

ENVIRONMENTAL EDUCATION IMPLEMENTATION IN WISCONSIN:
CONCEPTUALIZATIONS AND PRACTICES

by

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“If a child is to keep alive his inborn sense of wonder, he needs the companionship of a least one adult who can share it, rediscovering with him the joy, excitement and mystery of the world we live in.”

- **Rachel Carson**, naturalist and author

This research project of exploration and discovery is dedicated to

Jean Farber Lane

who inspired my sense of wonder.

Thank you.

ENVIRONMENTAL EDUCATION IMPLEMENTATION IN WISCONSIN:
CONCEPTUALIZATIONS AND PRACTICES

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This study investigated the implementation of environmental education (EE) in Wisconsin. In support of EE, the Department of Public Instruction passed two mandates in 1985 requiring preservice preparation in EE and the integration of environmental topics into district curriculum plans. Although the mandates use the term integration, the infusion approach was promoted in the late 1980s and early 1990s.

To investigate EE implementation in Wisconsin, professionals in the field were asked to share how they envisioned and promoted EE implementation, including how teachers include EE into their curriculum. The popularity of EE appears to have declined over the past 15 years, and this study also analyzed the reality of those perceptions. To help explore the reality of EE in schools, teachers provided their insights by sharing why and how they teach about the environment. A statewide survey was designed and implemented to gain insight into the pervasiveness of EE implementation practices throughout Wisconsin.

The primary method of data collection was through in-depth interviews with EE professionals and classroom teachers. Eight teachers—including one team-teaching pair—were the source of seven vignettes for this study. Their interviews were complemented with classroom observations and document analyses. By focusing on these teachers in depth, “rich pictures” of EE in Wisconsin were developed to inform future development of practical EE implementation.

Much of this study sought to understand the concept of infusion and if and how it differs from integration. The simple conclusion is that there are subtle differences, and some EE professionals would say there are subtle *and* insignificant differences. Because of this ambiguity, it is recommended that the term infusion be avoided and EE professionals focus on understanding and applying the integration approach to implementing EE. The study also

revealed that teachers insert environmental concepts and that this approach needs further investigation.

This study shows that despite barriers to EE, there are teachers who include EE in their classroom lessons. Rather than return to past efforts to enforce EE implementation through mandates, the motivations and practices of teachers such as these can provide models to reexamine professional development in environmental education.

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Nine years ago, I thought funding for the Wisconsin K-12 Energy Education Program (KEEP), the program I was directing, might be ending. I thought graduate school would be good professional development and help transition my career. I was accepted in graduate school,

but funding for KEEP didn't end. For some crazy reason, I decided to continue to direct KEEP and pursue my graduate degree at the same time. I could not have accomplished this dual role without the help and support of many people.

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CHAPTER ONE

INTRODUCTION

The purpose of this first chapter is to provide an introduction to this study and will discuss the following:

Statement of Purpose

Research Questions

Clarification of Commonly Used Terms

Overview of Research Methods

Significance of the Study

Statement of Purpose

Environmental education—its definition, its goals, how it should be taught, its status in schools, and why it is not being taught—has been researched extensively in the literature. This study will investigate how professionals in the field of environmental education (EE) in Wisconsin envision and promote EE implementation and how teachers include EE into their curriculum. The study will also explore motivations and barriers to EE implementation and provides insights and suggestions to improve EE in Wisconsin.

Environmental Education can be described and defined in a variety of ways (Disinger 1993; NAAEE 1999). There have been attempts to develop and adopt goals of environmental education at the international as well as the national level. In 1975, participants of the International Environmental Education Workshop in Belgrade, Yugoslavia developed and adopted the Belgrade Charter (UNESCO 1975). This charter provided a goal of environmental education that was further defined during the world's first Intergovernmental Conference on Environmental Education hosted by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in cooperation with the United Nations Environmental Programme (UNEP). During this conference held in Tbilisi, Georgia (USSR) in 1977, participants adopted

the Tbilisi Declaration that outlined EE objectives as well as its goal (UNESCO 1978). Since the Belgrade Charter and the Tbilisi Declaration, a number of institutions and agencies around the world proposed subsequent interpretations of these documents in order to support implementation of EE. Parts of the United States, including Wisconsin, were influenced by the interpretation outlined by Hungerford, Peyton, and Wilke (1980). Their proposal included a set of goals for curriculum development in EE, with the primary goal being “to aid citizens in becoming environmentally knowledgeable and, above all, skilled and dedicated citizens who are willing to work, individually and collectively, toward achieving and/or maintaining a dynamic equilibrium between quality of life and quality of the environment” (p. 43).

To promote the implementation of environmental education the Department of Public Instruction passed a mandate in 1985 requiring that certain subject areas integrate environmental education into their curriculum plans (Wisconsin Administrative Code PI 8.01(2)(k) 4.b.). Given its interdisciplinary nature, most supporters of EE recommend that the goals of EE be addressed through other disciplines, rather than creating a separate course (e.g., Engleson 1985). Two terms frequently used throughout the literature when discussing EE implementation are infusion and integration. Often these are used interchangeably (e.g., Monroe 1991; Volk 1993).

This study seeks to investigate these and other approaches to EE implementation. The approaches will first be explored through a review of the literature. Professionals in the field of EE will provide their insights into how EE should be included into school curriculum. It seems that the popularity of EE has declined over the past 15 years, and this study will also analyze the reality of those perceptions.

Despite restrictions of time, resources, and content knowledge, there are teachers who manage to include environmental topics into their classroom lessons. Why do these teachers continue to teach about the environment? What qualities do they possess? What motivations and attitudes? Are these qualities transferable to other teachers? To help answer these questions, this study will report on thirteen teachers invited to provide their insights. They will share why and how they teach about the environment and provide examples of how they include EE into their

subject area lessons. The hope is that these teachers who continue to teach about the environment despite the barriers will provide insider perspectives into the reality of EE implementation.

Finally, after learning ways in which teachers implement EE, this project intends to learn how pervasive these practices are. There are signs that the demands of academic standards and state and federal testing have affected EE quantity and quality. It is hoped that a statewide survey will assess the extent to which EE is included in school curriculum throughout Wisconsin.

In summary, there are three inter-related purposes to this study:

- To learn how professional environmental educators perceive EE should be implemented in Wisconsin, including their conception of infusion
- To investigate the reality of environmental education implementation, including infusion, into subject area curriculum in Wisconsin
- To assess the pervasiveness of environmental education implementation, including infusion, into subject area curriculum in Wisconsin

The purposes will be addressed in the order presented, so that findings from one inform data collection for the next. The findings from all three purposes will be considered in combination—each a reflection of the other—to provide generalizable insights into the practice EE implementation in Wisconsin.

Research Questions

This study is designed to gain insights into conceptualizations and practices of EE implementation. The information shared by professionals in the field and classroom teachers will provide insider knowledge about the reality of environmental education in Wisconsin. The following research questions will guide this study and its data collection and analysis:

- How do professional environmental educators currently envision the implementation of EE into school curriculum? How does this vision relate to infusion of EE that has been recommended in the literature?
- How do teachers reputed to be effective environmental educators teach about (and/or for) the environment? How do they integrate or infuse environmental concepts into their curriculum? How do their EE teaching practices compare to the methods prescribed by professional environmental educators?
- To what extent are EE infusion strategies practiced by teachers throughout Wisconsin?

Clarification of Commonly Used Terms

Environmental Education: According to Hart (2003), “environmental education is a diverse and postmodern field that resists precise definition” (p. 27). However, in Wisconsin, professional environmental educators often use the Hungerford, Peyton, & Wilke (1980) goal of EE to define the field: “to aid citizens in becoming environmentally knowledgeable and, above all, skilled and dedicated citizens who are willing to work, individually and collectively, toward achieving and/or maintaining a dynamic equilibrium between quality of life and quality of the environment” (p. 43). Given that this study focuses on Wisconsin teachers—many of whom have studied with Wisconsin professional environmental educators—this study considered the Hungerford, Peyton, and Wilke definition as the accepted foundation for its investigation.

Infusion: A commonly used and cited definition of infusion is the one provided by Ramsey, Hungerford, & Volk (1992) which states that “infusion refers to the integration of content and skills into existing courses in a manner as to focus on the content (and/or skills) without jeopardizing the integrity of the courses themselves” (p. 40).

Professional Environmental Educator: This term refers to individuals who conduct research in and provide professional development in environmental education. These individuals are often involved in developing policy in environmental education and promoting the integration of EE into K-12 school systems. Although this term readily applies to K-12 teachers, the literature

usually applies it to someone who works at an institution of higher learning in the field of environmental education.

Environmental Educator: Any individual who teaches about and/or for the environment. In this study, it includes K-12 teachers of any discipline who strive to meet the goals and objectives of EE through their teaching practice.

Overview of Research Methods

In-depth investigations are needed to ascertain the motivations of and methods used by teachers to overcome barriers to integrating EE into the classroom. More than simply finding out who is teaching about the environment and how often they conduct EE lessons, this study aims to find out “how” teachers include EE.

The methods for this project will be guided by the project purposes and research questions listed above. The first purpose will be addressed through a review of the literature and through conversations with professional environmental educators in Wisconsin. The literature review will address professional environmental educators’ conceptions of infusion and integration that were presented in the late 1980s and early 1990s. The topic of infusion is less prevalent in the more recent literature. Current views of infusion will be gained through interviews with professional environmental educators in Wisconsin.

The second purpose is to investigate the reality of environmental education implementation in subject area curriculum in Wisconsin and to address the research questions outlined above. The second purpose will be investigated through in-depth interviews, along with a classroom observation and document analysis, with Wisconsin K-12 environmental educators. Thirteen teachers have been invited to participate in this study, providing insights into the qualities and practices of exemplary environmental educators. Of the 13 teachers, eight teachers—including one team-teaching pair—will be the source of seven vignettes for this study. By focusing on these teachers in depth, “rich pictures” of EE in Wisconsin can inform future development of practical EE implementation.

The third part of the study is designed to assess the pervasiveness of EE implementation practices throughout Wisconsin. This part will be addressed by administering a statewide teacher survey. This survey will be adapted from a statewide survey conducted by the Wisconsin Center for Environmental Education in 1992 (Lane 1993). Findings of the reality of EE implementation gained from the interviews and observations will help to revise the survey to help ascertain how and why teachers in Wisconsin implement EE.

