning into her regular social studies classes but they were complementary to the main lesson, which was part of the mandated curriculum. Margaret noted many times throughout the study that she assessed student learning without grading. “When the city planner was here, they asked good questions and behaved well.” When asked if that was a demonstration of learning, she responded
Yes, I saw the students applying the NIMBY issues when they asked the city planner questions. Other times, when the students were working in groups on the NIMBY posters, I saw students getting more involved with the issues, on their posters, especially since the city planner came and talked to them.

On another occasion, she discussed an example in her social studies classes where she could tell that learning was taking place during her lesson. “I saw students applying NIMBY issues with China while working on their group projects in Social Studies. It happened with about five to ten students per class (four classes).” Concerning another lesson, she noted, “I think that my classroom discussions relating the Southeast Asia tsunami to disease possibilities went well because the students had prior knowledge of diseases from science class. Just by watching the students, I think the students were moderately successful. I think they could have done more interdisciplinary if we (teachers) had had more time to plan.” When asked how she defined ‘moderately successful’, her response was,

It is a gut feeling based on what I saw. I don’t know how to measure it. I suppose that if the students become excited, motivated, and interested in the ideas, topics, or issues we present, then I would view that as a success.

Expanding on her ‘gut based feeling’ of evaluating student learning, she elaborated on what she meant in a final interview,

I look for if they are engaged and if they are goofing off or whining, such as ‘I don’t want to do this.’ I also look for the level of their excitement and the types of questions they are asking me. I can tell if they are learning by their behaviors and questions.

When asked about how she determined what the quiet, non-expressive students had learned, Margaret explained,
I look for evidence that they are thinking. I walk around and listen to them; they usually talk within their groups. If it is a large group activity, I watch to see if they are listening, nodding their head in agreement, or making faces when something is said. Margaret’s statement that she used her ‘gut feeling’ to evaluate learning suggests the importance she placed on observation as an assessment “tool.’ Another “tool” that she considered was observations of student behavior. From Margaret’s perspective, if the students were behaving, they were interested and therefore learning. In her weekly reflection of February 24, she noted, “I think having the city planner speak to the team went really well. They behaved well.”

**Theme 2: Observation as a “Tool” for Assessing Student Learning**

In evaluating learning of the students and the environmental service-learning unit as a whole, Margaret relied heavily on observation as her approach. Throughout her weekly reflections, interviews, and team meetings, she consistently described firsthand observations of student learning taking place. The following series of weekly reflections demonstrates how she relied on observation to evaluate learning:

- **February 18th reflection:** “The students discussed the videos afterward. I could tell they learned from them. Most students expressed a genuine concern in the environment and the related environmental topics. Living in such a ‘booming’ county makes the idea of being a NIMBY real to them. I saw the kids become concerned and a little more active, at least addressing the issue of whether they wanted more subdivisions, shopping centers, and other construction projects ‘in their backyard’”

- **February 25th reflection:** “I saw students getting more involved in the issues (on their NIMBY posters) especially when the city planner spoke with them. They asked good questions. He seemed to give the students a better understanding of the issues.”
- Final reflection: “I saw students applying “NIMBY” issues with China in social studies class while working in groups. It happened in about 10 to 15 students per class.”

In Margaret’s final interview, she stated that she could tell the students in the large audience (approximately 90 students) were learning because

Even the students that were sitting in the audience while some of the students were talking in front of the group, to the city planner. They got to see those kids speak about their positions to the planner and I could see them thinking as well. They knew the kids that were up there speaking to the planner and how they usually did not do well in class. It caught many of their eyes and made them think more about the issues. And the usually quiet kids, they were listening, they were clapping, I watched many of them turn their heads back and forth as the others argued their positions. Some were even going ‘OOOOOOHHHHH’ when their classmate made a really good point and surprised the planner with their responses. They knew that they had gotten him. They knew what a silly argument was and what was a valid argument. This is a tough one, evaluating the success by just watching, it is so subjective.

In another part of the interview, she added:

I watch to see if they ‘show me’ they are thinking about the issue. I listen to the discussions in their groups. When they argue with each other, it shows me they are thinking. Or others say, ‘that is good,’ shows me they are thinking. That is what I want, them to think about their positions compared to others.

Margaret saw the students make connections with the environmental topics discussed at the meeting with the planner. She watched her students accept the idea of being a NIMBY and possibility of a chicken processing plant near the school as real and how they demonstrated their
desire to do something, an important component of activism. Although dissatisfied with what she had accomplished in the environmental service-learning unit, Margaret nevertheless believed students had learned and that the unit had been successful, commenting

I think I turned them on to some environmental issues. They responded to the scenarios we set up about possibly building a chicken processing plant next door and discussing eminent domain with the city planner. They defended their positions on whether or not they were a NIMBY – quite seriously. They meant what they said.

Margaret’s methods for evaluating learning during the unit were subjective but she was convinced that students had learned and that the unit was a success based on her observations.

*Within-Case Summary: Margaret*

Margaret saw environmental service-learning as a method for connecting her students to issues which would serve as a tool for developing their personal agency. This view was not related solely to the environmental service-learning unit, as Margaret indicated that she tried to relate local issues and current events to her social studies lessons with any given opportunity. Margaret also demonstrated passion for teaching students a purpose for their learning, going beyond the idea of learning to prepare for a test or high school. She wanted environmental service-learning to motivate students, but also to instill in them an ethic of care which could lead to a call for action. For Margaret, a process oriented approach to teaching social studies and environmental service-learning was a good match. She wrote in an early reflection that she, “believed all kids learn by doing,” that it is, “different for every kid,” and that, “all kids can learn.” Margaret summarized her ideas concerning why she wanted to do environmental service-learning by explaining,
I think you have to go back to what your original goals were for environmental service learning. I think you have to answer that question to determine if we were successful. A goal for me was to make them more aware of environmental issues. These are hard things to measure, making them care, get them involved, getting them to talk about the environment, get them questioning, and wanting to know more so they would research on their own to find answers. But I think about the city planner coming in and watching the students. Many got up and spoke with conviction. Some of the kids that got up were those that usually do not do well in class so I think we got them to care more for the environment. When we did environmental lessons, there were not any behavior problems; everyone was working showing me that they were interested and wanting to learn.”

Margaret revealed in this dialogue that she believed environmental service-learning motivated students, made them aware of environmental issues, and resulted in fewer discipline issues. She did not say these were her beliefs or goals for the unit until the final interview. However, the following dialogue reveals her doubts concerning the benefits of environmental service-learning in relation to high stakes testing.

Researcher: Do you wonder if the environmental service-learning helps your students do better on high stakes tests?
Margaret: It would be interesting to see in the spring when we have our high stakes test scores back, for kids like PN, how did he do on his tests. I would like to see how students that only prepare for tests compare to students that do interdisciplinary unit, like environmental service-learning. Or behaviorally, is there a difference in these kids when they are working on
environmental or service-learning stuff and when working on regular content material.

Researcher: It’s like you want some kind of reporting system.

Margaret: I think we should start collecting data like that. I don’t know, it’s just my opinion. I think we should, even if it’s just informal assessments of just making notes. On this day, like in social studies, on the day that I try to do a lot of environmental stuff, do I notice many are more involved? Do I notice that they are paying attention more? Do I notice that they’re not tapping their pencils as much? Do I notice that the kids that don’t normally ask, are they asking questions?

Researcher: That would be interesting.

Margaret: It would be interesting to see. You can then compare that with results on the high stakes tests and their normal grades. Grades and behavior. It just interests me. Is environmental service-learning really better than traditional ways of teaching middle schoolers?

All of Margaret’s methods for evaluating student learning were subjective and based primarily on her observations – she used no measurable objective method of assessment. However, the last sentence of the above dialogue reveals a tension she felt regarding student learning and high stakes testing and grades. Her discomfort with environmental service-learning as a pedagogy for preparing students for high stakes testing and demonstrating mastery in academic classes, as reported on report cards, surfaced during this study. This idea will be discussed further in the chapter five cross-case analysis.
Catherine – Working for Authentic Written and Oral Communication

Catherine was the language arts teacher for this interdisciplinary team and had been with the others the shortest amount of time, a period of five years. Before teaching, Catherine was a police officer for twelve years doing patrol and undercover work. She decided that the stress of being a police officer was too much so went to college for her bachelor’s degree in education. Like Thomas and Margaret, Catherine became National Board certified in 2004 in Early Adolescent Language Arts. Besides her teaching responsibilities, Catherine was the seventh grade language arts chair and language arts remediation and enrichment coordinator. For a detailed profile of Catherine, see Appendix O.

Of the four teachers, Catherine put in the longest school day. She usually was the first to arrive and last to leave each day. If the team needed something organized or otherwise done and the others did not have the time, Catherine volunteered to do it after everyone else left. Appendix P shows her daily schedule for classes and planning. The other teachers joked with her about how organized everything was in her room and she usually grinned as she straightened something on her desk. This within-case analysis describes Catherine’s beliefs concerning environmental service-learning, how she planned, negotiated, and implemented the curriculum, and how she evaluated student learning during the environmental service-learning unit. For each of the four research questions, themes that emerged will be identified and supported with evidence.

**Question 1 – What were Catherine’s beliefs regarding environmental service-learning?**

Catherine was a very structured and disciplined person. She had to have her room organized and neat, expected respect from her students, and followed rules and procedures to the letter. Many of these traits perhaps stemmed from her upbringing as a military child and some
from her experience as a police officer. Whatever the source, the students responded to her in a positive way. Three emergent themes capture Catherine’s beliefs about environmental service-learning: (1) building student awareness of community, (2) motivation as a dimension of learning, and (3) environmental service-learning for moral and character development. In general, Catherine’s teaching centered around experiencing language arts and learning how to be a better person. Environmental service-learning seemed to be a good fit for her.

Theme 1: Building Student Awareness of Community

Catherine believed that today’s students were not connected with their community. In one environmental service-learning planning meeting, she noted, “the students get up in the morning, come to school, go home, and watch TV. They do not go out, play outside, or know what goes on in their community.” In the next meeting, she said, “they have no idea what is going on around them.” Before beginning the planning of the environmental service-learning unit, Catherine completed a written autobiography and responded to the question, “How do you define learning?” with, “learning they are a part of the community and can do something that makes their community better.” When asked about her goals for environmental service-learning, she responded, “To have the students become more aware of their community and feel like they have a personal stake in what goes on. Also to learn outside the textbooks and have the students become leaders, where they might not be willing to in a traditional classroom setting.”

In Catherine’s initial interview, when asked to clarify what she meant when she said that kids need to have a personal stake in what goes on, she responded

I think if they had a sense of community, I think that they would value it more and there wouldn’t be as many social ills. They would take ownership and pride in where they’re
from. I’m thinking of like vandalism and breaking into houses and things like that. They don’t connect to the community.

In a later interview, when asked to elaborate on her comment, she explained,

It gives them a sense of belonging that we do not have anymore. Like belonging to the community, belonging to someplace other than just school because they do not see themselves connected to anything.

Catherine associated service-learning with connecting students to their community. During a midway focus group meeting, she raised the idea of having students write letters to city officials, and likened this to when they were asked to correspond with hospital patients during a project of the school’s service-learning club. For Catherine, the notion of writing letters to people without building personal connections fell short of the spirit of service-learning. Catherine described service-learning in her autobiography as “where you are out in the community and learn something that is not in the book. It is trying to make things personal for them, obviously something to do with the environment.” Later, in a planning meeting, she further discussed her idea of service-learning,

They can learn something, maybe empathy. I think maybe if, and I’m just thinking about myself, if I had to sit there and write for 30 minutes a letter to someone I never knew before, I would do it, that’s just the what kind of student I am. Would I get anything out of it? I don’t know, probably not. If I had gone maybe to that hospital or nursing home or children’s center and maybe seen something first hand, and then came back and wrote about it, it would have a much bigger impact, then just sitting in the room, just some anonymous person. That is why we need to reach out to the community and do real service learning.
Catherine applied her description of service-learning to the team’s discussion of the stream that flowed near the school. “I think if we make it relevant to them, they will get more out of it. Like you and Lisa talking about the creek that runs behind the school. A lot of people don’t know that it is there. Taking water samples and talking about how what they do effects it, like what we did in our training three years ago, that would be good. I learned that everything we do in our county went to the next county, then eventually to the ocean. That was a real big eye opener for me. What we do here in our city affects everything downstream.” Catherine continued to say, “which gives the kids a sense of connectedness and having to be responsible for their community. So I think that would definitely help the kids. They don’t go outside their little house, and like you said, their school. They are oblivious.”

Many of Catherine’s ideas for conducting environmental service-learning, detailed in later sections, can be traced back to her strong desire for students to feel a connection to their community. In the final interview, Catherine explained, “I think that environmental service-learning should get the students involved with their community. Service-learning is where you are out in the community and learning about something that is not necessarily in a book. The learning is personal for them, then obviously something about the environment.” When asked, “so why do it?”, her response was, “Because it gives them a sense of belonging, that they do not have anymore, like belonging to the community, belonging to some space other than just school. They do not think of themselves as being a part of the community.” Catherine never said that she wanted students to develop a sense of place (Gruenewald, 2002; Ward & Wolf-Wendel, 2000), although that is what she seemed to describe. Her interest in having environmental service-learning connect students to their community suggests that she valued a sense of place in
education, even though she was not familiar with the terminology.

**Theme 2: Motivation as a Dimension for Learning**

Catherine expressed the desire to participate in the environmental service-learning project because she believed it would provide strong motivation for her students. When the teachers discussed bringing the city planner in so that students would have a more authentic experience, she said, “students get more excited about writing when they think someone important is really reading what they wrote. They like an audience besides someone in the school.” Catherine emphasized this idea repeatedly throughout the planning process, particularly when the team discussed having students write letters to the mayor and present their arguments for controlling development to the city planner. When discussing water conservation and pollution essays the team had students do several years before, Catherine noted, “I know, that was hard, for them and us. Essays are not bad for the students to do, if it is something they are passionate about. If they are not passionate about the topic, you get a bunch of junk. But if we can them passionate about a topic, they will be motivated to good work. I think the students should take a ‘lesson to heart.’ If it is relevant to them, if they have a personal stake in what the lesson is about because they can relate to the issue, like pollution or over development in their community, they will learn the lesson better.” During the first planning meeting, Catherine suggested a way to motivate and connect students to their neighborhoods. She explained, “Many of our kids live in the subdivisions near school. Maybe we could get them passionate about pollution in their neighborhood. Like when we did the storm drain stenciling a few years ago, teach them how pollution from their yards and streets goes down the drains into the creeks.”

Giving grades for environmental service-learning was discussed at the second planning meeting. Catherine’s response to using grades as a motivator for the unit was, “Many kids are
motivated by their grades, but we have many that are not. We still have kids that do not do their work, even when it is a big part of their grade. Maybe we sometimes think that if we stress how important it is to do all their work, they will do it. But, you know, in reality, you have the few that just won’t do it, no matter what you say or do. It is one of those easier said than done.”

Although Catherine felt that some kids were not motivated by grades, she noted several times in her reflections that “all kids are teachable.” When asked about this, she explained that she believed that all kids can learn, simply at different rates. She noted the importance of determining students’ interests.

Not all kids are willing to learn so we have to guide them. In language arts, I try to give the kids different outlets and topics, hoping to motivate them by letting them write about something they are interested. If we do all the things we are talking about, different kids can do different things that interest them.

Catherine was passionate about the idea of having students perform public service announcements on the school’s intra-school cable network, as a part of the environmental service-learning unit. She said several times in planning meetings and her reflections that she wanted students to make video public service announcements. She wanted to nurture students’ individual interests by having them write scripts, provide technical support, participate in the screen acting, or edit the final product. Catherine described how many students “want their voice heard about something.” She felt that by providing opportunities for students to present their viewpoints to politicians, “some [students] can write letters, others can practice their public speaking skills to present their side to the city planner when he comes in.” Each time Lisa, Margaret, or Thomas came up with possible community connections, Catherine saw an opportunity to motivate her students to hone their language arts skills. “If the students take a
lesson to heart, if it is related to them, and they have a personal stake in it, they will work harder on it.”

Catherine wanted her students to be motivated in ways that would help them become leaders among their peers, something she felt that she did not provide in her regular class. In her autobiography, when asked why she wanted to participate in environmental service-learning, one of her reasons was, “I want students to become leaders, where they might not be willing to in a traditional setting, like Devon did.” Catherine explained that Devon was a student on their team three years prior - he was not a strong student and seldom participated in class. When the team took the students on a field trip to paint educational messages, such as, “Don’t Dump – Leads to Streams” on storm drains in nearby neighborhoods, “Devon emerged as a leader among the students. He helped, directed, and reached out to anyone that would listen about why it was not good to dump garbage in the storm drains because the drains dump into nearby creeks and pollute them.” Catherine called Devon, “my poster child for environmental service-learning.”

**Theme 3: Environmental Service-learning for Moral and Character Development**

Moral principles were central to Catherine’s beliefs about environmental service-learning. Her autobiography and weekly reflections contained numerous ethical overtones. She usually discussed teaching in general without specific application to science or environmental service-learning. Many of the moral issues she discussed were a spin off of her belief that all kids were teachable or the ethics of environmental protection. In her autobiography, she explained,

I believe that all kids are teachable and should have good, strong models in their lives to help them (like me by my Asian culture and religion). Not all students are willing to learn so we have to be the ones to guide them. I think teachers should have good, strong morals. I think that learning is gaining any type of information, if you leave knowing
more than when you came into it. But I also believe that students should pick up basic principals of life, like responsibility and commitment to something.

Catherine discussed multiple aspects of moral development, including cultural sensitivities, responsibility, and commitment. She expanded her definition of moral development to include the morals related to protection of the environment. In her interview, she added, “environmental service-learning should teach children the ‘basics’ of protecting the world. It should help them be more aware of their world, help them become more diverse in their thinking and appreciate other cultures.” Similarly, in a weekly reflection, when prompted about how the week went, she responded, “not as good as I had hoped but we need to do this, they need to know how important it is.” When asked in the final interview what she meant by ‘how important it is’, she explained protecting the environment is morally necessary. We have a responsibility to preserve and protect our world. I used to not understand that but since our environmental service-learning class a few years ago and my getting older, I strongly believe that. The kids to learn it earlier.

Catherine seemed to want to educate the whole child, a holistic type of education that included life lessons and life style, not just academics.

*Question 2 – How did Catherine plan and negotiate environmental service-learning?*

Planning and negotiating environmental service-learning was time consuming. Catherine took longer to do things than others “because it needs to be done right, my way.” The shortage of time was an issue with Catherine but not as much as for the other teachers. Referring back to Table 13, Catherine officially had 25 minutes to plan before school and a 75-minute planning period every day. However, she usually came in early and was the last to go home. This study
encompassed 43 school days from January 4 to March 4, 2005. Using Catherine’s daily planning calendar, her planning time can be accounted for in the following way:

- Five scheduled environmental service-learning meetings;
- One recorded unscheduled (spontaneous) environmental service-learning meetings between one or more of her teammates;
- Eight planning periods for one or more parent conferences;
- Three planning periods for faculty meetings (whole faculty and just seventh grade)
- Two student support team (SST) meetings with whole team, assistant principal, counselor, and parents;
- Three curriculum and staff development sessions;
- Two absences due to illness;
- One absence due to a curriculum meeting at another school.

Although she had twenty open segments with ‘nothing’ scheduled, they were used for planning her language arts curriculum, non-environmental service-learning team meetings and other routine activities normally conducted during planning. Her responsibilities as language arts chairperson also required a great deal of time. When asked if there was anything that specifically took her time during the course of the study, she responded, “it seems that there is always something we need to do when we are not teaching. That is why I stay so late some days, I always stay until 7:00 every night. I told Joe the other night, ‘I am not going to be here late tonight.’ At 6:45 I was walking out the door and ran into him, ‘Um, 6:45 hey? You just need to go on home at 5:00 like everyone else.’ I have so much to do and just get so involved in whatever I am doing.”
The language arts scope and sequence was very important to Catherine. She saw it as her personal mandate because, in her words, “We are bound by law to work with the mandated curriculum given to us.” As a former police officer, Catherine believed she was bound by the law and felt compelled to follow the schedule. The language arts scope and sequence for January, February and March is listed in Appendix P. Catherine’s challenge to plan environmental service learning was therefore made more difficult because she considered adherence to the scope and sequences so important. The four themes detailed in this section describe Catherine’s efforts to plan and negotiate environmental service-learning.

*Theme 1: Environmental Service-learning as a Tool for Authentic Written and Oral Communication*

During early planning meetings, Catherine had no problem seeing connections between environmental service-learning and her mandated language arts curriculum. “It is easy for language arts because it can tie into anything, especially when the topic is real and not a waste of time. The kids can then write and communicate about the topic, like the environment pretty easily.” When Thomas suggested having students write letters to politicians, Catherine’s reply was, “there is a persuasive writing objective and formal letter writing objective that would cover that.” When public service videos were suggested, her response was, “there is an objective for oral presentations and public speaking. There are also objectives for graphic presentations that the students would have to do when they made the graphics for the video.” When the team discussed the idea of organizing student debates to connect with Margaret’s social studies class, Catherine responded, “There is a language arts objective that says students need to base their persuasive arguments on real information. They would be doing that in the debates in your class.” Even when the other teachers brought up their worries about covering the entire mandated
curriculum, Catherine did not seem concerned. She creatively applied the objectives that she had to cover to make them fit with the environmental service-learning ideas her teammates thought would be good for the students. When asked, “Have you had a chance to look at the AKS you have to do each quarter yet and where the video or the letter writing might come in?” her response was, “Yes, I did the language arts syllabus for the entire year. It’s just a matter of putting our ideas and the objectives down on paper.”

The videotaping of student-produced public service announcements was high on Catherine’s list of environmental service-learning activities to accomplish. She really wanted students to produce them.

We talk about doing public service announcements every year but never do them. The students would love that. Like when they showed on the announcements students from somebody’s class doing a math rap. They were horrible, but when the kids had the opportunity to do the rap in front of a camera, they loved it. Our kids just stared at the television watching the math students do their raps. In remediation, Mark and Quinton made a tape doing a thing on the parts of speech, they loved it. We could have scriptwriters, someone doing the cameras, anchors, someone doing music, all kinds of jobs, something for everyone.

As the planning for the unit continued, Catherine continued to bring up the public service announcement idea but also suggested many other ways that environmental service-learning could fit with her language arts classes. Catherine’s strong interest in pursuing the public service videotape idea was evident in the second environmental service-learning meeting:

Catherine: It would be cool if we could do some kind of video to put on morning announcements.
Thomas: One big one or kind of segments?

Catherine: Segments. We could call it like we could call it ‘Environmental Wednesday’ or something like that and then every Wednesday have a little maybe a tip or um, just something, maybe like a one minute, two minute little clip. It would feature all kids. Maybe a story could be like the lesson I learned, that throwing cigarette butts down the drain can cause water pollution. Maybe the kids do a new story about washing cars on the lawn is better than washing cars in the driveways because the water will soak into the grass on the lawn but run down the drain from the driveway. Maybe they could shoot some of it on location, showing them doing that, and maybe like where it goes. That would be neat, feature something on announcements. And we could write letters.

Thomas: Congressmen or businesses, or parents

Catherine: Yes, I have several objectives that I have to teach persuasive essays and letters. Also business letters are one of my objectives. I could hit a bunch of objectives with the environmental topics. You know, talking about community, and to get them connected back to their community, um, that may be businesses in the area, like new subdivisions going up and all the run off and …

Thomas: Like when they were burning the trees behind the school, they were in the clearing stage, and kids were all upset they were cutting down the trees.

Catherine: We could definitely do that, because we have a bunch of subdivisions going up on Breadloaf Parkway.
Thomas: Write letters of persuasion?

Catherine: Right. I don’t want them to just to write something that’s not going to connect. So if we could somehow go out there and find out what’s going on and like you said, they were all upset about the burning and all that stuff. We could do something like and write letters. That would be great.

Catherine enthusiastically started planning the unit with the team. As the planning continued from January into February without beginning in earnest across the team, her determination and enthusiasm seemed to wane. The following quotes at a different planning meeting in February reflect the shift in her enthusiasm

It takes a lot of planning to figure out how to make this fit exactly what it is, what we are doing in language arts. There are certain objectives we have to meet certain nine weeks to finish our syllabus. It is hard; it will just have to take a lot more planning on my part. If this was something I did last year, I could just modify it a little bit but we didn’t do as much as we talked about. I have to figure out how to fit this with the county’s objectives.

Although Catherine did not initiate the dialogue at the February 18 meeting about discontinuing the plans to have students do a research report, she quickly agreed. Her reaction reflected the sentiment that this was one less thing to worry about. “Yea, we will never get it all together by March 4,” the last day of environmental service-learning during remediation/enrichment period.

With this comment, Catherine decided that she was not going to use any of her language arts classes for the environmental service-learning unit. The following theme highlights how Catherine shifted from enthusiast to follower during the rest of the planning and implementation of the environmental service-learning unit.
Theme 2: Matching Curriculum and Students: The Challenges

Although Catherine was very comfortable with matching the mandated objectives to the activities that the team generated, several other underlying influences affected how she participated in the planning and negotiating of the environmental service-learning unit. She felt strongly about certain things in her classroom and felt she was going to have to ‘give up’ some of her ways. Secondly, she did not feel comfortable with science topics and since the unit was heavily laden with environmental science topics, she expressed doubt. Lastly, the students in her classroom for any given year influenced how she planned lessons. Each of these influences is discussed in the following paragraphs.

Catherine was very particular about how she ran her classroom. In her autobiography, she wrote about these sentiments very clearly, “I like things in my class a certain way, my way.” When asked what she meant by that statement, she responded,

Catherine: Because that’s my personality. You know, being that police officer and wanting things done a certain way and um, it’s hard to let go. But I think I need to.

Researcher: Something you’re afraid of?

Catherine: Yes.

Researcher: What?

Catherine: That it will be all chaos and chaotic. I guess that I am scared of that. Maybe I do not give the kids enough credit that they’ll do what they’re supposed to do. Maybe they will shock me and do it really well. Yes, it is hard to let go.
Catherine’s reactions to pressures that she felt in relation to preparing students for high stakes testing is discussed in a later theme but is closely related to her need for control. She did not want to ‘give up’ class time for the environmental service-learning unit, “To do environmental service-learning, it is hard and I do not want to give up remediation time because I really believe in the tutorial program.” Catherine did not use any of her remediation periods for environmental service-learning until the last regrouping/cycle before March Madness, when all the team members agreed to do environmental service-learning at this time.

Catherine’s willingness to plan and implement environmental service-learning was also greatly influenced by her lack of confidence with respect to her knowledge of science topics. In an interview before the unit began, when asked if she would participate in environmental service-learning without the participation of an experienced science teacher, she replied,

No. I do not know much about science or the environment and could not help the students. To do environmental service-learning, there must be at least one teacher that knows a lot about the environment. I would probably do service-learning, with a topic that I felt comfortable.”

Catherine’s lack of confidence when it came to science was particularly reflected in a comment to Thomas, the science teacher. Catherine noted that she did not understand science, and although interested, “did not care to teach it, that is your job.”

The final factor that Catherine considered before planning curriculum was the ‘type’ of students she had in her classroom. She seemed to classify, generalize, and label her students as ‘fast or slow’, or ‘behaved or not behaved.’ This dichotomy regarding achievement and behavior influenced her planning. In the first interview, Catherine summarized her ideas about how students learn, commenting, “Not everyone learns exactly the same way. You know, a kid may
do well artistically to show that they learned something or they may do something better in a written form or in a play or something like that.” Then, as her team members began to plan the unit, Catherine said in the first planning meeting, “I have more failures this year at this point than I have ever had. Some years we have students that misbehave so much I do not want to do anything that gives them a chance to act out. This group are good kids but just slower than other years.” The other teachers confirmed her observation and statement and said how they wanted to do environmental service-learning in order to motivate some of the students that do not do well in traditional class settings. Catherine agreed and added, “Maybe I can use some of the environmental topics to write about, to motivate some of them.” Continuing to emphasize the importance of considering students when planning, Catherine commented, “I think that a good teacher is somebody who knows their kids. You need to know where your kids are coming from and you need to determine their knowledge levels before planning.” She added at the end of the conversation how developing an understanding of her students leads to better relationships with them. “Once I understand my students, I think it is easier to develop relationships with them. Because if you have a good relationship, even if it’s not like a great relationship with the kids, as long as you have some kind of relationship with them, you’ll try to work harder for them and they will try to work harder for you too. You get to know them and they get to know you.” Relationships were important to Catherine.

**Theme 3: A Teacher’s Perception of the Demands Placed on Her**

Each team member’s perception of reality effected how he/she participated in the environmental service-learning effort. In Catherine’s initial autobiography, she described herself as “strong in communicating with parents, empathetic for others (students and colleagues), knowledgeable in her content area, strong classroom management, and willing to learn.” She saw
the interdisciplinary team as one with, “similar values and beliefs about education, different (organization, spontaneity, sympathetic, being grounded), so the kids get a little from each of us, and good communicators.” Initially, it appeared that Catherine was going to be a leader with respect to implementing the environmental service-learning unit. However, as time progressed, her enthusiasm for environmental service-learning dwindled. Several demands ‘burdened’ Catherine to the point of shifting her interest in doing environmental service-learning. One of the demands she felt was the need to cover the mandated language arts curriculum to prepare students for the high stakes testing. Another demand was the responsibilities of being language arts curriculum chair and preparing materials for the other teachers. Both of these perceived demands led her to feel that she did not have enough time to do everything. “It’s time, it’s always time. There just is not enough.”

The pressures of covering the mandated curriculum and responsibilities as language arts chair were clearly apparent in Catherine’s comment, “I have to stay on that course because we have to turn all the progress data collected from remediation/enrichment periods. Plus helping to write all the remediation and enrichment lessons for everyone, which is a part of being language arts chairman. I have to do it.” In her final interview, when discussing why she had not implemented environmental service-learning, even though she had enthusiastically embraced the idea at the beginning of January, Catherine paused to think, then replied,

Well, we have to be curriculum oriented; we have to, because of the mandated objectives and all that stuff. And because testing is so important in this county, we have to cover so much basic curriculum. I want to do more stuff like the environmental service-learning unit but I have trouble doing it. We learned in the planning class three years ago how it needs to be somewhat democratic, you know, where the students decide some of the
things they are going to do. But we have the county’s objectives things we are supposed to do. It is hard.

When asked if she wanted to do more environmental service-learning after April testing, Catherine responded, “Yes, because you won’t feel so pressured for getting the entire curriculum in before testing.” When asked if she thought environmental service-learning was good for the kids, she replied

Yes, but with everything else we have to do, don’t try to do before March Madness, it is too hectic. Maybe do small amounts throughout the year, not just at one time. Get more of the administration to get involved. I don’t really know how to do this one but couldn’t hurt. Get the kids more involved in the planning. Go outside more to see the effects instead of just watching videos, lectures.

Theme 4: From ‘Empowerment’ to ‘Received Knower’

Catherine began the environmental service-learning planning with enthusiasm and ideas. As noted in the previous theme, her enthusiasm waned and she began to participate in planning meetings in a dramatically different way. A chronology of her shift from empowerment to received knower is described in the progression that follows. As the team brainstormed on January 6 and 21, Catherine contributed many of the ideas that appear on the list in Appendix G, specifically the idea of developing videos to educate others in the school. When she expressed the desire to have students develop videos, she followed up by saying, “Did you see them watch that eighth grade class do the rap video for their math class after announcements a few weeks ago? My class just stared at the TV. Our kids would really get into something like that.” When the team discussed having the students do a research report, she responded, “I have always
needed and wanted to do a research report with these seventh graders. They need to know how to
do one and the high school teachers keep telling us that we need to teach them how to do one.”

As the planning phase progressed, Catherine changed with regard to her role. The
planning phase took much longer than originally planned, nearly five weeks. During the midway
focus group meeting, Catherine noted that her planning was taking longer than expected because,
“I feel I didn’t have time to plan. I expected the planning to go faster. It’s difficult with
everything going on, like conferences and end of term things.” After this reflection in the
midway focus group meeting, Catherine’s role continued to shift. She seemed to change from her
role as an empowered member of the interdisciplinary team to that of received knower in regards
to the environmental service-learning unit. This shift can probably be attributed to the pressures
she felt from being curriculum chair and the high stakes testing discussed previously but there
are other factors that contributed as well. When the research paper and videos were discussed at
the February 4 planning meeting, and as the deadline to finish everything approached, Catherine
said in a very frustrated tone, “every year we talk about doing public service announcements but
do not do them. They would love to do them.” Catherine initially embraced the idea of student
research reports. However, her attitude changed from one of, “I can do that with the kids” to,
“Ask them what they want” when Thomas said that a teacher from the high school would like to
see the middle school do more research papers. As the discussion at the February 4 meeting
continued, Thomas hesitated and asked the team, “Do you think we can pull all this off by March
4?” Catherine responded in what appeared to be a frustrated tone, “Just tell us what you want. Do
you want a full report with chapters and bibliography or an essay summarizing their position?”
Her response seemed to be a combination of frustration and a feeling that she no longer had an
equal role in what was being planned for the environmental service-learning.
The prior history of this interdisciplinary team also appeared to influence Catherine’s shifting role during the environmental service-learning unit. Since the interdisciplinary team had been together for five years and had collaborated on interdisciplinary units before, they had developed role expectations. The teachers did not explicitly designate Thomas as the leader for this environmental service-learning effort, but it was obvious that they looked to him for guidance as the unit progressed. Prior to the team participating in the June 2002 environmental service-learning training, Thomas usually planned environmental lessons and gave the others ideas on how they could participate in the unit. After the training, each teacher had a better idea of how they might personally fit their subject areas into interdisciplinary environmental service-learning units. However, the history of Thomas serving as the environmental expert and leader in the past became a default for Catherine when she felt pressured. In the final focus group meeting, as the teachers reflected on their roles in the planning and implementation of the environmental service-learning, Catherine described her role as:

Well, you need someone to initiate it, because if you don’t, like it needs to have some kind of base, either a science base. Then, I think it’s good you sat us down, you kind of said ‘this is what we want to do, what are some kinds of things that we can do in language arts and social studies?’ That training (referring to June 2002 week course) helped a lot. And it helps to help each other. Margaret and my disciplines are so much alike, like reading and writing and all that stuff.

In her final reflection, when she was not with other group members, Catherine wrote about her role commenting, “I really do not feel like I participated in ideas; basically all I did was help execute your ideas. Time is always a factor at school. I would have liked to have written a ‘real’ research paper, but when do we have the time?” During the final interview, Catherine was asked
to clarify how she saw her role on the team. She empathically said that Thomas was the leader, even though no one verbalized it. Summarizing her feelings about leadership, Catherine responded, “Yes, organize the whole thing. Run the show for me.” Thomas did not want to tell his teammates what to do for the environmental service-learning but Catherine expressed a need to be told what to do. This tension affected how the team negotiated the environmental service-learning throughout the study.

**Question 3 – How did Catherine implement environmental service-learning?**

Catherine had many ideas for using environmental service-learning to motivate her students in language arts and give them a purpose to their writing and oral presentation lessons. She planned to have students write letters to government officials and editors of newspapers, develop public service announcement videos, and many other activities (Appendix G). In the end, she was the least involved in terms of implementing environmental service-learning activities. She did not do any environmental service-learning type activities during her academic language arts class but she did during her remediation language arts. However, the eleven days she conducted environmental service-learning during remediation were near the end when all the teachers agreed to use their remediation/enrichment periods. This notion of ‘why a teacher mirrors her teammates’ continued to bubble below the surface throughout the interdisciplinary unit. Catherine started the planning process as if she was going to conduct many aspects of the unit in her language arts class but ended up not doing anything. The following themes illustrate how Catherine ultimately implemented her portion of the environmental service-learning unit.

**Theme 1: From Plan to Implementation--Imitating Her Teammates**

The only environmental service-learning activities Catherine implemented were those her teammates also conducted in their remediation/enrichment classes. She did not initiate any
actions to carry out any environmental service-learning of her own. During the planning process, she had many ideas for how to implement environmental service-learning in her language arts class but her desire to make the effort was diminished by the combination of feeling responsible for covering the mandated curriculum and her feeling of “loss of voice” in terms of involvement in the process. Her hesitancy may also be attributed to her unwillingness to forfeit time to conduct environmental service-learning, “I had to give up remediation to do this. And it was hard and I did not want to give it up. I didn’t want to because I just really believe in the remediation and tutorial program.” Catherine used the last rotation of remediation/enrichment classes before the high stakes review time to conduct her portion of the environmental service-learning unit. Catherine also explained that scheduling affected her reasons for using only the remediation period. “Well, it depends on scheduling, too. Like remediation/enrichment. We had our kids for three weeks rotations, so we almost had to do the same thing since we were doing in the remediation/enrichment period.” If the other teachers had not agreed to use the last rotation of the remediation/enrichment period for the unit, Catherine may not have attempted to conduct environmental service-learning.

Catherine started the remediation periods showing environmental videos that were also being used by the other teachers. The intent of the videos was to provide a common experience for the students so that a shared language could be developed. Catherine, reflecting on the effectiveness of the videos commented, “I gave the kids a quiz at the end of each video to make them pay more attention. Even though I gave a quiz at the end of one video, and tried to get them engaged, after the third video, they were tired of them. After that, in the last video, I just tried to ask them more questions about how they could apply what they had just seen in the video.” Once the videos were finished, the team met and discussed their effectiveness. Margaret started the
conversation by saying, “My kids are bored with the videos.” Catherine added, “Mine are too. They are bored. That is why I had to quit giving the quizzes and start discussing the videos more.” That week’s Friday morning meeting was also the point at which the team decided to change the focus question of the environmental service-learning.

Catherine facilitated the collaboration effort with Margaret to implement the NIMBY poster lessons by opening the wall that separated their two classrooms. They decided to implement the poster lesson together so that they could help each other and interact more with students in different classes. Catherine said in her final interview that, “I am glad we opened the wall for when we worked on the posters. Margaret and I were able to float around and hear each other’s classes discuss their ideas in their groups.” Opening the wall also seemed to increase her comfort level with the environmental service-learning activity, since she did not have to explain the science behind the NIMBY to the students. Margaret did the lesson presentation to both classes at once, with the wall opened. “I did not feel totally comfortable with what NIMBY was; it helped having Margaret explain it to our classes.” Reflecting on the posters after the unit’s completion, Catherine noted that the students seemed to enjoy taking a stance on whether they were a NIMBY or not. The students worked on the NIMBY posters for six days. As the students were finishing the posters, the teachers began to organize for the city planner’s final presentation.

The team agreed to have students present their posters and NIMBY stances to the city planner. They wanted an interactive forum so agreed to have students carry out a debate in front of the planner. When discussing the role of each teacher in terms of preparing students for the debate, Lisa said, “I need to conduct more stream data analysis with my students, then I can prepare them for Friday.” Thomas and Margaret noted that they had done debates with students before, thus Thomas suggested, “Why don’t Margaret and I take the students that are outgoing
and willing to debate and prepare them? That leaves the quiet students that hardly ever say anything in class.” Catherine volunteered, “I will take them and have them write letters to newspaper editors and the city mayor about what they think about all the development.” The letter writing seemed to be a good fit for Catherine since she had discussed in many planning meetings how she wanted to have the students use the environment as a purpose for her writing. Two days were allotted for the debate preparation and letter writing. The letter writing did not go well for Catherine. She said in her weekly reflection, “the letter writing did not go well. I should have prepared them better. I should have brought in some sample letters to the editor and showed them to the students to give them an idea what to write.” None of the letters were mailed to the local newspapers or city mayor. When asked about this in the final interview Catherine responded,

I think maybe if I had to sit there and write for 30 minutes a letter to someone I never knew before, I would do it. That’s just the kind of student I am. Would I get anything out of it? Probably not. If I had gone maybe to somewhere to understand the issue first hand, and then came back and wrote about it, it would have a much bigger impact, then just sitting in the room writing to some anonymous person. Next time I need to prepare the students better, help them understand more of the issues and the people they were writing.

The culminating activity for the environmental service-learning unit occurred on March 4 with the city planner. All four classes of students were placed in Margaret and Catherine’s room with the folding wall opened, making room for all the students to participate. Several students presented their NIMBY cases and posters to the planner; then others role played a city council debate over a proposed chicken processing plant planned for development next to the school.
Thomas led the activity with the city planner since he was the most comfortable with environmental concepts. No explicit role was planned for Catherine during the culminating activity. She stayed on her side of the expanded room throughout the session, remaining near her desk or sitting on it. She appeared to be out of her comfort zone so stayed ‘close to home.’

Catherine became a follower with respect to her role in the environmental service-learning unit, though she started with many ideas. She felt the environmental service-learning unit was a success, as will be discussed in the next section, and did not indicate any regrets about not doing more. In essence, it seemed that Catherine ended up doing the minimum; her teammates really wanted to do environmental service-learning but perhaps Catherine’s heart was not really into the effort. Catherine had accepted a transfer to another school in the district the third week of February, right before the unit was to begin. This may have been a contributing factor in her waning enthusiasm for participating in the environmental service-learning effort.