Significance of the Study

On February 1, 2005, the entire state of Wisconsin was under an air quality alert. The entire state! Children, the aged, and individuals with weak or damaged lungs were warned to stay indoors. How has it come to be that most of us can hear this bit of news without missing a beat in our daily routines? Have we simply come to accept the inevitable decline of the quality of our air? Have we given up on efforts to stay this decline, or better yet, to reverse the trend? These efforts, among many, include environmental education.

In the early 1990s it seemed that the educational system, especially in Wisconsin, had finally realized the crucial role of environmental literacy to our future. Yet, just over ten years later, the environment—the basis for our very existence—has become a low priority in our school systems and teacher professional development.

In the early 1990s Wisconsin's EE mandates were proud accomplishments that secured hope for the infusion of environmental concepts into subject area disciplines. All the bases were covered: the teachers were being trained, and the districts were to develop an infusion plan. However, even in this time of hope there was evidence of failure; teachers were unsure about their professional development experiences and unaware of district curriculum plans (Lane 1993).

In the early 1990s classroom teachers dominated the number of attendees at Wisconsin environmental education conferences. Today, a topic discussed during the board meetings of the state environmental education organization that organizes these conferences is how to get more teachers to become involved in EE. Despite this decline in popularity of environmental education,

there are teachers who persist, who continue to integrate environmental concepts into their classroom lessons. This study will focus on these persistent teachers. The teachers who participate in the study will be encouraged to take an active role in this analysis, providing insights into the challenges and dilemmas they face while trying to implement environmental education and sharing the strategies they use to overcome these barriers.

Environmental education is only one of many efforts that can stay or reverse the trend of decline of our environmental quality, but it is an important one. It is the environmental literacy of our future. The centralized approach to mandating environmental education has not met expectations, yet there is still a role for the professional environmental educator in teacher education in EE. But we need to become aware of and appreciate the reality of the teachers as researchers who transform theory into practice. We need to transform our practice and policies to support and empower more teachers to become persistent environmental educators.

Summary of Chapter 1 and Introduction to Chapter 2

This study seeks to gain insights into hopes, plans, and strategies of EE implementation. Expert insiders, including professionals in the field of EE and classroom teachers, will share their perspectives through in-depth interviews. The following chapter consists of a literature review that provides foundational information for the project design. It includes an overview of environmental education, including strategies for implementation—especially through the infusion approach. When EE was promoted in the 1980s and early 1990s, professionals in the field recognized that adding a separate course on EE was not feasible given schools' crowded programs of studies. Therefore, many professionals recommended infusing EE, where environmental concepts could be blended or tied to the subject matter of existing curriculum. Ideally, with this approach extra class time would not be needed to add EE. There were some professionals who opposed this approach because it restricted student exposure to important environmental concepts and practices. Whatever approach is implemented, professionals in the field of EE recognize the importance of the classroom teacher to achieving the program goals. Teachers play an integral role in the current study, as their insights help understand the reality of EE implementation in Wisconsin.

CHAPTER TWO
LITERATURE REVIEW

The following review of the literature will provide an overview of environmental education (EE), including its definition and goals, implementation strategies, and its status. This review addresses the following topics:

Introduction

Overview of Environmental Education (EE)

Environmental Education Implementation

The Integration Approach

The Infusion Approach

Non-infusible Aspects of EE

Infusion and Integration Conclusions

Barriers to EE Implementation

Support of EE Implementation: Teaching Competencies

Support of EE Implementation: Activity Guides

Project WILD

Wisconsin K-12 Energy Education Program

Investigations into the Effects of EE Implementation

Infusion and Integration Successes and Failures (Outside of Environmental Education)

Involving Teachers in EE Research

Introduction

This examination of implementation strategies focuses on infusion, including the rationale behind infusion, an analysis of infusion attempts, and how it compares to integration. A section of the review focuses on reasons EE is not being taught in schools; often these reasons are called barriers. Professional development programs and associated support materials are reviewed to illustrate how professional environmental organizations promote EE implementation. This review includes findings from other disciplines outside of EE that have used infusion and

integration to ensure they are included in school curriculum. A common finding among the literature reviewed is that teachers are essential to the success of environmental education. This chapter concludes with a discussion of studies that support including teachers in researching the success of EE implementation.

Overview of Environmental Education (EE)

Environmental Education can be described and defined in a variety of ways (Disinger 1993; NAAEE 1999). There have been attempts to develop and adopt goals of environmental education at the international as well as the national level. In 1975, participants of the International Environmental Education Workshop in Belgrade, Yugoslavia developed and adopted the Belgrade Charter (UNESCO 1975). This charter provided a goal of environmental education that was further defined during the world's first Intergovernmental Conference on Environmental Education hosted by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in cooperation with the United Nations Environmental Programme (UNEP). During this conference held in Tbilisi, Georgia (USSR) in 1977, participants adopted the Tbilisi Declaration that outlined EE objectives as well as its goal (UNESCO 1978).

Since the Belgrade Charter and the Tbilisi Declaration, a number of institutions and agencies around the world proposed subsequent interpretations of these documents in order to support implementation of EE. Parts of the United States, including Wisconsin, were influenced by an interpretation outlined by Hungerford, Peyton, and Wilke (1980). Their proposal included a set of goals for curriculum development in EE, with the primary goal being “to aid citizens in becoming environmentally knowledgeable and, above all, skilled and dedicated citizens who are willing to work, individually and collectively, toward achieving and/or maintaining a dynamic equilibrium between quality of life and quality of the environment” (p. 43).

There have been alternative and complementary interpretations of the Belgrade and Tbilisi documents developed and promoted throughout the world and within the United States. In 1999, the North American Association for Environmental Education attempted to compile these varying approaches within their publication, *Excellence in Environmental Education* –

Guidelines for Learning (K-12). In Wisconsin, however, the Hungerford, Peyton, and Wilke guidelines (1980) continue to influence much of the professional development in EE and how EE is promulgated by the Department of Public Instruction (DPI).

In 1985, the Wisconsin Department of Public Instruction published *A Guide to Curriculum Development in Environmental Education* (Engleson 1985). According to this document, the goal of EE is “. . . to help students become environmentally knowledgeable, skilled, and dedicated citizens who are willing to work, individually and collectively, toward achieving and maintaining a dynamic equilibrium between the quality of life and the quality of the environment” (p. 5). The publication provides the following objectives to further categorize the goal of EE:

Awareness: Helping students acquire an awareness and sensitivity to the total environment and its problems; develop the ability to perceive and discriminate among stimuli; process, refine, and extend these perceptions; and use this new ability in a variety of contexts.

Knowledge: Helping students acquire a basic understanding of how the environment functions, how people interact with the environment, and how issues and problems dealing with the environment arise and how they can be resolved.

Attitudes: Helping students acquire a set of values and feelings of concern for the environment and the motivation and commitment to participate in environmental maintenance and improvement.

Skills: Helping students acquire the skills needed to identify, investigate, and contribute to the resolution of environmental issues and problems.

Participation: Helping students acquire experience in using their acquired knowledge and skills in taking thoughtful, positive action toward the resolution of environmental issues and problems. (p. 5-6)

The Wisconsin goal and subgoals borrow from and share common elements with other national and international definitions of EE. In particular, “the bottom-line purpose of environmental education, in the view of a number of its supporters and many of its practitioners, is the promotion of responsible and societal environmental behavior” (Disinger 1993, p. 35).

Despite the ongoing debate on what EE is and what it should accomplish, educators and researchers in the field of EE agree that it is important and should be taught. This agreement, however, leads to the next debate of how it should be taught. More generally, the issue is how EE should be included into the K-12 school curriculum. Disinger (1993) strongly voices the issues surrounding this debate when he writes, “Environmental education is undefinable in terms that ‘fit’ existing school organizational patterns. It is not a discrete curriculum” (p. 38). Further discussion of this issue continues below.

Environmental Education Implementation

Professionals in the field of environmental education devote extensive attention to describing EE because they recognize that its definitions and goals influence its development and continuance (Ham, Langseth, and Fazio 1985). Misunderstandings or misconceptions of EE can lead to it being considered nature studies or conservation education, something outside of the traditional K-12 curriculum (Disinger 1985/86; Ham and Sewing 1988; Hungerford 1975). Although administrators may appreciate the importance of these fields of study, they find it unrealistic to make them a part of their core curriculum. Even when a course is designed that adequately addresses the goals of environmental education, it is usually offered as an elective—once again outside the main K-12 educational programming. Monroe (1991) further expresses the challenges to EE implementation when she writes, “Adding anything more to an already

overburdened curriculum is out of the question. Expecting every teacher to become an expert on environmental issues is unrealistic” (p. 8).

An often proposed solution to “fitting” EE into the curriculum is to take advantage of its nebulous nature. The Tbilisi Declaration states environmental education should be provided at all ages and grade levels and be interdisciplinary in its approach (UNESCO 1977). In other words, rather than isolating EE to one course or discipline, it should be taught in multiple disciplines. This direction is further supported by professional environmental educators such as Simmons (1989) who writes:

by incorporating environmental education throughout the total curriculum at every grade level, a more comprehensive treatment of environmental concerns can be accomplished. Moreover, such an approach also recognizes that environmental issues cut across traditional disciplinary lines and that developing an environmentally responsible citizen involves acquiring knowledge, attitudes, and skills beyond that of a simple understanding of scientific or ecological principles (p. 15).

Besides advocating the inclusion of EE in many disciplines, the above statement also eschews limiting EE to only one discipline, such as science. Other professionals in the field agree that the knowledge and skills from multiple disciplines are needed to address the goals of EE (Disinger 1993; Lane 1993; Monroe 1991; Orr 1992; Ramsey, Hungerford, and Volk 1992).

One concern is that environmental education might be added in a temporary or ineffective manner (Simmons 1989; Ramsey, Hungerford, and Volk 1992). This process is often called insertion (Monroe and Cappaert 1994) and its main shortcoming is that an activity or unit can be removed from curriculum as easily as it can be inserted. Another limitation is that the inserted activity may not relate to or build upon preceding and subsequent concepts in the curriculum. To promote a more secure implementation for EE, professionals in the field discuss ways to making better links between environmental concepts and concepts in other disciplines.