**Question 4: How did Catherine evaluate student learning during the environmental service-learning unit?**

Catherine’s evaluation of student learning in relation to the unit depended directly on what she saw students do during the lessons. While Catherine’s assessment of learning was very similar to the other teachers, she looked for slightly different student indicators. This section describes how Catherine evaluated learning during the environmental service-learning unit, in terms of three themes: (1) student on-task behavior as a measure of learning, (2) shining moments for at-risk learners, and (3) the fit between student outcomes and teacher expectations. None of the themes identified for Catherine involve any quantifiable form of assessment, only subjective evaluation methods which, when used in combination, helped her gauge student learning with respect to the environmental service-learning unit. Though similar to the other
interdisciplinary team teachers in several ways, Catherine’s emphasis on the need for outcomes to fit expectations was unique to her. However, her primary method of evaluating learning was through observation of student on-task behavior.

**Theme 1: Student On-Task Behavior as a Measure of Learning**

Student engagement in the environmental service-learning lessons indicated to Catherine that learning was taking place. In each weekly reflection and the final focus group, her discussion always included some consideration of student level of engagement with respect to different activities. In her reflection during week five, she wrote, “They did a great job of brainstorming both sides of the issues for the posters and putting it down on the posters. Sometimes a few would get off task but when someone started talking about their ideas about NIMBY, the others would get back on task quickly.” The following week she noted, “They really liked expressing their ideas. It makes them feel important, part of the community, like their opinions matters.” In a later reflection she wrote, “Most of the students were really excited about the posters. Some needed to be reminded to stay on task but just a few.”

Catherine was later asked to discuss further her reflections and use of engagement as a measure of learning. Catherine’s reply was, “If they are actively engaged like when they were doing the posters, or like when they are watching the videos, if they are sitting there and really watching and asking questions, or making ‘oohhh’ or ‘aaahhh’ comments – that is successful.” She pointed out that she particularly watched for students that normally did not do well or participate in class to determine if they were engaged and working on the task at hand. When asked, “Could you look at each kid and say if they were successful with this unit or not?” Catherine replied, “Yes.” In further probing, Catherine was asked how she was able to evaluate the learning of quiet, well-behaved students. Without hesitation, she replied, “When I walked
around as they worked on their posters, Margaret and I were walking around, looking at posters, and I would ask, ‘why did you put what you did on the poster?’ They talked to you when it was informal and one on one.” In her autobiography, Catherine explained her ideas in a different way, “I think that learning is gaining any type of information, if you leave knowing more than when you came into it. If they are actively engaged in something, they will learn something. I know they have learned something from the project.” In the final focus meeting and interview, Catherine talked about how, “with the city planner, they (students) came up with good questions. I could tell they thought about what they said” and how, “they liked having the panel of their peers up there as the committee.” Catherine elaborated further on her ideas about evaluating student learning during this same interview,

Researcher: Could this [environmental service-learning] be a pencil and paper type evaluation?

Catherine: No – I don’t think with what we’ve done. We could do persuasive essays not just recalling facts. We could also make it into a testing format, like ‘pass/fail’ test has open ended responses. We are bound by standards – so if we could do both, that would be ideal but HARD (emphasis). I am torn.

Catherine’s clear preference for assessing learning was observation of student engagement, as she wrote in her final reflection on March 7

I think the environmental service-learning was successful. The students dealt well with the city planner. They got their posters ready and presented their ideas to him very well. They were really engaged and wanted to participate for the whole last two weeks. The students really wanted to “protest” against the eminent domain issue.
Theme 2: Shining Moments for At-Risk Learners

Catherine took pride in seeing students that normally did not do well in language arts excel during the environmental service-learning unit. She noted many times how well certain students did during specific activities, or how the group did as a whole. General statements like, “They loved the planner coming in today! They enjoyed presenting their ideas and thoughts to a real person in the city planning department” were typically found in her weekly reflections. However, she also commented on specific students, usually those students that did not do well in regular academic classes.

Four students stood out in Catherine’s mind as ‘shining,’ doing so well with the activities that her team members also commented on their efforts. Quinton, Jason, Mark, and Brian’s names came up several times in reflections and focus group meetings. Quinton was repeating seventh grade and it looked like, as of February, would once again not be promoted. Catherine noted in the final reflection

Quinton was awesome when he stood up in front of everybody and presented his cause for whether he was a NIMBY to the city planner. He usually is unmotivated and not interested in what we do. He was articulate and convincing in his argument.

Catherine referred to Quinton again in her final interview

Quinton did a great job presenting and he usually is just – ho hum. He got involved because he wanted to and he did a great job. He did well because he believed in what he was talking about. It gave him a chance to shine, and be in front of his peers, and you know, in a positive way. He usually wants to be the center of attention, even if negative.

Catherine also discussed Jason and Mark, noting how they surprised her when volunteering to take on a task. Before the culminating activity with the planner, Jason and Mark came to
Catherine and Thomas and asked if they could write up a tree ordinance and present it to the City for possible adoption. They wanted to start work on the ordinance before the planner came so they could talk to him about their ideas. Both students were usually compliant students that did their work but nothing extra. Catherine described how she thought to herself as they walked away, “I would have never thought those two would come up with that.” Brian was a successful student who became angry when the city planner spoke to the team about land use zonings and the right of government to take property for eminent domain. He liked being the center of attention but often in a disruptive way. Brian organized a group that became very vocal and adamant in arguing that it was not right to take people’s land if they did not want to move. In Catherine’s weekly reflection, she wrote, “I was impressed how Brian got those boys so fired up. He also did it in such a way that it was not offensive. The city planner actually listened and gave the students ideas for how to do it for real. That really got them fired up even more.” All four of the boys exhibited positive behaviors that they did not demonstrate in regular academic classes.

Catherine’s perceptions were in line with most experts’ theory that if students see relevance in what they are doing, they will perform and learn the material better (Ellis & Fouts, 2001; Irvin, 1992; Jackson & Davis, 2000; Jacobs, 1991). In Catherine’s discussion of her beliefs about environmental service-learning, she explained that, “students needed to connect with their community, develop a sense of belonging that they do not have anymore.” In a weekly reflection, when she was thinking about the week’s activities involving the NIMBY posters, she said, “they came up with things on their own that I never expected, even wondering out loud if they could do this or that. Like somebody put on their poster ‘I don’t want a nuclear power plant in my backyard. That is thinking way different than what I would have expected from our children.’ ” The student’s comment on a poster about a nuclear power plant surprised her. She told Thomas
later in the hallway, “I did not think that kids this age even knew about nuclear power plants, let alone not wanting one in their backyard.” She seemed to enjoy seeing the students make connections and display their learning in ways that were not typical in her regular class. Catherine felt that it was important for students to take ownership of the environmental lessons and relate them to their lives. If students demonstrated that they could see connections and even apply them to their lives, she considered it ‘shining.’ In the final interview, Catherine summarized her ideas about learning in this statement,

If you can get them to think about what they are doing and whether they agree or disagree, you kind of get it in their head, ‘this is my backyard, my community, I’m not going to be 13 forever, one day I want to have a house and children.’ One of the kids said they’d like a ‘Malibu Racetrack’ in their backyard. Some girl turned around and said ‘not when you are married.’ That is being successful! They think about themselves and their community. I wish we could get the students thinking and acting like that more often, not just for the short environmental service-learning unit, especially the ones that usually do not get to succeed in class.

For Catherine, environmental service-learning was a way to bring out the best in at-risk learners.

Theme 3: The Fit between Student Outcomes and Teacher Expectations

Catherine remembered some of the initial beliefs she expressed about the environmental service-learning unit, and referred to them in her reflections and final interview. Catherine wanted the students to make connections to their community and be motivated in their learning. She also emphasized the importance of having specific objectives for individual activities, such as the environmental videos. She said in the midway focus group meeting, “depending on what your objective is, are you or they successful. If I want them to watch the video and get something
out of it, by listening to their comments, I can tell if they are getting something out of it. Yes – that is one way I gauge success.”

Catherine also felt it important that if she helped the students see the relevance in what they were doing, they would take ownership of their learning. Environmental service-learning served as a vehicle for her to fulfill this personal goal. After the unit was completed, she reflected she contributed to increasing student awareness of the community, which in turn became a motivator for students to learn. She said

One of the goals I had for the environmental service-learning that I did not say before was to get them to look around themselves and the community. I wanted them to take ownership of things around them and their home and stand up for something they believed wrong. There are a lot of places in this city where the trees are being cleared to build a new shopping center or new housing development. Maybe some of the students live near those areas. I wanted them to ask themselves and decide if it was going to affect them or their family? What about the animals that live there?

When reflecting on what she heard the students discussing in groups as they were creating arguments for their NIMBY posters, Catherine noted

I think it went well because they were taking it (NIMBY Posters) personally and thinking about certain construction and how it would affect them. I would hear them saying to each other, ‘I can do this’ or ‘I can do that.’ Some of them were thinking out loud, a bunch of them were thinking outside the box. I did not expect that to happen with the environmental service-learning.

When asked, “What went exceptionally well?” Catherine responded
I think they really enjoyed learning about their community. Many did not know they lived so close to a river and had not thought about how construction affects them. I think we have definitely opened their eyes a bit. For me personally, I enjoy seeing them ‘fired’ up about things.”

Within-Case Summary: Catherine

Catherine wanted to conduct environmental service-learning with the interdisciplinary team because she believed that students did not have a sense of place in relation to their community. She also viewed it as a means for improving student motivation. She noted how students were often bored writing about hypothetical topics and thought that they would write more passionately about environmental issues that had real-life application. Though she did not implement any environmental service-learning in her academic language arts class, she did have her students participate during the eleven remediation/enrichment periods, and noted many examples of them becoming passionate about environmental topics and seemingly making connections to their community. Catherine strongly valued participation and engagement as a measure of student learning and success for the environmental service-learning unit. In particular, student on-task behavior and shining moments for at-risk learners were evidence of learning and supported her belief that environmental service-learning could improve student achievement if it provided opportunities for active engagement.
Thomas-The Environment as a Passion

Thomas was the science teacher for the interdisciplinary team. He had worked at the school for nine years, and was a member of the original team. He became a teacher twelve years prior to this study, after succeeding in two other careers. His first job was as an environmental research and protection specialist for the Federal government, using his undergraduate degree in environmental resources management. Thomas’ second job was that of a computer software trainer and sales manager in the corporate sector. Thomas’ brother was a math teacher and thus teaching had always been in the back of his mind. When an opportunity to switch into teaching came available, he began to teach seventh grade life science. Thomas received his National Board certification for Early Adolescent Science in 2000 at age 37. During the period of this study, he was the school’s teacher representative to the district superintendent’s teacher advisory committee and representative to the school council. For a detailed profile of Thomas, see Appendix R.

Thomas previously had held other leadership roles at school but decided to do less because of his home schedule. Working on his doctorate while continuing to teach and having three teenage daughters reduced the time he had available to take on responsibilities at school. He usually arrived at school at 8:15 and seldom left after 4:30. The afternoons usually saw him running to see his daughters’ sports games, transporting them across town, or rushing to the allergy doctor twice a week for shots. Thomas’ daily schedule is detailed in Appendix S. This within-case analysis describes Thomas’ beliefs regarding environmental service-learning and how he planned, negotiated, implemented, and evaluated student learning. For each of the four research questions, emergent themes are identified and supported with evidence.
Question 1 – What were Thomas’ beliefs regarding environmental service-learning?

Thomas held strong beliefs concerning the importance of environmental service-learning. He described his interest in the environment topics and issues as, “my passion since high school.” He did not hesitate to integrate environmental topics into his science class or work with his teammates on interdisciplinary units. The emergent themes in the case of Thomas include (1) environmental activism as an important goal of service-learning, (2) the importance of ‘sense of place’ for student learning, and (3) involving students in their own learning. Each of these themes are explained with supporting evidence.

Theme 1: Environmental Activism as an Important Goal of Environmental Service-learning

Thomas believed the environmental service-learning unit should be a combination of environmental education and service-learning. He attempted to put into action the UNESCO view that environmental education should, “prepare the individual for life through an understanding of the major problems of the contemporary world, and the provision of skills needed to play a productive role towards improving life and protecting the environment with due regard to ethical values” (UNESCO, 1977, p. 24). The National and Community Service Act’s definition of service-learning, “conducted to meet the needs of the community and helps foster civic responsibility (NCSA, 1999, p. 5) was also an important aspect of his belief regarding environmental service-learning. In Thomas’ initial interview, he expanded on what he thought environmental education should include. His idea for environmental education was:

When you do environmental education, I think the kids should understand what the environmental issues are, in air pollution, water pollution, land pollution, hazardous waste, endangered species, archeology, and noise pollution. The students need to understand the whole environment, then the issues confronting each. When they
understand why it is an issue, then they are able to look at the costs and benefits when trying to figure out if a construction project is good or not. Also, how can it be made better so it does not hurt the environment as much? Why do we have to make it better? From there, I want them to be able to come up with ways that they think would make it better. Problem solve, like reducing water pollution and air pollution during construction.

The degree of his passion for environmental issues and topics was evident in his autobiography when he wrote, “I believe that the environment is under attack now, with the current national administration. Many of our kids live in lower socio–economic conditions. The environment is not high on their list of things that are important.” He continued this thought with, “I guess I want to create an activism mindset in some of the students that makes them want to do something about an issue they feel strongly about, not necessarily just the environment,” implying that he wanted students to be active with the environment but other service oriented activism would also be a goal within the parameters of environmental service-learning.

Throughout the study, Thomas wrote and spoke of environmental service-learning as a call to action for his students. In his personal autobiography, he wrote that environmental service-learning should,

Make the student to look around themselves at school, home, in the community and be able to understand some of the basic environmental service-learning precepts and to apply what they learn to their lives. For a 13 year old, it is to create an awareness, an activism, and/or just plant a seed or future life. Environmental service-learning should open the kids’ eyes and minds to what is going on around them, in regard to the environment.
In one of the early planning meetings, as the teachers were starting to develop ideas for the unit, Thomas told the others that environmental service-learning “should create activism, make them want to do something about something they believe.”

Theme 2: The Importance of ‘Sense of Place’ for Student Learning

Thomas personally enjoyed being a part of his community. In every audio taped meeting of this study, he talked about environmental issues in the community near the school and the politicians in the city and county government. He had lived in the community served by this middle school for twenty years, and his daughters attended the local schools at the time of this study. Thomas noted that his team teachers did not like to live in the community served by the school in which they taught, but he explained, “I enjoy seeing the students and their parents outside of school, like at the grocery store. It makes the kids see that I am a real person and live with them in this city.” In every team meeting he contributed information about the local politicians, environmental issues present in the nearby communities, and helped his teammates with locations of landmarks throughout the area. Thomas was not born or raised in the community but definitely was an active member of the community at the time of this study.

As noted in the introduction to this section, Thomas was, “passionate about the environment.” In his autobiography, he demonstrated how he wanted his students to become aware of the environment when he said, “One goal I have for environmental service-learning is to get the students to connect to the lessons and community so that some day they will look back and feel like they need more to protect the environment at their home or in their community.”

Thomas felt that today’s students did not seem connected to their community. “All they know is what they see at school, out the school bus window, and in their house.” As the team talked about ideas for the environmental service-learning unit, Catherine also noted how she also
thought the students needed to feel more connected to the community and suggested they
develop some community-centered ideas for the service-learning component. Thomas said

Oh Yea, that is the idea. They should come up with the activities for in their
neighborhoods. I notice that when I talk about concepts in science, and give examples of
places I have seen or something in our city, those that know what I am talking about get
excited and the others want to know what or where I am talking about so they can see it
too. Like when we discussed mistletoe growing in trees. There is some growing in the
tops of the trees near the library. When I talked about it growing in trees, they are not
very excited until I say that there is some in the trees near the library. I see in every class,
five or six kids get excited when they make the connection and can say, ‘oh yea, I know
where that is. I have seen that.’ Connecting the neighborhood with the kids is important.
Margaret and Lisa then joined in the discussion, and all agreed that connecting the students to
their community was important.

Thomas saw students taking ownership of environmental issues by learning about what
was occurring near the school. He wanted students to learn, understand, and take ownership of
issues in their community. During the first planning meeting, shortly after he and Catherine
finished discussing their observations of how students did not seem to be connected to their
community, he said,

I want the kids to take ownership of the issues. Part of taking ownership is having a sense
what it is happening around them in their community, not happening somewhere else in
the world, like the rainforests. So many teachers do rainforest projects. The rainforests
are thousands of miles away. We have all kinds of things going on right here that they
need to have a sense of. Dinosaurs, too, they went extinct millions of years ago. When
you do endangered species, the kids know about the doo doo bird that went extinct in the south pacific, what about endangered species here in our county? What are they? What can they do to help protect them? Then there is pollution. I had a kid one year know about Lake Erie being polluted, which is hundreds of miles away. What about the Yapsy river down the hill from school? Everyone is spraying pesticides on their yards which is polluting the Yangtze River. There should be a real sense of place here. Kids need to feel the environment is here and that is what they need to be working on.”

Thomas wanted to have students understand that the environment was in their backyard, not just in exotic places around the world. The county in which the school was located was rapidly growing with construction of housing developments and shopping centers common. Thomas felt he could help students build connections to the community by discussing how development impacted their neighborhoods. He knew service-learning required a connection to the community. In the initial interview, he expressed the following thoughts about how he saw service-learning connecting with environmental education,

Service-learning is taking ownership, working with a community to find out what the community needs, like in our city. There are groups that need to be helped and issues that need to be addressed. We should have the kids come up with what the issues are, then approach the groups and see if they need or want help, like the County Clean and Beautiful that promotes environmental protection. The kids should come up with ideas for working with the group. There are so many environmental issues that need attention. It needs to be more than just community service, like road side clean ups. Those drive me nuts. It is not service-learning, picking up garbage is not service-learning and not learning
anything about the environment. I want the students to connect with the community and work on real issues with real groups.

Theme 3: Involving Students in Their Own Learning

Thomas believed that helping students develop a sense of place and an environmental activist stance would effectively cause them to be more involved in their own learning. He said in his autobiography, “I want to excite students about learning. Create an interest in them wanting so they want to know why things are the way they are and how they work. I get tired of just trying to teach them science content and trivia. I want them to take such an interest in the science and the environment that they initiate their own learning.” His passion was the desire to teach his students concepts and applications that were real to them and relevant to the environment. He felt that if students understood why they were learning something, such as how environmental issues could impact the quality of their lives, they would become more involved in their own learning. Thomas did not view the science textbook as the centerpiece of his instruction. He wanted to facilitate student learning through methods other than textbooks. Thomas wrote in his initial autobiography that, “environmental service-learning is a tool to open their eyes and minds and create some interest and ownership in their learning. You cannot create that kind of interest with just a textbook.” He believed environmental service-learning could generate interest and the desire to want to learn on their own.

I see environmental service-learning as a tool to do this and to create some interest and ownership in their learning. That is where the service part of the learning comes in. I think if they connect with their community, they will be motivated more because they understand why they are doing what they are doing. They want to do the action they picked.
In another meeting, he stressed that he wanted to, “get kids involved in their learning and see purpose for it.” For Thomas, environmental service-learning was a way to engage students, have them think out of the box, and maybe get fired up enough to want to do something about protecting the environment.

In the second planning meeting, Thomas mentioned that he had seen students in the past get “fired up” when they saw connections between the environment and their community. He said

I want to do cost and benefits of construction with the kids again. Several years ago when they cleared behind the school for the housing subdivision, I did short and long term environmental impacts of construction and the students did really well. They understood that development will continue because people need and want new things. But they also understood that there are ways to protect the environment. The kids get motivated when they understand why they are learning. I want to do that again.

As the conversation continued in that planning meeting, Lisa and Thomas discussed an activity they felt would really involve students in their learning. When Lisa brought up her desire to conduct an analysis of the local stream and apply the data to her statistics unit, Thomas added his own reasons for wanting to do the stream analysis:

So they can learn what the issues are with water pollution. Learning how to measure the water quality and what the information indicates would be so good for the kids. They can learn how to determine good or bad water by using pH, sediment load, dissolved oxygen, and look for insects. Just by looking at the invertebrates were present can tell how clean or polluted the water is. I want to do sampling because it would make it all real to the kids. There is a stream near school that runs thru three subdivisions that some of our
students live. Also, to understand why they do not want to drink it when you are down there playing near the creek, understand what might be in it. That would be great for getting our kids wanting to learn about pollution.

Thomas saw environmental service-learning as a method for creating environmental activism, a ‘sense of place,’ and involving students in their own learning. This vision influenced how Thomas planned, implemented, and evaluated student learning during the environmental service-learning unit. He summarized the beliefs inherent in this vision in the following statement,

Why I will do it? I know it is good for the kids. I know the environment. The more I read about environmental education and service-learning, the kids do not have connectedness with their communities. They do not feel connected to the land like in the old days of farming. So a big part of the problem is that they are so removed from the environment, they do not feel responsible for it. They flush things, dump things. I really believe that the kids need to be taught that sense of place so they feel responsible for their environment. If they understand the environmental issues and how they impact them personally, the students will become motivated and want to learn because they are interested in the topic, not because they have to learn it for a test.

Once the environmental service-learning unit was completed, Thomas continued to voice his beliefs about the value of this pedagogy.

I believe that environmental service-learning is a combination of environmental education and service-learning with a common denominator of getting kids involved in their learning. Kind of where the kids did not even know they were learning. Like when they did the NIMBY posters. Once they figured out where they stood on development,
we were able to pull that passion for what is right and wrong out of the seventh graders and they argued their cases with very little effort on our part.

**Question 2 – How did Thomas plan and negotiate environmental service-learning?**

Thomas entered into the environmental service-learning process with a strong desire to do as much as possible with his students and the interdisciplinary team. He was the interdisciplinary team’s designated leader, as assigned by the school’s administration. But he was not a top down type of leader. His leadership style focused on building consensus by having peers jointly make decisions about issues confronting them. He tried to apply consensus building to the planning of the environmental service-learning unit by sitting back and encouraging teachers to develop their own roles and contribute ideas for the unit. He commented to Margaret and Catherine in one of the planning meetings that, “I have intentionally not told you want to do, I wanted you all to come up with things to do that you thought you could do.”

As with the other teachers, Thomas felt the pressures of not having enough time to do everything. Of the 43 planning period segments during this study, Thomas had:

- five segments of scheduled environmental service-learning meetings,
- six segments of unscheduled environmental service-learning meetings,
- nine segments for parent conferences scheduled for planning periods,
- one whole school faculty meeting, two seventh grade faculty meetings,
- two student support team meetings (with the team teachers, assistant principal, counselor, and parent),
- two curriculum meetings,
- two staff development meetings,
- one absence due to illness,
- and two segments for other responsibilities.

Although he had fifteen planning periods with ‘nothing’ scheduled, they were used for planning science curriculum, non-environmental service-learning team meetings, and other routine activities normally conducted during planning. As mentioned earlier, all teachers in the school were required to plan their lessons in accordance with a scope and sequence published for each academic subject. The science scope and sequence for January, February and March is listed in Appendix S. It shows that protist and invertebrate animals were the topics scheduled for February. Thomas did what he could in his science class to connect environmental service-learning lessons to the study of animals in these two kingdoms.

The amount of planning time that Thomas had available for environmental service-learning and the required science sequence influenced his efforts significantly. The themes that emerged relative to how Thomas planned and negotiated environmental service-learning were (1) taking a leadership stance, (2) covering the mandated curriculum, (3) mediational role of external constraints, and (4) rethinking what is “manageable” and “doable.” Each theme is presented and supported by evidence in the pages that follow.

**Theme 1: Taking a Leadership Stance**

Thomas was the designated team leader according to the school’s administration, their ‘point of contact.’ Though Thomas was the designated leader, each teacher assumed tasks and responsibilities for the function of the team based on his/her strengths. Margaret kept track of reporting the needs of struggling students and discipline issues. Catherine kept team meeting records that were required each week to document the use of planning times. Lisa was the team’s scheduler; she dealt with any changes in the team’s schedule from within or without. Thomas was the point person for the administration and knew how to find the answers to the questions
they asked. For the environmental service-learning unit, Thomas wanted the team to operate in much the same way as they did on a daily basis, each teacher capitalizing on his/her strengths.

Thomas assumed the stance of a listener during the first three weeks of planning for the environmental service-learning unit. He was a proponent of environmental service-learning, something he knew the other teachers easily recognized. He expected them to be interested in the unit since they had participated in environmental service-learning at varying levels in prior years. Also, Thomas noted in his autobiography, “we all went to the environmental service-learning training at the university in 2002 and they had great ideas for each of their subjects. It seems that they wait for me whenever we do environmental units. I want them to come up with their own ideas and carry them out this time.” This seemed to be the case for the first month of the planning, but things began to change in February.

Thomas and Margaret had taught together for the longest period of time. Thus, Thomas often sought out Margaret to get ideas or to vent. Before school on February 17, he went to Margaret’s room and asked her what she thought of the team’s progress with the environmental service-learning unit. She told him that she and Catherine had not had a chance to collect the data they were going to use for the research report. A few weeks earlier Margaret and Catherine had volunteered to figure out what data to use and come up with an outline for the research report. At that time, Thomas noted that he “held myself back, I did not say what I thought should be in the report. I wanted them to take it and develop something that they thought they could pull off instead of me telling them what I thought would be good.” Later in his conversation with Margaret, Thomas told her that he deliberately chose not to say anything that day about the report. Margaret responded, “I could tell. That is why I volunteered Catherine and I to figure out what to include in the research paper.”
In his leadership role, Thomas was extremely frustrated about the team’s progress, perhaps more so than the other three teachers. He wanted to do more and wanted the others to take more initiative for planning the unit. He did not say much to his teammates but wrote about it often in his reflections. Thomas was becoming very frustrated by mid February, after four weeks of planning. In his February 17 reflection, when considering how he thought the environmental service-learning unit was progressing, he wrote, “I feel like we still do not have a plan. It has been five weeks.” In the midway focus group, he told the others, “I thought we’d be doing more service-learning action by now, like public service announcements, fliers.” Although he was the leader of the team, he seemed to feel that he did not have control over many items. In his weekly reflection February 24, he wrote,

I thought we’d be doing more ‘stuff” and more meaningful stuff by now. I feel like we are just ‘muddling through.’ A clear plan does not exist. Need more commitment to the environmental service-learning effort. Seems that all the day-to-day stuff is in the way, early release conferences, staff development, Lisa and Catherine as Curriculum chairs, Margaret as 7th chair and Principal Leadership Council representative and a mentor to new teachers. Then there are the nine weeks exam pressures, I am not sure we could do more.

One source of his frustration was that scheduling meetings, always a difficult task, became even more of a challenge as time progressed. After the delay of the first meeting from Thursday to Friday, the next was changed to the following Friday because one of the teachers could not attend. When the team gathered that Friday morning, they realized that Lisa had gone to a math meeting in another school. They decided to meet anyway since Lisa was working on her math
component separately. Thomas tried to call a meeting on February 23 before school, knowing that there was a parent conference scheduled during their planning period that day,

I asked the team to meet Thursday before school. No parents were scheduled, but Lisa was tutoring math to several kids, Margaret was with the principal in a leadership meeting. I don’t know where Catherine was. I was able to tell them we needed to meet during planning before Latonia’s mom was scheduled to come in, hoping that she would not show like others times. She showed and we had to cut the meeting short.

His frustration continued until the end of the unit. In his final reflection he wrote:

We never really had a plan. I have notes on what we were thinking about doing and how we were going to do it – but we met when we had time, it was a priority BUT faculty meetings, parent conferences, and other responsibilities limited the times we could all could get together and plan the environmental service-learning unit. We made a bunch of it up as we went along.

Thomas’ intent, noted earlier, was to have the interdisciplinary team develop the environmental service-learning unit jointly (since all had attended the same training and demonstrated they had their own ideas) – this did not prove successful, from his perspective. Thomas was clearly torn when considering the style of leadership which would be best for the team, (i.e., take charge and tell everyone what to do versus planning by building consensus).

**Theme 2: Covering the Mandated Curriculum**

Thomas was committed to environmental service-learning. As discussed earlier, he felt strongly about environmental service-learning as a pedagogical approach. He said in the first planning meeting, “we are teaching to the middle. Higher achievement is not emphasized, tests are emphasized.” Thomas noted in his autobiography that he, “wanted students to see science
connected to the other subjects. Environmental service-learning is a great way to show students that the real world is not separate subjects like at school.” He combined these premises with his obligations to teach life science in the specific scope and sequence noted in Table 16. Thomas expressed elsewhere that he did not like the mandated scope and sequence but in this reflection statement from February 24, he said, “I feel the pressures of high stakes tests and nine week exams, and how we will be compared to other seventh grade science teachers, the scores we each get.” However, he noted in the first planning meeting with his teammates, that, “we have to do what we think is best for the kids.” He saw environmental service-learning as a way to teach his mandated curriculum and extend his students’ learning beyond the minimum levels needed to simply pass tests.

Thomas’ required curriculum centered on introductory biology, ecology, and environmental issues. However, according to the scope and sequence, ecology and environmental issues were to be taught in the fall, at the beginning of the school year. Introductory biology was scheduled for winter, during the time of the environmental service-learning unit. Since he noted in his autobiography that the environment “is my passion,” and he knew that he would do some form of environmental service-learning with his teammates every year, he laid much of the groundwork for stimulating the students’ interest in the environment during the fall. In his reflective journal, he wrote that he did not know for sure that the team would agree to do the environmental service-learning unit in the winter but, “looking back, I was able to relate a lot of the fall ecology and environmental curriculum for the students to the environmental service-learning unit that we did. The kids brought up ideas that we talked about in the fall when we brainstormed the environmental impacts of development in class those three days.” If this study had included student data, it would have been interesting to see if they made
the connections Thomas believed he demonstrated throughout the year and carried into the interdisciplinary environmental service-learning unit.

Thomas felt the tension between his belief that environmental service-learning was good for his students and the requirement to cover the mandated curriculum. He noted that, “my reaction to high stakes testing is very negative. I feel like it is killing creative teaching.” Prior to administering the standardized nine weeks science exam, Thomas wrote in his journal, “I want to do more in science class but with the nine weeks exam next week, I have to cover material that I know will be on the test. It wouldn’t be fair to the kids to not cover the material.” This statement expressed the tension he experienced regarding the preparation of students for tests versus teaching science using inquiry-based methods which are inherently more open-ended.

**Theme 3: The Mediational Role of External Constraints**

Thomas had a lot on his mind outside of school that impacted his energy levels during the week. In his autobiography, he wrote that, “personal responsibilities after school (allergy shots twice per week, daughters’ swim meets, and soccer games) and my dissertation” were significant influences on the amount of time available to plan and prepare for lessons. The allergy doctor’s office took their final patients for shots at 4:40, so he left with the students after the final bus call to get there in time. In a weekly reflection, he wrote, “I hate leaving right away, I like to cleanup things before I leave but I have to keep to the shot schedule.” He was able to stay late one day, January 18, and was talking to Lisa in the hallway during bus call about everything he had not been able to finish during planning that day. They talked about getting papers graded, inputting grades into the computer, emailing grades to parents, planning for the next couple of weeks, and other paperwork they had to finish. Thomas told Lisa that he was going to stay at school until about 7:15 PM until he had to leave and pick up his daughter from soccer. Lisa’s response was
that she could not stay at all; she had to get home to pick up her daughter and get her to a tennis match.

Thomas and his interdisciplinary team had conducted various forms of environmental service-learning every year that they were together. The year of this study would have been no different; the teachers would have implemented some form of environmental service-learning. However, in previous years, before high stakes testing became so important in their school district and state, they had conducted activities throughout the year, whenever it fit into their regular academic plans or the weather was favorable to conduct environmental field trips (fall and late spring). Once testing became prevalent, they began to conduct environmental service-learning only in the fall, before they felt the pressures of getting students ready for the testing season. The year of this study, it worked out that the data collection phase for Thomas’ dissertation would work best if done during the January, February, and March timeframe. Though the teachers had suggested that might be a bad time because of the April testing, everyone agreed to participate in the environmental service-learning unit during this timeframe. It would fit Thomas’ schedule; furthermore, the teachers thought it would be more authentic to illustrate to others how to plan, negotiate and implement an environmental service-learning unit during a time when the pressures to prepare students for high stakes testing were immense. Margaret said in her final interview, “we could have done a lot more environmental service-learning if we would have done it after the tests in April. There was too much material that I had to cover in February and March to give it the time it deserves.” She added later in the interview, “environmental service-learning should be a strand in all of our subjects, that we plan into our scope and sequence at the beginning of the year.” Catherine emphasized a similar idea in her final interview, “I did not do much environmental service-learning because I felt too much
pressure to do everything I had to before the tests in March. We should just plan to do environmental service-learning in May, after the tests.” Conducting the environmental service-learning unit and study in May would have been artificial from the researcher’s perspective. The planning and implementation would have been very different without the pressure of tests and the anticipation of the end of the school year. A purpose of this research was to show ‘how an interdisciplinary team of teachers planned, negotiated, implemented, and evaluated student learning during an environmental service-learning unit.’ Though not stated in the overarching research question, implied, ‘during a period of time that demonstrates the teachers’ normal experiences and setting.’ Since the pressures of mandated curriculum and high stakes testing start at the beginning of the school year and continue until April, anytime after the high stakes testing in April would not be typical for the interdisciplinary team of teachers.

Outside of school, another stress for Thomas was his dual role as researcher and participant in the study. He had to separate his teaching duties and responsibilities to the school and students from the activities associated with the dissertation. It was constantly on his mind that he had to make progress on his dissertation. Thomas purposely created this separation to help manage his time and thoughts. He compartmentalized responsibilities and activities as a way to manage his time. Entries into the researcher journal were always made after school, once the students and other teachers were gone, but before leaving the building, in order to note what had occurred that day. Any environmental service-learning planning was done during the school day or at home in the evenings. Though many researchers consider themselves in a dual role, Thomas tried to separate the roles as much as possible to reduce confusion in his own mind during the study.
Thomas became more aware of the need to keep the environmental service-learning unit manageable for the teachers early on in the planning process. Although he had used the notes from the first two planning meetings to write the environmental service-learning plan submitted and approved by the school’s principal, he did not use it to guide the team’s planning as implementation drew close. He wrote in a weekly reflection in early February, “there is too much in the plan approved by ‘the principal.’ We need to figure out what we can realistically do before the testing review starts in March.”

Thomas wanted to conduct stream sampling so that he and Lisa could use the data for their classes, but once he realized he would not be able to manage starting a chemical and biological sampling regimen in time for the environmental service-learning unit, he began to work on a plan that was ‘doable.’ He decided to create chemistry data for Lisa’s statistical unit and biological samples for his protist unit. In order to help Lisa with her statistics unit, he created data for her to use. Thomas chose five water quality parameters (pH, temperature, suspended solids, dissolved oxygen, and bacterial count) and weather conditions that might impact water quality (precipitation, air temperature, cloudiness) and created the data to reveal patterns or anomalies that would surface when Lisa’s students used statistical analysis and graphing on the data. The data he created is included in Appendix K. To make the data seem more real to the students, he borrowed a secchi disk from the local high school and explained to his students how to measure opacity. He showed them pH strips and told them that he had taken bacteria samples from the stream like they did in class the previous month. The students did not know that the data was created. The created data assured Lisa that the statistics would work since it was developed with this desired outcome in mind. For his protist unit (described in detail in Thomas’
implementation section), he modified an investigation lab that normally had the students looking only at cultured protists, to include stations where they would look for biological indicators of pollution, such as certain protists and aquatic invertebrates. He told his students that the water and mud samples came from the same stream where Lisa had obtained water quality data for their math class. In reality, the water and mud samples came from the pond in Thomas’ yard. He knew what organisms were present, and was thus able to make the environmental lab ‘doable’ in light of the fact that he was not able to do the ‘real thing.’

**Question 3 – How did Thomas implement environmental service-learning?**

Thomas knew that he had to create a foundation of conceptual understanding for students so that they would later be able to analyze environmental issues and make sound decisions using their knowledge. Knowing that the team had special permission to use the academic and remediation/enrichment classes as he desired, Thomas planned to focus on building conceptual understanding in his science classes and use the remediation/enrichment classes to work on environmental service-learning with his teammates. He implemented the environmental service-learning in his science class six times and fifteen times in his math enrichment class, more than his teammates. Thomas’ implementation is characterized by two themes: (1) using environmental topics to teach life science and (2) implementing environmental service-learning without the pressures of grades. None of the environmental service-learning conducted by Thomas and illustrated in these themes was graded material or activities. He used the environmental service-learning only as supplement to his mandated curriculum.

**Theme 1: Using Environmental Topics to Teach Life Science**

Thomas implemented environmental service-learning lessons in his science class five times. He also taught an ecology and environmental issues unit as part of his required curriculum.
in the fall for approximately five weeks. Inclusion of ecology and environmental issues in his mandated science curriculum made Thomas’ class ideal for environmental service-learning. In January and February, he was required to teach the protist, bacteria, fungus, and invertebrate animal kingdoms. Thomas used two approaches to integrate environmental topics into his teaching. The first approach was to integrate environmental topics related to the team’s environmental service-learning plan and match them to the mandated curriculum. His other approach was to ignore the required curriculum topics and use three class periods for environmental service-learning activities. He chose these for separate reasons.

Thomas’ first approach was to integrate environmental topics into his mandated curriculum such that students would learn the required content with an environmental emphasis, which would enable them to understand how science connected to their other classes. For example, when it was time to teach the protist kingdom, he adapted the microscope lab portion of the unit by adding stations to include identification of pollution indicator organisms. He had students use microscopes to identify the required organisms of paramecium, ameba, and euglena in laboratory cultures and added two lab stations that included mud and detritus taken from a nearby stream. He wanted students to look for bacteria and invertebrate nematodes that might indicate pollution in the stream. He called the lab “Environmental Sampling” and told the students that in addition to looking at the organisms they were learning about in their book, they were going to be scientists looking for organisms that might indicate pollution in streams. When it was time to teach the bacteria kingdom, he extended a bacteria sampling lab, where the students swabbed various locations throughout the school using Q-Tips and an agar petri dish. It was expanded to include the growing of bacteria cultures using the stream waters brought in for the protist lab. When teaching the students the characteristics of protists, bacteria, and
invertebrates, he included examples of how giardi, E. Coli, and tape worms might be found in local waters. A discussion about the transmission of West Nile virus and plasmodium protists by mosquitoes was also included. Knowing that Margaret was talking about disease problems in the vicinity of the Indian Ocean following the December of 2004 tsunami, he related his lessons to her topics so that students could make cross-curriculum connections. He wanted students to see the connections between dysentery from the unsanitary conditions after the disaster and bacterial pollution that comes from leaking septic tanks in local communities.

The second approach Thomas used during the interdisciplinary team’s environmental service-learning unit was to ignore the required scope and sequence for three days and focus on developing students’ understanding of environmental impacts. He chose to ignore his required sequence in order to provide students with baseline knowledge regarding environmental issues. Thomas chose to use his academic periods to teach environmental impacts and issues so all students would learn the same material going into the environmental service-learning unit and because his teammates were not comfortable teaching the science of these topics. Thomas took three days of his science class and taught the students concepts of short and long term environmental impacts associated with construction of shopping centers and housing developments. Included in the three days were notes, discussions, and brainstorming about impacts that might be associated with these development activities. Appendix T contains a copy of the notes taken by one student and the impact matrixes completed by another student during the brainstorming sessions. The common knowledge developed by students was evident when they worked on their NIMBY stances, as Catherine noted in the final team meeting, “I am glad you covered what environmental impacts are for the students. They seemed to understand the difference when they discussed whether or not they wanted certain types of development in their
backyards or not.” Thomas noted in his weekly reflection after the impact lessons that, “they seemed to really get something out of the short and long term impact lessons. It started kind of slow but soon students began to indicate they understood, like Paul saying that if they quit building houses in the county, he will have to move to another state because his dad is a painter and needs the new houses so he has work. That seemed to help several others make a connection to what we were talking about.” The copy of a student’s completed environmental impact sheet in Appendix T shows the range of ideas developed by the students.

**Theme 2: Implementing Environmental Service-learning without the Pressures of Grades**

The math enrichment period at the beginning of each day gave Thomas time to do environmental service-learning activities that he could not work into his science class. Since he conducted math enrichment for students on the interdisciplinary team that had already mastered the mandatory topics for the three-week cycle, he had flexibility that Lisa and Catherine did not. They taught remediation math and language arts to students who had not demonstrated mastery of required topics. The remediation and enrichment periods were conducted from 9:30 to 10:20 AM and students did not receive any grade for work during the period. The work was intended to supplement required math and language arts curriculum. With the additional flexibility, he chose to start his portion of the environmental service-learning during remediation/enrichment earlier than the others.

Thomas began his part of the environmental service-learning unit by having students watch videos to broaden their understanding of environmental issues beyond what had been covered in science class. The County Clean and Beautiful Organization published several videos covering topics such as water conservation, water pollution sources from neighborhoods, and waste stream reduction/recycling. In Thomas’ words, “the videos were good but some of the
students got bored.” To improve interest in the videos, Thomas started a scoring system after the first video where students rated how well the topics were presented and the quality of the portrayed information. Thomas noted improved interest in the videos in his weekly reflection and recalled the dialogue between two students when discussing a video. The first student said, “That movie was boring.” Another student replied, “It may have been boring for how they presented the information but the information was good. A video doesn’t have to be fun to have good information.” Thomas realized his students were learning about the environment from the videos. From his students’ evaluations of the videos, he selected the best three and suggested to his teammates that they show the same videos when they began to implement environmental service-learning.

When the interdisciplinary team redistributed the students between the teachers for the remediation/enrichment cycle that began February 16, Thomas did not have students watch environmental videos since he had covered this earlier. He proceeded to have his enrichment class work on their position with regard to the focus question, “Should development be allowed along Breadloaf Parkway? Support your response.” He instructed the students to develop position statements which they would seek to support later that week. In his weekly reflection on Thursday, February 17, Thomas wrote, “the students are not doing well with their positions. I am not sure if it is how I presented it or they just do not care.” The next morning, when Catherine, Margaret, and Thomas met before school (Lisa was absent), they agreed that the students were not ‘into’ the focus question. The idea for the NIMBY position posters was formed and implemented that Friday.