This review also looks specifically at EE implementation in Wisconsin, one of the few states in the nation that have mandated EE. Rather than requiring the development of a separate course or discipline, they too recommend including EE in other disciplines. In 1985, the Wisconsin Department of Public Instruction (DPI) promulgated a rule requiring that educators interested in teaching Early Childhood, Elementary Education, Agriculture, Science, or Social Studies achieve EE competencies (Department of Public Instruction Administrative Code Requirement in Environmental Education PI 3.07(1)). In addition, Administrative Rule, PI 8.01(k)2 mandated that each school district develop, implement, and evaluate a sequential EE plan.

Two terms commonly used throughout the literature when discussing EE implementation are infusion and integration. Often these are used interchangeably (e.g., Monroe 1991; Volk 1993). Following is an introduction to integration followed by a more detailed discussion of the infusion approach and recommendations for its implementation.

The Integration Approach

As discussed previously, the terms infusion and integration are often used interchangeably. In a frequently quoted definition of infusion, it is described as “integration of content and skills into existing courses” (Ramsey, Hungerford, and Volk 1992). This definition could imply that to understand infusion, one must first understand integration. However, the term integration is fraught with ambiguity. Educational professionals have noted confusion among the terms and difficulty finding a concise definition for integration (Glasgow 1997; Wineburg and Grossman 2000). A definition that works well for environmental education is provided by Beane (1997):

a curriculum design that is concerned with enhancing the possibilities for personal and social integration through the organization of curriculum around significant problems and issues, collaboratively identified by educators and young people, without regard for subject area boundaries. (p. x)

Unlike infusion, there are numerous books on integration, including strategies, challenges, and benefits (Beane 1997; Jacobs 1989; Wineburg and Grossman 2000). In the mid 1990s, the Environmental Protection Agency funded a national environmental education program that developed a number of resources to support EE implementation.

One publication is titled *Integrating Environmental Education into the School Curriculum* (Monroe and Cappaert 1994). The authors prescribe five approaches to integration: Project Approach, the Thematic Approach, the Content Approach, Issue Investigation, and the Interdisciplinary Team. Each of these approaches can address two ways to integrate: content integration and process integration. The former involves linking to the content-specific knowledge while the latter relates to skills important to most subjects (e.g., critical thinking, cooperative learning, value clarification). This publication also reviews infusion and insertion indicating that both are approaches to integration. It equates infusion with thematic teaching, incorporating “environmental concepts, activities, and examples into existing curricular goals” while insertion involves “the addition of an environmental unit or course to the class or curriculum; usually something else is removed” (Monroe and Cappaert 1994; p. 11). The authors present this information on infusion and insertion as background, while the entire publication focuses on integration.

Integration in general is often prescribed to help prepare students for real world issues (Brandt 1991; Fogarty 1991; Jacobs 1989) and the environment is often touted as an ideal vehicle for integration (Engleson and Yockers 1994; Hungerford, Peyton and Wilke; Monroe 1991, UNESCO 1985). The quote by John Muir perhaps most eloquently provides an argument in support of integration:

When we try to pick out anything by itself we find it hitched to everything else in the Universe.

To summarize, environmental education is multidisciplinary and relates to concepts in many subject areas. The term integration is often used to describe how the disciplines should be

combined. Another term that has been used to explain how to implement environmental education (as well as other disciplines) in school programs is infusion.

The Infusion Approach

The term infusion has been used interchangeably with permeation, incorporation, integration, and supplementation. Infusion has also been used synonymously with both interdisciplinary and multidisciplinary education.

Many dictionaries use the word “pour” when defining the word “infuse.” A tea is made by infusing or steeping tea leaves in hot water. *Permeate* means to spread or to flow through. Both *incorporate* and *integrate* can mean mixing or blending things together to make them whole, while *supplement* means to add something to make it complete. There are similarities among all these terms. Regarding environmental education, the term infusion, along with integration, is often used.

According to Ramsey, Hungerford, and Volk (1992) “infusion refers to the integration of content and skills into existing courses in a manner as to focus on the content (and/or skills) without jeopardizing the integrity of the courses themselves” (p. 40). The term “integration” is used in this definition of infusion, but the key is that the addition does not affect the quality of the existing courses. Ideally, the inclusion of the new content and skills could enrich or improve the current curriculum (Fellows 1980).

The Wisconsin Department of Public Instruction strongly recommended infusion in its first edition of *A Guide to Curriculum Planning in Environmental Education* (Engleson 1985). Infusing environmental topics into the curriculum “would result in a totally environmentalized school district program of studies. In such a program, the instructional objectives identified for each subject area at each grade level and within each unit of study can still be achieved. Very little, if any, additional instructional time would be required to deal with the added environmental content. New, stimulating approaches to studying subject matter would enhance the entire program” (p. 50).

Using infusion to “environmentalize” a curriculum is commonly stated in the literature (e.g., Simmons 1994). In particular, infusion should go beyond simply adding facts about the environment to the curriculum. Monroe (1991) emphasizes that investigation of environmental issues is a unique aspect of EE. In particular, she notes that the inclusion of attitudes, values, and skills separates EE from Environmental Science. Monroe recommends four activities to turn environmental facts into environmental education and notes that each can be accomplished within existing subject areas and grade levels:

there are four kinds of activities which help convert environmental facts to environmental education. Different subject areas and grade levels will utilize these methods more effectively than others:

1. Extend the facts to include the issues – the often controversial edge between people and the environment – and examples of solutions to these issues.
2. Practice problem solving skills with students: communications, group skills, leadership, creative thinking, and decision making are a few.
3. Explore appropriate environmental feelings, attitudes, and values. Students can gain an appreciation and sense of responsibility for others and the environment and ultimately compare their values to their lifestyle and actions.
4. Involve students in the resolution of real issues (p. 9).

For an infusion plan to succeed, Hirsh (1982) found that inservice education, a K-12 scope and sequence, and adequate support materials are needed. Despite the frequent recommendations that EE objectives be infused into other disciplines, explanations on how to infuse are limited within the literature.

Two sources of information on EE implementation and infusion are described below. One is from the first edition of the Wisconsin Department of Public Instruction publication, *A Guide to Curriculum Development in Environmental Education* (Engleson 1985). When this document was revised in 1994, these “how to” steps were omitted. Volk (1993) authored the second source; her approach is based on the guidelines provided in the UNESCO-UNEP

publication, *Procedures for Developing an Environmental Education Curriculum* (Hungerford and Peyton 1986).

A Guide to Curriculum Development in Environmental Education (Engleson 1985) was developed in part to assist teacher educators, administrators, curriculum planners, and classroom teachers to meet state mandates in EE. This document prescribes developing a scope and sequence for EE and then taking the following steps for infusion:

- Step 1. Select the environmental topic to be infused into an existing subject area instructional unit. . . .
- Step 2. Identify the subject area units which relate to, or support the investigation of, the selected environmental topic. . . .
- Step 3. Develop one or more environmental objectives for the subject matter unit. . . .
- Step 4. Specify the environmental content to be added to the unit. . . .
- Step 5. Develop new instructional procedures as needed. . . .
- Step 6. Identify new process skills which might be used or developed in achieving the new environmental objectives. . . .
- Step 7. Identify new resources to be used in achieving the environmental objectives. . . .
- Step 8. Identify related activities and new topics for investigation which may be suggested by teaching the new infused unit. . . . (pp. 51-52).

The first edition of the guide goes further to identify subject areas commonly found in traditional school programming and explains how each has topics that relate to the environment. For example, energy shortages could be explored in agriculture education, increasing use of energy supplies examined in Social Studies, and the French view of nuclear energy in foreign language classes. To help develop the scope and sequence and locate instructional procedures and resources, the guide recommends investigating “Environmental Education Starter Programs.” These are nationwide and state-based curriculum development projects, such as Project WILD, designed to support teachers’ efforts to teach about the environment.

Volk (1993) provides the following suggestions for infusing EE. Her recommendations are based on *Procedures for Developing an Environmental Education Curriculum* (Hungerford and Peyton 1986). The steps include forming a curriculum team to infuse EE into school programs. This team would identify the school district's goals for an EE curriculum and then develop a scope and sequence for the curriculum. The scope involves identifying subgoals and objectives for the EE curriculum and the sequence helps decide where and how EE objectives could fit into the existing curriculum. The sequence also considers grade level appropriateness for the objectives, deciding which objectives are achievable by students of which age. Similar to the process described by Engleson (1985) above, the existing curriculum would be examined to find relevant objectives in various subject areas and to help decide if courses need to be adjusted to address the EE objectives. Volk titles this process "Horizontal Organization." She stresses that "for this task, the committee must use its combined expertise to determine how the environmental objectives are related to other disciplines in the curriculum and where they might be more efficiently and effectively accommodated . . . [identifying] points at which objectives in the infused discipline may parallel, complement, or supplement environmental objectives" (p. 57).

Both of the above sources of infusion strategies strongly recommend that the school district form an EE curriculum team who will provide a framework or guide for infusing EE objectives. This recommendation is especially important in Wisconsin where there is a mandate that a curriculum plan be developed. However, in a teacher survey conducted in Wisconsin, Lane (1993) found that less than 30 percent of the teachers knew if their district had an EE plan, and of those less than half had a copy of the plan.

Another approach taken by professional environmental educators to promote infusion is to provide a chart or list of traditional courses in schools (e.g., Mathematics, Science, Social Studies, Language Arts) cross-referenced to the objectives of environmental education. In their 1992 article, "Environmental Education in the K-12 Curriculum: Finding a Niche," Ramsey, Hungerford, and Volk (1992) presented a three-page cross-reference chart that shows how many EE topics relate to traditional subject areas. In 1993, Volk adapted the chart to highlight the

knowledge and skills particular to environmental issue investigations (see Table 1: Environmental Education Topics and Skills: An Infusion Inventory).