The sequence of events for the environmental service-learning unit quickly evolved when all four teachers began implementation during the remediation/enrichment class. There was not a
detailed plan for each teacher’s contribution to the interdisciplinary unit. As Thomas noted in his final reflection, “there was a lot of adjusting, changing, making up as we go. We responded to the kids, what didn’t seem to be working, what can we do?” That summarized how Thomas and the others implemented environmental service-learning from that point forward. Thomas introduced an idea for a new focus question Friday morning, suggesting, “Are you a NIMBY, partial NIMBY, or Not a NIMBY?” and brainstormed with the students ideas to include on their position posters. Thomas was able to schedule the planner to speak to the team on Tuesday February 22 about how the city approves zoning requests and manages development. With Tuesday already committed, he used Monday to introduce the students the job of city planner and prepare them for his visit on Tuesday. He helped the students develop questions to ask about shopping centers and housing developments.

The rest of the week, the students worked on their NIMBY position posters and prepared for the return of the city planner. On the Wednesday before the planner returned, Thomas had the students prepare and present their NIMBY positions to classmates, in order for them to select who would present a case to the city planner. The top three students were chosen to represent different NIMBY positions for their class. On the Thursday before the planner’s return, the class practiced debates and selected the individuals who would present to the mock city council positions regarding the development of the chicken processing plant adjacent to the school.

The culminating event for the unit was Friday, March 4. The city planner arrived with all four teachers’ students assembled in a single room. The students already knew the planner from the introductory meeting so Thomas reminded them of his job and role as an audience for students presenting their NIMBY positions. Since Thomas was a friend of the city planner and
the leader of the interdisciplinary team, he managed the events for the culminating activity while the other teachers were scattered around the room monitoring the students.

**Question 4: How did Thomas evaluate student learning during the environmental service-learning?**

Thomas evaluated student learning using observation as a “tool” for informed assessment, and by noting shining moments for at-risk learners. Though seemingly a very simple method of assessing student learning, he felt it adequate for this effort. A common thread with Thomas throughout the environmental service-learning unit planning, implementation, and evaluation phases was that if a student was interested enough in the activity or topic to participate, the student would learn something. For Thomas, participation meant that learning had occurred, even if it was not the expected knowledge.

**Theme 1: Observation as a “Tool” for Informally Assessing Learning**

Thomas was a self-proclaimed process oriented teacher. He typically evaluated student success with grades and through observation of student learning. He said many times that he ‘saw’ his students learning. He wrote in his initial autobiography:

> If I could just teach science the way I really want to and not have to give tests and the students did not have to take the high stakes tests that the county and state make them take, I would be in heaven. The kids would learn science by doing it, not learning stuff like they were preparing for a trivia game.

This strong statement is also a cause for some of his frustrations noted earlier. On the basis of this statement, Thomas felt that if a student was doing something, anything related to the intended lesson’s objectives, he/she was learning something. He observed students for evidence of learning. He did not feel he had to collect grades or evaluate individual work to determine if
students were learning. In his final reflection, he wrote that he wished there were no tests, suggesting:

I don’t need grades or tests to tell if they were successful. I can just tell. Maybe we should have done a reflection to help the kids summarize, think about the environmental service-learning unit but when March 4th came, everything shifted to March Madness and test prep in each academic subject.

Later in this same reflection, he wrote:

I am not convinced that passing tests (high stakes and regular progress checks) is a measure of success. The kids need to like learning, love learning, want to know more on their own – in what they are interested, not what we always want them to learn. The high stakes tests are too much preparing for Jeopardy – not real life.

In addition to observing students for learning, Thomas also looked for students who initially appeared not to grasp a concept and then suddenly made connections and demonstrated understanding. Thomas explained in his final interview,

I enjoyed seeing the ‘light bulb’ light up when they realized something or asked questions that took the idea further. It showed that they understood the whole lesson, or a single concept and showed signs that they wanted to learn more. Success is when the kids see a real life situation and learn about it, and they want to take it further.

Thomas noted that it was often hard to tell when quiet kids were learning; this also made it difficult for him to evaluate the success of his teaching methods. A strategy that he used during the environmental service-learning unit was to visit with every student during independent work times, and ask them probing questions. He said in his final interview
For the quieter kids, I watched them work on their NIMBY posters and looked for intensity in what they were doing. The things that they put on the posters and the way they drew and wrote. I would then ask them something about their work. If they enthusiastically responded and wanted to explain something on the poster that they believed in, it showed me that they owned the work and learned something.

He enjoyed seeing his students learn, especially those that usually did not demonstrate success outwardly.

Thomas associated ‘doing’ with learning so he watched for student engagement as an indicator. Thomas stated that he measured learning in terms of student involvement such that those, “that are not normally engaged, engage.” For Thomas, engagement was a sign that the students were interested; and by extension, he assumed that the students were learning if they were doing. Thomas also observed the intensity and scope of engagement and considered that in evaluating learning. He observed the students during the discussion with the city planner and listened to the quality of students’ arguments in regard to a particular NIMBY stance. In his final reflection, he wrote

I looked at student participation as they were presenting their case to the city planner but also looked for those in the crowd to see if they were engaged. I looked for them listening to the presentation, nodding their heads, and making side comments to their peers about what was said.

In two other reflections, Thomas associated level of engagement with student learning. When he reflected on the environmental lab conducted in mid January, he wrote, “The environmental lab went well. The kids were excited when they saw organisms. They did not even know what they were but it opened their eyes as to what lives in water.” When using engagement as a measure of
learning, he also was cognizant of the extent to which students made connections between lessons. When reflecting on the long and short term impact lesson at the end of the week, he wrote, “I saw many students go from short term impacts to long term impacts very smoothly. I didn’t think they would make the switch so easily.” A common pattern in Thomas’ reflections about evaluating student learning and success was the general nature of his statements. He very seldom noted that only a few students were learning or not. Either everyone was successful or not, except as noted in the following theme, shining moments for at-risk learners.

**Theme 2: Shining Moments for At-Risk Learners**

Thomas enjoyed seeing students that did not normally perform well in regular class achieve during the environmental service-learning unit. When Thomas decided to conduct a three-day lesson on long- and short-term environmental impacts associated with development of shopping centers and houses, he was pleased with the student responses to his questioning. He was not sure if the students would understand impacts to water, air, and land from construction activities so he prompted the students slowly with some initial questions. The response from the students regarding the lesson seemed to surprise him. In his weekly reflection at the end of the week, he wrote,

The first day was slow, I either went over their heads, or they were not interested. The second day changed. When I asked for some ideas for impacts that would happen if developers started clearing the forest next to school for a new shopping center, kids that never participate raised their hands and had good things to offer. It was like I struck a nerve with them.

Continuing with the reflection, he wrote about two students that did not usually participate in class, Sam and Alan:
Sam doesn’t do well in science but when I asked what would happen if they cleared the trees, he raised his hand and said several great things. I hope I didn’t embarrass him when I overemphasized how good his answer was, but he never says anything in class and I was happy to see him say something, and mean it. Then there is Alan who contributes sometimes but it is usually for a laugh. Yesterday, he had some good things to say when I asked about what would happen if they cut the trees. No one laughed.

Seeing the low achieving students perform well was especially satisfying for Thomas. Several of the students that normally did not do well in regular academic classes successfully participated during the environmental service-learning unit. During their final focus group meeting, the teachers discussed student learning in relation to the environmental service-learning experience. Much of the discussions focused on increased participation of the low achieving students. Thomas told his teammates of the discussion he and the city planner had as they walked out of the presentation room to the front office:

Thomas: Did you notice anything about the students that presented?
Planner: Yes. They were awesome. They presented themselves very well and were passionate about what they said.
Thomas: How do you think they usually do in class?
Planner: Pretty good I expect.
Thomas: No, they are almost all failing most of their subjects. They just really got into this NIMBY thing.

The pride in his students was evident in his voice as he described the story to his teammates.

Thomas was obviously pleased with the evidence of student learning, which he used to evaluate overall success of the environmental service-learning unit. In his final reflection,
Thomas commented, “Students that do not normally do well in traditional classes enjoy and jump into the environmental service-learning curriculum, especially when they relate it to their homes and lives.” Later, in the final focus group, he said, 

I think the biggest way I used to determine success was to watch the students that do not like regular class. The Alan’s, Sam’s that do not participate in class much. When we talked about the environment, they were the first to offer answers. When Brad was here, of the eight students that got in front of the whole team and presented, seven of them are failing more than one of their classes.

Within-Case Summary: Thomas

Thomas was passionate about the environmental service-learning unit conducted in the winter of 2005. His passion revealed itself in what he believed environmental service-learning could be for his students. He wanted the unit to call the students to action, create within them a sense of place, and motivate them in ways such that all students could participate in the required curriculum for all subjects. The original environmental service-learning plan (Appendix G) was a vision of everything possible that Thomas and the other team members wanted to implement. Thomas admitted that he knew they would not do everything in the plan but was frustrated that they did not do as much as he thought would be accomplished. Of the four teachers, he conducted the most environmental service-learning activities, which could be an indicator that he was more serious about the effort. It more likely reflects the fact that his life science curriculum was more conducive to environmental service-learning than the other subject areas. Despite his frustration, Thomas felt that the environmental service-learning unit was a success. One goal Thomas believed was essential to the success of the environmental service-learning unit was the call to action. He strongly believed that a successful unit should strike a nerve in his students and
cause them to want to do something about environmental pollution. He summed up his evaluation of success with the following reflection

I have a feeling that a seed was planted in many of these kids and that someday, when they see or hear their parents talking about something going on in their neighborhood, or when they grow up, they will use something they learned from this unit.
CHAPTER 5
CROSS-CASE ANALYSIS

Chapter 4 presented each teacher’s within-case analysis. This chapter presents the cross-case interpretive analysis, which includes arguments for supporting, or refuting the original assertions presented for each research sub-question. Each section in this chapter includes the original assertion for the respective topic which remained in the background during the cross-case analysis; then the revised assertion is presented after each sub-question’s data analysis and interpretation. As an interpretive case study, this dissertation attempted to understand how an interdisciplinary team of middle grades teachers planned, negotiated, implemented, and evaluated student learning during an environmental service-learning unit and explored the meanings the interdisciplinary teachers assigned to the phenomena. The study was an attempt to make sense of the complexity of the teachers in their given situation (Myers, 1997) during a specific period of time. The complexity, dynamics, and tensions that emerged as a team, are described in this chapter, using the four research sub-questions as a focus. Emergent themes for each sub-question are listed in Table 9. Evidence is presented for each sub-question that either support or refute the original assertions. In order to understand how the team planned, negotiated, implemented, and evaluated student learning with respect to environmental service-learning, it was first important to explain their beliefs regarding this pedagogical approach.
Table 9

Cross-case Analysis: Emergent Themes

What were the beliefs of an interdisciplinary team of middle grades teachers regarding environmental service-learning?

1. Environmental service-learning: An instructional pedagogy for connecting students to their community and creating concern for the environment
2. Environmental service-learning: An instructional pedagogy to cover mandated curriculum
3. Environmental service-learning: Good for middle grade students

How did an interdisciplinary team of middle grades teachers plan and negotiate environmental service-learning?

1. The need for certain ‘elements’ to be present
2. Teacher responsibilities beyond the classroom: effect on planning and negotiating
3. Negotiating curriculum: Dynamics and tensions
4. Collaboration: Within the school and community
5. Balancing the pressures of accountability with planning environmental service-learning
6. Importance of loyalty and collegiality

How did an interdisciplinary team of middle grades teachers implement environmental service-learning?

1. Plan to implementation: Significant changes
2. Communication and flexibility

How does an interdisciplinary team of middle grades teachers evaluate student learning during environmental service-learning?

1. Observing success: In the teachers’ eyes
2. Success: Any environmental service-learning is better than none

Research Sub-Question 1

What were the beliefs of an interdisciplinary team of middle grades teachers regarding environmental service-learning?

The interdisciplinary team of middle grades teachers demonstrated their beliefs regarding environmental service-learning in their words, actions, and inactions. Understanding the beliefs of the interdisciplinary team was important because they influenced how the teachers planned, negotiated, implemented, and evaluated student learning with respect to the environmental
service-learning unit (Corney, 2000; Warner, 2001). Since beliefs are a combination of “attitudes, values, judgments, opinions, ideologies, perceptions, conceptions, conceptual systems, dispositions, and theories” (Lumpe, Haney, & Czerniak, 1998, p. 216) this section combines the findings from the within-case analysis and generates themes which cut across all four teachers. Beliefs cannot be isolated from each other, within a single person or between people (Richardson, 1996). Therefore, it was important to identify each teacher’s beliefs regarding environmental service-learning in Chapter 4 before developing an understanding of common beliefs held by the team. The beliefs identified in this cross-case analysis are those that influenced how the team planned, negotiated, and evaluated student learning in the context of environmental service-learning. In their research, Trimble & Irvin (1996) emphasized that an interdisciplinary team includes common “values, openness, trust, caring professionalism, personal priorities, and attitudes toward work and play” (p. 53). Nespor (1987) added that an understanding of teachers’ beliefs about curriculum, children, themselves, and team collaboration form an important basis for making sense of actions. Teacher beliefs, as a theoretical framework, served as a tool for understanding the team’s actions.

The themes presented in this chapter are based upon evidence common to all four teachers. As mentioned earlier, the researcher revised the original assertion based on data that either supported or refuted it. The original assertion for sub-question 1 (What are the beliefs of seventh grade interdisciplinary team members regarding environmental service-learning?) was I asserted that each teacher of the interdisciplinary team believed in the need for students to have more a feeling of belonging to the community in which they were being raised. However, I expected that the degree of conviction for practicing
environmental service-learning to vary, such that negative tensions would surface in subsequent discussion and analysis.

The following section presents arguments that support and refute the assertions for each research sub-question.

*Theme 1: Environmental Service-learning: An Instructional Pedagogy for Connecting Students to Their Community and Creating Concern for the Environment*

The interdisciplinary team of teachers demonstrated their belief that environmental service-learning curriculum could connect students to the local community by their comments and actions during the first three planning meetings. As they discussed ways to connect the students to the local community, the teachers became more connected to the community themselves through the discussions. Thomas lived in the community for twenty years and often spent time during the first three planning meetings (approximately 25 of the total 177 minutes) informing the others of local environmental issues and politics. Lisa, Margaret, and Catherine listened intently and asked Thomas many questions that demonstrated their interests and increased connectedness to the local community. All four teachers said that environmental service-learning would contribute to helping students feel more connected to the local community. Though none of the teachers described their desire for students to feel connected to their community as a type of ‘placed based’ pedagogy (Gruenewald, 2003), intuitively they seemed to understand the importance of developing a sense of place in their early adolescent students.

The teachers’ backgrounds affected their beliefs regarding this theme. Their backgrounds contributed to how they conceptualized environmental service-learning as a way to connect students to the community and create a concern for the environment. Lisa came from an outdoor
background, her father a large animal veterinarian living in the country of another state. She said
many times how she appreciated the outdoors noting, “I want to make them aware of the
environment.” Lisa wanted “students to become more aware of how the environment is affected
by outside factors,” and, “make students more aware of issues.” When asked in her initial
interview what her goals were for environmental service-learning, she replied,

Just by exposing them to situations, making them think, whether it is writing on paper or
taking them to Tribal Mill Park or thinking about the pollution in the stream I want to
sample, we have to make the kids more aware because it is an important issue. Otherwise,
they are not exposed to it at all.

Margaret, like Lisa, came from a country setting. She grew up in a small town in the
mountains and was a self proclaimed ‘tom girl.’ She wrote in her autobiography that, “where I
grew up, everyone knew everyone and we felt connected to the outdoors. Kids today do not
know the outdoors or small communities.” When asked about her statement that kids do not
know about the outdoors, she replied,

A lot of kids have read about the environment but have never walked in mud, never seen
a lake or stream, or never gone out into the woods (referring to Tribal Mill Ecology field
trips). Environmental service-learning is a way to get the kids active, interested, and
involved. They can see the relevance and they can actually get involved, other than in the
classroom.

Margaret added, “My social studies curriculum includes teaching them about current issues and
civic responsibility. The environment is a perfect topic since most kids like the outdoors and
animals.”
Catherine grew up the most removed for the outdoors. Though she had usually lived on military bases since her father was a soldier, she said that she had not spent much time outdoors. Her experience as a city police officer further removed her from the outdoor environment. Although not much of an “outdoors person,” she felt strongly that students needed to connect with their community and the environment. In her autobiography, she wrote,

I hope the students become more aware of their community and feel they have a personal stake in what goes on. I want to have the students become leaders, where they might not be willing to in a traditional setting (like Devven).

When asked to clarify or add to her writing, she described what she thought environmental service-learning to be

I think environmental service-learning is about giving the students a sense of responsibility to the community and their environment. It is also a way to teach what is not in a textbook, actually being there and seeing things and making them feel responsible for their community. I want to do that because they just do not know about things like the environment and I think they need to. I think environmental service learning is a real interdisciplinary unit for all of us, all our subjects. I think it is so important to be able to take what you have learned and be able to synthesize it and put your thoughts down on paper. It is like I said before, if you can go out and see what you are learning about, feel it, and smell it, I think that is a great way to teach kids about the environment and being responsible for their community.

Thomas was the most connected to the environment with his background as a professional environmentalist, outdoor enthusiast, and, “having a passion for the environment.” He especially appreciated the idea of supporting environmental opinions based on facts. In his
autobiography, when prompted to write about his idea of environmental service-learning, his response was,

students need to know how to research about the environment and be able to figure out how they stand based on the information they find. People that did not know the facts before making a protest or scene have greeted too many environmental issues in the past with emotional responses.

Thomas was the school’s contact for the County Clean and Beautiful organization so attended the meeting on January 19th representing Rollander Middle School. At the teams’ planning meeting January 21st, Thomas told the others, “I went to the County Clean and Beautiful meeting this week. They had their slogan on a big banner behind the speaker’s podium. I like their saying, ‘science and community based decisions.’” His undergraduate degree in environmental management, years working as an environmentalist, and experience teaching science seemed to have made him aware of how people make emotional decisions without facts. Thomas wrote in his autobiography that, “I want them to be motivated to do something about pollution, and know what they can do. I want to create activism in the students, make them want to do something about something they believe.” Thomas closed his autobiography with the desire to, “open the eyes of the kids and their minds to what is going on around them to the environment.” Like the other teachers, Thomas also wanted the students to make strong connections with their community. When discussing the stream chemistry that Lisa wanted to do with her students, Thomas said in the first planning meeting

The creek goes through Carden, Hanrady, and Johnston subdivisions, where a bunch of our students live. They will be able to see their houses in the aerial photo and know the
creek since it runs by their house. Those kids will tell their friends in class about the
creek and the whole thing becomes more real for them.

Thomas believed that if the students could see the creek in an aerial photo or recognize the creek
because they lived near it, a connection would be made with the community.

The teachers’ belief that students needed to feel connected to their community was a
significant reason for their wanting to conduct environmental service-learning. Interpreting their
words and actions, this desire to develop a sense of place within their students was their number
two reason for wanting to conduct environmental service-learning, second only to wanting to
motivate their students to become self-motivated learners. Margaret and Thomas wanted the
students to become active citizens. Margaret wanted to ‘tap’ the sense of right and wrong in early
adolescents to motivate them to take initiative to ‘fix’ injustices they saw. Showing students how
they could become involved citizens was an important objective for Margaret in her social
studies class, not just for environmental service-learning. Burns (1998) found that students who
have participated in environmental service-learning understand and accept civic and social
responsibility more readily than those who have not had this kind of experience. With this in
mind, the interdisciplinary curriculum was ideal for Margaret and Thomas, as it could help
students feel involved in their community and expose them to multiple viewpoints regarding
environmental issues (Kneip & Marti-Kneip, 1995). Furthermore, Margaret and Thomas felt that
an interdisciplinary curriculum might inspire students to take a stand and express their ideas.

Dennis and Knapp (1997) in their application of Dewey’s 1916 essay on environmental
education, noted that Dewey predicted the urbanization of America would bring with it
environmental problems and teachers would be responsible for educating the masses for
developing solutions. Reflecting this idea, Thomas and Margaret believed that environmental
service-learning was a method for calling students to action. Reinforcing Thomas’ belief, Dennis & Knapp (1997) noted that Dewey realized that teaching students about environmental responsibility would not likely happen across subject areas; thus Dewey identified the science curriculum as the most logical place for environmental education. This logical placement of environmental education in science and Thomas’ passion for the environment made this theme especially important for him.

Thomas, Margaret, and Catherine all emphasized their belief that the only experience the students had with their surroundings were what they saw at home, on their school bus, and while at school. They lamented the fact that this was the case; their comments support Ward-Wendel’s (1999) research which found environmental service-learning useful in middle school by connecting curriculum to the concept of “sense of place.” The desire for students to experience some sort of place-based pedagogy (Gruenewald, 2003) motivated the teachers to plan and implement environmental service-learning. The interdisciplinary teachers wanted their students to participate in real experiences within the community to develop a sense of place.

The team demonstrated an understanding that the service-learning component of environmental service-learning was intended to help students build connections with the local community and meet a real need of the community (NCSA, 1999; Pate, 2002). Seeking organizations that could connect and help students become involved in meeting real community needs, the interdisciplinary team chose two groups. The first organization was the city government. The teachers had known the city planner for many years and he had spoken with their classes several times in the past. When asked if he would participate again, the planner replied,
I would love to. Too many people do not know how the planning and development process work. I try to get more people involved but have not been very successful. If I can help you turn on some students who then go home and tell their parents what is going on, maybe I can get more involvement in the rezoning and permitting process.

The original focus question, which centered on the development along the parkway in front of the school, was developed with the city planner’s interests in mind since the zoning and development requests for this stretch of highway were typically processed by his office. The second collaborator was the County Clean and Beautiful Organization, with the mission of increasing community awareness in regards to the environment. The interdisciplinary team of teachers had a long history of collaborating with the County Clean and Beautiful Organization. As the organization grew, it changed it’s slogan to “County Clean and Beautiful: Science and Community Based Decisions.” The organization’s slogan contributed to the selection of the initial focus question for the environmental service-learning unit, “Why should they continue to allow to development of housing subdivisions and shopping centers along Breadloaf Parkway?” The focus question provided all four interdisciplinary teachers with topics that would connect to environmental service-learning and at the same time meet the needs of two community organizations.

The teachers believed that the environmental service-learning would connect the students to the local community and help them develop an awareness of the local environmental issues. Closely related to this theme, they also believed that environmental service-learning could be beneficial in teaching their mandated curriculum and improve student learning - it was perceived as something good for middle grade students. The next theme explains why they believed they could cover the mandated curriculum by implementing environmental service-learning.
Theme 2: Environmental Service-learning: An Instructional Pedagogy to Cover Mandated Curriculum

The interdisciplinary team of teachers demonstrated their belief that environmental service-learning was a type pedagogy for teaching their mandated curriculum. Their intent from the beginning was to implement as much of the environmental service-learning in their respective academic classes as possible. As they brainstormed ideas for the unit in the first planning meeting, they circled those mandated objectives they would cover through the environmental service-learning unit. The selected objectives were in the environmental service-learning plan approved by the administration on February 1st. As detailed in Appendix G, Catherine identified eight language arts objectives she felt could be covered by the environmental service-learning unit. Lisa planned to use the interdisciplinary unit to cover ten math objectives through the stream analysis activity alone. Margaret, whose curriculum fit the environmental service-learning unit the least was able to say that it would address eleven mandated objectives through six activities. Thomas, whose curriculum matched with the environmental service-learning the best, listed six required objectives that could be met by conducting five activities. All the teachers were comfortable in identifying the mandated objectives that would be covered by the interdisciplinary unit and believed environmental service-learning could be an effective pedagogy for covering the mandated curriculum. Their methods for identifying the mandated objectives in their plan also illustrate Robert and Kellough’s (2000) notion of reverse design method for curriculum whereby “some teachers use the mandated curriculum to help design the interdisciplinary curriculum and others design the interdisciplinary curriculum, and then find which mandated curriculum is covered by the unit.”
The teachers’ belief that environmental service-learning could easily coordinate with their mandated curriculum faded as planning progressed. From the first (January 7th) to third (February 4th) planning meetings, their beliefs either changed or the realities of the planning process caused them to compromise their beliefs. It was evident by the end of the third planning meeting that the teachers saw they were not going to be able to implement the environmental service-learning as originally intended. At that point, they resorted to inserting environmental topics into lessons as much as possible and began to push back the service components until after the conclusion of the high stakes testing in April. Lisa, Thomas, and Margaret each were able to add a few environmental topics into their sequenced curriculum but Catherine did no environmental service-learning type activity in her academic language arts class. In her final interview, while reflecting on how the environmental service-learning effort went, she said,

To do environmental service-learning, it is hard and I didn’t want to give up language arts or remediation time. I did give up some remediation time at the end when everyone else did, but I didn’t want to. I really believe in the tutorial program.

Thomas, Margaret, and Catherine further demonstrated their shift to making environmental service-learning a supplement to their mandated curriculum when they stressed that they did not want to give up time during their academic class periods. Thomas did use three of his academic periods for the construction impact lessons, but said, “I needed to so that the students would have the same baseline information,” regarding environmental impacts. Although Lisa did not directly state that she was not willing to give up academic time for environmental service-learning, her actions demonstrated the belief. She only used the environmental data from the Tribal Mill ecosystem field trip to teach statistics in three math classes and the data was used only for practicing statistics, not understanding environmental issues. The fact the teachers did
not include environmental topics on any of their tests during the study also indicated their lack of integration of the environmental service-learning into their academic classes. All tests administered by the teachers were the same tests they would normally have given for content units, irrespective of environmental service-learning.

The interdisciplinary team teachers believed environmental service-learning was a way to create activism, increase awareness regarding environmental issues, create a sense of place, and instill civic responsibilities in their academic classes as an integrated part of the academic curriculum. They also demonstrated their belief that environmental service-learning curriculum was a way to teach mandated curriculum across the academic subjects.

Theme 3: Environmental Service-learning: Good for Middle Grade Students

The interdisciplinary team of teachers demonstrated their belief that environmental service-learning was good for middle grade students who were characteristically social, kinesthetic, and in need of instruction unique to the early adolescent child (Jackson & Davis, 2000; Meyers, 1999). The teachers consistently maintained that the students would have fun, become engaged, and get emotional about topics. The environmental service-learning unit conducted during this study was the team’s third effort since their participation in environmental service-learning training in 2002, though this was the most organized effort. As Thomas said in the first planning meeting, “this will be the first time we sat down together to make a firm plan for the environmental service-learning. The other years, we have made it up as we went along or fit it in when it would work.” Their repeated attempts at environmental service-learning was an indication that they believed it was good for their students. Lisa remarked in her initial interview that she wanted to do environmental service-learning because, “it is good for the students. They enjoy it and they learn in the process.” Catherine summarized the group’s reason for pursuing
environmental service-learning with, “the environmental service-learning should motivate them, it should be more interesting to them. What we are doing now is not working for them.” The teachers clearly articulated their belief that students would become more engaged if the theme of an instructional unit was interesting to them and if they understood why they were learning the material, consistent with the findings of related studies of Ellis & Fouts (2001), Irvin (1992), Jackson & Davis (2000), and Jacobs (1991). The belief that environmental service-learning would motivate their middle grade students was a significant factor in teacher participation. This belief became particularly apparent the first day back from winter break when the team met to begin discussing ideas for the environmental service-learning unit. The teachers stated how many students had failed their academic subject the previous nine weeks. Out of approximately 110 students (total student numbers varied because of pull out classes such as special education, language classes for non-English speaking students, and gifted classes), Lisa had 44 fail math, 36 failed Mary’s social studies, 41 failed Catherine’s language arts, and 34 failed Thomas’ science class. Approximately one third of the students on this team failed one or more subjects. The teachers understood that middle grades students are often hard to motivate. They noted that their students’ priorities were not always on school or academic achievement, as did Boston (1997), who found that students who participate in service-learning are more engaged in school. Also discussed in the first planning meeting was the fact that Rollander Middle School’s changing demographics may have contributed to the decline in student motivation. Lisa said, “The students have changed so much the last five years. I know I have to teach differently now than I did then.” Demographically, the student population was becoming more ethnically and socio-economically diverse. From the 1997-1998 to 2004-2005 school years, the Hispanic population had increased from 4% to 21% and the African American population from 12% to 36%.
Caucasian student numbers had decreased from 79% to 33%. The percent of students receiving free and reduced lunch had risen from 22% to 54% of the student population. All members of the team seemed to believe that environmental service-learning served at-risk student populations very well (Westheimer, Kahne, & Gerstein, 1992) and therefore wanted to use this pedagogy. Catherine noted that environmental service-learning was a pedagogy that could work with at-risk students. For example, she felt that in having students make video public service announcements, “Some of the students would do well in front of the camera, but there are so many that would excel at writing the scripts or others doing the technical aspects of the video production. There is almost something for everyone.” The teachers demonstrated support for Meyer’s (1999) idea that the engaging nature of service-learning was a method for improving participation even for at-risk students because it could make education available to all ability levels, backgrounds, and interests.

The team initially started the planning process trying to cover the mandated curriculum for each of their academic areas and jointly planned connections between their subjects so that learning would be real and engaging for their early adolescent students. As time progressed, they did not conduct the environmental service-learning as originally intended, but continued because they believed their students would still benefit. The team held beliefs consistent with the National Middle School Association’s philosophy that middle schools should engage students and teachers as active learning communities and that schools should provide “curriculum that is relevant, challenging, integrative, and exploratory” and “multiple learning and teaching approaches that respond to their diversity” (NMSA, 2003).
Summary of Teacher Beliefs Regarding Environmental Service-learning

The interdisciplinary team of teachers demonstrated that they understood the benefits of conducting environmental service-learning with their middle grade students. Their discussions and intentions supported literature for interdisciplinary teaming, interdisciplinary curriculum, and environmental service-learning in particular. They saw environmental service-learning as a means to an end for connecting students to the community, creating a concern for the environment, covering mandated curriculum, and motivating their early adolescent students. However, as will be demonstrated in how they planned, negotiated, implemented, and evaluated student learning, their beliefs became clouded by the issues and realities of developing interdisciplinary curriculum in today’s educational climate of accountability. Based on the evidence that supports and refutes the original assertion, the modified assertion for this interdisciplinary team’s beliefs regarding environmental service-learning is:

These teachers demonstrated a belief for using their interdisciplinary team as an organizational structure for planning and implementing environmental service-learning and as instructional pedagogy for connecting students to the community and relating diverse curricular subjects. The interdisciplinary team believed that environmental service-learning could be effective with their middle grade students because of the interdisciplinary nature of the instruction and the relevance of the material to the students. The teachers believed the environmental service-learning as an instructional pedagogy and motivational strategy for their students. However, actions and compromises with respect to these beliefs became apparent during the planning phase of the environmental service-learning unit. The following section identifies themes as to how the team planned and negotiated the environmental service-learning unit. Throughout the planning phase, the team remained true to
their belief that environmental service-learning was developmentally appropriate for early adolescent students because it offered opportunities for students to work in groups (meeting social needs), created connections to realistic contexts which heightened students’ curiosities about a topic (intellectual and emotional needs), and provided opportunities for them to move about (physical needs) (Irvin, pp. 297-298). The activities the teachers considered in their planning process and ultimately implemented supported their belief that environmental service-learning could be an effective pedagogy to use with middle grade students.

Research Sub-Question #2

*How did an interdisciplinary team of middle grades teachers plan and negotiate environmental service-learning?*

The planning and negotiating of the environmental service-learning involved very complex interactions among the four teachers. This section describes the common themes that emerged across the four interdisciplinary teachers with regard to how they planned and negotiated environmental service-learning. The researcher has modified the original assertion with respect to how the interdisciplinary team of teachers planned and negotiated environmental service-learning curriculum based on supporting and refuting evidence. The original assertion predicted personal and professional issues would influence the team and that the planning process would often be somewhat ‘chaotic.’ Using emergent themes for how the interdisciplinary team planned and negotiated environmental service-learning the researcher modified the original assertion to reflect the actual findings. The original assertion stated:

I asserted that the planning process would not be totally systematic and at times might appear ‘chaotic’ in nature. The interdisciplinary team of teachers met with the expressed purpose of planning the environmental service-learning unit but would drift off topic, be
interrupted, and often not finish what they intended for each planning meeting. Personal and professional issues would surface and influence how one or more of the teachers might act when interacting with the others. Pressures from mandated curriculum would also influence the time each teacher was willing to ‘give’ to the environmental service-learning curriculum in his/her academic class.

Palmer (1995) noted that interdisciplinary teachers have ways of doing things and when placed on an interdisciplinary team “negotiated curriculum” by their willingness to give and take, much like the negotiations of business contracts. This research question examined, in detail, how the teachers planned and negotiated the environmental service-learning unit. The planning ultimately involved varied degrees of commitment, perceived roles that influenced how teachers interacted with one another, motives for wanting to participate in the unit, and tensions that surfaced in the process. Although not the same as a formal contract negotiation meeting, the teachers demonstrated give and take throughout the meetings and reflections. The teachers attempted to base planning of the unit on their beliefs regarding environmental service-learning but sometimes shifted because of varying influences, as will be illustrated within the emergent themes as to how they planned and negotiated the environmental service-learning unit.

The interdisciplinary team had to address several constraints placed on it up front which influenced how they planned. Changing the team’s teaching schedule to accommodate environmental service-learning was not an option because of the size of the school and number of pullout programs for special education, non-English speakers, and gifted students. However, when planning the environmental service-learning curriculum, the team had an option that most interdisciplinary teams do not have available. The principal instituted a 50-minute remediation/enrichment period that teachers in sixth, seventh, and eighth grade held every
morning from 9:30 to 10:20 to prepare the students for the high stakes tests described earlier. This team requested special permission from the administration to use some of the remediation/enrichment period for environmental service-learning curriculum (Appendix G). Knowing that the team had special permission to use their academic and remediation/enrichment classes for environmental service-learning changed the planning and negotiation process. As will be shown, most of the environmental service-learning was implemented during the remediation/enrichment period, contrary to the researcher’s original expectation.

An abundance of evidence suggests that the teachers intuitively understood what the environmental service-learning curriculum should include, how to teach it, and other physical/non-physical factors that need to be considered before implementation. They discussed the roles of the administrators, using the collapsible wall dividing Margaret and Catherine’s classrooms, and the presence of other informal aspects of the curriculum (Palmer, 1995) important to the planning of the environmental service-learning. They used their common planning time to negotiate the environmental service-learning curriculum around a focus question involving development around the school and the related societal issues as a focus, consistent with the recommendations of Messic & Reynolds (1993). As Klein and Merritt (1994) recommended, the team wanted the students to take a position on an environmental issue, emphasizing the need for students to develop an understanding of the many facets of a controversy before taking a stance.

The process of planning and negotiating environmental service-learning curriculum was complex and intertwined with many factors. Five themes emerged in the cross-case analysis that explains what the interdisciplinary team of teachers considered while planning and negotiating environmental service-learning. An important aspect of these themes is their influence on how
the teachers interacted and attempted to come to consensus on what and how to implement 
environmental service-learning. Interwoven throughout this section is a description of how the 
teachers negotiated the environmental service-learning. Their plan was strongly influenced by 
how they negotiated among themselves. Positive and negative tensions helped or hindered 
progress toward planning the environmental service-learning.

Theme 1: The Need for Certain ‘Elements’ to be Present

The interdisciplinary team of teachers implicitly implied or explicitly identified several 
‘elements’ that needed to be present before they could plan or conduct environmental service-
learning. May (2000) concluded that planning interdisciplinary curriculum required that proper 
teaching conditions, teacher competencies, and teaching practices be present for success. These 
elements were also considerations for the interdisciplinary team. The first element the team 
believed essential for planning environmental service-learning was administrative support.

Administrative support. The interdisciplinary team had the full support of the 
administration with respect to conducting environmental service-learning. The principal, 
formerly a seventh grade life science teacher, told Thomas about an environmental education 
class she had taken and shared ideas for the team to consider implementing in their classrooms. 
The assistant principal, in charge of curriculum, supported the environmental service-learning 
effort but demonstrated the pressures on her for the school to perform well on high stakes testing. 
She approved the team’s environmental service-learning plan but added that it needed to be 
completed by March 8, the beginning of test review (Appendix G). This administrator had prior 
experience with integrated and interdisciplinary curriculum. She had taught eighth grade with 
another teacher, using a democratic classroom philosophy. The seventh grade administrator 
directly supervising the team also gave his support. He had observed the team conducting
environmental service-learning in prior years and saw the benefits. Even so, Margaret noted in a planning meeting, “We need to let Albert know what we are doing next week with the environmental service-learning, in case he comes into our classrooms. We are supposed to be doing remediation and enrichment first thing in the morning and if another administrator comes by and sees us doing the environmental activities and goes to him to find out why we were not conducting remediation, I want him to know what was going on.” Lisa added, “Albert will be very supportive. He likes this kind of stuff.” Catherine noted, “Albert knows our team really well and knows we would not do some kind of fluff stuff, wasting time on something not good for the kids.” The pressures to teach mandated curriculum and prepare the students for the high stakes testing seemed to permeate throughout the environmental service-learning planning phase. When the discussion drifted in a planning meeting and the teachers wondered out loud if the other administrators at the school were supportive of environmental service-learning, Lisa’s response was, “Oh sure, definitely. For me though, if the teachers buy into it and come up with a program that would be good for the kids, an administrator would be nuts to say no to something like this.” She added elsewhere in the meeting, “You convince the administration that you always match what you have planned with the mandated curriculum and objectives. Then how can they say no?”

The team frequently discussed during their planning meetings the benefits of environmental service-learning for students. One time, Margaret threw out the question, “I wonder what the central office thinks of environmental education and service-learning? Surely they would know that it is good for the kids.” The school system was very large, with more than 120,000 students and more than 100 schools. There had been an effort to standardize curriculum,
a driving force behind the mandated scope and sequence discussed many times throughout this study. Lisa remarked once that,

the standard scope and sequence for all teachers and schools was good because it made sure that everyone covered the same materials each quarter so if a student transferred to another school in the system during the year, it assured that he or she would not miss material essential for the high stakes tests.

The conversation went back and forth about the pros and cons of standardized scope and sequences but the teachers seemed to agree that it was stifling interdisciplinary curriculum efforts like environmental service-learning. Thomas interjected with his observation that other groups from outside the school system did not see the standardization movement hurting environmental education. He told the others that he had attended the County Clean and Beautiful Organization’s semi annual meeting and, “they gave Mr. Waters (superintendent) and Ms. Kendrick (director of curriculum) their environmental education award for the outstanding efforts the school system made for implementing environmental education in the schools in the district.” Although this team of teachers did not need district approval for their environmental service-learning effort, the school had the support of the central office.

Flexible and cooperative. The teachers felt they were flexible, as noted by each teacher in their autobiographies or interviews. Lisa noted in her initial interview, “we care about the kids and we are willing to be flexible and work together. I tell you that working on this team has been the best interdisciplinary team experience I ever had. We are so cohesive. All four of us have different teaching styles but work well each other.” Margaret wrote in her autobiography, “this team is flexible. Everyone is willing to work together toward a common goal and have a genuine attitude of the love for teaching.” Catherine stated, “I think everyone is willing to spend the time
and do it, then share the work load.” In his journal, Thomas described traits he deemed necessary before attempting interdisciplinary units, including “cooperation, mutual interest among all four teachers to do interdisciplinary units, and commitment to follow through with the unit, whether things are going well or not.”

As the unit planning and implementation progressed, evidence of the flexibility among the teachers emerged. When they decided to invite the city planner to speak to the students, Margaret told Thomas, “Find out when he can come and we will do it those days.” The others agreed, there was no discussion as to what days were good or bad from any of the teachers. As will be shown in the negotiating theme, the team seldom reacted to one another in negative ways when ideas for environmental service-learning surfaced. The team normally took each idea and tried to work it into their academic subject. The flexibility of the teachers may explain why so few negative tensions surfaced during the planning of the unit. There were a few, as noted in the negotiation theme, but not as many as might be expected. Margaret summarized the absence of tensions among the teachers in her weekly reflection, immediately after the focus question was changed. “This week shows how everyone is flexible. Everyone changed what was planned, were willing to do things differently because the other way was not working.” Thomas wrote in his final weekly reflection, “I like working with these teachers, they are willing to try things and are flexible when something does not work out as planned. They don’t get crazy like I have seen some teachers when things do not work out as they planned.”

*Willingness to participate and buy in.* Evidence of the four teachers’ willingness to participate was evident from the first planning meeting. Each actively contributed ideas for what to do and how to do them. Ideas from teachers were volunteered and easily accepted by all, though ultimately not all plans were accomplished. Lisa commented in her initial interview,
The teachers need to be willing to make the time to work together and find the time to make it work. It takes a lot of time to figure out want you want to do and how to do it. I might not be willing to do this all if I had not seen the kids other years turn on to different things we had done.

Later in this same interview, Lisa added, “I think everyone is willing to do it because they buy into this and are in it for the kids.” When asked in her initial interview what was necessary before attempting environmental service-learning, Lisa responded,

You have to have teacher buy in. If I had not gone on that weeklong environmental service-learning training, I would probably not buy into this and not do what I should. However, since I did, I understand and buy into environmental service-learning and how it is good for the students.