Likewise, Monroe (1991) listed eleven different traditional school disciplines and explains how each might infuse EE. For example, aesthetic awareness can be heightened in art while the dependency of mental and physical well-being on environmental quality can be emphasized in health education. She acknowledged that an EE committee would be ideal for identifying how best to infuse EE into district curriculum.

The Skill	Science	Social Studies	Math	Language Arts
Environmental sensitivity	X			X
Ecological concepts	X			
Environmental issue information	X	X		X
Environmental implications	X	X		
Socio-cultural implications		X		
Human beliefs/values		X		X
Examining values		X		X
Issue analysis	X	X	X	
Identifying problems/issues	X	X		X
Accessing secondary information	X	X		X
Evaluating information for bias	X	X		X
Synthesizing information		X		X
Writing research questions	X	X	X	X
Developing survey instruments	X	X	X	
Conducting interviews		X		X
Sampling	X	X	X	
Collecting data	X	X	X	
Recording/organizing data	X	X	X	
Graphing	X	X	X	
Data interpretation	X	X	X	
Communication (written)	X	X	X	X
Communication (oral)	X	X	X	X
Citizenship action skills				
Consumer action		X		
Political action		X		
Persuasion		X		X
Ecomanagement	X	X		
Action analysis/evaluation	X	X		

(Ramsey, Hungerford and Volk 1992, p. 44; adapted by Volk 1993, p. 59)

An observation of Table 1 is that when it comes to Citizen Action Skills, a single discipline—Social Studies—predominates for inclusion of EE. While not stated explicitly, it may be that some of the more unique aspects of EE need focused attention. This leads to the conclusion that some aspects of EE are not as easily infused into multiple disciplines as others. Rather than infusing EE into other subject areas, in this case the environmental topic is the main theme and other topics are infused into it. This conclusion is addressed in the next section which is followed by a summary of the literature reviews of infusion and integration.

Non-infusible Aspects of EE

A challenge to including EE in multiple disciplines is its focused goal which is to promote environmentally responsible behavior. In other words, there may be some aspects of EE that do not lend themselves to being addressed within existing subject areas. Environmental issue analysis, the educational strategy often recommended to achieve the goal of EE (Ramsey, Hungerford, and Volk 1989), requires extensive and focused class time and does result in noticeable changes to the school curriculum.

The issue analysis process involves doing background research, conducting surveys, interpreting data, and developing an action plan (Ramsey, Hungerford, and Volk 1989, 1992). This process, while not unique to EE, is an educational strategy characteristic of the field. An outcome of this process, which is more unique to EE, is for students to become actively involved in issue resolution. Hungerford and Peyton (1980) introduced five categories in which people can take action: Persuasion, Consumerism, Political Action, Legal Action, and Ecomanagement (see Appendix A). Incorporating a full-scale issue investigation into school curriculum is challenging enough; allowing for student citizen action is another matter altogether.

The ideal situation for this approach would be a single class devoted to community investigations. Since issue analysis requires higher level thinking skills, it would most likely take place at the secondary or even tertiary level. Given the structure of most secondary schools—where disciplines are divided into discrete classes—this means the strategy would most likely be used in one subject area, rather than multiple disciplines.

In the table below, Hungerford and Peyton (1986), compare and contrast adding EE to many disciplines (multidisciplinary) to creating a single course on EE (interdisciplinary).

Table 2: Interdisciplinary vs. Multidisciplinary (Infusion) Formats for EE: Advantages and Disadvantages		
Considerations	Interdisciplinary (Single Subject) Characteristics	Multidisciplinary (Infusion) Characteristics
1. Ease of implementation	Easier to implement as a single subject if time permits in the curriculum; teacher training is less of a problem.	Requires that more teachers be trained; greater coordination of curriculum necessary; requires less time/content in the existing curriculum.
2. Teacher competencies	May require fewer teachers but with more in-depth training in EE; thus teacher training is less demanding in terms of teacher numbers but more demanding in terms of level of competencies required.	Requires that teachers of all disciplines be competent to adapt and/or use EE materials, although perhaps not to the same depth as in single subject approaches.
3. Demand on curriculum load	Requires addition of this discipline to an already crowded curriculum.	May be effectively implemented with minimal demands on existing curricular load.
4. Ease of curriculum development	Components easier to identify and sequence.	Components must be effectively identified, sequenced, and accommodated by the existing curriculum.
5. Evaluation	A comprehensive evaluation is much easier to accomplish in single-subject curriculum.	Comprehensive evaluation difficult due to the number of variables involved.
6. Age-level appropriateness	May be more appropriate at secondary than elementary levels. For some types of EE goals, may be essential at secondary and tertiary levels.	Appropriate at all age levels with some exceptions at secondary and tertiary levels.
7. Effectiveness in teaching for transfer	More difficult to use in effectively teaching for transfer. Requires special efforts to do so.	Teaching for transfer is inherent in this approach when properly used. Infusion permits decision-making to take place in other disciplines in an environmental context.
8. Ability to provide in-depth coverage of environmental issues	Budget considerations entirely depend on the nature of the course being developed. A highly sophisticated course demanding many field excursions or laboratory equipment could prove costly.	Monetary considerations vary dependent on the nature of the curriculum being developed. Monies required could be greater than in single subject curriculum due to the number of learners involved across numerous grade (age) levels.

(Hungerford and Peyton 1986, p. 14)

Although there are some benefits to having a dedicated course in EE, the reality is that given the overcrowded condition of school curriculum, adding a new course may not be feasible. Moreover, even in situations where students have been involved in issue investigations, there is evidence that without support and relevance from other subject areas, student awareness, knowledge, and skill development in EE falters (Hungerford and Volk 1994). With or without the ideal approach of issue analysis, environmental educators stress the importance of including environmental objectives into the curriculum.

In sum, there are some aspects of EE that are best taught in a concentrated course, often in the secondary grade levels. These especially pertain to the higher level goals as outlined by Hungerford, Peyton, and Wilke (1980). Nevertheless, there are many features of EE that can be addressed through content and skills taught in other subject areas. Given that this project focuses on how EE is included in other subject areas, this review examined strategies to include or incorporate EE into school curriculum rather than creating a separate course.

Infusion and Integration Conclusions

Upon the review of the literature, distinctions between integration and infusion remain unclear. Even articles on infusion use integration as a verb in their descriptions. Infusion may even be a form of integration. One study attempted to differentiate between the terms, indicating that EE could be infused in non-biophysical disciplines (e.g., Language Arts and Math) and integrated in biophysical ones. However, they found the dualistic approach to disciplines restrictive and identified inconsistencies among their attempts (Mokuku et al. 2005).

Given that many of the articles on EE infusion focus on how to put environmental concepts into other disciplines, rather than how to combine multiple disciplines including EE, it is tempting to consider infusion as blending a particular discipline into other subject area matter. In this vein, the term permeation might be the best synonym for infusion. For example, infusion is a multidisciplinary approach where a single topic permeates many other disciplines.

The term infusion was especially popular in EE related literature in the late 1980s. In 1987, the North American Association for Environmental Education published a report that included papers from a symposium on the infusion debate. The debate, however, was not between infusion and integration; it was whether EE should be included in other disciplines or if it should be its own subject area. Both sides of the debate shared the intention of finding a “fit” for EE in school curriculum and program design. One side thought the topic important enough that it needs its own place, and should be inserted as a separate unit or course. The other side was concerned that unless EE is embedded within the existing curriculum it will fall out of place; therefore, they recommended the infusion of EE. While this debate continues, it appears that the term infusion has fallen out of fashion (Volk 2005). EE is still presented as a multidisciplinary program, yet one is as likely to find the term integration used in EE publications as infusion.

One example of the decrease in popularity of the term infusion can be seen by comparing the 1985 and the 1994 editions of the Wisconsin Department of Public Instruction’s *A Curriculum Guide to Environmental Education*. The earlier edition includes a definition of infusion and includes a step by step infusion guide, while both the definition and the guide are missing from the revised version. The 1994 version prescribes the following statement regarding subject area contribution to environmental education: “Elements of environmental education will not need to be ‘infused’ into subject area curriculum because they are currently there” (Engleson and Yockers 1994, p. 82).

Both the 1985 and 1994 editions of the Department of Public Instruction guides recommend schools form an environmental education committee to develop a curriculum plan for EE. This committee composed of administrators and representatives from a variety of disciplines and grade levels would ensure a K-12 scope and sequence for environmental education within existing subject areas. When the Department of Public Instruction employed a consultant for environmental education, this individual would meet with schools to help form and advise district committees. Therefore, extensive collaboration among faculty members is expected for successful EE implementation.

Barriers to EE Implementation

Indications that infusion of EE might be easier said than done are actually found in the words of environmental educators who support EE infusion:

Faculty members are the key to successfully infusing environmental education into the curriculum. A comprehensive infusion strategy demands a great deal of cooperation from the teachers who will be responsible for the infused program. Teachers must be in favor of an infused environmental education curriculum, and they must be willing to work cooperatively to build a plan for infusion and to see that the plan is carried out. It is important that instruction proceed logically across content areas; therefore, a major effort must be made to respect the integrity of existing courses (Volk 1993, p. 58).

Braus (1993) directly states that “it is difficult to infuse EE and requires extensive teacher training and effort [and that it] often relies on motivated teachers for efforts to succeed” (p. 35). Another concern about the infusion approach is that its implementation might lead to diffusion of the goal of EE. In other words, “the EE message can be so diluted to fit the objectives of a course that it can get lost/students might not ‘get it’ ” (Braus 1993, p. 35). Likewise, Volk (1993) warns that “the infusion process must not isolate objectives of environmental education so extensively throughout the curriculum that this synthesis does not take place. This implies careful and effective curriculum articulation both vertically (through grade levels) and horizontally (assignment to subject areas)” (p. 60).

Mason (1996) notes the importance of cooperation and collaboration among teachers to successfully integrate disciplines. He also discusses shortcomings of the interdisciplinary approach and stresses that additional research is needed to know if its outcomes are successful. Although the practice of EE infusion needs further investigation, the reasons why EE is not being taught in schools have been researched extensively.