Margaret demonstrated a similar willingness to participate. Margaret wrote in her autobiography that, “teachers must be willing to participate and have the patience to follow through with the extra work to pull off something like environmental service-learning.” When asked to clarify her statement, Margaret responded by saying, “dedicated to follow through. Something like this is an involved project. Everyone thinks we go out and collect dandelions and come back and write about it. What we do is real and takes a lot of work.” At another place in the interview, Margaret added, “since we have been doing some form of environmental education and service-learning for many years, I know that I have to be willing to keep learning how to pull this off. It is never the same from year to year.” Catherine, commenting on the fact that Thomas and Lisa had children at home, agreed that interdisciplinary units take more energy, responding emphatically, “definitely. And they take more dedication. I do not know if I would be willing to do interdisciplinary units if I had more responsibilities outside of school.”
Once the environmental service-learning unit was complete, Thomas and Margaret continued to show support for wanting to do additional realistic activities. Thomas remarked in his final reflection, “I wish that we could have done more but I am glad that we did as much as we did. My teammates are willing to try new things with environmental education and service-learning, even with all the other requirements that keep hitting us.” When Margaret was asked if she thought the team would do environmental service-learning again, in spite of the difficulties, she responded, “We are still going to do it because we are willing to do it and we all think it is important. If it wasn’t, someone would use their schedule or home life as an excuse for not doing it.”

Consideration of the students. In the first planning meeting in January, the teachers’ concern for students’ poor achievement and low grades was apparent. The teachers discussed how many students had failed their subjects. Thomas added to Lisa’s tally of failing students, but commented, “That is a lot but don’t you think there are a bunch of these kids that would be turned on by environmental service-learning?” Margaret concurred, adding, “Remember Devon how he never did anything in class and hated school but when we stenciled the storm drains in the subdivision, he became so involved? I think many of these students would react to something like this.” Catherine likewise noted, “These kids are so low. We have been doing mythology for two weeks; they can’t make phrases or clauses. We need to engage these kids so they are motivated to learn. What I am doing now is not working.” All the team members saw environmental service-learning as a way to help their students learn.

The teachers brainstormed ideas for the environmental service-learning unit during the first two planning meetings. As they ‘threw out’ ideas, Catherine began to consider possible
environmental service-learning topics that could be of benefit to under-achieving students, noting,

maybe if we wrote on real topics, it would motivate some of those that are not doing well right now. The public service announcements would definitely connect with many of them. There are those that would love to be in front of the cameras but there are many that would be good with the directing, technical, and production aspects.

Lisa added that since the statistics unit was planned for the same quarter as the environmental service-learning, “the students enjoy using real data for statistics, like other years when we go to Tribal Mill and collect biodiversity and biomass data. They always do better with that data because they collected it themselves so understand it better.”

Student behaviors did not seem to be a significant consideration in what the team planned for the environmental service-learning unit. Thomas was the first to mention student behavior. “There are some years I would not want to do environmental service-learning because of the discipline problems. We have good kids this year, I think we can do almost whatever we want and not have to worry about behaviors messing things up.” Margaret added, “Yea, remember that group five years ago? I would have never done anything like we did the last couple of years, or like we may this year, with that group.” Catherine finished the dialogue with the comment, “Yes, but there are a few that we need to watch if there is any unstructured time.” As it turned out, the team did not identify any behavioral issues once the unit was completed.

Dedication and confidence to attempt environmental service-learning. May (2000) identified many elements necessary for planning interdisciplinary units. However, according to May (2000), the single most important element necessary before attempting any interdisciplinary curriculum can be summed as, “it all boils down to dedication. Is the teacher willing to go the
distance (p. 9)?” When the teachers began the planning of the environmental service-learning, they appeared dedicated and confident. Nevertheless, when asked if she would try environmental service-learning without the support of the interdisciplinary team, Catherine responded, “I know it is good for the kids but I would be too scared to try to do this on my own.” When asked, “scared of what?” her reply was

All of it. Not having the knowledge of science to be able to pull it off. Afraid of starting it and not knowing how to do everything. Being with the other teachers gives me the confidence to try because I know everyone will help me if I get stuck. It is a huge undertaking. I know I can do it if I am with the others on this team.

Thomas, when reflecting on whether he would do environmental service-learning on his own or with another team, commented,

Yes, I feel comfortable enough with the environmental topics to do this no matter who I taught with. However, I may do more on my own if my teammates did not want to participate. It would end up being integrated into my science as much as I could pull off.

Lisa also noted dedication of the other teachers in her initial interview, saying, “everyone is willing to try, whether it works out the way we planned or not, we know that the kids will get something out of it.” Thomas wrote in his autobiography,

My teammates are willing to try environmental service-learning because they are not afraid of failing. I don’t think they consider much of what they do as failure. I think we all figure that no matter what happens, the kids learn something and so do we.

As will be shown in later sections, the teachers’ confidence and dedication waned in some ways but not in others. When asked if she would know if environmental service-learning was successful, Margaret responded, “Anything we do will be a success. If we do nothing with
environmental service-learning, the students will never learn anything about the environment or service-learning. At least they will be exposed to something.” In the final reflections and interviews, all the teachers said they felt the environmental service-learning unit was a success, even though not as many activities were conducted as originally planned.

The team demonstrated an air of confidence with respect to their ability to plan and implement environmental service-learning but each identified weaknesses at various times throughout the study. Margaret and Catherine both identified their weak science content knowledge as a reason for wanting a strong science person to lead the effort. Asked if she would do environmental service-learning in the future, without a strong science person on the team, Catherine responded, “No. I would not know what to tell the kids about environmental issues or why things happen the way they do in the environment.” Lisa noted that because she was weak in science, she would probably do a different form of service-learning. Thomas acknowledged his weakness with language arts, reading and writing, explaining “I would not be able to teach them how to write letters or compose something like a public service announcement as Catherine wants to do. I would end up doing straight environmental education with my students.” In addition to the factors discussed above, the teachers each held responsibilities beyond their classrooms which also impacted the planning of the environmental service-learning unit. The next section describes how additional duties of the teachers effected the environmental service-learning effort.

Theme 2: Teacher Responsibilities Beyond the Classroom: Effect on Planning and Negotiating

The interdisciplinary team of teachers had many responsibilities beyond just teaching their academic subjects. The four teachers all held leadership positions, such as academic subject chairs and teacher representatives within and beyond the school. They also worked under strict
guidelines for when to teach their curriculum and to test for student comprehension. All middle school teachers had to meet with parents of at-risk students during certain times of the year and one of those times fell in the middle of this study period. This theme identifies the many ‘things’ that kept the teachers busy and how the ‘busyness’ impacted their planning and negotiation process. Using the 75-minute planning time for planning the interdisciplinary environmental service-learning was more difficult than the teachers anticipated.

There were 42 planning periods during the course of this study for the teachers to use for planning environmental service-learning. Recording and transcribing the environmental service-learning planning meetings shed light on the multi-tasking nature of the interdisciplinary teams’ work. The six-recorded meetings were only the ones where environmental service-learning was the main topic for the meeting; the other team meetings were not recorded. Even though the meetings were specifically scheduled to plan the environmental service-learning unit, ‘regular’ topics of discipline, student achievement, parent phone calls, and walk in interruptions occurred frequently. A minute-by-minute time analysis of the environmental service-learning planning meetings showed that of the total 310 minutes the team met, 175 minutes were spent planning the environmental service-learning unit. The remaining 135 minutes were spent with one or more of the teachers receiving incoming phone calls, dealing with interruptions, listening to announcements over the school public address system, or engaging in discussions about students, or about non-school items. Table 10 shows the amounts and percentages of time spent for each topic during the environmental service-learning meetings.
Table 10

*Time Breakdown of Audio-Recorded Environmental Service-learning Planning Meetings*

<table>
<thead>
<tr>
<th>Time usage (See note 1)</th>
<th>Meeting 1 January 7</th>
<th>Meeting 2 January 21</th>
<th>Meeting 3 February 2</th>
<th>Meeting 4 February 14</th>
<th>Meeting 5 February 18</th>
<th>Meeting 6 February 24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total time of meeting (note 1)</td>
<td>67 min 100%</td>
<td>62 min 100%</td>
<td>48 min 100%</td>
<td>58 min 100%</td>
<td>42 min 100%</td>
<td>33 min 100%</td>
</tr>
<tr>
<td>Time spent planning</td>
<td>44 min 67%</td>
<td>31 min 50%</td>
<td>22 min 46%</td>
<td>30 min 52%</td>
<td>21 min 50%</td>
<td>27 min 82%</td>
</tr>
<tr>
<td>Someone entered room</td>
<td>2 min 3%</td>
<td>5 min 8%</td>
<td>None</td>
<td>3 min 5%</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Announcements over Public Address System</td>
<td>1 min 1%</td>
<td>2 min 3%</td>
<td>3 min 6%</td>
<td>1 min 2%</td>
<td>None</td>
<td>2 min 7%</td>
</tr>
<tr>
<td>Discussing Students</td>
<td>9 min 13%</td>
<td>12 min 19%</td>
<td>7 min 15%</td>
<td>13 min 22%</td>
<td>11 min 26%</td>
<td>6 min 18%</td>
</tr>
<tr>
<td>Nothing related to school</td>
<td>11 min 16%</td>
<td>9 min 14%</td>
<td>14 min 29%</td>
<td>11 min 19%</td>
<td>7 min 17%</td>
<td>5 min 15%</td>
</tr>
<tr>
<td>Telephone call to teacher(s)</td>
<td>None</td>
<td>4 min 6%</td>
<td>2 min 4%</td>
<td>None</td>
<td>3 min 7%</td>
<td>None</td>
</tr>
</tbody>
</table>

Notes: 1. Planning periods were 75 minutes  
2. Meeting started late so ended when planning period ended, students returning  
3. This meeting ended abruptly when parent arrived for a conference

As the study period progressed from January to March, the time spent meeting to plan the environmental service-learning unit decreased from almost the entire 75-minute planning period on January 7 to less than half the planning period on February 24. A sense of urgency was evident in the frequency of the meetings at the beginning of the study compared to near the end of the planning and implementation phase. Thomas, as team leader, tried to schedule meetings when he saw a window of time where all the teachers could possibly meet. This was difficult, as
many other meetings interfered with their planning periods. The following email dialogue between the teachers illustrates the conflicting priorities the teachers faced as Thomas tried to schedule a meeting for January 14th. He sent out the following email message:

Do you want to meet today during planning? This is the first day since last week we have had time. I was thinking of Monday but we are off, Tuesday, Catherine and I have staff development.

Another option that I thought about on the way in today (since I have done nothing since last week except search the web last night) is to not meet today and write down ideas for ourselves and others, then meet next week to merge, blend, and get closer to a plan.

Then on Tuesday after school or Wednesday during planning, we get together and work out which things will work, which will not, and come up with something doable. Attached is a work sheet I came up with. I am going to print it and just write in the boxes instead of taking time to make it neat and type in my ideas.

Thanks

The meeting did not occur that Friday, the 14th, nor the following Tuesday or Wednesday as suggested. On Wednesday the 19th, Thomas tried to organize a meeting when he saw that the others were not taking action to do so. Thomas sent another email that Wednesday morning before school suggesting that the team meet that day during planning time. The following email exchange occurred before school Wednesday in an attempt to arrange a meeting time for Thursday or Friday.
Thomas to all: Do you want to meet today during planning to plan more environmental service-learning, or Friday during planning? Thursday, Margaret and I are meeting with Sarah (to mentor)

Margaret’s response: Friday is better for me

Lisa’s response: I can meet briefly, but have a lot on my plate today. I need to finish grading their quizzes from Friday.

Catherine’s response: Today is fine. About 11:00?

After receiving the responses, Thomas sent the following email to set the meeting for Friday.

Thomas: Catherine said fine, Lisa has grading to do, I need to enter grades into the grading program, and Margaret prefers Friday. Let’s do Friday in Margaret’s room, 11:00. Bring whatever you have so we can make decisions and start, at least parts of the unit.

At that point, the team had not started implementing any environmental service-learning. The team was trying hard to get started, yet planning time still took second priority to grading papers and entering grades into the computer.

The time analysis in Table 11 illustrates how the audio-recorded environmental service-learning meetings were conducted. On a larger scale, summarizing the 42 planning periods available to this team during the time of this study illustrates how their daily planning period was structured. Walthier-Thomas (1997) noted that the single most persistent problem for teams was finding time for planning interdisciplinary curriculum after completing the tasks of scheduling, sharing concerns over student achievement or behaviors, addressing administrative requirements, or handling staff development issues. The findings of this study are consistent with Walthier-Thomas’ description of time constraints. Two team-planning meetings were rescheduled because
Table 11

Summary of Time Spent Planning Environmental Service-learning

<table>
<thead>
<tr>
<th></th>
<th>Total time for six environmental service-learning planning meetings</th>
<th>310 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total time spent planning environmental service-learning</td>
<td>175 minutes</td>
<td>57% of total time</td>
</tr>
<tr>
<td>Total time spent on non-environmental service-learning topics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Someone entering room</td>
<td>10 minutes</td>
<td></td>
</tr>
<tr>
<td>Announcements over PA system</td>
<td>9 minutes</td>
<td></td>
</tr>
<tr>
<td>Time discussing students</td>
<td>58 minutes</td>
<td></td>
</tr>
<tr>
<td>Non school topics</td>
<td>52 minutes</td>
<td></td>
</tr>
<tr>
<td>Telephone calls</td>
<td>9 minutes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>135 minutes</td>
<td>43% of total time</td>
</tr>
</tbody>
</table>

other issues and tasks took priority over planning the environmental service-learning. Two others were cut short because parents came to conferences unexpectedly. When asked if she was satisfied with how the team planned for the environmental service-learning, Margaret said, “No. We tried, we did our best and we would get together on Fridays but we were pushed. We got all these other meetings; each of us has our own curriculum stuff to contend with.”

The interdisciplinary team did not have control over all their planning periods during the study time. There were forty-two days from the beginning of the study (January 4th) until the end (March 4th). Of these forty-two days, the team had twenty-five days they could use, as they wanted. They chose to use five and a half of the days for planning the environmental service-learning unit, 26% of the total forty-two days; this closely coincides with Hackman’s (2002) study where teachers spent only 22% of their planning period for interdisciplinary curriculum. This team’s pattern of meeting with parents, however, was very different than that of Hackman’s findings. Hackman (2002) found that interdisciplinary team teachers met with parents 5% of their planning time. By contrast, this team met with parents during 15% of their planning time. Warren (1993) noted that interdisciplinary team teachers recognize the importance of meeting
with parents to learn more about their students and better adapt instruction to meet their needs. However, in the course of this study, the time spent meeting with parents was high compared to the rest of the year because of the school system’s requirement to meet with at risk student parents during February. This requirement diminished the amount of time available for planning the environmental service-learning unit.

The ‘open period’ category in Table 12 is misleading; the teachers did not have ‘free time.’ The 46% of the planning available for use as the teachers felt necessary was utilized to discuss students, grade papers, input data into the school’s record system, and plan for academic subjects. The teachers had many of the elements present necessary to plan and implement Table 12

Usage of Planning Periods during the Study

<table>
<thead>
<tr>
<th>Categories of planning time usage</th>
<th>Number of planning periods used</th>
<th>Percentage of planning periods available used for that purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open planning period, nothing scheduled for the team</td>
<td>19.5</td>
<td>46%</td>
</tr>
<tr>
<td>Scheduled meetings (faculty, staff development, curriculum, student support team, other)</td>
<td>11</td>
<td>26%</td>
</tr>
<tr>
<td>Scheduled and impromptu environmental service-learning meetings</td>
<td>5.5</td>
<td>13%</td>
</tr>
<tr>
<td>Parent conferences</td>
<td>6</td>
<td>15%</td>
</tr>
</tbody>
</table>

environmental service-learning but they were very busy with the many tasks and responsibilities of their positions. This ‘business’ significantly influenced how the team negotiated their plans. The next theme highlights the process by which the team negotiated within the context of their busy schedule and team meetings. Positive and negative tensions and their influences on the teams’ planning process are identified.
Theme 3: Negotiating Curriculum: Dynamics and Tensions

The interdisciplinary team started the planning process at the first meeting with the open-ended question by Thomas, “what do we want to do?” Thomas recorded everyone’s response on paper as they contributed their ideas. The first several ideas were activities the team had done in prior years. Appendix H shows the notes recorded by Thomas in the first and second planning meetings. Though the other meetings were not so free flowing as the first two, positive and negative tensions were still present among the teachers as they met for planning environmental service-learning. The six audio-recorded planning meetings shed light on the processes by which the team negotiated the environmental service-learning and the dynamics present among the four teachers.

Miller and Stayton (1998) found that the two greatest barriers to success in terms of interdisciplinary team planning are administrative constraints (37%) and interpersonal issues (36%). Since interdisciplinary teaming requires teachers to work together to plan curriculum and to help individual students who need assistance, interpersonal issues are a critical component of how a team functions. Administrative constraints are addressed elsewhere in this study so this section focuses on interpersonal issues. All four team teachers felt strongly that their team worked well together. In their autobiographies, when asked, “What makes a successful team of teachers? Which do you think this team has or lacks?” all described traits that they felt the team possessed - none listed traits lacking. Lisa felt a team successful when there was, “flexibility, a willingness to work together towards a common goal and a genuine attitude of the love of teaching.” Margaret said that team was successful because it was, “consistent in behavior and academic expectations, cohesive, enjoys spending time together, sense of humor, and flexible. We have it all!” Catherine saw the team strengths as communication, similar values, and shared
beliefs about education. She also noted that all the teachers had different strengths, “such as organization, spontaneity, sympathetic, and being grounded, so the kids get a little from each of us.” Thomas thought the team was successful because of their, “cooperation, mutual respect, open communication, and professionalism.” This positive self-image of themselves as an interdisciplinary team was important to their potential for even attempting the planning, negotiating, and implementing of environmental service-learning curriculum. Thomas noted in his final reflection that, “the give and take is something about the planning and negotiating, we listen to each other; the things that we need to do in our classes because of the mandated curriculum.”

Palmer’s (1995) idea of interdisciplinary teams ‘negotiating curriculum’ is important because it helps explain some of the reasons the teachers responded to each other as they did during the meetings. Palmer addressed the issue of teachers doing things the way they had for years and when suddenly placed on an interdisciplinary team, facing the challenges of having to give and take as in negotiating business contracts. As with negotiating business contracts, all parties do not necessarily get what they want, nor do they want to give up their prized processions. These teachers came to the interdisciplinary team with years of experience doing things their way or with favorite units at certain times of the year. When they started to plan the environmental service-learning unit, they were very open to new ideas and flexible scheduling. However, as time passed, each revealed issues and concerns they deemed important through what they said, how they acted, or positions they took in the negotiation process. The common goal of doing what was best for the students was a motivator for developing the interdisciplinary effort (Palmer, 1995) but the teachers were not open to everything. This theme identifies and presents evidence to support this claim.
The first planning meeting was very much an open brainstorming session and everyone contributed equally, accepting and adding to each other’s ideas. The following dialogue illustrates the openness of the team to new ideas when Lisa asked about using the data collected from the fall ecosystem biodiversity unit.

Lisa: Are we going to do anything with Tribal Mill (referring to the environmental data collected on the fall field trip)?

Thomas: We have all that data. Are you ready to use it?

Lisa: Yes, I am about ready to start statistics.

Catherine: We could turn it into a research project to support your statistical analysis of the data.

Thomas: In addition to your statistics work, we could also do a drawing contest like we did last year, for the drinking water poster contest put on by the state.

Margaret: The drawing thing they did last May, they really got into that. We have a bunch of drawers. Catherine and I were talking about that the other day.

Lisa: These kids love to draw

Thomas: The save water poster – I have all the directions from that. We could just copy it.

Lisa: When would we do the drawing?

Margaret: They could do it in remediation/enrichment

Thomas: That’s what we have to figure out. Probably. Likewise, with that essay contest – I saved all the stuff because I saved all the emails. We could pretend even pretend that there was a real deadline coming up.

Lisa: What was the essay on?
Thomas: Water conservation and reducing pollution.

Lisa: That goes right along with the drawing and the stream data analysis I want to do.

The dialogue continued, bouncing around from one idea to another for almost half of the planning period. Thomas recorded the ideas as they were introduced and saved them for future meetings so the team could narrow down the ideas once they had time to think about them.

A mutual respect for each other was evident in the team’s dialogues. When the team talked about when to do various components of the environmental service-learning, an exchange among the teachers demonstrated the respect each had for values different than their own. As it became time to refine ideas and make firm plans for implementation, tensions began to surface, but these were not serious enough to stop the planning process. Catherine noted in the second planning meeting, “I really do not want to give up my remediation time, I have so much to do and my kids really need help.” Thomas’ response was, “That’s OK, I have more flexibility with the period since I do enrichment with the students. They already get the concepts they were to demonstrate for math so I will start doing environmental stuff with them.” Lisa then contributed, “Margaret, why don’t you do as Thomas since you do enrichment language while I work with the students that need math remediation.” Margaret agreed and began persuasive letter writing with her students on the topic of animal waste disposal while Thomas started environmental video reviews to determine which movies might be appropriate for the other classes to watch. Later in the same planning meeting, Thomas saw that Catherine was becoming more protective of her remediation period. In order to help, Thomas offered to change his math enrichment class to a language arts remediation to help address the weaknesses she said her students demonstrated. Thomas suggested, “You give me language arts remediation for a little while to
help the students needing extra help” even though he did not enjoy teaching this subject. Though it was not ultimately necessary, the gesture seemed to affect Catherine because shortly after the offer, she agreed to give up more remediation time than she had originally indicated.

After the first planning meeting, the team had a full range of possible activities to consider for the environmental service-learning unit. A list of the ideas brainstormed is attached in Appendix H. Thomas wrote in his journal that week, “we listed too many things to do for the environmental service-learning; we will never be able to do them all. We need some system to narrow down what we really want to do.” In Thomas’ January 14 email attempting to schedule the next meeting, he suggested to his teammates that each identify possible activities on a form he had created (Appendix W) and bring it to the meeting. The approach was also an attempt to get the other teachers to think about the environmental service-learning unit because time was passing quickly. Thomas filled his chart with ideas generated by himself and the other teachers from the first meeting. None of the others filled in their charts. The team did not meet that Friday nor Tuesday or Wednesday as suggested. When the team finally met again on Friday, January 21, only Thomas had used the format to organize the teams’ ideas. When Thomas asked the others if they had their charts completed with ideas, Margaret said, “I forgot.” Catherine added, “I did not have time.” To keep the meeting moving, Thomas took out the handwritten notes from the last meeting and the teachers added and deleted from the list to narrow the ideas. After the meeting, Thomas made copies of the list for each teacher to think about until the next planning meeting.

Thomas continued to work at getting the teachers to negotiate and commit to their components of the environmental service-learning unit. Thomas typed a ‘mock up’ of a research report that he thought students might possibly do in class, incorporating many of the ideas
generated during the January 7th brainstorming meeting. The mock report was to be a tool from which to facilitate discussions and negotiate tasks and responsibilities. The sample report format included demographic data collection, tabulation, and analysis discussed in previous meetings by Margaret and the other teachers. Section IV of the mock report included a place for Lisa’s stream water quality analysis so that as a part of her statistics unit, she could have the students insert their results. A large part of this template was intended to help students brainstorm and prioritize service-learning activities they could do as outreach or by making connections with the community. When Thomas brought the sample report to the January 21 meeting, Catherine was the first to react, “Yes, the high school really wants us to be teaching the students how to do a research report. That comes straight from the high school language arts teachers.” Thomas explained how each teacher could contribute parts to the report so that the students would perceive the interdisciplinary nature of the effort. As the meeting progressed, the discussion began to jump to different parts of the report, each teacher trying to figure out his/her role. Lisa focused on the chapter for water quality analysis, Margaret on the demographic data collection and presentation. Catherine seemed overwhelmed, imagining how to get the students to do everything shown in the sample. Thomas emphasized repeatedly that the purpose of the report was to facilitate discussion, not to dictate a format for the environmental service-learning plan. After about 35 minutes into the meeting, the team was still not making progress toward deciding what to do for the environmental service-learning unit.

As the meeting continued, Catherine discussed the idea of a multi-page report while Thomas talked about having the students develop a persuasive essay about development along Breadloaf Parkway. Catherine seemed frustrated with Thomas when she asked, “so the end result that the students turn in is one sheet of paper, a persuasive argument for or against
development?” Thomas’ response was, “not necessarily, they would still need to do research and summarize their findings.” Catherine’s response was tense when she replied, “OK, we can make the persuasive paper a part of this. I mean, that is my problem, I am confused as to what you want the end result to be.” Margaret noticed the tension and tried to clarify for Catherine, then Thomas, what each was trying to convey to the other. She asked, “Thomas, so you do not really care what form the report takes?” When he said that he did not, Margaret said to Catherine, “that might be for you and me to figure out Catherine, and then we can go with it.” Margaret stepped in and defused the tensions arising between Thomas and Catherine.

There were many times during the meetings when an issue was not resolved and the teachers switched topics or split into ‘groups’ to complete a thought or task. There were five times during the four planning meetings that Thomas and Lisa discussed an environmental topic or a task while Catherine and Margaret discussed other tasks. The team worked well in that way, subdividing tasks, and working with one or more teammates to accomplish the task, either avoiding or resolving conflicts in the process.

Theme 4: Collaboration: Within the School and Community

The teachers fulfilled many different roles with respect to implementing the environmental service-learning unit. These four teachers were obviously important to the planning and implementing of the unit, but each teacher played more than one role within the team. In addition, there were people within the school with collaborative roles that the team called upon for their expertise. Thirdly, collaborators were available within the community to help the team carry out environmental service-learning, adding a layer of realism and connectedness for the students which was essential to the environmental service-learning
initiative. The following sections describe the roles of the teachers and other collaborators in the school and community.

Among the teachers

The quality of teachers and their ability to work together are critical for success with interdisciplinary teaming and curriculum implementation. Each must be professional, responsible, and willing to work as a team. Catherine commented in her autobiography about the strengths of the subject team, noting, “Everyone just does what they need to do. Everyone is very professional and responsible.” When asked what their strengths were as teachers, Lisa listed, “We have been together for so long that we understand and compensate for each other when necessary.” Margaret described herself as having, “humor, sensitivity, organization, enthusiasm, and love of subject.” Catherine saw herself as “strong in communicating with parents, empathetic for others (students and colleagues), knowledgeable in her content area, strong in classroom management skills, and willing to learn.” Thomas perceived his strengths to be, “love of learning, enthusiasm, I like kids, I love science, which I hope to model to students.” Even though the teachers did not list the same strengths, their love of learning, enthusiasm, love for their subject, humor, willingness to work with the others, and flexibility were evident in the team meetings. According to Warren (1993), these characteristics are essential to teachers; and they need to believe that they have the ability and capacity to teach middle school students, with their unique characteristics.

The team did not identify as many weaknesses as they did strengths. Warren (1993) suggested that positive self-perception and efficacy enables teams to try efforts such as environmental service-learning curriculum. However, the weaknesses identified were stated or implied throughout the study. Lisa, Margaret, and Catherine noted their weakness with respect to
environmental topics. Margaret and Thomas mentioned their weakness with regard to time
management several times throughout the study. It appeared that all the teachers were dealing
with time management issues. Lisa did not write her lesson plans or appointments in her plan
book. Margaret wrote her lessons out and maintained a calendar, yet she was the teacher that
most frequently said that she did not have enough time to do everything. Catherine was the most
organized in terms of writing down her plans and calendar. She was usually the first to arrive
every day and the last to leave, indicating that maybe she needed to work on different aspects of
time management. This being said, the data suggests that these teachers truly did have too much
to do in terms of the number of hours in a day. Time management strategies may have helped;
however, there were times during planning meetings where the team would just stop talking
about environmental service-learning and ‘chat,’ as if they did not get to relax very often. After
five or ten minutes of casual chatting, they would plunge back into the topic almost without
missing a beat.

Each team member had a primary role as academic teacher but also had responsibilities
beyond their subjects. Lisa, the math teacher, was also curriculum chair and remediation/
enrichment chair for the seventh grade. The eight other seventh grade math teachers called on
Lisa for guidance and directions for numerous content topics. Since many non-math teachers
taught math remediation or enrichment during the early morning period, she also had to prepare
lesson plans for them to assure that students received the instruction required. Margaret was the
social studies teacher but also was the seventh grade level chair and representative for the
principal’s leadership council. She dealt with issues and controversy among the 34 seventh grade
teachers and planned grade level functions not addressed by the administrators. Margaret also
was a mentor to a new teacher with no prior teaching experience. The new teacher required much
time and support from Margaret. Catherine was the seventh grade language arts chairperson and
remediation/enrichment coordinator, like Lisa. She was very detailed in compiling material for
her language arts teachers and spent many hours before and after school collecting ideas for
them. Thomas taught life science for the team, was the contact person for the school’s
administration, and was the teacher representative for the school to the district superintendent’s
teacher advisory council (more than 100 schools). He was also one of two teacher representatives
for the school council (teachers, parents, and business representatives) and the building contact
for the state’s professional teacher organization. Lastly, Thomas was working on his dissertation,
which also took time and energy from his daily schedule. All four teachers were very involved in
the functioning of the school, which took time away from efforts to plan their academic subject
lessons and environmental service-learning.

Thomas did not want the environmental service-learning unit to be ‘his’ project so had to
be conscious not to dominate the first several planning meetings. Thomas sat back providing
opportunities for the other teachers to take on leadership roles with the environmental service-
learning unit. However, by the third meeting, he saw that the others looked to him for guidance
more than he had hoped. His team mates viewed Thomas as the expert to be followed. As Dewey
noted many years earlier, science is the best academic fit for environmental education. Van
Matre (1990) later pointed out in his writings that the world operates with the practice of
teaching different academic subjects by individual teachers. Accepting this reality, he agrees
with Dewey that environmental education fits most closely with the science curriculum.
Catherine reinforced this observation in her final interview when asked if she would conduct
environmental education at her new school. Catherine explained,
Well, you need someone to initiate it, because if you don’t, like it needs to have some kind of base, either a science base. Then, I think it’s good you sat us down, you kind of said, ‘this is what we want to do, what are some kinds of things that we can do in language arts and social studies?’

It became obvious that Thomas was the undisputed leader for the team’s environmental service-learning effort. In her final interview Catherine expressed doubts about engaging in environmental service-learning without a strong leader. She emphasized, “I don’t know if you could do it. You have to have a strong leader.”

Collaborators Within the School

This interdisciplinary team of teachers believed in seeking out resources beyond the team. During planning meetings, when the topic of a research report arose, Catherine quickly suggested that the team seek the assistance of the school’s reading and writing specialist to help students needing additional support. Catherine enthusiastically remarked, “we can get Karren to help with the report.” Margaret added, “like we did a couple years ago when we had her come help us teach the students how to read across the content areas and learn to take notes from the content books.” When Margaret and Catherine discussed going to the computer lab to use the internet for collecting demographic data, Margaret suggested, “we need to get Susan (Media Specialist) to teach the students how to collect and summarize information from the web. I have heard that she is good with the kids with teaching that.” Catherine then added,

And we need to get Leigh (technical support coordinator) to help schedule the lab and set up some home web pages to narrow the search for the kids, otherwise they could spend all day randomly searching the web and never finding the data we need them to find.
The collaborators from within the school freed the teachers to focus on their expertise, without having to expend their energies teaching students how to write a report or use the computer research lab to gather information.

Collaborators Outside the School

The interdisciplinary teachers did not hesitate to go beyond the school for help with their environmental service-learning effort. As they considered how to conduct the stream sampling, Thomas remembered that two teachers at the nearby high school had taken their students to a community lake for collecting chemical and biological samples. He contacted them and discussed the idea of having high schoolers act as leaders to his students and instruct them in sampling techniques. However, the high school students had already completed their environmental unit. Instead, Thomas and Lisa decided to contrive stream data so asked the high school teachers for suggestions in creating realistic data for the middle school students to analyze.

In addition to the collaborations with the city’s planning and zoning office and the County Clean and Beautiful Organization mentioned earlier, the team contacted the county’s public utility department. The county’s Adopt-A-Stream coordinator (Michele) was part of the public utilities office responsible for pollution monitoring and control of the county’s streams and rivers. Thomas had spoken to Michele several times about the possibility of the school becoming part of the Adopt-A-Stream program and was told that she would help anytime. As will be discussed in research question 3 – implementation, the interdisciplinary team was not able to conduct the stream sampling as planned, so Michele’s expertise was not needed. Another section of the public utilities department sponsored the storm drain-stenciling program. The storm drain-stenciling program was designed to educate citizens about the effects of dumping
pollutants down storm drains in local subdivisions. The team wanted to work with that section of public utilities because it had jurisdiction over the county’s storm drain infrastructure and approval authority for painting. In addition, the department supplied schools with paint, stencils, and door hangers so that students could participate in citizen awareness efforts. As will also be discussed in the implementation section, the storm drain-stenciling component of the environmental service-learning effort was delayed until after the high stakes testing in April. The use of outside collaborators expanded the range of activities the team could conduct with their students and provided them with a purpose for doing the environmental service-learning. An important component of service-learning is the emphasis on meeting a real community need. The city’s planning department, County Clean and Beautiful Organization, and public utility department provided resources not otherwise available within the team and an audience for the student participation in service-learning.

*Theme 5: Balancing the Pressures of Accountability with Planning Environmental Service-learning*

The issue of accountability was a common thread throughout the environmental service-learning planning and implementation effort. Each of the teachers acknowledged accountability factors that supported or hindered the environmental service-learning effort, as noted in the chapter 4 within-case analysis. This section describes the ‘big picture’ for all four teachers and how the mandated curriculum, high stakes testing, and other requirements influenced the environmental service-learning unit. The four main factors that surfaced as either positive or negative influences were mandated curriculum and sequencing, standardized end of quarter exams, mandatory high stakes test review, and required parent-teacher conferences and high stakes testing in April. The following paragraphs describe these positive and negative influences.
Mandated Curriculum and Sequencing

The intent of interdisciplinary curriculum is to meet the needs of students by showing them the connectedness of academic subjects. According to Jacobs (1991), the interdisciplinary design should include a “parallel discipline design” (p. 15) where teachers include the curriculum they are required to cover and adjust when they teach their academic component to coincide with the other teachers. The school system adopted curriculum for every subject many years before this study took place. Since the original curriculum adoption, the system had initiated system-wide tests for determining promotion for students in fourth, seventh, and tenth grades. More recently, the State Department of Education implemented testing to determine whether schools made Adequate Yearly Progress (AYP) and created report cards for public review. The curriculum these teachers were required to teach had become increasingly important in light of these developments. With the importance of covering the curriculum for seventh grade recognized, each teacher’s perception as to how the mandated curriculum was covered by environmental service-learning became important as well.

Standardized End-of-Quarter Exams

One or more of the teachers at every planning meeting, especially those in February, mentioned the standardized end-of-quarter exams. March 10 was the date for the end-of-quarter exams in language arts and social studies. Friday, March 11 was the date for the math and science exams. At the February planning meetings, each teacher made more than one comment about preparing for the nine weeks exams (Lisa six times, Margaret four times, Catherine four times, and Thomas five times). In prior years, each teacher had constructed their own end-of-quarter exams and the administration did not see the results. As a consequence of No Child Left Behind, standardized tests were developed for the 2005-2006 school year and all teachers in the
seventh grade had to administer the same tests. The standardization permitted the administration to compare results to identify strengths and weaknesses among teachers and develop improvement plans where necessary. The administrators said that they did not use the exams to compare teacher performance; however, Lisa refuted that claim in a planning meeting with her teammates and said, “They say they don’t compare our scores but at the curriculum chair meeting last week, Albert was comparing everyone’s second quarter math results.” Whether perceived or real, the idea that they were being compared to their peers caused team members stress, and they had to be sure to cover all mandated curriculum scheduled for that quarter. Thomas rationalized this sense of pressure to cover the material with his statement, “It is not fair to the kids, to not cover material that will be on the tests.”

High Stakes Tests and Mandated Review

The high stakes testing in April was always present in Rollander Middle School but was placed front and center by the principal at the January 4th ‘welcome back from winter break’ faculty meeting. The principal spent thirty minutes stressing the need to prepare the students for the high stakes testing. She emphasized that there were 57 school days before testing began and that the school’s scores must improve to have the state remove the school from the “needs improvement” list, per the No Child Left Behind legislation. At that meeting, the principal also emphasized the use of the remediation/enrichment time at the beginning of each day to focus on the lowest 20% of the Math and Language Arts objectives to improve the scores. The high stakes testing included four consecutive days (one subject each day: language arts, math, science, then social studies) of system wide tests. This test was used to determine student promotion to eighth grade, regardless of their grades during the year. For example, if a student failed a particular subject throughout the year, he/she could still be promoted by passing these tests. Two days after
completion of the high stakes promotion tests, students began the five day State Department of Education criterion referenced test (reading, language arts, math, science, and social studies). The state’s test was used to compare schools and systems statewide for development of the annual school report cards. The importance of the high stakes testing weighed heavily on the teachers.

Rollander Middle School began a high stakes test preparation process the year prior to this study. The math and language arts remediation period at the beginning of the day was converted to a time for test preparation so academic teachers could review content with students on their team before the tests began in April. Four 4-day cycles existed so each academic subject teacher had four extra days with their students to review material for the high stakes tests. Being that the review took place during the remediation/enrichment period at the beginning of the day, the subject teachers could continue with their mandatory scope and sequence up until testing began. Since the review time was set to begin March 8th, 2005 for the April testing period, all environmental service-learning the interdisciplinary team planned for during the remediation/enrichment period had to be completed by Friday, March 4th.

*Theme 6: The Importance of Collegiality and Loyalty*

The interdisciplinary team teachers demonstrated a strong sense of collegiality and loyalty toward each other throughout the study. The colleagues’ personal and professional relationships were positive and supportive. They were loyal to each other and the cause of teaching early adolescents. This combination of collegiality and loyalty became critical with respect to how the team planned, negotiated, and implemented the environmental service-learning unit. It is worth noting that if it were not for their loyalty to each other, the unit may not have ever occurred.
Evidence of their collegiality was evident from the first planning meeting. When they met, they seldom complained about their students or the school administrations, they worked toward solutions. As pressures increased and they could tell they were not progressing as they had hoped, Catherine and Margaret began to bring up their “not having enough time.” However, no one dwelled on the topic, they returned to the task at hand, planning the environmental service-learning unit. As the audio tapes of meetings were analyzed, the importance of personal relationships and sharing their personal lives was evident. Intertwined into every meeting were stories of their spouses, what they did over the weekend, talk about what happened in their favorite television shows, or told jokes. Of the 310 audio-recorded meetings, 52 minutes was spent talking about personal topics, 16.8% of the total meeting time. Not once did any of the teachers interrupt or show a lack of interest in the other. Margaret gently pulled the others back onto topic three times and Thomas twice with no resulting tensions arising. Of the other time not spent planning environmental service-learning during the team meetings, 67 minutes (21.6%) was spent discussing students’ needs. They did not seem to complain about teaching conditions, too many meetings, or paperwork. Rather, they discussed what needed to be done, supporting and offering to help one another. Outside of team meetings, collegiality was apparent by their choice to stay together as a team for so many years. Rollander Middle School and the system provided many opportunities for change when teachers became disgruntled or unhappy with their situations. The school system had more than 100 schools at all levels to which teachers could transfer with no loss of service time or pay. Of all the four person teams in Rollander Middle (twenty-two teams), this team had been together the longest. The teachers also went to professional learning and social events outside the school. Their willingness to attend the weeklong environmental service-learning training during June 2002 was agreed upon within a
week of Thomas being invited while attending a graduate class and extending the invitation to
his teammates in March. All four agreed to participate and worked their summer schedules
around the training. During the study, the teachers attended a Mardi gras party together on a
Saturday night. The collegial relationships benefited their teaching, students, and the
environmental service-learning effort.

The collegiality seemed to develop a sense of loyalty among the team. Their loyalty to
each other became most evident as planning for the unit progressed. As Lisa went on a tangent of
analyzing stream data while the others discussed their plans for the unit, the others supported her
and Thomas took extra time to synthesize the data to produce results she was seeking. The
ultimate show of loyalty to each other occurred on February 18th when it was obvious they were
not going to be able to complete the ‘planned’ unit. When the teachers were trying to decide how
to proceed, it was never mentioned to quit and not do the environmental service-learning unit.
Out of loyalty to Thomas and his need to finish his dissertation effort, without a single dissenting
voice, they agreed to continue. There was no question that they were going to continue the effort
because he needed to complete his study. To further support this claim, it is noteworthy that the
teachers said they would continue the environmental service-learning unit in May after high
stakes testing. When May arrived and found Thomas was done with his data collection, none of
the teachers brought up continuing the unit. The deferred service-learning components were
never completed.

Summary

Balancing the pressures of accountability with planning the environmental service-
learning took its toll on the implementation effort. The team demonstrated that they had many of
the elements necessary for conducting interdisciplinary units (May, 2000) but the business of
their positions impeded progress toward developing a detailed plan for environmental service-
learning. The team had defined and implied roles for each teacher that either impeded or
promoted the environmental service-learning planning and negotiation process.

The original assertion regarding how the interdisciplinary team of teachers would plan
and negotiate environmental service-learning was similar to the findings of this study. Using the
emergent themes with respect to how the interdisciplinary team planned and negotiated
environmental service-learning, the original assertion was modified slightly to reflect the actual
findings. The process of the team planning began as a systematic method for brainstorming and
narrowing of activities but shifted to a non-systemic model of “what can we get done in the time
we have left?” During the full implementation phase (last nine days) planning was ‘chaotic,’
indicated by teachers’ spontaneous meetings before school to figure out what they were going to
do that day and the change of the environmental service-learning focus question from
development along Breadloaf Parkway to the focus on NIMBY positions. Such drastic change
would probably not have occurred if the teachers had a firm implementation plan in place. The
interdisciplinary team scheduled six meetings to plan the environmental service-learning. They
also met three times informally to clarify issues. Ultimately, a formalized plan with a timeline
was never established. Based on the evidence and arguments above, the modified assertion for
this study is:

I assert that the planning process was not very systematic and at times ‘chaotic’ in
nature. The interdisciplinary team of teachers met six times with the expressed purpose of
planning the environmental service-learning unit but drifted off topic, were interrupted,
and often did not finish what they intended for each planning meeting. Personal and
professional issues surfaced and influenced how the teachers interacted with each other.
Pressures from mandated curriculum influenced the time the teachers were willing to ‘give up’ for environmental service-learning curriculum in their academic classes. A final plan with action items and dates was never completed and is reflective of what environmental service-learning ultimately took place.

How the teachers planned and negotiated environmental service-learning is integrally connected to how the unit was implemented and student learning assessed. The following research sub-questions three and four demonstrate how the planning conducted by the team significantly affected the implementation.

Research Sub-Question #3

*How did an interdisciplinary team of middle grades teachers implement environmental service-learning?*

The interdisciplinary team did not conduct the environmental service-learning unit as originally planned and negotiated. This section describes how the team moved from the planning and negotiating phases of the environmental service-learning to the implementation phase, and what changed in the process. The actual environmental service-learning unit ended up ‘looking’ quite different from what was planned; nevertheless, the team felt that the environmental service-learning unit was a success. The many issues addressed in the planning and negotiating themes are also woven throughout the implementation process but are not as obvious; they will be highlighted only as needed. An important point worth noting is that there was not a clear transition from the planning phase to the implementation phase, which may contribute to how the changes are viewed. The ‘saddest’ part of the implementation phase was that most of the service-learning components planned for the students were dropped because of time and accountability issues.
Interpretive methodology will again guide the analysis of the data to either support or refute the original assertion regarding how the team implemented environmental service-learning. In this cross-case analysis, the original assertion as to how the interdisciplinary team of middle grades teachers would implement environmental service-learning curriculum is later modified. The original assertion was as follows:

I asserted that all four teachers would deviate from the plans as developed and make frequent adjustments to instruction during implementation. Teachers would not have everything planned and ready to implement as teacher preparation programs require but would have to create and adjust much of their teaching during the implementation phase. How they physically or emotionally felt on a given day, how they perceived the moods of the students, unplanned school events, and last minute interruptions would require the teachers to adjust, each to differing degrees based on their underlying beliefs about environmental service-learning identified in sub-question 1.

The following themes describe the data that supported and refuted the original assertion such that it could be revised to reflect the findings of this study. The modified assertion is found after the evidence is presented.

Theme 1: Plan to Implementation: Significant Changes

The team did not have a formal scope and sequence plan with deadlines for the interdisciplinary unit as recommended by Jacobs (1991). The only ‘plan’ they had was handwritten notes and a sample ‘mock up’ report compiled by Thomas as a point of discussion for the teachers at the January 21 planning meeting (notes and mock report included in Appendix H). The plan included a process by which students would obtain a background understanding of
environmental issues, synthesize their understanding of these issues, and develop service-learning actions they wanted to pursue to reach out and connect to the community. The handwritten notes had the students conducting a research paper in all four academic classes that pulled the interdisciplinary nature of the environmental service-learning effort together. The plan also included activities such as having students draw posters for an annual drinking water contest, write essays for a contest conducted by the state, and debate issues of development. In order to distribute responsibilities among the team members, tasks were generally assigned to each academic subject as follows:

**Math:**
- Statistical analysis of biomass and biodiversity data to practice procedure
- Statistical analysis of stream data

**Social Studies:**
- Data collect – demographics of city
- Plot and analyze demographic shifts
- Debate pros and cons of development as cause of population shifts

**Language arts:**
- Pull research together into a research paper
- Persuasive and business letter writing to local officials
- Produce, direct, and publish public service announcements concerning environmental and development issues

**Science:**
- Create an understanding of pollution, causes/effects
- Predict short and long-term environmental impacts

As of the January 21st meeting, it appeared that the team was progressing toward implementing most of the interdisciplinary environmental service-learning as planned. At the January 7th meeting, the teachers recognized that not all needed to start and conduct the same activities simultaneously. Thomas volunteered to provide students with baseline information
during the week of January 14th. Catherine acknowledged by saying, “That is good. You start them and that gives me another week or so to finish my mythology unit.” Margaret wrote in her lesson plan book activities which introduced debating procedures and strategies. Margaret also told Catherine at the meeting, “Since I will not have much since my curriculum is Asia and Africa, I can help you with the language arts parts since I used to teach it and know what you will have to do with the students.”

It still seemed that the environmental service-learning unit was going to be implemented somewhat similar to the handwritten plan and mock report (Appendix H). However, at the February 4th planning meeting it appeared that the implementation phase was slipping by the wayside. By the February 14th meeting, it was clear the ‘plan’ was falling apart. Margaret reported to the others, “We have not done anything for collecting and organizing the demographic data.” Catherine added, “We also do not have the computer labs scheduled to go do the research.” The discussion became one of what could be done to make the data collection manageable for the teachers and students. Lisa was at the meeting but her only contributions concerned the stream analysis component. She occasionally asked questions about the stream data, sometimes in the middle of a discussion between the other teachers. She indicated that she was making progress toward her implementation activity. Thomas’ tone of voice and actions seemed to become one of trying to ‘salvage’ the environmental service-learning data collection and analysis so the students could still use real data to develop their conclusions regarding development along the Parkway in front of the school (section V of the mock report, Appendix H). The remaining discussions reduced the report to a “persuasive essay” by Catherine, or to maybe “a data chart and essay,” by Margaret. Margaret and Catherine sensed Thomas’ hesitation
in terms of both ideas. At this point, Catherine’s ‘loss of voice’ became apparent when she asked, “Well, what do you want us to do?” The entire planning process changed at that point.

The looming deadline for completion by March 4th changed the whole dynamics for planning and implementing the environmental service-learning unit. An urgency was suddenly present not there before. The team was free to do whatever they wanted in their academic classes after March 4th but the end of nine weeks tests were scheduled for all subjects the following week and there were twenty school days left before the commencement of the April high stakes tests. Margaret and Thomas seemed to be desperately trying to salvage some data collection and analysis. Thomas suggested to Margaret, “Maybe you could get on-line and collect some data, then print, cut, and paste onto it so you could just hand it to the students to use.” Catherine seemed to agree but did not do anything. She seemed frustrated and did not say much at that meeting. As the meeting neared the end of the planning period, the team agreed that environmental service-learning from that point forward would take place in the non-graded period. The environmental service-learning plan developed by the interdisciplinary teachers was almost totally discarded at that meeting. The team agreed that the research report was not going to happen when Thomas asked, “do you think we can pull the report off at this point?” They agreed it was not possible, but still wanted the students to answer the focus question, “Why should ‘they’ continue to allow development of housing subdivisions and shopping centers along Breadloaf Parkway?” The team discussed what to do and finally Thomas suggested that students still needed to understand the issues of development, even with little time remaining. He told the others that he had introduced environmental topics and impacts of development in his science class as discussed earlier, but that students needed more background before they could form any positions. He also said that he did not feel he could give up any more science classes because he
had so much to cover before the nine weeks exams. He offered to order several environmental videos from the County Clean and Beautiful Organization for other teachers to show during the remediation/enrichment period when the new cycle began the following week. The other teachers agreed immediately, even though there had never been any mention of using videos to teach the students about environmental topics before this point.

The team began showing the videos the week of February 22nd but by Friday, it was obvious to the teachers that they needed to do something different to ‘save’ the entire environmental service-learning initiative. Thomas asked, “Do you think we can get the kids motivated to answer the development question concerning Breadloaf Parkway?” Catherine and Margaret both said they did not think things were going to work out. In the time from 8:40 AM to 8:55 AM that morning, all implementation efforts, except Lisa’s stream analysis, changed totally. The focus question changed from whether development should continue along the Parkway to “Are you a Total NIMBY, Partial NIMBY, or Not a NIMBY?” The teachers felt they still needed some focus that asked students to make a choice and defend it; however, they knew that at this point they would not be able to have the students develop a stance about development along Breadloaf Parkway based on real data, as originally planned. The discussion was a salvage effort, with only eleven days of remediation/enrichment periods left. In the fifteen minute meeting that morning, they decided to have the students make posters illustrating their position with respect to NIMBY and invite the city planner to visit the following week to share information about planning and zoning. Thomas emailed the city planner later that day and arranged for him to speak to all the students on Tuesday February 22nd, with a follow-up visit on Friday, March 4th to close out the environmental service-learning unit.
The environmental service-learning implementation ultimately took on a completely different look than was planned. In the end, the environmental service-learning was relegated to the remediation/enrichment period for fourteen days, consisting of activities tallied in Table 13.

Table 13

*Environmental Service-learning Activities by Each Teacher*

<table>
<thead>
<tr>
<th>Day</th>
<th>Lisa</th>
<th>Margaret</th>
<th>Catherine</th>
<th>Thomas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tuesday</td>
<td>Environmental pollution videos</td>
<td>Environmental pollution videos</td>
<td>Environmental pollution videos</td>
<td>Environmental pollution videos</td>
</tr>
<tr>
<td>February 15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Wednesday</td>
<td>Environmental pollution videos</td>
<td>Environmental pollution videos</td>
<td>Environmental pollution videos</td>
<td>Environmental pollution videos</td>
</tr>
<tr>
<td>February 16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Thursday</td>
<td>Environmental pollution videos</td>
<td>Environmental pollution videos</td>
<td>Environmental pollution videos</td>
<td>Environmental pollution videos</td>
</tr>
<tr>
<td>February 17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Friday</td>
<td>Introduce NIMBY focus question</td>
<td>Introduce NIMBY focus question</td>
<td>Introduce NIMBY focus question</td>
<td>Environmental pollution videos</td>
</tr>
<tr>
<td>February 18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Monday</td>
<td>No school</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>February 21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Tuesday</td>
<td>Students work on their NIMBY position</td>
<td>Students work on their NIMBY position</td>
<td>Students work on their NIMBY position</td>
<td>Introduce NIMBY focus question</td>
</tr>
<tr>
<td>February 22</td>
<td>posters</td>
<td>posters</td>
<td>posters</td>
<td></td>
</tr>
<tr>
<td>7. Wednesday</td>
<td>City planner introduce himself to the</td>
<td>Students work on their NIMBY position</td>
<td>Students work on their NIMBY position</td>
<td>Students work on their NIMBY position</td>
</tr>
<tr>
<td>February 23</td>
<td>students and discussed planning, zoning,</td>
<td>posters</td>
<td>posters</td>
<td>posters</td>
</tr>
<tr>
<td></td>
<td>eminent domain issues</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>8. Thursday</td>
<td>Students work on their NIMBY position</td>
<td>Students work on their NIMBY position</td>
<td>Students work on their NIMBY position</td>
<td>Students work on their NIMBY position</td>
</tr>
<tr>
<td>February 24</td>
<td>posters</td>
<td>posters</td>
<td>posters</td>
<td>posters</td>
</tr>
<tr>
<td>9. Friday</td>
<td>Lisa and Catherine were scheduled to be</td>
<td>Students work on their NIMBY position</td>
<td>Students work on their NIMBY position</td>
<td>Students work on their NIMBY position</td>
</tr>
<tr>
<td>February 25</td>
<td>out so the team decided to have all</td>
<td>posters</td>
<td>posters</td>
<td>posters</td>
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<tr>
<td></td>
<td>students on the team work on an</td>
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<tr>
<td></td>
<td>environmental word find</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10. Monday</td>
<td>Debate the ethics of development using</td>
<td>Students work on their NIMBY position</td>
<td>Students work on their NIMBY position</td>
<td>Students work on their NIMBY position</td>
</tr>
<tr>
<td>February 28</td>
<td>newspaper article</td>
<td>posters</td>
<td>posters</td>
<td>posters</td>
</tr>
<tr>
<td>11. Tuesday</td>
<td>Analyze stream data</td>
<td>Students work on their NIMBY position</td>
<td>Students work on their NIMBY position</td>
<td>Students work on their NIMBY position</td>
</tr>
<tr>
<td>March 1</td>
<td></td>
<td>posters</td>
<td>posters</td>
<td>posters</td>
</tr>
<tr>
<td>12. Wednesday</td>
<td>Analyze stream data</td>
<td>Practiced debating for city planner</td>
<td>Had students write letters to</td>
<td>Practiced debating for city planner</td>
</tr>
<tr>
<td>March 2</td>
<td></td>
<td></td>
<td>government officials or new paper</td>
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<td></td>
<td></td>
<td></td>
<td>editors</td>
<td></td>
</tr>
<tr>
<td>13. Thursday</td>
<td>Video taped class analyzing stream data</td>
<td>Practiced debating for city planner</td>
<td>Had students write letters to</td>
<td>Practiced debating for city planner</td>
</tr>
<tr>
<td>March 3</td>
<td></td>
<td></td>
<td>government officials or new paper</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>editors</td>
<td></td>
</tr>
<tr>
<td>14. Friday</td>
<td>Entire team met with City Planner for</td>
<td>Practiced debating for city planner</td>
<td>Had students write letters to</td>
<td>Practiced debating for city planner</td>
</tr>
<tr>
<td>March 4</td>
<td>presenting their positions as NIMBYs and</td>
<td></td>
<td>government officials or new paper</td>
<td></td>
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<tr>
<td></td>
<td>presenting to a mock city council for and</td>
<td></td>
<td>editors</td>
<td></td>
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<td></td>
<td>against a proposed chicken processing</td>
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<tr>
<td></td>
<td>plant next to the school</td>
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</tbody>
</table>
The scope and focus of the implementation effort changed dramatically once the March 4th end date became a reality for the teachers. The most significant change in the environmental service-learning unit was the DROPPING of the intended service-learning components. Section VI of the mock report was intended as an organizer to help students develop their ideas for community outreach. The team wanted the students to develop their own ideas for the service-learning component using the following prompt and organizer, “based on what I have learned about building subdivisions and shopping centers and what I think the government should do, we, as students, can do one or more of the following:” shown in Table 14.

Table 14

*Student Prompts for Service-learning Component*

<table>
<thead>
<tr>
<th>Part 1 - What can be done and who would it benefit?</th>
</tr>
</thead>
<tbody>
<tr>
<td>What can be done?</td>
</tr>
<tr>
<td>(Students would write ideas here)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part 2 - Based on my interests and talents, I will do the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>What I will do?</td>
</tr>
<tr>
<td>(Students would write ideas here)</td>
</tr>
</tbody>
</table>

The teachers did not implement environmental service-learning according to their ‘plan,’ but they did conduct a “watered down” form of it. The service-learning component was totally dropped, a significant deviation for implementation of environmental service-learning. The
interdisciplinary effort conducted by this team was, therefore, NOT an environmental service-
learning unit but rather an environmental education interdisciplinary unit. The continuation of
their attempt to implement the unit at the last moment was testimony to the teachers’
communication skills and flexibility, the next emergent theme important in describing how this
team implemented environmental service-learning.

Theme 2: Communication and Flexibility

While the interdisciplinary team did not implement the environmental service-learning as
planned, the teachers still communicated and were flexible enough to conduct at least some form.
They openly communicated about what happened in their academic classes. They seldom
complained about their jobs or students; rather, they just shared their experiences on a regular
basis. This regular communication may have contributed to the ‘salvation’ of the unit on the
morning of February 18th. At the February 4th meeting, Thomas noted to the other teachers that,
“The students were not very interested the first day. They did not seem interested in the idea of
development along Breadloaf Parkway.” He explained to his teammates how students’ interests
perked up when he introduced the term NIMBY. “Maybe it was the sound of the word but it
captured their attention.” When the other teachers asked what the term meant, he explained, “Not
In My Back Yard.” Margaret quickly responded, “I am a NIMBY. There is a gas station near my
house that I refuse to stop because of where it is.” Catherine added, “Mitch and I will not shop
the grocery store they just built behind our house either.” The discussion was not significant at
the time except for the interest it created at the moment. However, the following week when
Catherine, Margaret, and Thomas met on Friday morning, February 18th, they discussed student
boredom with the environmental videos. The discussion progressed from students’ boredom to
the realization they would not be able to implement most of the planned environmental service-
learning. They quickly talked through this large issue that seemed to be looming below the surface. Because the team communicated in their planning meetings and Thomas had shared the idea of NIMBY with his teammates the prior week, the team was quickly able to adapt and shift to a new focus question.

The week before the city planner was scheduled to return for the culminating activity, the team changed the focus question from one which required students to develop a research-based position regarding development along Breadloaf Parkway to one that asked students to generate emotional-based responses about issues surrounding development in their backyard. Although the others agreed, Thomas was most adamant about the need to help students learn to base decisions regarding development on facts, not opinions. When the team realized that they were not going to implement the environmental service-learning unit as they had hoped, they calmly discussed their options and desire to continue with some form of environmental service-learning. In adjusting their ideas for the planner’s return visit, they quickly agreed to have him listen to the students’ reasons for being NIMBYs and stage a mock city council meeting. Lisa even remained flexible in her schedule for videotaping her National Board requirement, commenting, “I really want my students to be able to participate with the planner like your students. I will work in preparing for the planner like you are doing, maybe just not as much.” When talking with the city planner after the culminating activity and the topic of the curricular changes surfaced, he said that, “When I received the email yesterday about what we were going to do today, I saw that it was different than we originally talked. I am impressed how well the students adapted and presented themselves today.” His comments were a testimony to the team’s communication skills and flexibility during the implementation phase of the environmental service-learning unit.
Summary

This interdisciplinary team implemented the environmental service-learning unit as enrichment to the existing mandated curriculum. It was not integrated into any of the teachers’ academic classes except as a ‘tangent’ or supplement to the existing curriculum. The team’s hesitancy to implement environmental service-learning full scale in their academic classes may be explained by Heidi Hayes Jacobs’ (1991) ideas from her research regarding interdisciplinary teams and curriculum. Jacobs noted that implementing interdisciplinary curriculum is difficult and teachers must be fully aware of what they are attempting. Two obstacles that particularly affected the implementation of interdisciplinary curriculum for this team were the structure of the school (formal and informal curriculum, Palmer, 1999) and the personal constraints that teachers had coming into the effort. Rollander Middle School was organized by subject area specific time blocks for teaching, which to some extent hindered flexibility. This school structure combined with the fact that the teachers considered themselves to be experts in a single subject area hindered implementation of the interdisciplinary unit. The departmentalized organizational culture supported the teachers’ notion that they needed to cover mandated curriculum and further constrained the implementation of the interdisciplinary curriculum. However, the biggest problem evident among this team of teachers in their attempt at implementing interdisciplinary curriculum was, what Jacobs (1991) referred to as, “trying to do too much, too fast.” This team was guilty of trying to do too much. The environmental service-learning plan developed and submitted to the administration for approval on February 1 had everything possible included. There were too many objectives listed, too many activities planned, and not enough time to do everything. Margaret’s comment at the February 18 team-planning meeting summed up the position that the team felt when she said, “What can we realistically do before March 4th?”
Thomas’ frustration, which reached its peak during the implementation phase, was directly a result of this notion ‘too much, too fast.’

The teachers held beliefs regarding environmental service-learning and set out intending to conduct the unit to its fullest potential. As time progressed, the well-intended teachers adjusted their plans to the circumstances, such that the service-learning components were entirely dropped. Based on the observations made during this study, the original assertion regarding how this team implemented environmental service-learning curriculum was modified as follows:

The teachers did not follow the plan they developed for the environmental service-learning unit. They implemented what they thought could be done in a given period, with the deadline for completion handed down by their administration. The service-learning component of the unit was dropped, thus teachers essentially ended up implementing an environmental education unit. The teachers adjusted to the changes well through their communication skills and flexibility.

The unit implemented was an example of “environmental education,” rather than “environmental service-learning.” The team planned and progressed with service-learning in mind but fell short. Drawing from Pate’s (2001) nine-step process for involving students in service-learning, the team identified a real need within the community, knew what curriculum would be addressed, identified what students would be involved and had plans to help them identify how they would participate in their own ways, and involved two community partners. However, the team failed to plan the project thoroughly before beginning so that everyone knew what was expected and they were unable to involve students in any community outreach service-learning experiences. The team could have had the students reflect on their collaborative experiences with the city planner. However, reflection, another aspect of Pate’s nine-step process
for effective service-learning was not evident in any aspects of the implementation phase. Once March 4th arrived, the entire team ended all environmental service-learning participation and immediately went into nine weeks review and April high stakes testing preparation mode. The interdisciplinary team evaluated student participation and learning from the unit based on what was conducted, not what was originally planned. The next section describes how the teachers evaluated student learning during the environmental service-learning effort.

Research Sub-Question #4

*How does an interdisciplinary team of middle grades teachers evaluate student learning during environmental service-learning?*

Success in general education is not clearly defined (Arhar, 1996, Springer, 1994), let alone for environmental service-learning. Some define student learning based on test scores (Bailey, 2003; Bandlow, 2001), some if students are engaged (Jackson & Davis, 2000), and still others attribute learning to less tangible factors, such as the development of a sense of place (Gruenewald, 2002). In order to identify what guided this team of teachers, it was important to understand their assumptions about learning and look at how they evaluated it during the environmental service-learning unit. While each teacher defined learning differently as an individual (as noted in Chapter 4), they also reached a consensus for defining and measuring learning with respect to the environmental service-learning unit. All the teachers observed their students’ actions as they evaluated perceived learning during the environmental service-learning unit. The teachers agreed that they could measure learning based on subjective observations of students.

The teachers evaluated learning during the environmental service-learning in a holistic manner, not concerned about individual performance or quantifying student progress. None of
the teachers raised the possibilities of measuring student learning with respect to environmental service-learning through grading or other numerical means.

Following the discussion of these themes and interpretation, the original assertion was revised accordingly. The original assertion with respect to how the team would evaluate student learning during the environmental service-learning unit was

I asserted that teachers would find it difficult to negotiate a way of assessing student learning that crossed disciplinary boundaries. I believed that the teachers would ultimately use different methods of evaluating students’ learning during the environmental service-learning unit, based on their beliefs about grading as either process or product oriented. The product oriented teachers would use more pen and pencil type assessment methods while the process oriented teachers might use more observation and judgment oriented methods of evaluation.

How the teachers evaluated learning during the environmental service-learning unit was much simpler than the assertion detailed. The teachers never indicated throughout the entire planning of the environmental service-learning any intentions to use assessment tools or evaluations to assess student learning or their own personal success in terms of implementation. The following themes indicate the holistic and simplistic method the teachers used to evaluate learning with respect to environmental service-learning.

*Theme 1: Observing Success: In the Teachers’ Eyes*

The teachers all evaluated learning with respect to environmental service-learning on the basis of observed behaviors of the students. It was originally thought that the teachers would integrate much of the environmental service-learning into their respective academic classes and incorporate testing of the target objectives identified in the approved environmental service-
learning plan into their classroom assessments. However, there was never any evidence to suggest that teachers wanted to numerically evaluate the environmental service-learning effort. As it ultimately worked out, the implementation occurred in the remediation/enrichment period, where the teachers felt there was no need for a quantifiable measurement tool. All the teachers evaluated learning by observing student behaviors, such as the process of taking a position regarding NIMBY, preparation of presentations, student engagement during activities, shining moments displayed by at-risk students, and evidence that students took ownership of at least some of the environmental service-learning lessons. Whether the students meet goals in some measurable way is usually important in today’s academic atmosphere of standards and accountability; however, this issue was not important to the team in assessing student learning during the environmental service-learning unit.

Basically, the interdisciplinary teachers evaluated learning simply on the basis of whether students participated in any environmental service-learning. If the students participated in any way with the unit activities, the teachers deemed this as evidence that learning had occurred. There were degrees of success, where one teacher felt more successful than the other. However, the important point to make is that the teachers did not consider grading or student performance as a measure of learning. When evaluating student learning during the environmental service-learning unit, the teachers looked for indicators that the students were participating in the activities. The teachers did not discuss or set a standard for the curriculum in the environmental service-learning unit by which to measure student learning. The environmental service-learning was a ‘free’ teaching experience, unique to them, and from the teachers’ perspective, learning did not need to be measured in terms of their students’ performance toward learning mandated curriculum. For Thomas, eye contact and nodding heads signaled that students were engaged and
thus learning. Catherine said in her final interview that, “most of the students were really excited about the posters. Some needed to be reminded to stay on task but just a few.” Jackson and Davis (2000) noted that when students participate in engaging curriculum, student behaviors improve. For this team, amount and intensity of engagement indicated that the students were learning.

Evidence of student pride in their work is an extension of students’ engagement. It is also somewhat separate from the notion of engagement in that it places an emphasis on the students displaying ownership as a reflection of learning. To these teachers, pride was an indication that students had internalized and truly understood concepts enough to apply it to their lives. Each teacher made a point of highlighting at least one student to illustrate how observation of student behavior was his/her primary criteria for evaluating learning during the environmental service-learning unit. Lisa looked for evidence that the students related to the lessons she conducted. In her terms, “they were able to internalize the content.” When asked how she could tell if a student was internalizing the content, she replied, “mainly by observation. The maps in my room, the kids could see where they live. ‘I live here, I live here.’ They were totally into the maps. We made it personal and relevant to them.” Margaret watched her students show off their posters to their peers, demonstrating ownership in their work. “The NIMBY posters in the hallway. Other kids see them and wonder what NIMBY is, our kids explained and showed pride in their work, to be able to teach their friends something, to claim something.” Catherine listened to what the students talked about as they worked in groups. She overheard a girl talking to a boy while working on their NIMBY posters. Catherine explained in her final interview,

If you can get them to think about what they are doing and whether they agree or disagree, you kind of get it in their head, ‘this is my backyard, my community, I’m not going to be 13 forever, one day I want to have a house and children.’ One of the kids said
they’d like a ‘Marquis Racetrack’ in their backyard. Some girl turned around and said ‘not when you are married.’ That is being successful! They think about themselves and their community.

Thomas extended his definition of engagement when Sam and Alan participated during a science lesson about environmental impacts of construction. He discussed this example in the final interview,

Sam doesn’t do well in science but when I asked what would happen if they cleared the trees, he raised his hand and said several great things. I hope I didn’t embarrass him when I overemphasized how good his answer was, but he never says anything in class and I was happy to see him say something, and mean it. Then there is Alan who contributes sometimes but it is usually for a laugh. Yesterday, he had some good things to say when I asked about what would happen if they cut the trees. No one laughed.

No one laughed. He was successful with Alan.

Observation of shining moments was another aspect of how teachers evaluated success of the environmental service-learning. The teachers took pride when they observed a student excel in front of his or her peers in ways not normally possible in everyday academic classes. Boston (1997) noted service-learning can help students become more personally and socially responsible citizens, a difficult extension for early adolescents. Middle school students are characteristically self-centered but also have a ‘soft spot’ of caring. Although the team did not truly implement service-learning, the teachers felt that the activities they did conduct brought out the caring side of many students and gave them a chance to shine. Lisa, Catherine, and Thomas discussed students they saw demonstrating a shining moment. Lisa’s premier student was Jonathan. He was not a high achieving student but he enjoyed the outdoors. When they were trying to figure out
why the temperature in the stream was warmer below a highway, he demonstrated both understanding and ownership with respect to information from the lesson. Lisa discussed him in her final interview,

    Jonathan, he is not a high achieving student. He was sitting with some kids in his group that are high achieving and he was arguing with them about how the pavement heated the water and that was why the stream water temperature was rising and they did not agree with him. So when I said “Yes” that is why, he yelled “Yes” and said, “You all thought I was stupid.” Whereas I had a high achieving student (Richard) I really had to pull it out of him. He wasn’t connecting it all together. Maybe the kids that are books mart - it lets the lower level kids – it puts them up to their level. It allowed Jonathan to shine.

The environmental service-learning unit allowed many students to take ownership of their learning in ways often not available in regular academic classes. Springer (1994) noted that he watched for evidence of his middle school students demonstrating “self-motivation, self-discipline, and self-esteem (Springer, 1994, p. 169)” as a measure of learning. These teachers used similar criteria as a part of their “measurement” of learning.

**Theme 2: Success: Any Environmental Service-learning is Better Than None**

A consensus emerged among the interdisciplinary team of teachers that any environmental service-learning conducted with the students was a positive outcome. From the first planning meeting in January until the final day of environmental service-learning on March 4, the team went from their ideal vision of a comprehensive, integrated, and engaging environmental service-learning unit to one that could be implemented in eight days. The environmental service-learning was not the large or robust experience they had hoped to create.
However, none of the teachers identified the environmental service-learning unit as a failure, even though it did not come close to their original vision.

Researcher: Was the environmental service-learning a success?

Lisa: YES! It was a success.

Researcher: Why?

Lisa: I could tell by looking. From the first time the city planner came in to the second time, their questions were so much better. They really got into the NIMBY posters and telling everyone their stance. When the students were looking at the aerial photos of the stream and finding their houses, they were enthusiastic about it all.

Researcher: But how is that a success?

Lisa: Well, they would answer the questions. They were actually engaged, working together, coming up here, asking questions, and looking at the maps. They were actively engaged. They do not get that enthusiastic in regular math class. They learned stuff they were interested in when we did the environmental service-learning, stuff we don’t usually do. I think that is good for them, and for me. I enjoyed watching them get enthusiastic.

When asked in her final interview if she thought the environmental service-learning effort was a success, Margaret replied without hesitation, “Oh yes. The kids learned things about the environment and how they can have a voice at city hall.” She added, “Any environmental service-learning is a success. The kids would not have gotten anything like this in our regular classes.”

Researcher: How do you evaluate learning in environmental service-learning?
Margaret: That’s a tough one. I think you have to go back to the beginning, what’s our goal in doing it? What did we want to come out of it? I think we have to answer that question to determine if we were successful.

Researcher: What was your goal for it?

Margaret: Make them aware. These are all hard things that are hard to measure, make them care, get them involved, get them talking about the environment, get them questioning, and wanting to, you know, research more on their own. But when I think about when the city planner came, a lot of the kids that got up and spoke were not the kids that normally performed in the classroom everyday. Even the one’s that were sitting there talking, they got to see those kids, and they know how they are in the classroom. We got to see them succeed.

Researcher: The kids that are quiet, do you think they showed success there?

Margaret: I think so.

Researcher: How do you tell?

Margaret: They were listening, they were clapping, they heard the discussion back and forth and the debate back and forth – and even though they were going OOOOHhhh – they knew he had gotten them. They knew that that was a silly argument or a valid argument. That is a tough one, evaluating environmental service-learning. It is so subjective.

Researcher: You haven’t mentioned social studies.

Margaret: No
Researcher: None of your goals, evaluations, or purposes for doing the environmental service-learning.

Margaret: Right

Researcher: Is that OK?

Margaret: I think it’s fine. I think just exposing the students to the interdisciplinary nature of environmental service-learning, getting them to take stands and defend themselves with an outsider, like the planner, that was a success. The environmental service-learning did not have to be my curriculum for me to think it a success. The NIMBY idea was a really good idea.

Researcher: Why?

Margaret: Because there is so much construction around them in this area, and they look at it differently now. Before they would just drive by on the bus and just “they’re building something there’ and just go on by. Now they are thinking about what we talked about. And they might say something to another kid on another team on the bus about it that had no exposure to this kind of stuff.

Margaret’s criteria for success, and by extension student learning, centered on exposing students to something that would have traditionally not been covered in her social studies class. Likewise, although Catherine only did environmental service-learning during her remediation class, she still felt students had learned and that the unit was a success as reflected in the following dialogue:

Researcher: You have approximately 100 students. Could you look at each kid and say if they were successful with this unit? Is there a way you could say if they
were successful with this or not? Is there a way you could look at each one?

Catherine: Yes

Researcher: We talked about those that presented to the city planner but what about the quiet kids?

Catherine: I have Laura and that really quiet kid, Elizabeth, really, really quiet. Looking at the posters while walking around and asking them why they put what they did on the poster, they talked to you. They never say anything.

Researcher: You could see learning in that?

Catherine: Yes. I think it was a great success. They came out of their shell and explained what they were thinking.

Researcher: But what about all the other students?

Catherine: I truly think that everyone walked away with something that they learned from us during the environmental service-learning so it was worth doing.

Thomas had the most vested in the environmental service-learning unit with its close connection to his mandated science curriculum. But even Thomas based his determination of learning on the idea that getting students to do any environmental service-learning would increase their awareness and understanding, and thus was a positive outcome. In his final interview, he summarized his ideas for evaluating learning as follows:

I think the biggest way I evaluate learning is watching kids that don’t like class, the Alan’s and Sam’s. When the planner did the culminating activity, most of the kids that stood up that day and presented to him were the kids that failed at least one subject last
quarter. I guess success is getting those kids motivated that usually don’t get to shine in class. When students apply the lesson to their life, like Pablo talking about his dad having to move if they don’t have enough construction jobs for painters. I want to see the light bulb go off in the kids, seeing the kids that are not normally engaged, become engaged.

No grades. No tests. We should have done a reflection to see what they thought, but with the March review having to start, that pretty much killed that. I think that it was such a success that after all the tests in April, we need to do some activist stuff; paint storm drains, make videos, public service announcement. I am not convinced passing the high stakes tests makes for success. The kids need to like learning, love learning, want to know more on their own, in what they are interested, not what we want them to learn.

All the teachers agreed that ‘any environmental service-learning was better than none.’ Some were more philosophical than others about the attempt at environmental service-learning, with Margaret approaching the evaluation of its success the most openly.

Margaret: I think that no matter how it ends up, we are going to be successful because we tried. I think the kids are going to get something out of it. They are going to learn things about the environment. It is not going to be a futile effort. I think that just trying, giving it a go, we are going to be successful, just exposing the students to it.

Researcher: The kids learn by seeing their teachers screwing up sometimes.

Margaret: Oh, Yea. I think that’s important for them to see. It is important for them to know that we are always learning. They need to see that it is ok to not know something. It makes them, makes them know that we don’t think we know everything.
Lisa included a short description of how she would evaluate success of the environmental service-learning in her written autobiography commenting, “If the ‘project’ is completed, not necessarily if things go as planned. If the students get the GIST of what we are trying to teach them – then it will be a success.” In Thomas’ final written reflection, he wrote, “I wish we had done more but just doing what we did was a success.”

Summary

The team was comfortable with the subjective nature of evaluation and believed it was a good fit with how they approached the implementation of the environmental service-learning curriculum. Originally planned for inclusion in each of their academic subject classes, environmental service-learning would have been a natural extension of the mandated curriculum, including the objective measures of assessment. However, most of the environmental service-learning activities took place during the morning remediation/enrichment period, de-emphasizing the need for formal assessments. In a sense, the teachers were liberated from the academic measurement requirements by implementing environmental service-learning during the remediation/enrichment period. As noted in the literature review section of this dissertation, no studies have provided evidence to indicate interdisciplinary units decrease student achievement on high stakes testing, a very real fear of these teachers. They did not feel comfortable implementing the interdisciplinary environmental service-learning curriculum in their academic classes when they knew their students would be taking the high stakes tests within a month.

All the interdisciplinary teachers used student observation as the primary criteria for evaluating learning during the environmental service-learning unit. If they perceived that their students were successful in one of many ways, they deemed the environmental service-learning successful. No grades were necessary for them to assess student learning. The teachers based
their evaluation of learning on student engagement, shining moments, or evidence of some degree of ownership in the environmental topics. The data did not support the original assertion with respect to how the teachers would evaluate learning during the environmental service-learning. The original assertion was accurate to the extent that the teachers did not agree on a single measure of assessment that crossed disciplinary boundaries, but only because they did not purposely attempt to develop a cross discipline assessment method. Because of the pressures felt from high stakes testing and the availability of the non-graded remediation/enrichment period, their evaluation of learning became totally subjective and tied to observed student behaviors. Assessing student learning and success of the environmental service-learning was left to each teacher with no effort to standardize any aspect of assessment or evaluation. The four teachers were more similar than originally asserted in regards to their beliefs about the value of product versus process. Based on interviews and observations, it appeared that Lisa and Catherine were more grade oriented in their academic classroom where it was important to have students demonstrate measurable progress toward mandated objectives. Margaret and Thomas equated participation with learning, and emphasized that grading was not important. Lisa and Catherine used paper assessments regularly to assess student progress toward mandated language arts and math curriculum in order to group students on the team into enrichment or remediation classes. The need for quantitative data drove Lisa and Catherine on a regular basis in their academic subjects. By contrast, Margaret and Thomas only assessed in their academic classes at the end of units or for the mandated end of nine weeks exams. Although environmental issues were included in content lesson plans (i.e., Asia, statistics, bacteria, and protists) they did not appear in the related paper and pencil assessments. Based on these conclusions, the modified assertion as to how teachers evaluated success with regard to environmental service-learning is
Teachers did not assess student achievement (objectives) for any environmental service learning component. All evaluations of learning were qualitative in nature and based on observations. All four teachers based their assessment of learning on the observed behaviors of the students, with engagement synonymous with learning. An underlying premise held by all the interdisciplinary teachers was that any environmental service learning activities were better than none, no matter what occurred. The teachers believed the students would learn what interested them the most or to that which they could relate.

Cross-Case Analysis Summary

This study investigated how an interdisciplinary team of middle grades teachers planned, negotiated, implemented, and evaluated student learning during an environmental service-learning unit. This interpretive case study adds to the research knowledge base regarding how teams plan interdisciplinary curriculum, not just environmental service-learning curriculum. As noted in Chapter 1, many studies focus on the design and implementation of interdisciplinary curriculum (Arhar, 1996; Jackson & Davis, 2000; Rottier, 2000). However, there are few stories of success or failure with respect to the process. Arhar (1996) attributed this lack of research to the complexity of investigating interdisciplinary teaming and curriculum planning. Ellis and Fouts (2001) state that “experimental research on interdisciplinary curriculum is very difficult to conduct and, therefore, rather rare” (p. 26). This study reinforced many of the factors contributing to success or failure as described in published literature, such as the teachers, school, content, students, time of year, and high stakes testing (Ellis & Fouts, 2001).

This interdisciplinary team started with good intentions and the desire to implement environmental service-learning with their middle school students. The four academic teachers each knew what environmental service-learning involved, had attended the same training, and
had conducted environmental service-learning segments over the three years since their training. However well intended they were, they did not implement the environmental service-learning as planned. A common thread across the assertions was that planning and implementing environmental service-learning was hard because it was different than what teachers were used to doing in their classroom. Meister and Nolan’s conclusion that “change is complicated because beliefs, lifestyles, and behavior come into conflict (2001, p. 608)” is applicable to this interdisciplinary team.

This teachers struggled with their beliefs regarding environmental service-learning and the realities of implementing this kind of curriculum. They were well intentioned, educated as to environmental service-learning, and motivated to conduct it for their students. However, they also seemed to fit Jackson & Davis’ (2000) observation that while teams are still an organizational component of middle schools, teachers are isolated in their content area and not delivering interdisciplinary curriculum as intended on their teams. The teachers demonstrated that they understood that students learn at different speeds and by different methods. This was especially evident in the criteria used to evaluate learning – looking for student engagement, shining moments, and the internalization of environmental concepts. There was tension between teachers’ desire to conduct interdisciplinary curriculum and hesitancy to do so because of uncertainty about its effectiveness in terms of improving student learning on high stakes testing.

Applying Miller and Slayton’s (1998) findings to this team, administrative constraints, and the use of planning times for reasons other than developing curriculum held true. The administration required the team to complete environmental service-learning by March 8th. The teachers felt the pressures of the upcoming nine-week exams because they knew that the administration compared student results among teachers to determine strengths and weaknesses.
These team members each wanted their students to perform well on these tests because they felt it was a personal reflection of their effectiveness.

The teachers used the planning periods during the study in ways they felt necessary to perform their normal teacher duties. However, their use of the planning periods during the time of this study influenced the development of the environmental service-learning unit to such an extent that the teachers were never able to complete a written scope and sequence with specific dates, benchmarks, and implementation timelines to keep them on track (Jacobs, 1989). Some may question the need for so many parent conferences, especially since Jackson and Davis (2000) say that effective interdisciplinary teams should not have as many behavioral issues. Hinckly (1992) agreed that parent meetings should not occur more than two or three times per month in the context of interdisciplinary teams. Contrary to these researchers’ recommendations, this team conducted many conferences because of the administration’s (school system wide) requirement to meet with parents of students with academic or behavioral issues. Almost every parent conference was for academic issues, due to the high failure rate noted earlier. This team did not have many behavioral issues. Planning time also fell into Rottier’s (2000) notion that team planning often becomes a time for discussing issues of student behavior, social development, academic progress or a time to take care of housekeeping duties – this was often the case for the middle school team.

The idea of evaluating learning is an important dimension of this study, especially in today’s political and educational climate. The existing literature does not include many descriptions of how learning is typically “measured” for interdisciplinary curriculum, environmental education, service-learning, or environmental service-learning. In the majority of studies examined for the literature review, ‘learning’ was defined through the eyes of the
beholder. Some may say that this team was not successful with their environmental service-learning effort because they did not do nearly as much as planned. Yet, all four teachers felt that their efforts were successful because they saw their students learning. Maybe the elusiveness of assessing learning in terms of both students and teachers is a reason for the standardized testing movement, a need to quantify something that has never been before quantifiable beyond grades on a report card.