In 1994, Rossow conducted a statewide survey of Wisconsin public school principals and curriculum coordinators (N=1,123). She found that only 40 percent of the districts reported

having a curriculum plan for environmental education and only 50 percent knew if they had an individual in their district devoted to EE. While there was general support of EE among the administrators, she found this support rarely resulted in action such as funds and resources devoted to EE. The administrators indicated that insufficient funds and time prevented them and their teachers from including more EE in their subject areas and school programs. Rossow's study is one of the few that focuses on the administrative level of EE implementation. Most studies assess individual teachers, recognizing they play a pivotal role in whether EE actually gets included in subject area lessons.

Following is a discussion of what are commonly called "barriers" to EE. These barriers are reasons cited by teachers and administrators for not including EE in classroom instruction. Ironically, despite convictions that EE is interdisciplinary, a common reason for not teaching about the environment is its lack of relevance to various subject areas. In other words, teachers of disciplines besides science feel that environmental education is not relevant to their subject area (Cantrell 1987; Ham and Sewing 1988; Hungerford 1975; Iozzi 1989; Lane 1993; Marco 1997; Tewkesbury and Harris 1982).

When examining the lack of successful EE implementation in schools most researchers focus on a wide array of barriers, rather than just focusing on the infusion process. In an often cited article, Ham and Sewing (1988) organized EE barriers into the following categories based on their review of the literature:

Conceptual barriers

. . . lack of consensus about the scope and content of EE. Several misconceptions about EE help to promote its lack of a consistent identity. One is that EE is relevant only to science curricula . . .

Logistical barriers

. . . perceived lack of time, funding, resources, suitable class sizes, and so forth.

Educational barriers

. . . teachers' misgivings about their own competence to conduct EE programs. Teachers with a poor background in a discipline may lack the personal interest or commitment to provide adequate instruction in that subject area.

Attitudinal barriers

. . . teachers' attitudes about EE and science instruction . . . The supposition is that if teachers do not have positive attitudes toward EE, very little instruction in this area will occur in the classroom (pp. 17-19).

In a 1986 study, Sewing used these barriers as study objectives in a research project. She interviewed 91 randomly selected teachers from six school districts in eastern Washington and western Idaho. She found that the primary barrier to teaching EE was lack of time (logistical barrier). Based on these results, Ham and Sewing (1988) noted that "the high ranking of lack of time in the school day may also engender a misconception that EE is a separate entity, something to be added on to the curriculum, thereby competing for time with other subjects" (p. 20). In other words, other barriers such as conceptual barriers can influence logistical and attitudinal barriers. The Sewing study found that although most teachers recognized that EE was teaching about the environment, over 60 percent felt that it should be taught in Science classes. This conception has been found in a number of other studies (Cantrell 1987; Hungerford 1975; Iozzi 1989; Marco 1997; Tewkesbury and Harris 1982; and others).

In 1993, Lane asked K-12 teachers in Wisconsin for reasons they do not teach about the environment. While her study found that lack of time and relevance were often cited, the main reason was lack of background knowledge (educational barrier). Unless the school district has a curriculum plan, it is up to the individual teacher to include EE. Even with a plan, it is still up to the teacher to take the time to develop the lessons and ensure that EE objectives are addressed effectively.

Although it is apparent teachers play a pivotal and often independent role in ensuring EE is included in their subject area curriculum, it is still ideal that the teacher receive support from the school, the district, and state educational agencies. Unfortunately, besides teachers facing

barriers to EE, the field as a whole has had to overcome barriers. For a number of years, it was “attacked” from a variety of critics, many of whom were funded by think-tanks such as the George C. Marshall Institute and the Atlas Economic Research Foundation (Sivek 1997). Wisconsin in particular was targeted when Michael Sanera conducted an examination of Environmental Science text books used in Wisconsin schools (Sanera 1997). His key finding was that the materials did not present fair and unbiased information, but rather used fear tactics to promote activism. Other evaluators and critics of EE reported similar findings (e.g., Adler 1992; Holt 1991; Kwong 1995; Poore 1993). Professional environmental educators reacted to these criticisms by acknowledging that the scientific knowledge and pedagogy used in EE instruction can be improved, yet also asserted that there were anti-environment agendas motivating most of the studies (Holsman 2000; Sivek 1997).

Recognizing the role teachers play in implementing EE, with or without district support, many environmental education programs have focused their attention to meet the needs of the individual teacher. They develop support materials—such as activity guides, videos, and resource books—to help teachers improve their background knowledge and to provide teaching strategies and ideas on the environment. To ensure that teachers receive these materials and learn how to use them, these programs usually offer workshops and other professional development opportunities for teachers.

Support of EE Implementation: Teaching Competencies

According to Wilke, Peyton, and Hungerford (1980), environmental education competency is the ability to provide learners with the ecological knowledge, conceptual awareness, investigative analysis skills, and participatory action skills needed to become environmentally literate citizens. The competencies of effective environmental educators have been researched and identified extensively in the literature (Caduto 1983; Hungerford and Volk 1990; Iozzi 1989; Iozzi, Laveault, and Marcinkowski 1990; Stoner 1986).

Based on her review of the literature, Lane (1993) divided EE competencies into six main areas. (1) Cognitive education competencies in EE, (2) Affective education competencies in EE,

(3) Competencies needed for the promotion of locus of control and assumption of personal responsibility, (4) Responsible environmental behavior, (5) Ability to determine grade level emphasis for EE objectives, and (6) Ability to infuse environmental education concepts. Using these categories, Lane administered a teacher survey in 1992. The results of the self-reporting survey found that teachers generally felt they were competent in increasing the environmental literacy of their students. Their responses indicated they were most confident in using a wide variety of cognitive education teaching strategies, but were less experienced in using values education methods or addressing the skills their students needed to participate in environmental issue resolution.

Carlton (1997) used the competencies outlined by Lane to assess the effectiveness of environmental education courses offered through the University of Wisconsin–Stevens Point. These courses were developed and offered during the early 1990s and funded through a National Science Foundation grant. The grant also supported UWSP in the development and administration of a master’s program in EE for teachers. Carlton’s extensive and comprehensive study included quantitative and qualitative components, surveying and interviewing teachers (and peers of the teachers) who had been through just one course of the program, three courses, and had completed the master’s program. The assessment focused on changes in classroom practice as well as the development of leadership skills and qualities. Regarding the classroom practice investigations, several of the quantitative as well as the qualitative assessments asked teachers about their EE infusion practices. Several notable findings were revealed through Carlton’s investigation.

When Carlton asked teachers how they infuse EE, she found that teachers had varying answers. They ranged from teachers reporting that environmental topics were blended throughout their practice to teachers indicating that they had EE units that they used a couple of times a year, especially around Earth Day. Carlton noted that many teachers “found their own unique balance between these two poles” (p. 136). She concludes that “it appears that the definition of ‘infusion – to environmentalize an existing course, while still meeting the objectives of the course’ is open to interpretation. For some educators it has meant adding lessons and/or

units that have an environmental focus. For others it has meant using environmental examples to illustrate a point. In other words, once again educators are balancing trying to incorporate EE into daily things and using units” (p. 179).

Another finding in the Carlton study is that teachers who completed the master’s program actually reported spending less class time teaching about the environment than teachers who had only taken one or two EE inservices courses. Her suggested explanation is that

as educators become adept at infusing environmental concepts into their curriculum, they become less aware of the fact of having done so. In addition when concepts are infused, if educators are asked to pull these topics back out to evaluate the amount of time spent, doing so can be very difficult and result in an under-estimation of the time . . . From the researcher’s point of view, educators that infuse completely may report they don’t spend any time teaching environmental concepts or themes. Instead they would report 100% of their time is spent teaching Math; they just happen to use examples that illustrate proportions through fish population data. But they wouldn’t have the audacity to claim that they are teaching about fish populations! (pp. 282-283)

Carlton also notes that teachers with advanced degrees in EE were more likely to revise lessons and incorporate more teaching strategies into their lessons, especially those particular to environmental education (e.g., skills related to environmental issue analysis). The Carlton study was a broad and comprehensive investigation into outcomes of EE professional development experiences. She interviewed 29 teachers, including 11 who had been through the master’s program.

As mentioned above, the Carlton study used aspects of the survey instrument developed by Lane (1993). A common focus of both studies was to investigate teacher EE competencies. In her concluding reviews of the literature regarding teaching competencies in EE Lane writes:

In summary, competent environmental education teachers use a variety of teaching techniques and are knowledgeable about teaching resources in EE. While each EE learning outcome is not autonomous there are specific qualities which should be developed for each outcome (e.g., ecological literacy, issue analysis, use of environmental action strategies . . .). It is also important that teachers have a positive attitude towards teaching environmental concepts, and are actively involved in teaching students about the knowledge and skills needed for environmental issue resolution. Finally since the recommended process of providing students with an environmental education is through infusion, teachers of many different disciplines must be competent environmental educators and must also be skilled in the techniques of integrating concepts into their lessons (p. 67).

Support of EE Implementation: Activity Guides

For environmental education to be successfully included into curriculum—whether by infusion or integration—teachers need resources and background information to provide ideas and strategies to teach about the environment (Braus 1993; Disinger 1993; Engleson 1985; Hayden et al. 1987; Simmons 1989). Some of the most popular support materials were published by the Western Regional Environmental Education Council (now called the Environmental Education Council) in the mid to late 1970s. These resources have been distributed through teacher workshops to hundreds of thousands of teachers worldwide (Disinger 1993). Many other organizations have developed similar resources and activity guides. Over the past 30 years, hundreds of EE activity guides and support materials have been developed by national and state level agencies and organizations. Teachers of all grade levels can find resources on seasons, solid waste, rainforests, invasive species, forests, water, endangered species, and much, much more.

Given the importance of educational materials to the field of EE, it is not surprising that the North American Association for Environmental Education published guidelines for evaluating EE materials (NAAEE 1998). This publication outlines key characteristics to look for in reviewing resources; these include Fairness and Accuracy, Depth, Emphasis on Skill Building, Action Orientation, Instructional Soundness, and Usability. The importance of the materials

being interdisciplinary is listed under “Instructional Soundness” along with eight other indicators. The term “infusion” is not found within this document, but “integration” is. The criteria used to evaluate the interdisciplinary nature of a resource include the following:

- Materials list the subject disciplines integrated into each lesson or lessons, suggest tie-ins with other subject areas, such as the Science disciplines, Social Studies, Math, Geography, English, Arts, Physical Education, Occupational Education, etc.
- The material helps develop skills useful in other subject areas, such as reading comprehension, math, writing, and map reading and analysis.
- Where appropriate, materials are keyed to national standards for other disciplines or standards adopted by the school district or state (p. 16).

NAAEE developed three complementary volumes to their EE materials guidelines, titled *The Environmental Education Collection: A Review of Resources for Educators*. These volumes reviewed more than 100 EE resources using their guidelines. Each review includes a two-page overview showcasing the results of evaluator’s comments and conclusions.

Project WILD

One of the resources reviewed in Volume 1 of the NAAEE Collection is Project WILD. Project WILD is a national environmental education program that began in 1983. Project WILD consists of an activity guide with nearly 100 activities or lesson plans that address one or more concepts related to wildlife education. The program developers created a conceptual framework that guided the activity writing process. The standard method for disseminating the Project WILD activity guide is through six-hour workshops usually offered on the weekends. Project WILD workshops are offered in all 50 states. Usually these workshops are hosted by the state’s department of natural resources, although they are sometimes made available through universities. The typical agenda of a workshop includes a brief introduction to wildlife issues in the state, an overview of the activity guide, and then involving teachers in conducting two or three activities from the guide. Workshops are led by facilitators who received training through

the state or a professional development agency offering the Project WILD program. When activities are conducted during the workshop, the facilitator usually takes the role of a classroom teacher, inviting the teachers to pretend they are students while simultaneously considering how they might use the activity in their own classrooms. The workshop concludes with a discussion on how teachers envision using Project WILD activities in the classroom.

Project WILD has been the focus of a number of evaluation projects, initiated both by the program and by outside reviewers. In 1996, Project WILD produced a summary of research findings from 26 studies generated from 1983 to 1995 (Pitman 1996). The summary highlighted teacher awareness of the program, workshop reviews, and implementation of Project WILD. By implementation, however, the review implied use of Project WILD activities and did not investigate integration or infusion. One paragraph did relay “Curriculum Placement and Implementation Strategies” and summarized that the studies concluded that Project WILD is integrated into all subject areas, with Science being the most common.

The research study of Project WILD highlighted below, conducted in the early 1980s, provides a comprehensive analysis of the program’s implementation. In addition, it includes an extensive examination of concepts and practices related to integration.

In 1983, Cantrell conducted an extensive research project on the implementation of Project WILD in Ohio. Cantrell’s project investigated the development and implementation of Project WILD on a national, state, and local level. Project WILD materials are supplementary, meaning that they

were not part of a teachers’ required curriculum. Instead they represented instructional materials which fell within the discretionary arena of the individual teacher. As optional materials, the individual teacher would then decide how best to include the activities into the existing curriculum—as something ‘added on’ to the curriculum or as an ‘integral’ part of the curriculum. (p. 330)

Although Cantrell's study thoroughly explores aspects of national and state programming, her literature review as well as her own findings continually emphasized the importance of the teacher in determining program success.

Cantrell conducted interviews with teachers who participated in three Project WILD workshops that occurred within the schedule of her project and within driving distance (50 miles) of her home. From those three workshops, 15 teachers were selected based on the criteria of grade level, subject area, and district location. Her population came from seven different schools and included eleven elementary teachers, one middle school teacher, and three high school teachers.

Of the 15 teachers selected, two high school teachers reported that they had not used any of the Project WILD activities. One indicated that she might find time next semester, but the second stated that the activities, while interesting, did not relate to his chemistry and physics classes. Cantrell's study and report of use, therefore, focused on the 13 remaining teachers who indicated that they had been using Project WILD activities.

Cantrell interviewed the teachers in her study to find out which Project WILD activities were used, how often they were used, why they were used, and how they were used (level of adaptation and incorporation). She found that the activities the teachers used the most were the ones modeled during the workshop. The reasons for activity selection stated by the teachers in Cantrell's research included relevance to the curriculum, time, and ease of use. The teachers reported mainly using the activities in Science classes, although a couple used them in other subjects such as Math and Language Arts. Most of the teachers (75 percent) indicated that they adapted the activities rather than using them exactly as written. How the activities were adapted included adjusting the materials, using only a portion of the activities, and enriching the activities with other resources. The teachers also reported that they tended to adapt the activities when they used them more frequently and became more comfortable using them ("They might do an activity as written the first time and then decide if and how to adapt it for later uses" [p. 339]).

Cantrell stressed that the purpose of her study was not to evaluate program effectiveness, although she did ask teachers how they knew the activities were successful. Teachers perceived the activities were effective based on written, oral, and nonverbal feedback.

Another measure of program success was what she called degrees of integration. The levels of integration were based on the extent to which Project WILD activities were “anchored” to the curriculum. Cantrell provided the following diagram to represent these degrees of integration.

Figure 1: Degrees of Integration of Project WILD into the Curriculum (Cantrell, p. 351)

Unanchored	Loosely anchored	Moderately anchored	Firmly anchored	Tautly anchored
← Unconnected	Related but not directly connected	Directly connected but not essential	Essential but still discernible	→ Completely integrated and no longer discernible

In Cantrell’s study population, six of the teachers’ Project WILD activities were moderately anchored and six were firmly anchored. None of the teachers had tautly anchored activities. She noted that “[a] loosely anchored program may soon be forgotten. A firmly anchored program can become an essential part of the institutional strategy and curriculum. A tautly anchored program becomes institutionalized” (p. 378).

Although this model of degrees of integration provides the promise of environmental education in general, and Project WILD in particular, becoming an integral part of the curriculum (institutionalized), there are some qualities of Project WILD and other supplementary materials that might compromise this goal. While Project WILD was “designed for integration,” the activities were also designed to be easily used, with little challenge to teachers’ existing values or traditions (Romberg and Price 1982).

This remains a major concern within the field of environmental education. In an area mostly perceived as a ‘special interest,’ few envision radical change as a result of a single program but many look at the cumulative affect [sic] of a variety of programs and see the potential for more broad based change. Project WILD individually represented simple change; as one among other environmental education programs, it represented an effort at a more complex scope of change (Cantrell 1987, p. 375).

Wisconsin K-12 Energy Education Program

In 1995, the Wisconsin Center for Environmental Education created the Wisconsin K-12 Energy Education Program (KEEP). The goal of KEEP is to increase and improve energy education in Wisconsin. More than a study of the science of energy, KEEP’s rationale is to help teachers and their students recognize that energy is “the underlying ‘currency’ that is necessary for everything humans do with each other—whether in the work place or in their personal lives—and with the natural environment that supports them” (KEEP 1999 p. vi). Energy education is a social issue as well as a scientific one and therefore has the multidisciplinary aspects common to its umbrella discipline of study, environmental education.

Recognizing that the topic of energy might seem even less relevant to subject areas other than Science, KEEP staff took several steps to emphasize the interdisciplinary nature of energy when developing the program’s activity guide and other support materials. When the activity guide was being developed in 1996 and 1997, the Wisconsin Department of Public Instruction was simultaneously publishing its Academic Standards in various disciplines. Among the steps KEEP staff took to promote the inclusion of energy concepts into other disciplines was to create cross reference charts that correlated energy concepts to the standards. Other steps included developing a suggested scope and sequence for curriculum development and designing each activity to be relevant to one or more subject areas. For example, one activity titled, “Energy Use Then and Now” can be used by Social Studies teachers to explore the history of energy use.

The framework of the *KEEP Activity Guide* was developed with the “Goals for Curriculum Development in Environmental Education” in mind (Hungerford, Peyton, and Wilke

1980). Therefore, the activities begin with awareness building topics, leading toward building knowledge and skills related to examining energy development and consumption, concluding with activities that explore investigating environmental issues related to energy and contemplating citizen action that could be taken to ameliorate some of the negative impacts of energy use.

Of the more than 2,500 teachers who have participated in KEEP inservice courses and received the activity guide, over 600 teach students in the elementary grades. Within the secondary levels of teaching, over 500 teachers who take KEEP classes are Science teachers. The remaining teachers come from a variety of disciplines including Language Arts, Social Studies, and technology education. A recent survey of teachers who have and have not been through KEEP courses found however, that more KEEP non-Science teachers teach energy than non-KEEP non-Science teachers (Ryan and Hink 2004). The KEEP courses are designed to attract teachers of a variety of disciplines; the promotional materials emphasize how energy relates to a variety of subject areas. Teachers are also interested in the inservices because they can earn a graduate credit, usually at a reduced fee; graduate credits help teachers secure recertification and increase their level on the pay scale. Therefore it is very common to have a class with a mixture of teachers from different grade levels and subject areas. The KEEP adjunct faculty who teach the courses often relay the challenges and rewards of encouraging teachers from these distinct groups to collaborate and communicate. As one KEEP adjunct faculty member recently wrote:

I really had an exceptional group that was very helpful in sharing their expertise. I do stress the point that as a facilitator it is always a challenge to meet the expectations of the class when it is so diversified—meaning K-12 teachers taking the same course in the same room. So we had teachers of geology, chemistry, physics really willing to help and share with the middle and elementary teachers. That does not always happen so I was very grateful to the H.S. teachers. ...the group really took their peer teaching seriously and when info could be added and shared all of the class members were willing to do that. Sometimes as a facilitator you see some teachers come in very lost and concerned and to see them blossom during class discussions is really neat (Henschel 2005).

To summarize this review of the literature so far, it is apparent that the interdisciplinary nature of EE is key to its successful implementation into school systems. Professional environmental educators recommend that EE objectives and concepts be integrated or infused into the curriculum. Guidance for how this infusion is to occur is limited in the literature, but is available. There are steps to the infusion process outlined in a number of publications. Frequently, these publications emphasize the importance of using environmental education resources and support materials to make the connections among EE and the objectives of other subject areas. Ideally, a curriculum development team for the school or district will create an EE plan for infusing EE. What if, as Lane (1993) found in a statewide teacher survey, the school or district lacks a plan? If EE is to be taught in the classroom it is up to the individual teachers to make the connections. Usually, workshops and professional development opportunities offered through EE programs are geared toward individual teachers, counting on them to take the initiative to integrate or infuse EE content into their subject area. Given the scheduling and budget limitations of traditional school programming and the goals of EE, infusion is an efficient strategy to implement EE into the K-12 curriculum. What is the reality of how EE implementation is to take place and what evidence is there that it has taken place? This question is explored below.