A reason that the team may not have accomplished as much environmental service-learning as they originally intended was their lack of follow through in the planning, somewhat considered critical by Jacobs (1989). Jacobs outlined a systematic approach to planning interdisciplinary curriculum that the team intuitively applied partially, but not completely. The team initially established the focus question about development along Breadloaf Parkway, which was consistent with Burton’s (2001) idea of inquiry which would enable students to connect with a topic. The team also brainstormed associations for all four academic content areas and accepted that not all subjects might be treated equally in the unit. The team addressed Jacobs’ (1989) third step for planning interdisciplinary curriculum when they considered different student needs, interests, ownership, and success. However, the team did not follow through with Jacobs’ fourth recommendation for implementing interdisciplinary curriculum, which calls for the establishment of a scope and sequence with specific plans including dates, tasks, and responsibilities. Dates were occasionally identified in the initial planning but not for the scope of the entire interdisciplinary unit effort. The only date that ended up mattering to the team was March 8th, the day that mandatory high stakes test review was to start during the remediation/enrichment period.
The interdisciplinary team of teachers perceived itself to be well accomplished and effective with students. This perception was influenced by their experience working together for five years, the numerous awards team members had received, their National Board certifications, the low number of student discipline issues, and the camaraderie. Murata (2000) found that maintaining team compositions over many years is difficult. Although there is teacher turnover among other interdisciplinary teams in the school, the composition of this team had not changed in five years. Murata noted that low teacher turnover was important in keeping teachers together to give long-term interdisciplinary teaching goals a chance. This was an award winning team, receiving recognition as regional team of the year from the state’s middle school association and nominated as a national team of the year with the NMSA. Three of the four teachers were National Board certified and the forth was close to certification. Their principal noted that they regularly had a very low discipline referral rate, compared to other interdisciplinary teams in the school. Based on these assumptions, the team would likely rank favorably with respect to George’s (1982) four “operational phases” needed within an interdisciplinary team to increase its chances for success. They met George’s first phase (organization phase) and second phase (community phase) where the team identity is established and teachers bond with each other and with their students. However, the team was only beginning to enter George’s third phase (team teaching phase) where teachers design and implement interdisciplinary units to teach content and meet the needs of the middle school learner. According to Palmer (1995), the community phase is not reached very often. The difficulty does not seem to be “the result of ill-will or lack of effort, but rather a lack of understanding of the wholeness of the process (Palmer, 1995, p56).” The team is nowhere near the fourth phase (governmental phase) when teachers and students jointly practice participatory decision-making. For most teachers, sharing power and authority
for developing curriculum and instruction decisions with students is very difficult. The governmental phase is difficult to achieve with most teachers, as it requires them to give up some of their control and authority in the classroom (George, 1982). None of the teachers demonstrated any intention during the study of allowing the students to determine how to meet the mandated curriculum. Throughout the study, the teachers always intended to control what happened in their classrooms, assuring themselves that the curriculum was going to be presented adequately. As Homestead (1997) discussed, students need to be trusted to take responsibility for their education and can act responsibly, if teachers have the confidence in themselves and their students. There was evidence to suggest that this team did not fully trust their students or themselves to let this happen.

This study was guided by four research sub-questions and assertions that attempted to answer the overarching research question: What did an interdisciplinary team of middle grades teachers believe regarding environmental service-learning and how did they plan, negotiate, implement, and evaluate student learning during an environmental service-learning unit? There is no overarching assertion regarding the primary research question. However, a concluding assertion is possible based on the evidence of this study. The final assertion, based on all evidence presented is:

This team believed that environmental service-learning was a method for motivating their students in ways the standard curriculum did not, by creating a ‘sense of place’ for students, which in turn provided engaging and stimulating material relevant to their lives. They negotiated the environmental service-learning curriculum but planned more than was possible, based on the existing testing environment in the school. But instead of giving up, they proceeded to do what they felt was possible within the time constraints set
on them by the administration. They did not need grades to evaluate the student learning during their environmental service-learning effort. They based their evaluation of students’ learning and success of the environmental service-learning curriculum solely on observation of the students. If the students were engaged, showed they had internalized the curriculum, and exhibited shining moments, the team deemed their efforts a success. The concluding assertion maintains that the teachers believed environmental service-learning was good for their students and that they were well intended with their efforts. However, they faltered in their ultimate implementation because of the complexity and pressures of wanting their students to be successful in terms of the current state of education accountability and high stakes testing. The group was not a phase four democratic interdisciplinary team (George, 1982) and did not complete a detailed scope and sequence with firm deadlines (Jacobs, 1989), factors which may have contributed to the lack of follow through in implementation as planned. The conclusions are extended to include the business of their teaching positions, multiple demands on their time, and the energy required to implement interdisciplinary curriculum, all of which were important mediating factors in determining what the team could fully accomplish in their current setting.
CHAPTER 6

IMPLICATIONS

Implications for middle school practitioners, administrators, and researchers interested in environmental service-learning are described in this chapter. Teachers contemplating environmental service-learning specifically or interdisciplinary units in general, might weigh the implications presented herein before beginning the process of planning. Administrators evaluating whether to promote environmental service-learning in their school may glean ideas from this section to improve chances for success. Researchers interested in investigating deeper the findings presented in this study may develop additional questions from the implications presented. It is hoped that other audiences might use the following implications to improve existing models or generate new approaches to environmental service-learning.

Implications for Middle School Practitioners

Middle grades teachers considering environmental service-learning might want to engage in a process of self-evaluation before beginning the planning of such an initiative. Teachers need to understand the complexity of planning, negotiating, implementing, and evaluating student learning before beginning this kind of effort. Based on the findings of this study, a two phased evaluation process has been developed to guide teachers as they evaluate and contemplate environmental service-learning as a model of instruction within their interdisciplinary team. In the first phase, teachers should review the context for environmental service-learning and the presence of positive and negative factors that may impact the team’s efforts. Each teacher and the team as a whole must then decide whether to take on the effort of planning, negotiating, and
implementing environmental service-learning. If the consensus among team members is to pursue environmental service-learning, a second phase evaluation should begin. In phase two of this evaluation process, the team should identify the ‘nuts and bolts’ of planning that will serve to anchor progress of the environmental service-learning effort. The following section describes each of these phases in further detail.

Phase One Evaluation: Understanding the School/Community Context

Palmer (1995) stated that curriculum is more than just the material to be taught, it also includes the physical and non-physical characteristics of the school. In phase one evaluation the interdisciplinary team should determine the personal, school, and community factors that could support or hinder planning, negotiating, and implementing of environmental service-learning. The interdisciplinary team must determine their beliefs regarding environmental service-learning, the pressures of accountability that must be addressed, and responsibilities of teachers beyond their classroom. They should also evaluate other elements that could potentially affect their effort, such as interpersonal skills among team members and opportunities for collaboration within and beyond the school. Honestly investigating and evaluating the impact of these elements will effect decisions about participation in environmental service-learning. Once teachers determine their degree of comfort with each factor, they need to openly discuss concerns and develop consensus before beginning. If one or more team members decide not to participate in interdisciplinary environmental service-learning, the remaining teachers can continue without this individual teacher, not pursue as a team effort, or conduct an integrated curricular unit within their academic subjects only.

The second part of phase one evaluation requires teachers to recognize their understanding and comfort levels with respect to their ideas and beliefs regarding environmental
service-learning, pressures of accountability, available collaborators, interpersonal skills, responsibilities beyond the classroom, and other elements present that might impact the effort. Varying levels of each element may impact the teachers’ desire to participate in the environmental service-learning effort, thus affecting the chances of success for the unit. The teachers might each complete a short reflection guided by prompts to record and reflect on their ideas and beliefs regarding environmental service-learning, their perceptions of the pressures of accountability, or assessment of the interpersonal skills of various team members, including themselves. Once teachers complete their reflections, they should share their responses with teammates in an open meeting. This collegial sharing will create new ideas not previously considered and may help them reach consensus as to whether to pursue interdisciplinary environmental service-learning curriculum as a team, in a modified approach, or not at all.

Phase Two Evaluation: “Nuts and Bolts”

Phase two evaluation emphasizes an interdisciplinary team’s interest and commitment to pursue environmental service-learning curriculum. Once the team understands what they are getting into, there are several issues that need to be addressed to increase the chances for success. The team must decide on leadership within the team, assess strengths and weaknesses in relation to interpersonal skills, determine professional learning/staff development needs, and involve the administration in creating a formal plan for implementation. The following section describes each of the above and how they contribute to developing the formal plan necessary for implementation of environmental service-learning.

Leadership within the team.

The interdisciplinary team needs to agree on a leader for the environmental service-learning effort before beginning the process. This individual may be the administration’s
designated middle school team leader or the teacher with the most background knowledge of environmental education or service-learning. Responsibilities might include scheduling of meetings, serving as a point person for contacts outside the team, documenting progress as predetermined by the plan (described below), identifying needs, finding resources necessary to accomplish the unit, or acting as cheerleader if the team begins to let the interdisciplinary unit slide to second priority in academic classes. Each interdisciplinary team is unique and should negotiate leadership responsibilities that best fit their particular context. Without a designated leader willing to take on the responsibilities for promoting the unit within the team, the teachers will most likely begin to ‘muddle along’ to the point where environmental service-learning is dropped from their classes. As noted above, a written plan is important for the process of implementing the unit. The interpersonal skills of the teachers will impact the progress and success of planning and implementing the unit and need to be considered accordingly.

Assessing strengths and weaknesses in relation to interpersonal skills.

The team honestly needs to evaluate their ability to plan and negotiate interdisciplinary curriculum. If a team reaches consensus on developing an environmental service-learning unit, positive interpersonal skills need to be in place. Since planning and negotiating interdisciplinary curriculum requires a ‘give and take’ among the teachers, all involved must have the interpersonal skills to work with their teammates. If the interpersonal skills are not present among the teammates, the teachers will most likely not function well as an interdisciplinary team, let alone be able to plan curriculum that crosses academic boundaries. Therefore, teachers must believe they can work together to plan and negotiate environmental service-learning.
Assess the degree of collegiality and loyalty among team members

A significant theme which emerged in the cross-case analysis was impact of loyalty among team members. An interdisciplinary team considering environmental service-learning would benefit from honestly looking at itself and identifying whether the collegiality among the team members is such that it would result in them supporting each other when the unit might not be progressing as originally intended. Extending beyond the collegiality present, the team’s faithfulness to a particular member or the cause of environmental service-learning should be determined. As evidenced in this study, the loyalty to team members was stronger than to the environmental service-learning effort, resulting in action to continue the effort when the ‘going got tough.”

Determining professional learning/staff development needs.

It would be possible to plan and implement environmental service-learning without any formal training but professional development for all teachers involved is recommended. As demonstrated with the team for this study, planning environmental service-learning was difficult even though all four teachers had attended the same training together. Without any professional development, teachers may be putting forth even more energy to figure out how to plan and conduct the unit than if they had no training. If only one teacher participated in professional development, the team would have to spend much of the planning time learning about environmental service-learning and the interdisciplinary nature of its foundations from the single source. Additional time and energy would be required of this one teacher to the extent that he/she might not be able to handle the extra responsibility of teaching his/her teammates. When all academic teachers attend the same training, they come into the planning effort with a shared understanding of environmental service-learning and are able to begin planning without a
learning curve. The exact nature of the professional development that best fits the team’s needs should be determined.

*Involving the administration.*

School administrators should be a part of the decision-making process for conducting environmental service-learning. These individuals can make or break an environmental service-learning effort by their conscious and unconscious actions. Interdisciplinary teams considering environmental service-learning may interpret verbal and nonverbal cues sent by the administrators and act on their interpretations of the messages. Administrators must be clear and consistent in communications with the team. Administrators can improve the chances of success for environmental service-learning efforts in their schools by providing the following.

When an interdisciplinary team communicates its intentions to plan and implement interdisciplinary curriculum, such as environmental service-learning, administrators should provide a clear response. If the administrators are indeed committed to environmental service-learning, they should provide the time, support, and resources necessary for the team’s success. The interdisciplinary team in this study received approval to conduct environmental service-learning but also received the direct message that they had to be done by March 4th. The message itself was not that significant in effecting the environmental service-learning effort because the teachers regularly dealt with deadlines for completion of curriculum. More importantly, the date and time of the school year for the deadline sent a subliminal message to the teachers that their performance would be compared with other teachers and that their environmental service-learning effort needed to be completed in time to prepare students for the end of nine weeks exams and high stakes testing in April. The teachers, themselves, had to determine whether to teach the mandated curriculum by means they had in the past or rely on interdisciplinary
environmental service-learning to adequately cover the required material. In this study, the teachers chose to focus on teaching the mandated curriculum by traditional methods to improve their chances of success with the nine weeks exams and high stakes tests at the expense of the environmental service-learning unit.

The administration must provide time to plan and implement the environmental service-learning unit, not just monetary support. The team in this study did have available to them a ‘free’ period at the beginning of each day which was used for remediation/enrichment. If that period had not been available, the team in this study probably would not have implemented environmental service-learning to any significant level. Depending on the experience and confidence of interdisciplinary teams considering environmental service-learning, administrators should consider providing teachers with extra time during the day, or make it clear that they have the flexibility to alter their scope and sequences and academic time periods to accommodate activities for the unit. This would be a particular issue for larger middle schools with less flexibility in scheduling, but may also be a concern for teachers in a small middle school.

The teachers of the interdisciplinary team may be the most important criteria for success of any environmental service-learning effort. It is critical that the teachers understand the requirements of their mandated curriculum, environmental service-learning, and how the two can be accomplished. Along with pedagogical understandings, the teachers must have the skills to work with each other to plan and negotiate the details needed to implement the interdisciplinary curriculum. If the teachers cannot communicate and agree regarding what environmental service-learning includes and how to implement it as an interdisciplinary unit among themselves, it is doomed to failure from the beginning. Administrators interested in interdisciplinary units, or environmental service-learning in particular, should form teams of teachers that are compatible
Administrators and teachers must also acknowledge that interdisciplinary curriculum is not for everyone and teachers should not be forced to participate.

Creating a formal plan.

The interdisciplinary team must create and commit to a written plan for the interdisciplinary unit (Jacobs, 1995), considering the decisions made in the previous sections. Tasks and responsibilities should be included but most importantly, the plan must include dates for execution and completion of each component. The individuals responsible for specific aspects of the plan should be designated to create accountability. If no plan is developed, environmental service-learning tasks will likely become a secondary priority behind the daily requirements of planning classes, grading papers, and attending meetings. The plan should include timing of the unit within the academic year and incremental execution of the unit for each teacher.

The team should decide how and when the environmental service-learning will be incorporated into the already scheduled curriculum for the year. Environmental service-learning can be planned and implemented as a stand-alone unit or as an integrated component of each teacher’s curriculum. Consideration of mandates placed on teachers must be included when planning the timing of the unit. If there are certain times of the year that extra mandates are placed on teachers, these should be considered in the planning process. Examples of external mandates include high stakes testing reviews, required parent/teacher conferences, nine weeks final exams, and periods of unusually high number of meetings. As found with this study, the teachers did not have a written plan which took into account the mandated curriculum for the year and extra mandates; they attempted to complete the environmental service-learning before
an administration imposed ending date, resulting in trying “too much, too fast” (Jacobs, 1995) and not completing much of the intended activities.

Pedagogical Implications of This Study

Most experts agree that interdisciplinary curriculum and teaming is good for middle school students, as noted throughout this study. However, there is not much literature published that describes specifically what is means to be ‘good for middle schoolers’ except to say that they are more actively engaged, become more involved in their learning, and benefit when the material is relevant. The researcher found more literature published regarding improved students learning with service-learning that environmental education, but very little as a combined pedagogical approach. With respect to service-learning this study supported Duckenfield and Wright’s (2001) findings state that student acquisition of content is improved, as well as their social and moral development (a desire of Catherine). Boston (1997) observed that students that participated in service-learning were more motivated and had higher grade averages. Combined with researchers, such as Saul (2000), Dennis & Knapp (1997), and Sanger (1997) that state that environmental education meets the needs of middle grade students by providing lessons that are relevant and realistic for students, interdisciplinary environmental service-learning curriculum should provide an exceptional situation for students to learn and achieve beyond the minimum. However, for environmental service-learning to become more widely accepted in today’s educational climate, teachers need to understand the measurable and non-measurable aspects of student achievement. In this study, the team noted that they ‘felt’ students would learn the mandated curriculum through environmental service-learning but only ‘measured’ student success in terms of engagement. All students were not included in the teachers’ informal methods of evaluating learning, only those that stood out because of their level of engagement.
In an accountable educational climate, consistent evaluation methods must be used. At the same time, it is important to recognize that not all educational questions lend themselves to quantification. The interdisciplinary teachers in this study did not demonstrate confidence that environmental service-learning pedagogy fostered conceptual understanding of mandated curriculum in their students at a level necessary for them to be successful on mandated high stakes tests. Unless there is sufficient evidence that interdisciplinary curriculum and environmental service-learning are shown to be approaches which effectively help students construct conceptual understanding, teacher confidence will be such that they do not attempt either. Interdisciplinary teaming and curriculum will be only a meaningless jester toward meeting the needs of middle school students.

The pedagogy of environmental service-learning implemented as interdisciplinary curriculum and teaming is very complex. Even though middle schools and interdisciplinary teaming and curriculum have been around for more than twenty years, neither is practiced often in its true form. The reluctance to fully implement the pedagogy in this study seemed to be an issue of available teacher time and energy combined with a lack of confidence in its effectiveness for teaching mandated curriculum in preparation for high stakes testing. The interdisciplinary team started planning the environmental service-learning unit with the appearance that their work might serve as an exemplar case study for how to conduct interdisciplinary teaming and curriculum through environmental service-learning. They demonstrated in the plan they submitted to the administration their use of a practice known as ‘backward design’ (Wiggins & McTighe, 1998). These teachers had end-products in mind as they developed their plan (Appendix G), such as a report, analysis of stream data, development of personal positions regarding development, and student generated service-learning initiatives.
They then went through the curriculum they were to address during the period of the environmental service-learning-unit and identified the objectives that would be covered. Wiggins and McTighe (1998) point out that practitioners should not expect to be able to carry out backward design of curriculum, often the process takes three to five years. This teachers had informally developed their ad hoc environmental service-learning curriculum for five years prior to the study so inherently understood the process when time to plan the unit. However, the pressures of time and lack of energy among the teachers began to take their toll on the planning process. Meetings, commitments, and personal needs took priority over the environmental service-learning unit. The pressures of additional duties, requirements for meeting with parents, mandated curriculum with its detailed scope and sequencing, end of quarter exams comparing student and teacher outcomes, and the overshadowing high stakes testing used to determine student promotion and school performance further degraded the effort. When it came to time to ‘fish or cut bait,’ the team showed signs that they still believed in the effectiveness of the pedagogy for middle school students but lacked confidence in its ability to adequately cover mandated curriculum satisfactorily for high stakes tests. The teachers chose their traditional methods over the environmental service-learning pedagogy for preparing students for testing.

Cookbook approaches to interdisciplinary teaming and curriculum do not work because of the variations among teachers, students, and curriculum involved. This team had practiced some form of environmental service-learning for four years prior to this study. In their first two planning meetings, the focus of many discussions was on what could they do with the particular group of students, the time of year, and the collaborators they would invite to participate, combined with the mandated curriculum needed to be addressed. The teachers knew that every year was different and that many variables came into play when planning environmental service-
learning. They did not even consider the same sequencing or activities utilized in previous years, let alone one published by an outsider to their school and team. Every interdisciplinary environmental service-learning effort is different and resists standardization. Interdisciplinary teams interested in carrying out environmental service-learning must evaluate their situation and desire to conduct the pedagogy, and then plan accordingly.

Implications for Research

This case study investigated one interdisciplinary team of middle grades teachers at a particular time in their lives and at a specific school, as an individual phenomenon. The results of this study can be used as a springboard for subsequent research regarding environmental service-learning curriculum and interdisciplinary teaming. This section is divided into two parts: a discussion of the extent to which the findings of this study address the needs and rationale put forth at the beginning of the research, and a discussion of methodological implications stemming from this research.

Addressing the Needs and Rationale of the Study

This study was deemed necessary for six reasons, as described in the introduction of this dissertation. Though the study contributed to each reason, more research is needed. The six reasons that initially served as a rationale for this study are listed below with a summary of what was learned and recommendations for future research.

Reason 1 - Some researchers suggest that interdisciplinary teaming and units can meet the needs of middle grades students by engaging them in the curriculum (Jackson & Davis, 2000) and changing the way teachers think about assessing students (Murata, 2002).

This study showed that interdisciplinary teaming and units meet the needs of some middle grades students on the team. The teachers focused their observation evaluations on the
students that did not usually perform well in traditional classrooms. The teachers used only qualitative observation methods to evaluate student learning. The teachers did not attempt to evaluate individual learning of students on the team in any depth or manner. The teachers in this study had the benefit of a ‘grade free period’ that did not require a quantified measure of assessment for standards or accountability. More research needs to be conducted to determine if environmental service-learning really meets the needs of middle school students and determine ways that teachers might assess student learning with respect to this pedagogy. Specific recommendations for research stemming from this study include:

- Determine how teachers might quantitatively assess student learning of mandated curriculum in relation to an interdisciplinary environmental service-learning instructional approach.
- Investigate how participation in thematic units presented by multiple teachers across curricular areas impacts student learning. Determine the degree that interdisciplinary teaming and curriculum improves retention and learning among middle school students.

Reason 2 - Other research suggests that service-learning (Berv, 1998; Boston, 1997; Meyers, 1999), environmental education (Norris & Jacobson, 1997), and environmental service-learning (Cogswell, 2001; Springer, 1994) can meet both the academic and affective needs of students. As a case study, this research provides an in-depth account of how one interdisciplinary team uses environmental service-learning to meet the needs of their middle school students.

The teachers failed to implement any service-learning during this study so findings generally do not contribute to the literature regarding this topic. What started out as an environmental service-learning initiative ended as an interdisciplinary environmental education
unit. Anecdotal evidence suggests that students were very engaged in outreach activities, such as NIMBY posters and presentations to the city planner. However, much more research needs to be conducted to determine whether environmental service-learning meets both academic and affective needs of middle grades students. Research that would continue to contribute to this rationale for conducting the research includes:

- Determine how environmental service-learning meets the academic needs of students. Though states, organizations, and districts have published mandated curriculum, more emphasis should be placed on ascertaining the academic needs of middle grade students, especially in terms of knowledge that falls outside the traditional academic subjects of math, science, language arts, and social studies.

- Determine how environmental service-learning meets the affective needs of students. Middle school students are known to be bodies and minds in transition from children to young adults. Future research should consider the extent to which interdisciplinary environmental service-learning addresses learners’ affective needs.

- Examine the advantages or disadvantages of different philosophical models of service-learning, including functional, spiritual, liberal, communitarian, radical democratic, and postmodern.

- Examine the extent to which service-learning fosters stronger networks and learning communities within and across schools.

Reason 3 - In the current educational climate of accountability and standards, teachers fear that high stakes testing impacts student learning in negative ways (Moore, 1994). Jackson & Davis (2000) conclude that in the climate of accountability, although many middle grade schools utilize
the structures of interdisciplinary teams, teaching and learning is not improved by changing the structure alone.

The teachers in this study were organized as an interdisciplinary team involving four academic subjects with the authority to plan interdisciplinary units as they determined feasible among themselves. This study supported Jackson & Davis’ (2000) statement that teaching does not necessarily change along with the structure of interdisciplinary teams. The team frequently noted the pressures of preparing the students for testing. They began the planning of the environmental service-learning unit with intentions to implement it in each of the academic classes, much in the way that interdisciplinary curriculum is intended. However, as testing season approached, teachers retreated into their comfort zones of teaching mandated curriculum, using the traditional methods determined successful in the past. More research needs to be conducted to demonstrate whether interdisciplinary teaming and curriculum is successful for preparing students for mastery of mandated curriculum evaluated on high stakes tests. Possible areas for further research include:

- Determine the degree to which interdisciplinary environmental service-learning fosters student conceptual understanding of mandated content objectives.
- Compare and contrast student success in meeting mandated objectives by studying similarities and differences between isolated content learning and interdisciplinary environmental service-learning curriculum.
- Examine what students learn through environmental service-learning both cognitively and academically using alternative means of assessment.
Reason 4 - While there is literature examining service-learning (Burns, 1998; Meyers, 1999; Pate, 2001b) and environmental education (Dennis & Knapp, 1997; Sanger, 1997; Saul, 2000) few studies examine models or approaches to environmental service-learning (Cogswell, 2001; Springer, 1994). This study is intended to add to the knowledge base surrounding conceptions of environmental service-learning.

This study demonstrated an approach to conceptualizing environmental service-learning within one interdisciplinary team. It adds to the knowledge base surrounding conceptions of environmental service-learning but other approaches need to be studied before generalizations may be made. In fact, how the teachers originally conceptualized their environmental service-learning effort changed as the planning and implementation phases progressed. More studies will make possible the development of diverse models to assist practitioners with their efforts at pursuing environmental service-learning. A cookbook approach will never be possible because of the idiosyncratic pressures, diverse nature of interdisciplinary teams, and varying school contexts. However, basic guidelines can be developed to better prepare teacher teams for conducting environmental service-learning and improving chances for success. In order to develop frameworks for preparing new teachers and expand the horizons of experienced teachers, research needs to be conducted that:

- Investigates many different conceptualizations of interdisciplinary environmental service-learning. From the results, several models for planning, negotiating, implementing, and evaluating environmental service-learning might be developed so individuals and teams of teachers can determine which model would be best for their situation, personalities, and interests.
• Examine different conceptual models of environmental service-learning in relation to the knowledge constructed by the students. Such research-based determinations will assist teachers and administrators with determining how to proceed with environmental service-learning based on their primary desired outcomes.

• Investigate the potential of environmental service-learning to encourage post-formal thinking in students in ways that helps them become cognizant of how power shapes their everyday lives.

Reason 5 - There are many studies that focus on the design and implementation of interdisciplinary curriculum (Arhar, 1996; Jackson & Davis, 2000; Rottier, 2000); however, there are few stories of success or failure with respect to the process.

The findings of this study are one more step in documenting successes and failures of interdisciplinary teaming and curriculum planning. Many factors were identified as influential in the planning and implementation of the interdisciplinary curriculum. The most significant factors for the teacher participants in this study were the stake he/she held in the process, the degree of ‘buy in,’ the extent to which the curriculum fit with different academic subjects, level of scientific knowledge, confidence to follow through, and the degree of influence each teacher had on other members of the team. This study supported Arhar’s (1996) recognition that investigating interdisciplinary curriculum is complex and researchers need to step up to the challenge and conduct more research. Therefore, recommendations for future research include:

• Evaluate degree of impact for each of the factors described above in relation to desired outcomes of environmental service-learning. Findings may help interdisciplinary middle school teams consider the presence or absence of each and adequately address this in their planning and negotiating process.
Investigate ways to help schools become places that support teachers as researchers. Just because interdisciplinary teaming and curriculum is difficult to study (Arhar, 1996) is not a reason to bypass research that supports the unique challenges of middle school learners and teachers. There seems to be a consensus that interdisciplinary curriculum and teaming are good for middle school students but there is not adequate research to demonstrate its effectiveness to administrators or government officials responsible for policy and budgets to encourage more active participation in the practice.

Utilize new methods of research using techniques borrowed from anthropology, history, and other fields to confront the complexities of studying interdisciplinary efforts.

Reason 6 - This study investigates the intersection of interdisciplinary curriculum, interdisciplinary teaming, and environmental service-learning curriculum in a middle school with high stakes testing.

This study supported Jackson & Davis’ (2000) note that while teams are still an organizational component of middle schools, teachers are increasingly isolated in their content area and not planning instruction with their teammates to implement interdisciplinary instruction. The teachers in this study believed environmental service-learning was good for middle grade students and that mandated curriculum could be taught through interdisciplinary units. Yet, when time and events challenged their beliefs and will to continue with the unit as planned, the default epistemology centered on their individual classrooms, where content was taught in isolation from other subjects. Further research needs to be conducted to:
• Investigate why teachers fall back on traditional, isolationist forms of instruction when they inherently believe interdisciplinary curriculum is good for their students’ learning.

• Investigate ways to change the structure of schooling to provide opportunities to engage in ongoing conversation relative to interdisciplinary curriculum and environmental service-learning.

Methodological Implications of This Study

Future research focusing on what interdisciplinary teams of middle grades teachers believe regarding environmental service-learning and how they plan, negotiate, implement, and evaluate learning would benefit from a mixture of research methodologies. Educators must look beyond statistics and psychometric research to produce knowledge germane to the lives of teachers. Case studies are useful for studying the backgrounds and interactions of a given group in a particular social unit, such as individuals in a school. They provide detailed information about a given situation and set of interactions (Myers, 1997), as was done for this study. However, action research methodologies are one of the most important activities whereby teachers gain (1) the skill to question their own practices, (2) question their assumptions, and (3) understand contextually their own situations. Teachers wanting to improve their teaching and use an organized method for developing strategies (Myers, 1997), might benefit from engaging in action research to better examine their ideas for enhancing environmental service-learning efforts. Narrative inquiry is another method that can be useful in understanding a phenomenon by relating a situation being investigated to humankind’s fundamental method of understanding, story telling (Myers, 1997 & Patton, 1999). Since narration requires one to explain something, an individual must compile and process the information in his/her own mind before it can be
explained to others. A combination of case study, action research, and narrative inquiry methods might be effectively used in studies that contribute to the literature on environmental service-learning in ways that might be more useful to practitioners, administrators, teacher preparation programs, and researchers.

With respect to methodological implications, future research should include a mixture of indigenous insider/outsider and external insider/outsider participants (Banks, 1998), since each typology influences how the researcher carries out his or her study. The indigenous researchers are teachers that intimately understand the practice of education and can provide a view of what happens on an interdisciplinary team as can only be explained by a person experienced with the nuances of the classroom and school learning environment. External researchers are those individuals not necessarily experienced with the terminology and practice of teaching so their view would include trying to understand the teachers’ processes, in addition to explaining the phenomenon. This study was conducted by an indigenous insider so was influenced by values, perspectives, and beliefs inherent to the position of researcher and subject. Extensive research needs to include the perspectives of an indigenous outsider, who is familiar with environmental service-learning but is not integrally involved with its planning and implementation. A contrasting perspective will identify aspects of the planning, implementation, and evaluation of environmental service-learning that an insider to this study may not, perhaps because of factors such as ‘pride’ associated with conduct of the unit. Other perspectives of external insider and outsider would provide views of individuals not influenced by their connectedness to environmental service-learning as indigenous researchers. Comprehensive interdisciplinary environmental service-learning research needs to include a mixture of the four researcher roles
identified by Banks (1998) so that meta-analysis research may be conducted regarding the topic and generalizations made that are not inherently possible with individual case studies.

Theoretical Implications of This Study

This case study documents what an interdisciplinary team of teachers believed regarding environmental service-learning and how they planned, negotiated, implemented, and evaluated student learning. Going into the effort, there were many theories of pedagogy that the teachers could have consciously pursued regarding their planned efforts but in reality, they conducted themselves based on knowledge and practices accumulated over the tenures of their education careers. This section describes the teachers’ theoretical orientations, both conscious and unconscious, and how the case study adds to the theoretical knowledge base in relation to environmental service-learning.

The team of interdisciplinary teachers demonstrated a social constructivist philosophy from beginning to end of their environmental service-learning unit. Though they never stated outright that they believed children build their knowledge based on prior experiences, they often commented on how important it was for them to help students make connections by using experiences common to early adolescents. Their non-standard methods of evaluating learning also suggest that they believed students build knowledge uniquely and make meaning of environmental and social issues differently. The following sections describe different premises inherent to interdisciplinary teaming, interdisciplinary curriculum, environmental service-learning (composed of environmental education and service-learning), place-based education, and teacher beliefs. Following the short overview is a discussion of how the study extended theoretical understandings in each case.
Interdisciplinary Teaming

The teachers were organized into a group of four to provide an atmosphere conducive to some of the fundamental premises of interdisciplinary teaming regarding the importance of relationships, size, peer affiliation, and collaboration. The importance of relationships is fundamental to interdisciplinary teaming. The interdisciplinary team organization provides a setting for educators to develop relationships with each other; when practiced to its fullest, connections between students and teachers also emerge. Students need relationships with adults as they grow in order to make sense of the world in which they live. This team of teachers displayed a sense of team work that was used to engage students in the environmental service-learning unit. The teachers displayed their passion for environmental topics throughout the unit and students connected with them in developing their own beliefs regarding the environment and service to the community. The students demonstrated growth in terms of relationships by working together in groups and by sitting attentively when their peers presented to the city planner.

The premise that smaller class size is better for student learning was difficult to examine in detail given the number of students involved in the service-learning effort. There were 115 students on the interdisciplinary team, compared to the 750 seventh graders and nearly 2100 students in the entire Rollander Middle School. The smaller number of students on the team facilitated group work planned during the enrichment period, but the 25 to 28 students per academic class was still not small enough to implement several activities. The teachers discussed on several occasions the limitations of class size in relation to managing activities in the computer lab and media center, and in terms of report writing sessions that required individual attention.
The teachers also demonstrated an understanding that peer relationships are an important aspect of middle school student development. Normally, the teachers assigned students to remediation and enrichment classes by their demonstrated math and language arts abilities, but for the environmental service-learning unit, teachers randomly grouped the students to provide opportunities for them to be with chosen peers. When the teachers introduced the NIMBY poster activity, they did not assign students groups. Students were allowed to choose who they wanted to work with for the effort. The teachers knew the importance of peer association facilitated by interdisciplinary teaming. Each teacher noted an increased level of engagement among many students during the environmental service-learning component conducted during the remediation/enrichment period as compared to ‘regular’ academic classes. The combination of peer affiliation with collaborative work contributed to the increased engagement of the students.

The teachers wanted the students to collaborate with one another for the environmental service-learning unit because they saw it as a way to fulfill many premises of interdisciplinary teaming at once. Collaboration can be learned by ‘traditional classroom instruction’ but this team modeled the practice for the students and let them learn as they engaged in the unit, knowing that different students had varying degrees of knowledge of how to work with others. An example of their social constructivist stance towards teaching and learning occurred when they let students pick their own groups during the remediation/enrichment period. This decision was not only to let students develop peer relationships or further reduce size of their learning environment. The teachers knew the students had varying amounts of experience with collaborative work and service-learning so wanted them to work with chosen peers from which to develop their knowledge collaboratively.
The premises of interdisciplinary teaming are accepted as important with respect to enhancing the learning environment of middle grades students. The combining of academic teachers into an interdisciplinary team within a large school is theorized to provide a small school atmosphere that encourages the building of relationships between teachers and students. The relationships, in turn, facilitate a setting for developing cross-curricular units that consider the formal and informal aspects of the school setting. The results of this study support theories of interdisciplinary teaming and add to the premises of effective grouping practices. The teachers noted students’ lack of engagement with environmental service-learning in the academic classes. However, when the students were randomly grouped in the remediation/enrichment period and allowed to work with classmates of their choice, student engagement increased tremendously. The increased participation among the students might also be related to the topic of the unit, specifically the environmental education component, as will be discussed later. However, since all four teachers noted the high level of engagement, it may be partially attributed to their understanding of the constructivist nature of learning and the use of peer grouping to assist the students in building knowledge of how to learn and develop relationships.

Interdisciplinary Curriculum

Students traditionally associate learning math, science, social studies, and language arts with different rooms, teachers, and lessons with little or no connections between the four content subjects. Interdisciplinary curriculum is intended to provide the students with an awareness that all content subjects are connected, thus sending the message that life is not compartmentalized. A premise of interdisciplinary curriculum is the idea that a teaching unit should revolve around a theme realistic to life and the students. All content areas should contribute to the execution of the interdisciplinary unit. Interdisciplinary curriculum should apply a curricular approach that
consciously applies content and concepts from multiple disciplines to examine a chosen theme that engages middle grades students naturally. Interdisciplinary curriculum requires teachers to practice parallel content design, each teacher fulfilling his/her curricular requirements while contributing to the desired interdisciplinary nature of the chosen unit. An additional premise is that interdisciplinary curriculum can better meet the needs of the middle grades student by covering necessary content in a manner that demonstrates the connectedness of subjects.

The teachers in this study demonstrated their knowledge of the fundamental theories of interdisciplinary curriculum as described above from the outset of planning for the environmental service-learning. The desire to create an interdisciplinary curriculum was demonstrated, but the lack of follow through to completion is noteworthy. Understanding the conceptual basis of a practice does not automatically assure application of the theory. This study highlights the importance of the disconnect between understanding and practice to such a degree that other researchers need to take note. As will be discussed in the conceptual model section, while the planning of the interdisciplinary curriculum seemed to progress naturally, there was a significant breakdown between the planning and implementation phases. This study illustrates the difficulty of following through with a practice believed to be important for middle grades students without the proof and confidence needed in today’s climate of accountability. In this sense, it illustrates the tensions that exist between teacher beliefs and practices.

*Environmental Service-learning*

Environmental service-learning as a singular discipline is not significantly described in educational literature. Thus, this study considers the pedagogy in terms of the root components of environmental education and service-learning. This section discusses each theory of instruction and describes how this study adds to the baseline knowledge of each.
Environmental education. Environmental education is an accepted pedagogy of instruction useful for covering academic curriculum (Klein and Merrit, 1994; Saul, 2000). The interdisciplinary team took this accepted pedagogy and applied it to their interdisciplinary situation, in an attempt to improve student learning and increase the environmental awareness of their students. The teachers sought to expose the students to environmental topics through each of their content classes so students could see that the world is not compartmentalized and important topics cross-curricular boundaries.

The environmental service-learning unit motivated and engaged students in ways not seen in the teachers’ normal academic setting. From the teachers’ perspective this form of interdisciplinary environmental education improved learning when issues were relevant and real to students. The region surrounding Rollander Middle School had experienced rapid growth and development. Students saw forests cleared, sat in traffic jams, and witnessed smoke plumes as trees burned. These real situations connected the students to the environmental education curriculum. A different type of student learning was witnessed. Determination of student learning with regards to mandated curriculum became unimportant as the team progressed with the environmental service-learning unit. The teachers ultimately demonstrated that they felt that when students experienced emotions and reactions resulting from exposure to environmentally ‘hot topics’ such as development, a different type of learning emerged which contrasted with what was commonly expected in their classrooms, through mandated curriculum and testing. Grades and measured progress toward mandated content knowledge became unimportant. However, though environmental service-learning was enthusiastically embraced as a method for engaging students in their learning, the forces of standardized curriculum and high stakes testing caused the teachers to scale back their plans when it became time for the ‘rubber to hit the road.’
Service-learning. Service-learning is an instructional pedagogy with the underlying theory that students learn and develop knowledge through active participation (Boston, 1997) in experiences that meet actual needs of the community. Service-learning works best in middle schools when conceptualized as an interdisciplinary model (Jackson & Davis, 2000) and needs to include a collaboration component so students can connect the school, themselves, and their community through real issues. The interdisciplinary team of this study planned for their students to collaborate with several organizations to learn more about environmental issues so that they could eventually educate the community on the issues of over-development and pollution. However, the best of plans fell to several of the realities identified by Lofgran (2004) with regard to factors that hinder service-learning implementation. The teachers attempted service-learning in a school where no one else was practicing the pedagogy, one of the factors that Lofgran (2004) indicated was a significant barrier to success. Teachers need to have a support system to fall back upon for ideas and the encouragement to continue. The team also attempted planning the service-learning without enough time on the front end to prepare themselves for the various components that would take place during the planned period of implementation. Had they been able to complete the service-learning, they would have demonstrated a functional approach (Boyle-Baise, 1999), to pedagogy where students plan, act, and reflect on their own actions. If the students had implemented the service-learning component of the planned environmental service-learning unit, it is likely that the teachers would have felt good about having a part in ‘saving the environment,’ a characteristic of functional service-learning.

Place-based education. Gruenewald (2002) and Ward & Wolf-Wendel (2000) emphasized the importance of developing a sense of place in middle school students to improve engagement and learning. Gruenewald noted that, “humans and nature are inextricably connected
and that our educational policies, structures, practices, theories, traditions, and academic journals continue to operate as if that were not the case (2005, p. 206).” Gruenewald (2002) and Hass & Nachtigal (1998) theorized that education is homogenizing the populace, ignoring the importance of local community, ecology, and culture. The environmental service-learning unit emphasized that students can make connections with their local community through environmental issues. Once the students saw themselves connected to their community and the impact of economic development on the local environment, teachers aimed to challenge them to act on their own situations (Sobel, 1996) through role playing with the city planner. When the students experienced their education in ways that connected them to their community and local ecosystem, they became motivated in new ways.

The environmental service-learning unit created an atmosphere that conflicted with the dominant culture of the middle school: accountability, standards, and testing. The teachers experienced the tensions noted by Gruenewald, “unlearning much of what dominant culture and schooling teaches and learning more socially just and ecological sustainable ways of being in the world (p. 9, Gruenewald, 2003).” The teachers felt the pressures of entrenchment in traditional educational pedagogies and homogenization, a by-product of state standards and high stakes testing. The effect of these tensions was less emphasis on environmental service-learning and place-based education than the teachers initially intended to pursue.