Investigations into the Effects of EE Implementation

A frequently referenced study showcasing how EE integration benefits student learning is *Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning* conducted by the State Education and Environmental Roundtable (Lieberman and Hoody 2002). The study examined 40 school programs that had developed and implemented an interdisciplinary program that used the Environment as the Integrating Context (EIC) approach. The EIC “designates pedagogy that employs natural and socio-cultural environments as the context for learning while taking into account the ‘best practices’ of successful educators” (p. 1). The investigation found that students performed better on standardized tests and were more positive about school learning than students enrolled in traditional school programs. The study concludes that “EIC, using the environment as an integrating context for learning, holds great promise to helping to ‘close the achievement gap’ in Reading, Writing, Math, Science and Social

Studies. The environment can provide a meaningful context around which educators can create a curricular framework that intrigues learners and revitalizes teachers” (p. 11). Other studies have also sought to show the academic benefits of learning about and in the environment (Cheak, Hungerford, and Volk 2002; Coyle 2005; Monroe, Randall and Crisp 2001; Sobel 2004).

In addition to some national investigations of the effects of EE integration, the University of Wisconsin–Stevens Point offers a source of EE implementation studies involving teacher research. The UWSP extended master’s of Science in Environmental Education for Teachers Program requires that teachers conduct an EE research project in their school setting. Many of these projects involve teachers developing EE curriculum and infusing or integrating the product into their lessons. Two research projects that involved infusion of energy education into science curriculum are highlighted below. Both projects use activities from the *KEEP Activity Guide*.

The goal of Rendl’s (2000) project was to infuse KEEP activities into her seventh grade science curriculum at John Muir Middle School in northern Wisconsin. Rendl’s middle school science curriculum has a unit on energy and electricity called Shocks or Surprises; what she proposed was to add KEEP activities that correlated and “fit well” to the objectives of the existing program. Rendl also mentions she needed approval from her administrator to teach additional lessons during the unit. Given the infusion strategy she describes and her request for more time, it appears that Rendl inserted and added KEEP activities to the curriculum (rather than replacing lessons in the existing unit with KEEP activities). Rendl taught the existing curriculum and the “infused” curriculum to two different classes, though she was unable to teach them simultaneously. She administered pre- and post-tests to both the control group (the class being taught with the existing program) and the experimental group (the class with the infused curriculum). Her results did show that the students with the infused curriculum scored better on the post-test (scoring 76 percent while the control group scored 60 percent). She used a linear model to examine if any factors were predictor variables for post-test results (student grade point average, gender, ethnicity, pre-test score, science average) and found the only indicator was exposure to the treatment (KEEP lessons). She did express concern, however, that the test used

included items specifically pertaining to the KEEP lessons and recommended that a traditional assessment for the existing unit should be used to arrive at more conclusive results.

Collins and Jaeger (2003) conducted a similar project in their school district during the 2001 and 2002 school years. Their project was more extensive, however, as it involved revising their entire science curriculum to use energy as a unifying theme. The researchers reported that their science curriculum, written in 1990, which was supposed to be infused with environmental topics, in fact had very little EE. Only the ecology units in the Life Science and Biology courses had references to the environment. Moreover, they found little evidence that these units were being implemented in classrooms. They found even less reference to energy, noting that it was treated as single units within the sixth and eighth grade Physical Science courses. Within their literature review, Collins and Jaeger cited reasons why they chose to use energy as a unifying theme of their Science curriculum; their justification included that energy is instrumental to both environmental and science education. They also indicated that the state academic standards for both science and environmental education included references to energy concepts. During the summer of 2002, they revised their existing curriculum to use energy as a unifying theme; in addition to a variety of supplemental resources, they “relied heavily on the *KEEP Guide* (1999) for activities, lessons, and information” (p. 17). Similar to the Rendl study, Collins and Jaeger found that students participating in the revised curriculum performed better on their assessment instruments (an average of twelve percent higher). While their instruments were not designed to address KEEP activities, the items did relate to energy in particular. Like Rendl, they made suggestions to improve the rigor of their assessments. Although Collins and Jaeger conducted a more extensive revision of their curriculum, there is evidence that their infusion involves addition of activities. For example, they stated “we took our original curriculum and added appropriate activities and subject matter to augment every unit. We then taught the same progression of topics, but the discussions included relationships to energy, and new labs and activities were performed at appropriate times during the units” (p. 20). They also provided the following advice about infusion:

When more than one staff member is involved, an open-minded team approach is needed in order for complete and successful infusion. All team members need to be committed to the approach if students are to benefit. It is important to point out, though, that this does not mean all staff members need to throw out their existing curriculum and start over. Energy infusion is an effective method when it is simply added to existing curriculum materials. The KEEP guide is an excellent source for finding energy activities that can be added to varied topics and subjects (p. 45).

The teacher research projects discussed above both indicated that infusion of energy education was their goal. Both projects—especially Rendl’s—inserted and added activities to existing units; energy concepts were not integrated or blended with the existing lessons. So, either they have a perception of infusion different than what has been described in the literature or the definition of infusion needs to be reconsidered.

Infusion and Integration Successes and Failures (outside of Environmental Education)

To further investigate the reality and effectiveness of including one discipline within another, this review explores how other subject areas outside of EE examined infusion and integration. In 1982, Hirsh investigated the success of an educational program designed to infuse an economics education curriculum into schools in northern Texas. Based on the results of her study, she concluded that

infusion seems to contain characteristics that qualify it as a slogan . . . It has the necessary ambiguity about its meaning and purpose as indicated by the lack of definition in the literature. Moreover, the term itself seems to provide no help to indicators in identifying the what, when, where, and how of implementation. Clear conceptualizations of strategies for achieving infusion have yet to be identified. While the concept is vague enough to distract followers, it appears to lack the necessary specificity to direct action (p. 26-27).

She further indicated that the infusion approach is popular with mandates, especially unfunded mandates. A harsh interpretation of this assertion is that legislators and administrators pass mandates with no real thought (or care) to if or how they will be followed or implemented. Indeed, several researchers report finding little information in the literature on how to infuse EE (Marco 1997; Simmons 1989; Volk, Hungerford and Tomera 1984). Other studies focused on teachers' understanding of infusion and found inconsistencies among educators of what infusion is and how and where it is to occur. Several of these studies are discussed below.

In 1998, Meier, Cobbs, and Nicol examined the research related to the integration of Mathematics and Science. They noted that although benefits of Math and Science integration abound, there has not been enough support in the literature to promote extensive programming to integrate the two subjects. They highlighted issues related to the ability of teachers to meet the goals of both subject areas simultaneously. In particular, they looked at the results of research related to integration programs such as Activities Integrating Mathematics and Science (AIMS), Teaching Integrated Mathematics and Science (TIMS), and Integrated Mathematics, Science, and Technology (IMaST). Their literature overview categorized barriers to Mathematics and science integration which are described below.

The Teacher Knowledge Barrier

“Teachers at any level who teach an integrated curriculum must be knowledgeable about the connections among many disciplines. They must have the background and confidence to integrate the various content strands within a content area, as well as to maintain the integrity in the entire integrated curriculum” (Meier, Cobbs, and Nicol 1998, p. 441). They identified challenges to teachers achieving these competencies at both the elementary and secondary level. Despite their pre-service education programs, elementary education teachers usually lack confidence in both Science and Mathematics. Expecting them to integrate the two or to integrate the subjects into other disciplines is “questionable, at best.” Programs such as TIMS are designed to provide teachers with integration knowledge and skills. The research noted that the programs succeeded, but needed to increase content knowledge support, and the importance of the involvement of the principal was crucial to program success (Goldberg and Wagreich 1991).

Teacher Belief Barrier

Meier, Cobbs, and Nicol (1998) found in several studies that teachers were frequently unwilling to change their teaching practices. Even when they expressed vocal support for integration, an examination of their practice found that little integration was actually taking place. Lehman (1994) found that teachers perceived that integration was adding lessons to an already crowded curriculum. Meier, Cobbs, and Nicol state that “In-service and preservice teacher beliefs are not the only barriers to integration. University faculty must also examine their own beliefs and practices. Until then, unanswered questions regarding the support for integrated curricula in teacher education programs abound” (p. 442).

School Structure Barriers

Meier, Cobbs, and Nicol reported that school scheduling, student involvement, financial support, and standardized testing issues all affected the acceptance of curriculum integration. They noted that any new curriculum has to overcome challenges, and that when more than one discipline is involved in the adoption process the challenges are compounded.

The Assessment and Curriculum Barriers

Evidence of student achievement through integrated curriculum instruction would definitely support system reform. However, Meier, Cobbs, and Nicol note that current standardized tests are designed to assess single rather than integrated curriculum. They indicate that the results of traditional standardized testing would not reflect the benefits of integrated programs. They also report that textbooks and curriculum projects that provide integrated teaching materials are limited, but increasing. Likewise, these programs are generating test items designed to assess student understanding of integrated curriculum. They stress the importance of staff development to the success of integrated program implementation.

James et al. (2000) assessed the effectiveness of the GTE foundation-funded Science, Mathematics, and Technology integration project GTECH. They defined integration as the interaction of concepts and contended that integration is essential for broader understanding of concepts. They used the Stages of Concerns Questionnaire (SoCQ) developed by Hall, George, and Rutherford (1979) to conduct a formative assessment of GTECH, focusing on teacher

perceptions (concerns). Their study found that GTECH helped students develop skills in problem solving, teamwork, technical expertise, and creativity. They did report some ways in which the program needed to be improved. In particular, they found that teachers of Mathematics were least likely to integrate science and technology concepts into their curriculum, stating that the rigid structure of the state standards did not allow for more content. Addressing this shortcoming will be a focus of the GTECH team members in the future.