Teacher beliefs. The concept of teacher belief was used to frame this study in order to understand better why each teacher acted the way he or she did during the planning and negotiating of the environmental service-learning curriculum, and to make sense of these actions in relation to beliefs. Although this study was not intended to investigate the complex dialectical relationship between teacher beliefs and actions, tension was obvious during this study. As the
planning progressed, tensions surfaced for each teacher as he/she struggled with the desire to do what was believed best for students while striving to ensure academic expectations were met. All four teachers started the planning effort enthusiastic about using interdisciplinary environmental service-learning curriculum to make learning more relevant and engaging.

Conceptual Model

This section describes the conceptual model developed to represent how the team planned, negotiated, and implemented environmental service-learning, taking into account their beliefs regarding the pedagogy and evaluation of student learning. As a case study, the results speak to the specific phenomenon investigated. The researcher did not attempt to make generalizations about the planning, negotiating, and implementing processes for application to other interdisciplinary teams. However, the results of the study may be used to frame future efforts for studying interdisciplinary teams of teachers attempting environmental service-learning.

The interdisciplinary team set out to plan, negotiate, and implement the environmental service-learning unit using a simple model of what can be described as equal input and equitable participation. The teachers did not specifically state they were going to use this model; this approach was inherently assumed because the teachers had been together for five years, attended the same environmental service-learning training, and had been recognized for their achievements as a team. There were no discussions during the first two planning meetings of outside factors that might slow or alter the execution of the environmental service-learning unit. The team reflected an air of confidence with respect to its ability to integrate environmental service-learning into academic classes, help students develop an understanding of mandated curriculum, and fulfill their beliefs regarding appropriate pedagogy. The team did not seem
concerned about additional duties, faculty meetings, parent conferences, or absences that might potentially affect their efforts. The conceptual model presented at the end of this section attempts to explain the reasons for the inequities and the interactions that ultimately impacted the planning, negotiating, and implementing of the environmental service-learning unit. First, the positive and negative influences on the team and the tensions within each teacher are summarized to establish the reasoning behind the model eventually presented.

**Tensions on the Team**

The cross-case analysis revealed six tensions that created both positive and negative influences on the team and impacted the planning, negotiating, and implementing of the environmental service-learning in a manner different than originally intended. The tensions identified as a part of this conceptual model are: the influence of beliefs; pressures of accountability; collaboration; interpersonal skills, responsibilities beyond the classroom, and elements present. Each tension is summarized in this section. This study did not seek to quantify the level of impact for each, although an estimation of its relative positive or negative influence is used to explain the dynamics that influenced the phenomenon of an interdisciplinary team of teachers carrying out the environmental service-learning curriculum at a given place and time.

**Influence of beliefs.** The consistency of teacher beliefs regarding environmental service-learning can make or break an interdisciplinary curriculum effort. This team of teachers had a very similar set of beliefs regarding environmental service-learning. They believed that environmental service-learning was good for middle grade students, covered mandated curriculum, and began to create a sense of place within their students. Since all four teachers held similar beliefs, discussing and negotiating curriculum was easier than if their beliefs were
divergent. However, it is worth noting that the teachers did not share their personal beliefs with teammates to develop a mutual understanding of each other’s perspectives; each contributed to the unit based on his/her own ideas, creating tensions that could have been avoided. Positive and negative tensions are identified later to provide insights into the conceptual model presented later.

* Pedagogy for creating sense of place – Positive tension. Early in the process, the teachers established that they wanted the students to build a sense of place with their community. Two teachers said they wanted their students to ‘feel a part of’ the community. The teachers felt that if students could experience a sense of place, they would develop the desire to participate in environmental service-learning. Ultimately, all four teachers saw a sense of place as a method for motivating students and creating positive attitudes and collaboration with respect to implementing environmental service-learning.

* Covering mandated curriculum – Initially positive but became a negative tension. The teachers started the study believing and acting as though the interdisciplinary environmental service-learning effort would cover mandated curriculum such that students would learn what they needed for the high stakes and nine week tests scheduled after the unit completion. As planning progressed, a combination of the mandated scope and sequence not matching the teachers’ environmental service-learning plans, pressures of the upcoming nine weeks exams and high stakes tests, combined with a lack of confidence that the interdisciplinary unit would adequately prepare the students created tensions that significantly contributed to the ‘downfall’ of the environmental service-learning unit.

* Good for middle grade students – Positive tension. The teachers believed environmental service-learning was good for middle schoolers. Their enthusiasm for carrying out
the unit demonstrated this belief. It became obvious they were not going to conduct the environmental service-learning as planned. Nevertheless, their initial beliefs were upheld, especially in terms of ‘at risk’ students; they continued to focus on specific low achieving students when they discussed their evaluation of the environmental service-learning effort.

**Pressures of Accountability**

The pressures of accountability were an apparent thread throughout this study. The need to cover mandated content as directed by a school-wide scope and sequence caused the teachers distress when the reality of conceptualizing the environmental service-learning into an action model came nearer to reality. This section describes how the content, sequencing, and testing caused negative tensions with respect to how the teachers conceptualized their environmental service-learning model.

* Mandated curriculum – Negative tension. All four teachers started the planning phase saying they could cover mandated curriculum through the environmental service-learning unit. None of the teachers demonstrated the comfort or ability to do so, and reverted to the methods they historically had used for covering the mandated curriculum scheduled for the time of the environmental service-learning unit. All four teachers emphasized many times during planning meetings the need to cover the mandated curriculum for the high stakes tests. Environmental service-learning slipped from its idealized role as an integrated part of academic classes to an afterthought, if included at all. The environmental service-learning unit was ultimately implemented during the remediation/enrichment period, not the academic classes as originally planned.

* Mandated sequencing – Negative tension. The school’s sequencing of curriculum created a significant negative impact on the environmental service-learning unit. Initially, the
teachers stated they understood the sequencing and could make the environmental service-learning unit fit the mandated curriculum sequence. However, as time progressed, the nine-week exams were approaching and material had to be covered as scheduled so that students would perform well.

* High stakes tests – Negative tension. The two high stakes tests for the seventh graders weighed heavily on the teachers. Many times during the study, when it appeared the environmental service-learning may become a reality, the teachers back-pedaled and returned their focus on preparing the students for the tests. Though the teachers said they could cover mandated content through the interdisciplinary unit, they had not internalized the belief such that the negative tension caused them to retreat from fully carrying out environmental service-learning.

Collaboration

The willingness to collaborate among themselves and beyond the interdisciplinary team affected how the environmental service-learning unit was planned, negotiated, and implemented. The teachers were willing to work with each other to plan and carry out the environmental service-learning unit. The team reached out and collaborated with individuals within the school and local community, filling gaps in expertise.

* Within the team – Positive tension. The team worked well together and helped each other, supplementing knowledge and skills nicely. They understood how each of their classes fit into the ‘big picture’ of the interdisciplinary unit.

* Within the school – Positive tension. The team planned to have the media center specialist help students research demographic information, the reading/writing specialist teach the students how to put together a research report, and the information technology specialist help
organize computer lab sessions so students could research their topics. However, the team did not use these collaborators because of the last minutes changes to their plan.

* Within the community – Positive tension. The team collaborated with the county Clean and Beautiful organization in creating the focus question for the unit and the city planner to provide an audience for the students’ efforts. The students responded very well to the planner’s two presentations and this most likely made the unit a success in the teachers’ eyes. All the teachers noted how well specific students presented their cases to the planner for the culminating activity. The city planner was a star in the team’s effort to carry out the environmental service-learning as their focus waned internally.

**Interpersonal Skills**

The process of negotiating the interdisciplinary environmental service-learning curriculum was dependent on the communication skills of the teachers. They were willing to listen to each other, respect shared ideas, and process information toward the common goals of the environmental service-learning unit. However, the strength of personalities among team members was not equal and was evident when the team planned and negotiated the unit. Thomas attempted to limit his role as the designated team leader for the administration so as not to impact the planning of the unit. However, it became obvious that he was the leader of the environmental service-learning effort because of his passion for the environment and expertise with science issues and local community. The others deferred to his influence often. How the team was able to negotiate and the role of their personalities in the process is described below.

* Ability to negotiate – Positive tension. The teachers seemed to know what they wanted for themselves and students, including what they would give up as the planning and negotiation progressed. Their prior experiences with various forms of environmental service-learning
seemed to create for them an implicit understanding of how they could contribute to the effort, thus, negotiation was very straightforward. When one teacher asked another if they could do an activity regarding the environmental service-learning, the other seemed to understand what would be expected of them without having to ask for clarification or help. Also, if one of the teachers did not feel they could do a task, they would say so directly, but continue the discussion to possibly modify the request so they could work it into their plans. There were no cases where the teachers responded “no” on a request or idea without further discussion. The teachers were willing to negotiate and work toward consensus with each other.

* Personalities and Interests – Positive, then negative tension. All four teachers were outgoing and leaders within the school. They were personable and cooperative. They were also interested in the environment and related issues, but to varying degrees. Therefore, the teachers began the environmental service-learning effort supportive and enthusiastic, but as time progressed, their differing levels of interests in the environment, combined with their strong personalities for ultimately doing what they felt right, rather than what someone else told them to do dominated, and environmental service-learning was ultimately impacted in a negative way.

Responsibilities Beyond the Classroom

The teachers had many responsibilities beyond their classrooms. Some responsibilities were simply time commitments, such as required faculty meetings, staff development, curriculum, and student support team discussions. All four teachers held positions of leadership, such as grade level chair, curriculum chairs, and teacher representatives to leadership councils which required preparation. Responsibilities beyond the classroom required expenditure of time and energy, reducing what each teacher was capable of giving to the planning and implementing of the environmental service-learning unit. It was apparent several times that meetings and
responsibilities beyond the classroom took priority, resulting in a collective sense that environmental service-learning was lowest on the priority ladder and creating a perception of lesser importance for the interdisciplinary unit. Each responsibility beyond the classroom is discussed below in terms of how it negatively affected the execution of the environmental service-learning unit.

* Required meetings – Negative tensions. Faculty, student support team, curriculum, and staff development meetings are a normal part of a teacher’s schedule and should not have created negative tensions for this team. However, the number and timing of the meetings seemed to impact the teachers’ rhythm for progressing with the unit. Several cases were noted in the cross-case analysis where unit planning sessions were scheduled around the required meetings, often resulting in more than a week between discussions of environmental service-learning.

* Parent/teacher conferences – Negative tension. The coincidence of timing for required parent/teacher conferences and the environmental service-learning unit was not anticipated. In and of itself, the conferences might not have affected the environmental service-learning effort significantly. However, combined with the other responsibilities beyond the classroom, the additional duty drained energy the teachers had for the environmental service-learning unit. Upwards of 60 conferences were scheduled, each requiring only a small amount of preparation but cumulatively, requiring a significant amount of time. Also, parent ‘no shows’ and rescheduling impacted environmental service-learning planning meetings, as noted in the cross-case analysis.

* Positions of leadership – Positive and negative tension. All four teachers held positions of leadership within the school. In a positive way, their roles motivated them to complete the environmental service-learning, setting an example by accomplishing the unit. However, the
extra time and effort associated with preparing and conducting the meetings (as leaders, they set agendas and prepared for the meetings) created a negative impact on their environmental service-learning effort. The teachers were active within the school and took their leadership positions seriously, but the roles were ‘one more thing’ that demanded time and energy from the teachers.

*Elements Present*

Certain elements were present that affected the teachers’ ability to plan and conduct the environmental service-learning unit. This team had six elements that contributed to their ability to conduct the environmental service-learning, though not as originally intended: administrative support; cooperative team members; willingness to participate; supplemental knowledge; curricular fit; degree of influence; and stake in the environmental service-learning process. Though each element was present during the time of this study, there were inconsistencies that contributed to the reduced implementation of the unit. This section explains the elements present for the environmental service-learning effort and describes the positive or negative influence each had on the execution of the unit.

* Dedication and confidence – Positive tension. The teachers were dedicated in term of conducting the environmental service-learning unit and started out planning the unit with a great deal of confidence. Their experience with many forms of environmental service-learning from prior years and dedication to the students made the difference in terms of actually conducting the unit. When the teachers realized they had only fourteen days before the administration’s imposed deadline, their dedication and confidence made the difference by assuring that some form of environmental service-learning would take place.

* Flexibility and cooperative spirit - Positive tension. All the teachers said they were willing to participate fully but when the time came to implement the unit in their academic
classes, each conducted less than originally voiced. The teachers began the process of planning the unit appearing to be fully flexible and cooperative. However, as time progressed, each shifted in his/her degree of flexibility and cooperativeness such that environmental service-learning was not conducted in the academic classes nearly as originally intended, but still was implemented.

* Willingness to participate – Positive, then negative tension. The teachers recognized and planned interdisciplinary connections with their science, language arts, and social studies classes, such as research and report writing, however, most of these never occurred. The degree of participation of each teacher was assumed equal going into the environmental service-learning effort but it was quickly clear that Thomas’ ideas were dominant with regard to what should be included in the unit. Similar to Lofgran’s (2004) research, the willingness of teachers to participate also fell victim to their personal characteristics, available planning times, and the pressures of high stakes tests.

* Administrative support – Positive tension. The administration verbalized their support of the interdisciplinary environmental service-learning effort, recognizing the benefits of such units for middle school students. Permitting the team to use the remediation/enrichment period was a significant indication of support, because the administration was very protective of time. Teachers were not allowed to do any lessons that did not directly involve math or language arts remediation or enrichment. It took a special request and approval to use the remediation/enrichment period.

* Students – Positive tension. The students on the interdisciplinary team were lower performing than those from previous years. The teachers particularly wanted to conduct environmental service-learning with those students because they felt the approach was good for motivating and engaging at-risk students. This element was probably the single most significant
reason for initiating the environmental service-learning unit and following through when things were not progressing as planned.

Teacher Roles

The role of each teacher varied as to how the environmental service-learning unit was planned and implemented, though all were critical. The varying roles and amount of impact on the process included the degree of ‘buy in,’ curricular fit, supplemental knowledge, confidence to follow through, and influence within the team. A teacher’s degree of ‘buy in’ exemplified commitment to the unit because of a belief in its purpose. Curricular fit attempted to identify how well the teachers’ mandated curriculum fit with plans for environmental service-learning and was thus associated with the perceived level of difficulty with respect to implementation. Supplemental knowledge regarding environmental topics and issues impacted teachers’ confidence in terms of working with students, and by extension, their willingness to participate in such discussions. The positive and negative tensions acting upon each other resulted in an implementation quite different than originally envisioned. The imbalances associated with team members’ roles contributed to the surfacing of some negative tensions, particularly related to issues of commitment and control.

The full execution of the interdisciplinary curriculum was a combination of each teacher’s belief regarding environmental service-learning, his/her ideas for evaluating student learning, positive and negative influences on the team, and the tensions within each person. The previous section details the positive and negative influences on the team and tensions within the teachers. This section conceptualizes the process of planning and implementing the environmental service-learning in this study.
In general, the team followed an accepted pattern of planning by starting “big” and narrowing down to what can realistically be accomplished (Jacobs, 1995). The team began with more activities than they could realistically accomplish and began to narrow their plans as they considered what might realistically be possible. Their beliefs regarding environmental service-learning and views of student learning, combined with the positive and negative influences and tensions of the school environment constrained their initial ideas. Figure 6 illustrates the nature of the planning process. In an ideal world, the conical reduction from left to right would illustrate how an interdisciplinary team might start by identifying all possibilities for a unit and then narrow the scope of planning such that what is actually implemented becomes a subset of what was originally planned. In this study, the interdisciplinary team ‘broke down’ and did not smoothly transition to implementation but rather made significant changes to their original plans.

![Diagram](Plan big (Identify all ideas) | Plan down (What is realistically possible) | Actually implemented)

**Figure 1.** Planning and implementation of environmental service-learning for the interdisciplinary team of this study

(indicated by lightning bolts before implementation). The ‘breakdown’ area represents the effect of negative influences and tensions that disrupted plans AND the positive influences and tensions for continuing with the environmental service-learning in the face of the negative forces. The fact that the team conducted any form of environmental service-learning (even dropping the
service-learning component) is testimony that the positive influences outweighed the negative forces on the team.

Epilogue

This study was about four teachers who wanted to do environmental service-learning. They had attended the same environmental service-learning professional development and had conducted various forms of environmental service-learning over their many years together. Each year, they conducted different degrees of environmental service-learning; however, this study depicted their first truly coordinated effort to plan, implement, and evaluate environmental service-learning. The study depicted a team that wanted to conduct environmental service-learning because they believed it was good for middle schools students but was unable to pull everything off as desired. The environmental service-learning effort was like a sinking ship that was salvaged at the last minute. Luckily, the team believed that any environmental service-learning was better than none and conducted what they could. Without these strongly entrenched beliefs, they would have abandoned the effort totally, in light of the pressures and other influences identified in this study. At their February 22nd meeting, the teachers agreed to put off the service-learning components until after the April testing season but it did not happen then either. As a middle school teacher for fourteen years, I may venture to say that this case is more typical than many would want to believe. Teachers ‘know’ what is best for students but the realities of their situations too often reduce teaching to ‘what they can pull off.’

The interdisciplinary team split up in the year that followed this study. Catherine transferred to another middle school, citing ‘time for a change’ as the reason. Margaret, Lisa, and myself talked about doing environmental service-learning the following year, introducing the new teammate to the pedagogy. The school was successful in achieving annual yearly progress
(AYP) and the plan was to wait until after all the high stakes testing in April to start environmental service-learning - but it never happened. Each teacher taught their subjects in isolation with no interdisciplinary connections to speak of. Lisa received her National Board certification the following fall of 2005. Later that school year she decided that she wanted to work closer to home and in a different demographic area. She moved on to teach sixth grade gifted math in a high performing school within the system. Margaret decided at the end of the 2005 - 2006 school year that she needed a ‘big change.’ She quit teaching to work with her husband in his business. Her case makes me wonder how education will retain good teachers, not just because of the many pressures teachers feel doing their jobs but maybe more so because of today’s work culture where many people change careers every seven to ten years. After many years of teaching and having changed careers myself three times, I understand the need for change as a reality. The days of anyone staying in a career for thirty years are long gone.

The dissertation is completed and I have three new interdisciplinary team teachers. They have expressed an interest in environmental service-learning so the plan is to pursue the pedagogy as best we can in Rollander Middle School. The high stakes tests continue in the spring, but the school is back on the State Department of Education’s “Not Met AYP” list. I wonder how my new teammates will plan and implement interdisciplinary units in the middle school in light of not meeting AYP.
REFERENCES


Toepfer, C. F., Jr. (1997). Middle level curriculum: Defining the elusive. In T. S. Dickerson & T. O. Erb (Eds.), *We gain more than we give: Teaming in middle schools* (pp. 63-71). Columbus, OH: National Middle School Association.


APPENDIX A

INITIAL CRITICAL AUTOBIOGRAPHY
Initial Critical Autobiography

How does an interdisciplinary team of middle grades teachers negotiate environmental service-learning curriculum?

Name of participant: __________________________ Date: ____________

This writing activity is intended to get you to look at yourself and be critical concerning your involvement with environmental service-learning. The following prompts are provided to help get you going but please feel free to expand on them OR write anything else that comes to mind. Please be honest and thorough, nothing will be shared with the others without your permission. As you write, if you start to get stuck, just keep ‘rambling’ and you will probably come back to responding to the prompts. DO NOT worry about grammar, usage, or mechanics in your writing. Use either a separate sheet of paper or I can provide you with the word FILE so you can type your responses.

1. Describe your previous career and the influences that lead you to go into teaching.

2. What daily factors (schedules, home life, administration requirements, mandated tasks, etc) influence you, as a teacher, and your teaching methods?

3. In what ways have socio-cultural factors (political, economic, religious, etc.) influenced your beliefs about teaching?

4. What do you think teaching should be, do, and/or accomplish for children?

5. What are the qualities of an effective teacher that you exhibit or practice? Which do you think you are strong and which do you need to work on?

6. What makes for a successful team of teachers? Which do think this team has or lacks?

7. Why do you want to do environmental service-learning?

8. What is your definition of success for environmental service-learning?

9. How do you define “learning?” How will you know that students have learned as a result of participating in environmental service-learning activities?

10. What kind of ‘things’ do you think you have that are necessary before attempting interdisciplinary units, such as environmental service-learning?

11. What are your goals for environmental service-learning?
APPENDIX B

MIDWAY – FOCUS GROUP GUIDING QUESTIONS
Midway Focus Group Guiding Questions

How does an interdisciplinary team of middle grades teachers negotiate environmental service-learning curriculum?

Each interdisciplinary team member was be given a copy of this prompt sheet to help guide the focus group. It was intended to help facilitate discussion but NOT limit discussion. Any member of the interdisciplinary team was encouraged to add thoughts and ideas anywhere during the discussion.

1. Is the implementation of the environmental service-learning unit going as planned, individually and across the team as a whole?

2. What indicators of success for the students are the teachers seeing? Are these as expected or more/less than expected at this point of the implementation? (Give examples)

3. What is going exceptionally well for you and or the other teachers? For the students? Why? (Give examples)

4. What is not going well for you and/or as a team? For the students? Why? (Give examples)

5. Is there anything that needs to be changed, as a team effort
APPENDIX C

FINAL – FOCUS GROUP GUIDING QUESTIONS
Final Focus Group Guiding Questions

How does an interdisciplinary team of middle grades teachers negotiate environmental service-learning curriculum?

*Each interdisciplinary team member was be given a copy of this prompt sheet to help guide the focus group. It was intended to help facilitate discussion but NOT limit discussion. Any member of the interdisciplinary team was encouraged to add thoughts and ideas anywhere during the discussion.*

1. Where you “successful” (do you all agree what determines success?) in conducting the environmental service-learning unit? How do you know that you were successful?

2. What went exceptionally well for you, as teachers? For the students? Why? (Give examples)

3. What did not go well for you, as teachers? For the students? Why? (Give examples)

4. What will you do again, as a team, when you conduct environmental service-learning units in the future? Why?

5. What will you not do again, as a team, when you conduct environmental service-learning in the future? Why?
APPENDIX D

FINAL WRITTEN REFLECTION PROMPTS
Final Written Reflection Prompts

How does an interdisciplinary team of middle grades teachers negotiate environmental service-learning curriculum?

Name of participant:______________________ Date:___________

There are two parts to this closing reflection. The first is reflecting on your efforts with the environmental service-learning unit. The second part is reflecting on the interdisciplinary team’s effort with the environmental service-learning unit. As with the initial critical autobiography, please write your responses to the following guiding questions. Feel free to write about other topics and reflections that come to mind as you respond. DO NOT worry about grammar, usage, or mechanics in your writing. Use either a separate sheet of paper or I can provide you with the word FILE so you can type your responses.

Critique of self effort:

1. What do you believe went exceptionally well for your part of the environmental service-learning unit? Why do you think this?

2. What do you believe that you did not do well for your part of the environmental service-learning unit? Why do you think this?

3. Do you think students were somewhat, moderately, or mostly successful with your components of the environmental service-learning unit? How do you determine this?

4. What will you do differently next time you participate in an interdisciplinary team environmental service-learning unit? Why?

Critique of interdisciplinary team effort:

1. What do you believe went exceptionally well for the team of teachers in this environmental service-learning unit? Why do you think this?

2. What do you believe that you did not do well for the team of teachers of the environmental service-learning unit? Why do you think this?

3. Do you think students (as a whole team) were somewhat, moderately, or mostly successful with the environmental service-learning unit? How do you determine this?

4. What do you think the interdisciplinary team should do differently next time they participate in an interdisciplinary team environmental service-learning unit? Why?
APPENDIX E

WEEKLY JOURNAL PROMPTS
Weekly Journal Prompts

How does an interdisciplinary team of middle grades teachers negotiate environmental service-learning curriculum?

Name of participant:______________________ Date:___________

Please use the following prompts to help guide your reflection on your progress implementing environmental service-learning. Feel free to expand or modify your writing to reflect on this week’s environmental service-learning effort.

1. What went exceptionally well this week with your plans and implementation of environmental service-learning? Why do you think it went so well?

2. Did you see student learning with the environmental service-learning in your class? With all the students or only a few? Please explain.

3. What did not go as planned this week? Why not? How did you respond?

4. Next time you this part of the environmental service-learning unit, what will you do the same? Why?

5. Next time you this part of the environmental service-learning unit, what will you do differently? Why?
APPENDIX F

CONSENT FORM
Consent Form

I, _________________________________, agree to participate in a research study titled "How an interdisciplinary middle school team negotiates environmental service-learning curriculum" conducted by Timothy M. Mullen, a doctoral candidate at the University of Georgia in Middle Grades Education working on doctoral dissertation at the University of Georgia under the direction of Dr. Deborah Tippins, Department of Education (Middle Grades), University of Georgia (706-542-4244). I understand that my participation is voluntary. I can stop taking part without giving any reason, and without penalty. I can ask to have all of the information about me returned to me, removed from the research records, or destroyed.

The reason for this study is to identify characteristics and what happens within an interdisciplinary team of four middle school teachers when negotiating and implementing environmental service program for their students.

If I volunteer to take part in this study, I will be asked to

1. Complete a written critical autobiography about my background and beliefs about teaching and environmental service-learning, then be interviewed by the researcher to clarify my responses, at the beginning (approximately one hour) of the research and at the end (approximately one hour);

2. Keep a reflective journal with my thoughts and ideas as I participate in the environmental service-learning unit (approximately 30 minutes per week, for 6 weeks);

3. Participate and allow the researcher to record our weekly team focus meetings during the environmental service-learning unit to discuss how we are planning, negotiating, and implementing the environmental service-learning unit (approximately 45 minutes per week) and I agree to permit the researcher to use the minutes/notes for the researcher’s dissertation;

4. Provide copies of lesson plans that I develop as a part of the environmental service-learning unit;

5. Participate in two group sessions (midway and final) to reflect on how my team mates and I plan, negotiate, and implement the environmental service-learning curriculum. Each meeting will take approximately 1 hour. My responses will be recorded and transcribed for use by the researcher. Audio tapes will be erased no later than August 31, 2005.

If I choose to participate, I may use any information that I learn from the study to improve my teaching. The researcher has explained that there should be no discomforts or risks.

No information about me will be shared with others without my written permission, except if it is necessary to protect my welfare or if required by law. I will be assigned an alias name in the transcripts and any reports that might come out of the research.
The researcher may keep and use copies of materials I provide and transcripts of recorded meetings for future reference and research efforts that he might become involved. YES/NO Initials: _____

The investigator will answer any further questions about the research, now or during the course of the project (770-962-0883).

I understand that I am agreeing by my signature on this form to take part in this research project and understand that I will receive a signed copy of this consent form for my records.

Timothy M. Mullen ___________________________  __________

Researcher     Signature     Date

Telephone:  770-962-0883 (Home) 770-995-7133 (Work) email: timmmullen@aol.com

_________________________  _______________________  __________

Name of Participant   Signature    Date

Please sign both copies, keep one and return one to the researcher. Additional questions or problems regarding your rights as a research participant should be addressed to Chris A. Joseph, Ph.D. Human Subjects Office, University of Georgia, 606A Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu

November 15, 2004
APPENDIX G

ORIGINAL ENVIRONMENTAL SERVICE-LEARNING PLAN

APPROVED BY THE PRINCIPAL
(Email)

Date: February 1, 2005
From: Karren (AP for curriculum)
To: Thomas

Subject: Re: Use of remediation/enrichment time

I checked with Jane – this is fine by us.

You will be finished in time to participate in the ‘high stakes test’ review – right?

----------------------------------------------------------------------------------------------------------------------------------

(Email)

Date: February 1, 2005
From: Thomas
To: Karren and Jane (Principal)
c: Lisa, Margaret, Catherine, Albert (7th AP)

Subject: Re: Use of remediation/enrichment time

Jane and Karren:

When I asked for approval in December to use some of the remediation/enrichment time to carry out our environmental service-learning unit, you asked me for more information (see email below). We have met several times and compiled a plan for how we will do the unit and identified how we want to use the remediation/enrichment time. We would like to use the remediation/enrichment periods in February and March for the environmental service-learning.

In math enrichment, I would use some of the time (3 or 4 times per week) and do enriched math analysis on data collected in social studies and science classes for the project. Lisa (math remediation) would use one or two periods per week, once the basic math remediation is covered adequately.

In Language arts, Catherine (remediation) would use one or two days per week, once the basic language arts is covered. Margaret (LA enrichment) would work with the students to develop their synthesis and presentation (oral, written, and other) skills using the data collected in social studies and science.

For detailed objectives to be covered and a description of what we have planned for each of our academics, please see the attached plan for environmental service-learning.
What do you think? OK to use remediation/enrichment time?

Thomas
Date: December 3, 2004  
From: Karren  
To: Thomas  
Subject: Re: Use of remediation/enrichment time  

Jane asked that I get a synopsis of activities to be done during the remediation/enrichment time and the objectives it covers. I will also need to know how long the instructional unit will last. I talked to Jane yesterday and we will follow up shortly.

Date: November 28, 2004  
From: Thomas  
To: Karren (AP curriculum), Jane (Principal)  
Cc: Albert (7th AP)  
Subject: Use of remediation/enrichment time  

Jane and Karren:  
I talked to you, Karren, about possibly using remediation/enrichment time for the interdisciplinary unit about a month ago. Looks like we can do in January. I do not want to use all the remediation/enrichment time, just some. The theme is: Should developers be allowed to developing shopping center and housing along Breadloaf Parkway like they have been? Factoring in everything that needs to be considered (mandated curriculum, high stakes tests, engaging curriculum for students, middle school concept teaming and learning, etc) it should be interesting.

I want to confirm that we can use the remediation/enrichemtn time, if needed. We will also juggle our academic classes to cover what we need AND do the interdisciplinary unit. We do not know exactly how much yet but just want to be sure that it is an option. It may work that the enrichment classes do more than the remediation or visa versa because remedial kids benefit more if the curriculum is engaging.

Thank you

Thomas
Focus Question: Why should ‘they’ continue to be allowed to develop subdivisions and shopping centers along Sugarloaf Parkway as they have the last five years?

Clarifying focus questions: Who are ‘they’? Who lets them continue to develop? Support your response using available data AND/OR develop ways to collect the data you need to make an informed response.

Integration and implantation of the environmental service-learning

Most of the instruction and activities planned for the environmental service-learning unit will be conducted in each of our academic periods. Continuous Quality Instruction (CQI) time will be used on a limited basis. Amount of CQI time used will also depend on whether the CQI is for remediation or enrichment. Remedial CQI time will be used only once or twice per week, integrating the basic skills being reviewed that particular week. Enrichment CQI may use two to four days per week, integrating the basic skills to be cover BUT also extending the skills to challenge and push the students’ thinking.

AKS’s covered, by subject area, and possible student activities and products:

Language Arts

Objectives
- Listen to, interpret, and evaluate oral instructions, directions, and descriptions (7LA-1)
- Pre-write to generate ideas for writing (30)
- Draft, revise, and edit to improve fluency, content, organization, and style (30)
- Edit for spelling, fragments, and run on sentences (31)
- Develop clear topic with examples and details (33)
- Write to report research questions (35)
- Write paragraphs and compositions for a variety of purposes including exposition, description, narrative, and persuasive (38)
- Use available technology to assist in writing

Possible Activities and Products (students will generate their own lists and pursuits)
- Letters to government officials (Gwinnett County Commissioners, City of Lawrenceville Mayor & Council)
- Letters to the editors of Gwinnett Daily Post and Atlanta Journal Constitution Newspapers
- Pamphlets/fliers with varied target audiences
- Public service announcement video (for RMS and maybe other target audiences)
- Posters and other graphics to present ideas
- Prepare and present oral findings to government officials
- Prepare and present and technical report of their findings and conclusions regarding development in Lawrenceville/Gwinnett

Math

Objectives
- Find percent increases and decreases (7MA-4)
- Represent practical problem situations using integers (8)
- Identify and graph ordered pairs (9)
- Read and interpret box plots, stem and leaf plots, and scatter plots (21)
- Evaluate data to make predictions or draw conclusions (23)
- Use mean, mode, and median and use range to describe spread of data (25)
- Develop and use tables, graphs, and rules to describe relationships (31)
- Recognize, analyze, describe, and extend patterns involving numbers and figures (32)
- Analyze functional relationships (33)
- Compare and contrast how changes in one variable can affect another variable (34)

Possible Activities and Products
- Using multiple mathematical methods, analyze stream quality data for:
  - Relationships between water temp and oxygen levels
  - Relationship between sediment/turbidity and oxygen levels
  - Bacteria levels and water temps
  - Identify source(s) of pollution (Bacteria/coliforms & pH changes based on data and map

Social Studies

Objectives
- Use map symbols and keys to acquire information (7SS-4)
- Draw conclusions and make generalizations based on information from maps(6)
- Identify issues, and/or problems related to a specific region studied (7)
- Identify reference resources to use for a specific purpose (9)
- Read for main idea, detail, sequence of events, and cause effect relationships in social studies context (10)
- Construct and interpret graphs, diagrams, charts, tables, and timelines (11)
- Distinguish between fact and opinion in a social studies context (15)
- Analyze interpretations of the same event from multiple types of sources (16)
- Draw conclusions and make generalizations (17)
- Describe the role that location and physical characteristics play in the social and economic development of an area (26)
- Describe how the natural resources of an area influence development and interaction with the world economic community (27)

Possible Activities and Products
- Read and analyze aerial photos of Lawrenceville
- Read and analyze topographic, planning/zoning, and other maps of Lawrenceville and Gwinnett
- Collect socio-economic data from multiple sources for Gwinnett and the City of Lawrenceville for analysis
- Identify, analyze, and synthesize positive and negative impacts to socio-economic factors for short and long term timeframes
- Synthesize and present conclusions concerning development based on socio-economic and environmental data
- Debate the pros/cons of continued development in Lawrenceville/Gwinnett

Science

Objectives
- Draw conclusions and/or design a new scientific investigation based on a prior investigation (7SC-2)
- Communicate scientific procedures, instructions, and explanations (3)
- Question claims made without evidence or based on small or biased samples (4)
- Use appropriate scientific tools and technologies to gather, analyze, and interpret data (6)
- Describe how the physical factors of a biome affect organisms (12)
- Describe how changes in environmental conditions can effect the survival of individuals and species (14)

Possible Activities and Products
- Collect biotic and abiotic data from multiple sources for use in developing (such as - stream data for Dissolved oxygen, pH, turbidity, temperature, and coliforms)
- Identify, analyze, and synthesize positive and negative impacts to biotic and abiotic factors for short and long term timeframes
- Synthesize and present conclusions concerning development based on environmental data
- Recommend other data and/or improvements to existing data collection schemes
- Develop positive and negative environmental impacts (Abiotic and Biotic factors)

===================================================================== 

Why we (Team 7C and ALL Middle School Interdisciplinary Teams) must do Environmental Service-learning as Interdisciplinary Curriculum

Environmental education

Saul (2000) proposes that teachers expand their use of environmental education methods by first understanding misconceptions held by people involved in the field. Teachers of environmental education must be conscious of how people perceive the world based on their cultural contexts. In order to overcome this, they must understand the constructivist premise that
the learner actively constructs knowledge (Klein & Merritt, 1994). Learning is an adaptive process that develops as one has new experiences. Environmental education models must include critical thinking skills where students synthesize their experience within their own cultural context (Klein & Merritt, 1994). According to these authors, environmental education is different than traditional learning methods in that it seeks to have students position themselves with respect to one side of an issue; the emphasis is on developing an understanding of the many facets of an issue or problem. For example, studying possible environmental impacts of a proposed construction project requires that the student understand the physical, biological, and the social-economic aspects of the issue. There will be immediate social, economic, and environmental issues resulting from the project and some that will linger for many years after it is completed.

Saul (2000), Dennis & Knapp (1999), and Sanger (1997) emphasize the common theme that environmental education needs to be relevant and realistic for students. Most educational theory and curriculum courses tell pre-service and in-service teachers to make learning “real.” After reading these perspectives and reflecting on my own teaching methods, I wonder why we still need to be told this simple, well known, and accepted theory of practice. What inertia continues to influence our teaching methods to not practice this idea in teaching?

**Service-learning:**

Service-learning is also described as a method “under which students learn and develop through active participation in thoughtfully organized service experiences that meet actual community needs and that are coordinated in collaboration with the school and community” (Meyers, 1999). The National and Community Service Act of 1990, as amended through P.L. 106-170, approved December 17, 1999, defines “service-learning” as a method –

A. under which students or participants learn and develop through active participation in thoughtful organized service that

(i) is conducted in and meet the needs of the community;
(ii) is coordinated with an elementary school, secondary school, institution of higher learning, or community service program, and with the community; and
(iii) helps foster civic responsibility; and

(B) that –

(i) is integrated into and enhances the academic curriculum of the students, or the educational components of the community service program in which the participants are enrolled; and

(ii) provides structured time for the students or participants to reflect on the service experience (National and Community Service Act of 1990, p.5).

**Interdisciplinary Curriculum**

Jacobs (1991) defines interdisciplinary as “a knowledge view and curriculum approach that consciously applies methodology and language from more than one discipline to examine a central theme, issue, problem, topic, or experience (p. 8).” According to Jacobs (1991), the interdisciplinary design addresses the concerns of teachers that must cover certain material in their class and it better meets the needs of students by showing them the connectedness of
academic subjects. Learning becomes more related to the interests of the students. Ackerman (1989) asks “could an enlightened educator really be against aiming to help students achieve a coherent view of things (p. 26)?” The willingness of the teachers to let the students pick their topics increases the engagement for many of the students.

Planning interdisciplinary curriculum

Ackerman (1989) presents a set of guidelines to use when evaluating the nature and need for interdisciplinary curriculum. He suggests that there is “intellectual criteria” for considering interdisciplinary curriculum but also “practical criteria.” Imbedded in Ackerman’s criteria is Roberts and Kellough’s (2000) belief that the curriculum must fit within the expected scope and sequence of the mandated curriculum for the school system. Some teachers use the mandated curriculum to help design the interdisciplinary curriculum. Others design the interdisciplinary curriculum, and then find which mandated curriculum is covered by the unit. Ackerman’s criteria for intellectual consideration of interdisciplinary curriculum states that it should be:

- **Valid within the discipline.** Concepts identified for inclusion “must not only be related to their subject but are important to them (p. 27).

- **Valid for the discipline.** Some concepts or skills are covered in more than one subject. Inclusion of them in an interdisciplinary unit will expose the students to the same concept or skill in multiple contexts, reinforcing that concept or skill for the student better than if only presented in one subject.

- **Valid beyond the discipline.** Though learning content and skills identified in the curriculum, it is also important for students to experience beyond the identified curriculum. Students might “also get a metaconceptual bonus – a powerful idea, a cross-cutting idea, a perspective on perspective taking, a dimension of experience – that may be of great value (p. 29).”

- **Contribution to broader outcomes.** Students should become broader thinkers because of interdisciplinary units. They will be able to analyze multiple sources of information better than if they learned concepts in isolation. Developing their own ideas and opinions of concepts and methods for learning will provide frameworks for future learning. Teachers considering interdisciplinary units should consider broad outcomes for the students that are not included in their formal curriculum.
APPENDIX H

TENTATIVE PLAN DEVELOPED AFTER PLAN SUBMITTED FOR ADMINISTRATION APPROVAL
The information contained herein are:

1. Transcribed handwritten notes by Thomas taken during the January 7 and January 21 environmental service-learning planning meetings.

2. ‘Mock’ research report format used at the January 21, 2004 planning meeting to facilitate discussions. Notes are typed in **Bold, italics, and underline** denoting decisions made during the discussions.

Outline of environmental service-learning activities
planned by the interdisciplinary team

(Activities that were planned and eventually implemented are included in appendices for the specific teacher. If an activity was planned and implemented at the last moment and not a part of this plan, it appears in the respective teacher appendix only)

Process wanting to achieve for the environmental service-learning unit

→ Provide background and understanding
  → So students can synthesize their understanding of environmental issues
  → So students can develop actions they want to pursue
  → So students can conduct actions
  → Then have students reflect on their actions

General ideas:
Research paper to connect all four academic classes
Drawings, entries to “Safe Drinking Water” poster contest held by each May
Write “Water conservation and pollution reduction” essays for annual contest
  (do as enrichment and remediation activity)
Use water pollution as theme since environmental service-learning training focused on water pollution

Specific content area contributions to environmental service-learning unit:

**Math:** Statistical analysis of biomass and biodiversity data to practice procedure
* (Lisa)
  (attached in appendix K for Lisa)
Statistical analysis of stream data
  (attached in appendix K for Lisa)
Statistics – end of January
Computer lab for graphs

**Social studies:** Data collect – demographics of city
* (Margaret)
  Plot and analyze demographic shifts
  Debate pros and cons of development as cause of population shifts
  Tag websites with good data
Language arts:  Pull research together into a research paper
  (Catherine)
  Write research paper
  Persuasive and business letter writing to local officials
  Produce, direct, and publish public service announcements concerning
  environmental issues

Science:  Create an understanding of pollution, causes/effects
  (Thomas)
  (notes of the discussion by students attached in appendix T)
  Predict short and long-term environmental impacts
  (completed matrices by students are attached in appendix T)
  Help students learn to develop position in regard to environmental issues
  and make a defense based on facts
  Water borne diseases
  Pollution
  Biodiversity – relationship between plants and animals in an area’
  Changes in biodiversity from development (long and short term)

Everyone:  Drinking water poster contest
  (remediation/enrich)
  Pollution essay contest
(Focus question for posting in everyone’s classroom)

Why should ‘they’ continue to allow development of housing subdivisions and shopping centers along Breadloaf Parkway?

Clarifying questions:

Who are ‘they’?

Who lets them continue to develop?

Support your response using data and/or develop ways to collect the data you need to make an informed response.
POSSIBLE TITLE

What I think about letting “them” continue to develop in the City of Lawton and George County the way “they” have along Breadloaf Parkway near our school

DRAFT

Mock up for research report

(used for team meeting discussions on January 21)

By:

Name
Homeroom Teacher

Name
Homeroom Teacher

Name
Homeroom Teacher

March ___, 2005
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   F. Water Quality (Along Yello River and Pew Creek)
   G. Solid Waste and Recycling
   H. Traffic (Breadloaf Parkway and High 92)

III. Predicted Impacts – Short term, 2 – 3 years, and long term, 4 or more years (if things continue the way they are) (*Thomas take lead*)
   A. Population
   B. Students in Schools
   C. Businesses
   D. Biodiversity (Plants & Animals)
   E. Air Quality
   F. Water Quality (Along Yello River and Pew Creek)
   G. Solid Waste and Recycling
   H. Traffic (Breadloaf Parkway and High 92)

IV. Study of a watershed (Pew Creek) (*Lisa take lead*)
   A. Data
   B. Data Analysis
   C. Conclusions

V. My Opinion:

VI. Based on my opinion, I will ……

VII. References
I. Introduction (Catherine and Thomas share)

A. Say why you are doing this project, in paragraph form

B Important Vocabulary:
   - Subdivision
   - Shopping center
   - Population
   - Biodiversity
   - Watershed
   - Dissolved oxygen
   - pH
   - Coliform bacteria
   - Sediment
   - OTHER VOCABULARY

II. Background Information and Future Estimates

A. Population *(Margaret take lead)*
   Are there going to be too many people?
   How do you figure what too many is?
   Who decides?

B. Students in Schools *(Margaret take lead)*
   Are there going to be too many students?
   How do you know?

C. Businesses *(Margaret take lead)*
   Is business good for the people that live here?
   Explain

D. Biodiversity (Plants & Animals) *(Thomas take lead)*
   Is a lower, or higher biodiversity better?
   How can the biodiversity be kept?

E. Air Quality *(Thomas take lead)*
   Is the air quality going to get better or worse?
   How can the air be kept clean for us to breath?
   How can the air be made cleaner?

F. Water Quality (Along Yello River and Pew Creek) *(Thomas take lead)*
   Is the water pollution to get better or worse?
   How can the water be kept clean?
   How can the water be made cleaner?
G. Solid Waste and Recycling *(Thomas take lead)*

NEED QUESTIONS

H. Traffic (Breadloaf Parkway and Highway 92)

III. Predicted Impacts – Short term, 2 – 3 years, and long term, 4 or more years (if things continue the way they are) *(Margaret and Thomas share lead)*

A. Population

B. Students in Schools

C. Businesses

D. Biodiversity (Plants & Animals)

E. Air Quality

F. Water Quality (Along Yello River and Pew Creek)

G. Solid Waste and Recycling

H. Traffic (Breadloaf Parkway and High 92)

IV. Study of a watershed *(Lisa Lead)*

A. Data

In order to see how development can affect a stream, Pew Creek was chosen to conduct chemical and bacteria sampling. Pew Creek flows by Rollander Middle School, crossing under Breadloaf loaf Parkway near the intersection of L/S Road. Pew Creek starts near THE High School and empties into the Yello River near Patty Road. A map of the watershed is below:

<p>| Location A – Near Boys and Girls Club |</p>
<table>
<thead>
<tr>
<th>Water Quality Data</th>
<th>Other Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>Dissolved Oxygen</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Dissolved Oxygen</td>
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**Location C - Breadloaf Parkway**

<table>
<thead>
<tr>
<th>Date</th>
<th>Dissolved Oxygen</th>
<th>Water Temp</th>
<th>pH</th>
<th>Coliform Bacteria</th>
<th>Sediment (Turbidity)</th>
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<th>Recent Rain?</th>
<th>Other</th>
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</table>

**Location D – Patty Road**

<table>
<thead>
<tr>
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<th>pH</th>
<th>Coliform Bacteria</th>
<th>Sediment (Turbidity)</th>
<th>Air Temp</th>
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</table>

**B. Pew Creek Data Analysis (Lisa take lead)**

The stuff Lisa does with the kids would go here
  - graphs, charts, and other stuff they come up with from math analysis

**C. Conclusions (Lisa and Thomas)**

Using the data, there will be several things that I hope the kids will see
  - Why the bacteria levels went up below the subdivisions in the summer
  - That there is more Oxygen in the water when it is colder
  - When trees cut along stream, the water gets warmer so there is less oxygen
  - Why the increase/spike in pH below Breadloaf Parkway that one day?
V. My Conclusion: *(All help students)*

Based on the information you gathered and thought about, what do you think should be done?

*(Choose one and explain why you feel this way)*

1. I think that George County and the City of Lawton should let developers continue to build subdivisions and shopping centers the way they have along Breadloaf Parkway near our school.

2. I think that George County and the City of Lawton should still let them build some subdivisions and shopping centers and do a better job of making sure that they ………

3. I think that George County and the City of Lawton should stop anymore subdivisions and shopping centers because…….

VI. What can be done and what I plan to do *(ALL help students – This is the SERVICE-LEARNING COMPONENT)*

Based on what I have learned about building subdivisions and shopping centers and what I think the government should do, we, as students, can do one or more of the following:

What can be done: Target Audience: How it could be done:

- 
- 

Based on my interests and talents, I will do the following:

What I will do: Why I chose this: How I am going to do it:

- 
- 

VII. References *(Catherine take lead)*
APPENDIX I

TEACHER PROFILE – LISA
Teacher Profile
(January 7, 2005)

Lisa
Math teacher

**Education:**
- B.A. Communication
- M.A. Math Education

**Certification:**
- State Middle Grades, 4 – 8, Math and Social Studies
- National Board of Professional Teaching Standards Early Adolescent Math – Pending
  (*redid a portion of the certification process during the environmental service-learning unit*)

**Employment history:**
- Event sales, Hotel chain
- High school Math teacher - 3 years
- Middle School (grade 7) math teacher – 8 years

**Current school responsibilities:**
- Seventh grade Math curriculum chair (eight seventh grade math teachers)
- Enrichment/remediation coordinator for seventh grade Math (14 seventh grade teachers)

**Other/non-school responsibilities and interests:**
- Tennis league – adults
- Tennis league for daughter, team captain
- Three daughters and their needs

**Personal information:**
- Age: 42
- Married: 24 years
- Three daughters, ages 22 (college), 14 (eighth grade), 9 (fourth grade)
- Husband: computer sales, travels for work
APPENDIX J

LISA – DAILY AND ACADEMIC SCOPE/SEQUENCE SCHEDULES
Lisa’s Daily Schedule

OFFICIAL teacher arrival time: 8:30 AM
(Lisa has children that limits how early she can arrive at school)
Students begin entering: 8:55 (20 min)
School begins/announcements: 9:20 (10 min)
School-wide Math/Language Arts remediation/enrichment: 9:30 to 10:20 (40 min)
(Lisa teaches Math remediation)
Student exploratory /teacher planning: 10:25 to 11:40 (75 min)
Math academic period 1: 11:45 to 12:35 (50 min)
Math academic period 2 (includes 25 minutes lunch): 12:40 to 2:05 (85 min)
Math academic period 3: 2:10 to 3:00 (50 min)
Math academic period 4: 3:05 to 4:00 (55 min)
Phase I Dismissal (last period teacher holds students as buses arrive and are called and first load exits, usually 30 of 55 total busses): 4:00 to 4:10 (10 min)
Phase II Dismissal (last period teacher stays with remaining students until buses arrive and students are called, remaining 25 of 55): 4:10 to 4:30 (20 min)
OFFICIAL end time for teachers: 4:30 PM
(Lisa has younger children that limits how late she can stay at school)

Required Math Scope and Sequence (January, February, March 2005)

Computation, estimation, numbers, and number relationships
- Add, subtract, multiply, divide, and compare rational numbers including integers
- Apply estimation strategies, including rounding, front end estimation, clustering and compatible numbers, to determine the reasonableness of results
- Apply percents to find interest, discounts, sales tax, sale price, and commission

Statistics
- Read and interpret box plots, stem and leaf plots, and scatter plots
- Collect and display data using tables and graphs with appropriate method and scale
- Read, analyze, and interpret tables and graphs
- Evaluate data to make predictions and draw conclusions
- Explore uses and abuses of statistics
- Use mean, median and mode and use range to describe the spread of data

Algebra
- Analyze functional relationships
- Compare and contrast how changes in one variable can affect another variable
- Write and evaluate algebraic expressions
- Write and solve algebraic equations and inequalities
- Graph inequalities on a number line
APPENDIX K

LISA – ENVIRONMENTAL SERVICE-LEARNING IMPLEMENTATION
Pew Creek Data Analysis Math Activity

(The activities actually implemented by the teacher are included in this appendix. Activities initially planned and itemized in appendix H are included here as well as activities developed and implemented at the last moment.)

Lisa’s environmental service-learning implementation

<table>
<thead>
<tr>
<th>Math class</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wednesday January 26</td>
<td>Use Tribal Mill biomass versus biodiversity data to practice computing mean, mode, median, range, and quartiles</td>
</tr>
<tr>
<td>Thursday January 27</td>
<td>Use Tribal Mill biomass and biodiversity data to practice identifying Relationships between the two variables</td>
</tr>
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</table>

Math Remediation class

<table>
<thead>
<tr>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wednesday February 16</td>
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<tr>
<td>Started discussions “Should they continue to allow development of shopping centers and subdivisions along Breadloaf Parkway as they have the last five years?” with watching environmental videos from the County Clean and Beautiful organization</td>
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<td>Thursday February 17</td>
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<td>Friday February 18</td>
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<tr>
<td>Monday February 21</td>
</tr>
<tr>
<td>Tuesday February 22</td>
</tr>
<tr>
<td>“Are you a Total NIMBY, partial NIMBY, or not a NIMBY?”</td>
</tr>
<tr>
<td>Wednesday February 23</td>
</tr>
</tbody>
</table>
Thursday  February 24
Students worked on NIMBY posters

Friday  February 25
Students worked on NIMBY posters

Monday  February 28
Lisa directed a discussion about the ethics of development based on a newspaper article titled, “Ethics also should be part of growth debate”

Tuesday  March 1
Students made environmental word finds (all four remediation/enrichment classes)

Wednesday  March 2
Students prepared for stream analysis

Thursday  March 3
Students analyzed and discussed stream quality data (and Lisa video taped for her National Board certification portfolio)

Friday  March 4
Culminating activity with city planner. Two parts:

1. Students presented their positions regarding to NIMBY, city planner questioned and challenged students

2. City planning meeting forum conducted, three students acted as city council members, then students presented to the council arguments for and against a proposed chicken processing plant next to school
NOTE from Thomas to Lisa

IV. Study of a watershed (Ideas developed for Lisa by Thomas)

A. Data

In order to see how development can affect a stream, Pugh Creek was chosen to conduct chemical and bacteria sampling. Pugh Creek flows by Richards Middle School, crossing under Sugarloaf Parkway near the intersection of Lawrenceville Suwanee Road. Pugh Creek starts near Central Gwinnett High School and empties into the Yellow River near Patterson Road. A map of the watershed is below:

“Events” that the students should be able to “find” in the data:

1. In the summer, the bacteria levels seem to rise just below the subdivisions and then slowly drop downstream
   (Because of pet waste from yards AND the warmer water promotes bacteria growth (the pets still dump in the winter but the cool water slows growth)

2. The water temperature suddenly increases below Breadloaf Parkway after a rain event.
   (Because the pavement of the highway warms the rain water before it flows into the stream. They should also see a drop in Oxygen at the same site because of the warmer water)

3. The pH below Patty Road increases when all the other sampling sites are the same. Why did it rise only at the one sampling point?
   (Maybe it is a fluke/mistake in the data collection or maybe there was a car accident on Patterson Road that week and the battery acid leaked into the stream. We should make them try to come up with possible explanations)

4. After a rain in summer, all the sampling locations have a slightly higher pH along the entire stream, compared to all other pH data over two years.
   (Maybe because it is summer and air pollution levels are high – we have been having smog alerts/health alerts. Maybe the air pollution is mixing with the rain and creating acids / localized acid rain)
**Analysis of Water Quality along Pew Creek**

Instructions to students:

Analysis of water Quality along Pew Creek

In order to see how development can affect a stream, Pew Creek was chosen to conduct chemical and bacteria sampling. Pew Creek flows by Rollander Middle School, crossing under Breadloaf Parkway near the intersection of Lanceville-Swan Road. Pew Creek empties into Yell Creek near Patty Road.

Using the data given, analyze the water quality by answering the following questions.

1. Where are the four locations where the water samples were collected?
   - Location A:
   - Location B:
   - Location C:
   - Location D:

2. Are there any major developments near these sites? Refer to the map if necessary.

Use your graphing calculator to make a scatter plot comparing the water temperature and colonies of bacteria found on each data of sampling. (Have each member of the group choose one location to compare and then share results). Sketch the results on the piece of construction paper.

3. What type of relationship is found at each location? (positive, negative, or no relationship). Why do you think this occurs?
4. What happens to the bacteria levels as you head downstream?
5. What happens to the water temperature along Breadloaf Parkway after a rain event? Why do you think this occurs?

Refer to you scatter plot previously drawn comparing the water temperature to the amount of dissolved oxygen in the water.

6. What type of relationship is found between the two sets of data and can this relationship be found at all sampling sites? What conclusions can you form from your results?
7. What major subdivisions are located near Johnston Road (location B)?
8. During the summer, the bacteria levels at this site increase. What could be the cause of this increase?
9. During the summer of 2004, construction began for the Super Mart store located on Lanceville-Swan Road and Breadloaf Parkway. Study the water quality data for the location C. Can you find any sudden increases or decreases in the data that could be caused by the construction? Explain your reasoning.

As a group, read the article on the debate of growth and the quality of our watershed.

10. As a future taxpayer of this county, what recommendations would your group give the planning and zoning commissions concerning future growth?
Data Collection from Pew Creek

Location A – Boys and Girls Club

<table>
<thead>
<tr>
<th>Date</th>
<th>Dissolved oxygen</th>
<th>Water temp</th>
<th>pH</th>
<th># of bacteria</th>
<th>Sediment</th>
<th>Air temperature</th>
<th>Rainfall</th>
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Location B – Johnston Road

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<td>5/5/2003</td>
<td>15</td>
<td>61</td>
<td>5.7</td>
<td>11</td>
<td>30</td>
<td>85</td>
<td>3 days ago</td>
</tr>
<tr>
<td>7/3/2003</td>
<td>9.4</td>
<td>77</td>
<td>6.1</td>
<td>29</td>
<td>0</td>
<td>97</td>
<td>None</td>
</tr>
<tr>
<td>9/10/2003</td>
<td>8.1</td>
<td>84</td>
<td>5.8</td>
<td>24</td>
<td>90</td>
<td>81</td>
<td>3”</td>
</tr>
<tr>
<td>12/26/2003</td>
<td>10.9</td>
<td>74</td>
<td>6.9</td>
<td>14</td>
<td>60</td>
<td>34</td>
<td>Light</td>
</tr>
<tr>
<td>3/10/2004</td>
<td>23.9</td>
<td>55</td>
<td>5.7</td>
<td>7</td>
<td>0</td>
<td>45</td>
<td>None</td>
</tr>
<tr>
<td>5/12/2004</td>
<td>18.1</td>
<td>68</td>
<td>5.6</td>
<td>19</td>
<td>0</td>
<td>69</td>
<td>None</td>
</tr>
<tr>
<td>7/3/2004</td>
<td>4.6</td>
<td>88</td>
<td>5.7</td>
<td>31</td>
<td>95</td>
<td>95</td>
<td>Thunderstorms</td>
</tr>
<tr>
<td>9/30/2004</td>
<td>9.8</td>
<td>69</td>
<td>6</td>
<td>38</td>
<td>0</td>
<td>82</td>
<td>None</td>
</tr>
<tr>
<td>12/5/2004</td>
<td>19.8</td>
<td>50</td>
<td>6</td>
<td>11</td>
<td>0</td>
<td>40</td>
<td>None</td>
</tr>
</tbody>
</table>
APPENDIX L

TEACHER PROFILE – MARGARET
Teacher Profile
(January 7, 2005)

Margaret
Social studies teacher

Education:
   B.A. Marketing
   M.A. Education

Certification:
   State Middle Grades, 4 – 8, Social Studies and Language Arts.
   National Board of Professional Teaching Standards Early Adolescent Soc Studies, 2003

Employment history:
   Sports marketing
   Elementary teacher – 2 years
   Middle School (grade 7) Social Studies teacher – 8 years

School responsibilities:
   Seventh grade faculty chair (28 seventh grade teachers)
   Principal Leadership Council seventh grade faculty representative
   Mentor to first year teacher

Other/non-school responsibilities and interests:
   Husband owned a restaurant food supply company, Margaret was actively involved when not at school teaching

Personal information:
   Age: 34
   Married: 8 years
APPENDIX M

MARGARET’S – DAILY AND ACADEMIC SCOPE/SEQUENCE SCHEDULES
Margaret’s Daily Schedule

OFFICIAL teacher arrival time: 8:30 AM
(Margaret has no children and often arrives early at school)
Students begin entering 8:55 (20 min)
School begins/announcements: 9:20 (10 min)
School-wide LA/Language Arts remediation/enrichment: 9:30 to 10:20 (40 min)
(Margaret teaches Language Arts enrichment)
Student exploratory/teacher planning 10:25 to 11:40 (75 min)
Soc Studies academic period 1 11:45 to 12:35 (50 min)
Soc Studies academic period 2 (includes 25 minutes lunch) 12:40 to 2:05 (85 min)
Soc Studies academic period 3 2:10 to 3:00 (50 min)
Soc Studies academic period 4 3:05 to 4:00 (55 min)
Phase I Dismissal (last period teacher holds students as buses arrive and are called and first load exits, usually 30 of 55 total busses) 4:00 to 4:10 (10 min)
Phase II Dismissal (last period teacher stays with remaining students until buses arrive and students are called, remaining 25 of 55) 4:10 to 4:30 (20 min)
OFFICIAL end time for teachers 4:30 PM
(Margaret has no children and often stays late at school)

Required Social Studies Scope and Sequence (January, February, and March 2005)

Information Process Skills:
- Identify issues/problems related to regions studied
- Compare/contrast studied regions
- Identify social studies reference resources for a specific purpose
- Read for main idea, detail, seq. of events, cause/effect in SS context
- Construct/interpret graphs, diagrams, charts, tables and timelines, political cartoons, facts and opinion in SS context
- Analyze interpretations of the same event from multiple source types
- Draw conclusions/make generalizations time zones

Africa:
- Role of location and physical characteristics in the social and economic development
- How natural resources (or lack of) have influenced development and interaction with the world economic community art, religion, and societal structures
- Explain the ways humans have changed the natural environment and describe the consequences of these changes
- Historical development of values, beliefs, and political and social institutions

Economics:
- Identify entrepreneurial resources
- Explain how people engage in basic economic activities
- Describe distribution of resources and interdependence/specialization of nations
- Describe how technological advancements have contributed to standard of living
APPENDIX N

MARGARET – ENVIRONMENTAL SERVICE-LEARNING IMPLEMENTATION
(The activities actually implemented by the teacher are included in this appendix. Activities initially planned and itemized in appendix H are included here as well as activities developed and implemented at the last moment.

### Margaret’s environmental service-learning implementation

<table>
<thead>
<tr>
<th>Social studies</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wednesday</td>
<td>Bacteria contamination in Tsunami areas</td>
</tr>
<tr>
<td>January 16</td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>Environmental impacts of dam construction in China</td>
</tr>
<tr>
<td>January 24</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Language arts</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrichment class</td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>Letter writing to city commissioners regarding land use development OR chose Letter writing to families in subdivisions, why important to clean up dog and cat wastes from yards</td>
</tr>
<tr>
<td>January 17</td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td>Continued letter writing activity</td>
</tr>
<tr>
<td>January 18</td>
<td></td>
</tr>
<tr>
<td>Wednesday</td>
<td>New enrichment groups Started discussions “Should they continue to allow development of shopping centers and subdivisions along Breadloaf Parkway as they have the last five years?” with watching environmental videos from the County Clean and Beautiful organization</td>
</tr>
<tr>
<td>February 16</td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>Continued the environmental videos</td>
</tr>
<tr>
<td>February 17</td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td>Introduced new focus question “Are you a Total NIMBY, partial NIMBY, or not a NIMBY?” and began to draw posters</td>
</tr>
<tr>
<td>February 18</td>
<td></td>
</tr>
</tbody>
</table>
Monday  
February 21  
Prepare for city planner visit to team

Tuesday  
February 22  
City planner spoke to entire team in one room. Discussed planning and zoning, right of eminent domain, and idea of NIMBY

Wednesday  
February 23  
Debriefed students after city planner, developed ideas for their NIMBY positions and posters

Thursday  
February 24  
Students worked on NIMBY position posters

Friday  
February 25  
Students continued work on NIMBY position posters

Monday  
February 28  
Students continued work on NIMBY position posters

Tuesday  
March 1  
Students made environmental word finds (all four remediation/enrichment classes

Wednesday  
March 2  
Students prepared arguments to planner for:
   1. Their positions regarding NIMBY
   2. Their positions for/against a proposed chicken processing plant next to school

Thursday  
March 3  
Students presented their arguments to the class for each case above so their classmates could vote who was to present their cases to city planner

Friday  
March 4  
Culminating activity with city planner. Two parts:
   1. Students presented their positions regarding to NIMBY, city planner questioned and challenged students
   2. City planning meeting forum conducted, three students acted as city council members, then students presented to the council arguments for and against a proposed chicken processing plant next to school
Instructions given to students on overhead
on Tuesday March 1
(when Lisa and Catherine were absent)

Build an Environmental Word Find using the following words:

Watershed  
Tributary  
Pollution  
Turbidity  
Traffic  
Congestion  
Sprawl  
Quality of life  
Odor  
Dissolved oxygen  
Coliforms  
Clearcut  
City planner  
Mayor  
City Council  
Protest  
NIMBY  
Activist  
Apathy  
Public Hearing  
Government  
Developer  
Citizen  
Eminent domain
APPENDIX O

TEACHER PROFILE – CATHERINE
Teacher Profile
(January 7, 2005)

Catherine
Language arts teacher

Certification:
State Middle Grades, 4 – 8, Language Arts and Social Studies
National Board of Professional Teaching Standards Early Adolescent Language Arts, 2004

Employment history:
Police officer – 12 years
Middle school (grade 6) Language Arts teacher – 2 years
Middle school (grade 7) Language Arts teacher – 6 years

Current school responsibilities:
Seventh grade Language arts curriculum chair (eight seventh grade Language Arts teachers)
Enrichment/remediation coordinator for seventh grade Language Arts (28 seventh grade teachers)

Home information:
Age: 37
Married: 8 years
Husband: Police Officer
**Catherine's Daily Schedule**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30</td>
<td>OFFICIAL teacher arrival time:</td>
</tr>
<tr>
<td>(Catherine has no children and often arrives early at school)</td>
<td></td>
</tr>
<tr>
<td>8:55</td>
<td>Students begin entering</td>
</tr>
<tr>
<td>9:20</td>
<td>School begins/announcements:</td>
</tr>
<tr>
<td>9:30 to 10:20</td>
<td>School-wide LA/Language Arts remediation/enrichment:</td>
</tr>
<tr>
<td>(Catherine teaches Language Arts remediation)</td>
<td></td>
</tr>
<tr>
<td>10:25 to 11:40</td>
<td>Student exploratory /teacher planning</td>
</tr>
<tr>
<td>11:45 to 12:35</td>
<td>Language Arts academic period 1</td>
</tr>
<tr>
<td>12:40 to 2:05</td>
<td>Language Arts academic period 2 (includes 25 minutes lunch)</td>
</tr>
<tr>
<td>2:10 to 3:00</td>
<td>Language Arts academic period 3</td>
</tr>
<tr>
<td>3:05 to 4:00</td>
<td>Language Arts academic period 4</td>
</tr>
<tr>
<td>4:00 to 4:10</td>
<td>Phase I Dismissal (last period teacher holds students as buses arrive and are called and first load exits, usually 30 of 55 total busses)</td>
</tr>
<tr>
<td>4:10 to 4:30</td>
<td>Phase II Dismissal (last period teacher stays with remaining students until buses arrive and students are called, remaining 25 of 55)</td>
</tr>
<tr>
<td>4:30</td>
<td>OFFICIAL end time for teachers (Catherine has no children and often stays late at school)</td>
</tr>
</tbody>
</table>

---

**Required Language Arts Scope and Sequence (January, February, and March 2005)**

**Listening, speaking, viewing**
- Listen to, interpret, and evaluate oral instructions, directions, and descriptions in a variety of genres and media
- Respond to oral and dramatic presentations
- Read with rhythm, flow, and meter to sound like everyday speech (prosody)

**Reading and Literature**
- Read for a variety of purposes in all content areas; expect reading to make sense, to answer questions or to stimulate ideas
- Relate literary work to information about its setting or historical moment
- Identify and analyze similarities and differences in traditional literature from different cultures
- Read, identify and compare characteristics of various genres: folklore, fables, mythology, short stories, poetry, nonfiction and novels
- Interpret and analyze character traits and actions to make inferences supporting evidence about motives or events in a story
- Explain and analyze effects of sound (alliteration, onomatopoeia, internal rhyme, rhyme scheme) and figurative language (simile, metaphor, personification, hyperbole)
- Distinguish between concepts of theme in a literary work and the author's purpose in expository text

**Writing**
- Produce writing (narrative, multi-paragraph, expository, persuasive and technical) that establishes an organizational structure appropriate to purpose, audience, context and type of composition
- Use writing handbooks, grammar check and references to edit usage and mechanics
- Compose original folktales, fables, or myths based on core textbook models
- Write, combine and vary sentences to match purpose and audience
- Identify and use sentence phrases and clauses
- Follow word usage conventions of American English
- Use independent clauses, dependent clauses, and complements to clarify ideas
- Demonstrate comma and semicolon usage (compound, complex and compound-complex sentences, and split dialogue)
APPENDIX Q

CATHERINE – ENVIRONMENTAL SERVICE-LEARNING IMPLEMENTATION
(The activities actually implemented by the teacher are included in this appendix.

Activities initially planned and itemized in appendix H are included here as well as activities
developed and implemented at the last moment.

Catherine’s environmental service-learning implementation

<table>
<thead>
<tr>
<th>Language arts</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>No environmental service-learning in language arts</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Language arts</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remediation class</td>
<td>Activity</td>
</tr>
<tr>
<td>Wednesday February 16</td>
<td>New enrichment groups</td>
</tr>
<tr>
<td>Started discussions “Should they continue to allow development of shopping centers and subdivisions along Breadloaf Parkway as they have the last five years?” with watching environmental videos from the County Clean and Beautiful organization</td>
<td></td>
</tr>
<tr>
<td>Thursday February 17</td>
<td>Continued the environmental videos</td>
</tr>
<tr>
<td>Friday February 18</td>
<td>Introduced new focus question</td>
</tr>
<tr>
<td>“Are you a Total NIMBY, partial NIMBY, or not a NIMBY?”</td>
<td></td>
</tr>
<tr>
<td>Monday February 21</td>
<td>Prepare for city planner visit to team Tuesday</td>
</tr>
<tr>
<td>Tuesday February 22</td>
<td>City planner spoke to entire team in one room. Discussed planning and zoning, right of eminent domain, and idea of NIMBY</td>
</tr>
<tr>
<td>Wednesday February 23</td>
<td>Debriefed students after city planner, developed ideas for their NIMBY positions and posters</td>
</tr>
<tr>
<td>Thursday February 24</td>
<td>Students worked on NIMBY position posters</td>
</tr>
<tr>
<td>Date</td>
<td>Activity</td>
</tr>
<tr>
<td>---------------</td>
<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>Friday, Feb 25</td>
<td>Students continued work on NIMBY position posters</td>
</tr>
<tr>
<td>Monday, Feb 28</td>
<td>Students continued work on NIMBY position posters</td>
</tr>
<tr>
<td>Tuesday, Mar 1</td>
<td>Students made environmental word finds (all four remediation/enrichment classes)</td>
</tr>
<tr>
<td>Wednesday, Mar 2</td>
<td>Students prepared arguments to planner for:</td>
</tr>
<tr>
<td></td>
<td>1. Their positions regarding NIMBY</td>
</tr>
<tr>
<td></td>
<td>2. Their positions for/against a proposed chicken processing plant next to school</td>
</tr>
<tr>
<td>Thursday, Mar 3</td>
<td>Students presented their arguments to the class for each case above so their classmates could vote who was to present their cases to city planner</td>
</tr>
<tr>
<td>Friday, Mar 4</td>
<td>Culminating activity with city planner. Two parts:</td>
</tr>
<tr>
<td></td>
<td>1. Students presented their positions regarding to NIMBY, city planner questioned and challenged students.</td>
</tr>
<tr>
<td></td>
<td>2. City planning meeting forum conducted, three students acted as city council members, then students presented to the council arguments for and against a proposed chicken processing plant next to school</td>
</tr>
</tbody>
</table>
APPENDIX R

TEACHER PROFILE – THOMAS
Teacher Profile
(January 7, 2004)

Thomas
Science teacher

Education:
B.S. Environmental Resources Management
M.S. Public Administration
Non-degree coursework to become certified to teach
Doctoral Candidate

Certification:
State Middle Grades, 4 - 8, Science, Math, and Social Studies
National Board of Professional Teaching Standards Early Adolescent Science, 2000

Employment history:
Environmental researcher and manager – seven years
Computer software trainer and sales manager – seven years
Middle School (grade seven) Science teacher – seven years

Current school responsibilities:
School representative for District Superintendent Teacher Advisory Council
Teacher representative to local school community and parent school council
Building contact for state professional teacher organization
Building contact for County Clean and Beautiful organization

Other/Non-school responsibilities and interests:
Conducting doctoral research
District Board member for state’s professional teacher organization

Personal information:
Age: 50
Married: 23 years
Wife: High school teacher
Three daughters, ages 19 (college), 17 (11th grade), 15 (9th grade)
APPENDIX S

THOMAS’ – DAILY AND ACADEMIC SCOPE/SEQUENCE SCHEDULES
### Thomas’ Daily Schedule

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFFICIAL teacher arrival time:</td>
<td>8:30</td>
<td></td>
</tr>
<tr>
<td>(Thomas has children at home that sometimes limits how early he can arrive at school)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students begin entering</td>
<td>8:55</td>
<td>(20 min)</td>
</tr>
<tr>
<td>School begins/announcements:</td>
<td>9:20</td>
<td>(10 min)</td>
</tr>
<tr>
<td>School-wide Math/Language Arts remediation/enrichment:</td>
<td>9:30 to 10:20</td>
<td>(40 min)</td>
</tr>
<tr>
<td>(Thomas teaches Math enrichment)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student exploratory /teacher planning</td>
<td>10:25 to 11:40</td>
<td>(75 min)</td>
</tr>
<tr>
<td>Science academic period 1</td>
<td>11:45 to 12:35</td>
<td>(50 min)</td>
</tr>
<tr>
<td>Science academic period 2 (includes 25 minutes lunch)</td>
<td>12:40 to 2:05</td>
<td>(85 min)</td>
</tr>
<tr>
<td>Science academic period 3</td>
<td>2:10 to 3:00</td>
<td>(50 min)</td>
</tr>
<tr>
<td>Science academic period 4</td>
<td>3:05 to 4:00</td>
<td>(55 min)</td>
</tr>
<tr>
<td>Phase I Dismissal (last period teacher holds students as buses arrive and are called and first load exits, usually 30 of 55 total buses)</td>
<td>4:00 to 4:10</td>
<td>(10 min)</td>
</tr>
<tr>
<td>Phase II Dismissal (last period teacher stays with remaining students until buses arrive and students are called, remaining 25 of 55)</td>
<td>4:10 to 4:30</td>
<td>(20 min)</td>
</tr>
<tr>
<td>OFFICIAL end time for teachers</td>
<td>4:30</td>
<td></td>
</tr>
<tr>
<td>(Thomas has children that sometimes limits how late he can stay at school)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Required Science Scope and Sequence (January, February, and March 2005)

**Characteristics of Science (All year)**
- Identify questions and problems that can be answered and solved through scientific inquiry.
- Design and conduct investigations using scientific method.
- Apply standard safety practices for all classroom laboratory and field investigations.
- Use appropriate scientific tools, techniques, and technologies to gather, analyze, and interpret data.
- Apply computation and estimation skills necessary for analyzing data and developing conclusions.
- Think critically and logically about relationships between evidence and explanations.
- Read scientific materials to establish context for subject matter, develop vocabulary, and to be aware of current research.

**Classification (January February, and March 2005 - Bacteria, protists, and animal kingdoms)**
- Use external and internal features to classify and compare organisms (simple to complex). Compare various life processes of living organisms (i.e., cellular organization, chemical composition, growth and development, response to stimuli, reproduction, photosynthesis, respiration, methods of obtaining food, and behavior).
- Investigate the diversity of living organisms and how they can be compared scientifically. Differentiate and describe the major characteristics of the six-kingdoms (bacteria, protists, fungi, plants, and animals).
- Compare and contrast mechanisms by which organisms reproduce. Distinguish between asexual and sexual reproduction (bacteria, protists, fungi, plants and animals).
- Differentiate between internal and external fertilization in sexual reproduction.
Protist lab/environmental Biology lab
Environmental impact lessons
Short-term environmental impacts discussion and matrix

(The activities actually implemented by the teacher are included in this appendix.
Activities initially planned and itemized in appendix H are included here as well as activities
developed and implemented at the last moment.

Thomas’ environmental service-learning implementation

<table>
<thead>
<tr>
<th>Science classes</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friday January 21</td>
<td>Bacteria sampling lab</td>
</tr>
<tr>
<td>Thursday February 3</td>
<td>Protist lab/environmental Biology lab (sheet attached)</td>
</tr>
<tr>
<td>Friday February 4</td>
<td>Finish Protist lab/environmental Biology lab</td>
</tr>
<tr>
<td>Wednesday February 9</td>
<td>Environmental impact lessons (copy of student’s notes attached)</td>
</tr>
<tr>
<td>Thursday February 10</td>
<td>Short-term environmental impacts discussion and matrix (copy attached)</td>
</tr>
<tr>
<td>Friday February 11</td>
<td>Long-term environmental impacts discussion and matrix (copy attached)</td>
</tr>
</tbody>
</table>

Math
Enrichment class
Enrichment class

<table>
<thead>
<tr>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental video reviews</td>
</tr>
</tbody>
</table>
Tuesday   Environmental video review
February 15

Wednesday   New enrichment groups
February 16  Started discussions “Should they continue to allow development of
shopping centers and subdivisions along Breadloaf Parkway as
they have the last five years?” with watching environmental videos from
the County Clean and Beautiful organization

Thursday   Continued the environmental videos
February 17

Friday     Introduced new focus question
February 18 “Are you a Total NIMBY, partial NIMBY, or not a NIMBY?”

Monday   Prepare for city planner visit to team Tuesday
February 21

Tuesday   City planner spoke to entire team in one room. Discussed planning
February 22 and zoning, right of eminent domain, and idea of NIMBY

Wednesday   Debriefed students after city planner, developed ideas for their
February 23 NIMBY positions and posters

Thursday   Students worked on NIMBY position posters
February 24

Friday     Students continued work on NIMBY position posters
February 25

Monday   Students continued work on NIMBY position posters
February 28

Tuesday   Students made environmental word finds (all four remediation/enrichment
March 1 classes

Wednesday   Students prepared arguments to planner for:
March 2 1. Their positions regarding NIMBY
2. Their positions for/against a proposed chicken processing plant
    next to school

Thursday   Students presented their arguments to the class for each case above so
March 3 their classmates could vote who was to present their cases to city planner

Friday   Culminating activity with city planner. Two parts:
March 4

1. Students presented their positions regarding to NIMBY, city planner questioned and challenged students.
2. City planning meeting forum conducted, three students acted as city council members, then students presented to the council arguments for and against a proposed chicken processing plant next to school.
Short-term (during construction) Environmental Impacts
Name: ___________________________

Guiding question: Why should they be allowed to continue developing housing subdivisions and shopping centers along Breadloaf Parkway near Rollander Middle School? Defend your answer with information.

<table>
<thead>
<tr>
<th></th>
<th>“Bad” Impacts</th>
<th>“Good” Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biotic Factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Plants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Animals</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Abiotic Factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Air</td>
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<tr>
<td>- Soil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Noise</td>
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<tr>
<td>- Visual</td>
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<tr>
<td><strong>Social Factors</strong></td>
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<tr>
<td>- Population</td>
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</tr>
<tr>
<td>- Schools</td>
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<td>- Other</td>
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<td><strong>Economic</strong></td>
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<td>- Jobs</td>
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<tr>
<td>- Taxes</td>
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*Short-term impacts are those that occur while they are building the housing subdivision or shopping center*
Long-term (after construction) Environmental Impacts
Name: ___________________________

Guiding question: Why should they be allowed to continue developing housing subdivisions and shopping centers along Breadloaf Parkway near Rollander Middle School? Defend your answer with information.

<table>
<thead>
<tr>
<th></th>
<th>“Bad” Impacts</th>
<th>“Good” Impacts</th>
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<tbody>
<tr>
<td><strong>Biotic Factors</strong></td>
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<td>- Plants</td>
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<td>- Animals</td>
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<tr>
<td><strong>Abiotic Factors</strong></td>
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<td>- Water</td>
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<td>- Air</td>
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<td>- Soil</td>
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<td>- Noise</td>
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<td>- Visual</td>
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<td><strong>Social Factors</strong></td>
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<td>- Population</td>
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<td>- Schools</td>
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<td>- Other</td>
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<td><strong>Economic</strong></td>
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<td>- Jobs</td>
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<tr>
<td>- Taxes</td>
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*Long-term impacts are those that occur after construction is finished, even years after the project is built*
APPENDIX U

MODIFIED FOCUS QUESTION
NIMBY Poster project lesson
(Directions posted and displayed in all classrooms)

Are you a:

1. “TOTAL NIMBY” that wants nothing in their backyard?

2. “PARTIAL NIMBY” that may not want some things in your backyard but others things would be all right?

3. “NOT a NIMBY’ that does not care and anyone can build anything they want anywhere.

-----------------------------------------------------------------------------
Once you decide, make a poster illustrating your position and draw, or write, anything you need for others to understand your position.
-----------------------------------------------------------------------------
Be prepared to defend your position and poster to the teachers, your classmates, and the city planner when he comes back at the end of the unit
APPENDIX V

CULMINATING ACTIVITY WITH THE CITY PLANNER
Email

Date: March 3, 2005

To: “City planner”

From: “Thomas”

Subject: Friday morning?

Dear B

Are you still available Friday morning – same time 9:30 to 10:20?

The plan is to have:

Part 1 – students present to you whether they are “Total NIMBY,” “Partial NIMBY,” or Not a NIMBY.” (three to five students will present). Each may give up to two minutes to present their stance, then after all three, they each will have one minute to rebut one or more of the others’ comments. When all three are done, you tell them the pros and cons of each of their arguments so they learn from your feedback. We have told them that you are brutally honest and know what a good and bad argument is so do not hold back. “He will tell you that it is a dumb argument,” or “it was good but…” and so on. We would all like to hear your feedback.

Part 2 – The scenario is like a planning commission meeting. You, as the planner, and three council members (students). The scenario is that the land owner next to the school, sandwiched between our school and shopping centers, is selling his land to get away from the crowd. BUT he sold to a chicken processing plant. Goldplast chicken company is interested because it would put their processing near their supermarkets, fast food chicken restaurants, that need chicken. By being close to their markets, they would reduce shipping costs and delivery times. But there are many pros and cons for the plant. We will prepare the students to present to you and the city council like normally occurs so that you may make your recommendation to the council as their planner, who then vote “Yes” or “No” based on what they heard from the citizens and their planner. (We need to make sure that the students know that this is not really going to happen. We think that when the students left our classes this morning and we discussed this idea, many of the kids think there may really be a chicken processing plant being built next door.)

Thank you for everything

Let me know what you think

Thomas
Environmental service-learning Ideas

*(Please jot ideas and bring to next planning meeting)*

### Academic times:

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<thead>
<tr>
<th></th>
<th>Lisa</th>
<th>Margaret</th>
<th>Catherine</th>
<th>Thomas</th>
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<tbody>
<tr>
<td><strong>Everyone:</strong></td>
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<td>Works into everyone’s academic plans?</td>
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<td><strong>Ideas for self:</strong></td>
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<tr>
<td>Into your academic period</td>
<td><em>Math</em></td>
<td><em>Social studies</em></td>
<td><em>Language arts</em></td>
<td><em>Science</em></td>
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<td><strong>Others:</strong></td>
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<tr>
<td>Possible ideas for team mates (during their academics)</td>
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### Remediation/enrichment periods:

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<th>Lisa</th>
<th>Margaret</th>
<th>Catherine</th>
<th>Thomas</th>
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<tbody>
<tr>
<td>Possible activities for remediation/enrichment</td>
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<tr>
<td><em>(Jot ideas for the team)</em></td>
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<tr>
<td><strong>Math Remediation</strong></td>
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<tr>
<td><strong>Language arts remediation</strong></td>
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<tr>
<td><strong>Language arts enrichment</strong></td>
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