Arnold and Schnell (1999) administered a self-report questionnaire to Georgia teachers to ascertain educators' opinions of the importance and frequency of Technology Education integration into academic and vocational classes. Their study focused on high school and postsecondary teachers, comparing and contrasting the perceptions between and among the two groups. Georgia legislation requires the integrated Technology Education programs to address employer concerns that students were graduating from high school lacking important skills in teamwork, communication, and problem-solving. The integration approach was recommended to "curb fragmentation in school organization and invigorate the curriculum with greater relevance" (p. 87). Despite this support, Arnold and Schnell found criticism of integration in the literature, noting concerns about its rationale and effectiveness and lack of evidence that integration even occurs. In their study, they found that while both high school teachers and postsecondary instructors agree that curriculum integration benefits both academic and vocation courses, the frequency of actual implementation lagged behind its perceived importance. They ponder if educators are reluctant to change their practice that currently emphasizes college preparation rather than job readiness. They also wrote that high school teachers especially noted that they lacked the administrative support (e.g., resources and staff time) to effectively integrate curriculum.

Shoff (2003) investigated the support systems that sustained interdisciplinary teams in five high schools within the Los Angeles County school district. The study also explored barriers that hindered interdisciplinary teaming and identified strategies that were used to overcome the barriers. A significant conclusion of the research noted that

integration requires the teacher to make significant instructional changes in classroom practices, as well as changes in working with the subject matter and colleagues.

Traditional instructional practices tend to focus on teaching specific knowledge and skills, whereas integrating curriculum involves understanding relationships between subject matter and helping students make connections to the real world. Therefore, integrating curriculum suggests the use of more student-centered instructional strategies rather than traditional teacher-centered. Teamwork, problem solving, and project-based learning are instructional methods often associated with the integration of disciplines (p. 36).

In 2002, Brewer conducted a literature review to analyze the benefits, validity, and implications of integrated teaching as well as to report if and how integrated practices have affected schools and educational policy. The subject area focus of his review was art education. He defined an integrated art curriculum as one that combines or blends art instruction with another subject area. Brewer expressed his concerns about integrated curriculum for art early in his review, stating that the approach can “deny visual arts its value as a distinct discipline” (p. 31). He also noted that while much of the literature describes integration programs and their intent, very few conducted actual research of curriculum integration and its effect on student achievement. Brewer concludes that

one of the main points distilled from this analysis is that—although integrated, correlated, and interdisciplinary art instruction can provide positive learning circumstances—more often these approaches result in instrumental functions for art learning. This instrumental function diminishes disciplinary and academic integrity and brings up far short of the rigor set forth in state and national standards for visual arts. Moreover, the new curriculum may often be more a matter of content selection, political interests, or administratively expedient policy than about improving student achievement (p. 36).

These reviews focused on the challenges and benefits of infusion and integration of disciplines other than EE. In general, while there are appealing aspects of the interdisciplinary

approach, there are many challenges to developing and implementing combined discipline. Teachers of core subject areas resist changing and adding more to their curriculum. Supporters of infused content are concerned that their discipline will be treated as inferior compared to core subject areas. Other barriers include lack of time, teacher background knowledge, and administrative support—similar to challenges found with EE implementation.

Involving Teachers in EE Research

The review of the literature regarding the definition and implementation of environmental education continually referenced the importance of the teacher in the success of environmental education. Much of the implementation of EE to date in Wisconsin and as well as the United States has used a “top down” approach. As discussed in this literature review, Wisconsin has state mandates requiring that teachers of certain disciplines receive professional training in EE teaching methods and that districts are responsible for developing EE curriculum for these and other disciplines. “The . . . approach, then, is predicated on the assumption that a central authority is competent in identifying innovation problems, developing solutions to those problems by drawing upon pre-existing bodies of knowledge and empirical testing strategies, and disseminating these solutions—which are thought to have universal applicability—to ‘target groups’” (Robottom 1987a, p. 293).

In addition to state EE mandates, the University of Wisconsin–Stevens Point offers a master’s program for teachers of environmental education. Through this program, teachers participate in courses about natural resources and natural resource management and are required to complete an EE research project. The project should foster the development of the teacher’s EE skills and help improve the status of EE in their school or district. The professional environmental educators who administer this master’s program often label these teacher projects as Action Research (Sivek 2002). Furthermore, other professional environmental educators use this title to describe projects where teachers and their students are involved in actively researching and analyzing environmental issues (EE link 2005; Mordok and Krasny 2001). Often the success or failure of these projects is measured through quantitative surveys and analysis.

Rarely are teachers encouraged to examine their practice and their educational theories regarding the implementation of environmental education.

Despite this concern over the lack of teacher involvement in EE research in Wisconsin, there is evidence that alternative views (and paradigms) are becoming more acceptable and popular in EE research. At the national level, several leaders in the field of EE have begun to conduct qualitative studies as part of their research (Volk 2002). Recently the North American Association for Environmental Education awarded Paul Hart, a professional environmental educator from Canada who has long promoted qualitative research in EE, its highest award, recognizing the importance of his research to the field of EE.

Until quite recently educational decisions . . . have relied heavily on the results of causal comparative psychometric methods . . . focused more on outcomes than on how teachers make sense of their educational goals and experiences. We now seem more willing to acknowledge that, in order to begin to understand something as complex as teaching, we must employ a much broader range of research methods, which implicate and involve teaching practice more directly (Hart 2003, p. 4).

In Wisconsin, Lane (1993) recognized the need for a broader range of research during quantitative analysis of her statewide survey. Despite the usefulness of the survey results, the study had some acknowledged limitations. In particular, the researcher acknowledged “The instrument [used in the study] contain[s] test items which have teachers determining their perceived level of competency, these types of test items may result in teachers consciously or unconsciously misrepresenting themselves” (p. 13). Lane also noted a “discrepancy among different aspects of the survey findings (e.g., positive attitudes and perceived competencies versus lack of diversity) in use of teaching strategies [and] limited amount of class time spent teaching EE concepts” (p. 239). She suggested that qualitative research methods might provide more effective insights into the EE practices of classroom teachers. “Through interview and classroom observations, researchers could learn about the actual practices . . . regarding the environmental education of students” (p. 239-240).

Hart (2003) writes, “professional development in environmental education, whether reflective or inquiry focused, should include some form of critique of environmental and educational values and assumptions that inform existing educational policies, curriculum activities, and school practices” (p. 29). This quote comes from Paul Hart’s book titled *Teachers’ Thinking in Environmental Education: consciousness and responsibility*. Hart and his research team conducted an extensive review of the literature to identify a variety of qualitative methods that could be used to investigate teacher thinking (e.g., Butt, Raymond, and Yamagishi 1988; Cochran-Smith and Lytle 1993; Connelly and Clandinin 1986; Day, Calderhead, and Denicolo 1993; Elliot 1993). He noted that they were looking for methods that would help teachers to understand their own personal practical theories. He also wrote that these articles and others were part of a “rapidly expanding literature that begins to deepen conversations about the potential of teachers as researchers, to question the conventions of traditional research methods and analysis, and to propose new frameworks for crossing traditional boundaries that have divided teachers and researchers” (p. 53).

Through conversations with teachers Hart wanted to create an atmosphere where teachers could think through what they often take for granted and to consider their values regarding environmental education. Hart acknowledges the limitations of narrative inquiry, and in particular the presence of the researcher/analyzer in this project. They recognized that they did not play a neutral role and in fact played an active part in the teachers’ construction of their social reality. Hart indicated that they involved teachers in the review and analysis of the stories at every aspect of the project, but bemoans that

our attempts to make the process more akin to participatory action research were forestalled to some degree by circumstance—busy teachers whose main interest was not in research but in using the research process for their own purposes; that is, to locate new materials and methods and news about what other teachers were doing in environmental education (p. 61).

Although they indicate it would be ideal if teachers conducted and reported the research and analysis of their own theories and practices, Hart notes that

we were pleased that teachers, reluctant to write about their own thoughts and experiences, became involved in contributing to restorying and some interpretations of their ideas and practices. We assumed that their theoretical beliefs, philosophies, and understandings about their environmental education could best develop in their own minds as we worked together in reflective conversations about what was happening in their classrooms and field experiences (p. 60).

The key characteristic that makes Hart's research attractive is that teachers are involved in the data analysis. While the data collection and analysis in this current study involves analyzing interview results rather than the teacher narrative methodology used by Hart, teachers play a key role in this project. The following chapter outlines the methods used to further explore the concept of infusion and examine the reality of EE implementation in Wisconsin classrooms.

Summary of Chapter 2 and Introduction to Chapter 3

The field of environmental education has faced many challenges over the past thirty years. Although it has received international attention and been the focus of United Nations symposiums, its definition and goals are still debated. Despite the controversy of what EE is, professionals in the field agree that it should be taught and should promote environmental literacy. However, with this agreement comes a different dilemma of how it should be taught, and more importantly, how and where it should be in school programs that are already crowded with traditional disciplines and special interest topics. Although it might be ideal to add EE to the school curriculum, a concern is that an inserted course or activity may be considered ancillary and expendable. Unless the activity or course is integral to the curriculum, it can be removed as easily as it was inserted. A common recommendation is that EE objectives be integrated or infused into the curriculum of other disciplines. Once again, what infusion is and how it should take place are in turn debated. Wisconsin has a state mandate requiring that EE be integrated into several subject areas and that each school district develop an EE curriculum plan.

Given the support for infusion, investigations into the reality of infusion—how teachers actually practice infusion—are limited in the literature. While the barriers to EE have been identified and studied extensively, the successes need further attention. In support of infusion, many environmental education programs (Project WILD, Project Learning Tree, Project WET, and KEEP) have developed support materials designed to supplement existing curriculum. Ideally, teachers competent in integrating EE into their curriculum will use these resources and other support strategies to teach their students about the environment and involve them in environmental issue analysis. Involving teachers in reporting and reflecting on their practice will provide key insights into the reality of EE implementation.

The following chapter provides the methods used for investigating conceptualizations and practices of EE implementation. Classroom teachers were used as expert insiders, helping to form, confirm, and disconfirm insights of how the status of EE could be sustained and improved in Wisconsin.

CHAPTER THREE

METHODS

This chapter outlines the methods used to investigate the three-part purpose of this project:

- To learn how professional environmental educators perceive EE should be implemented in Wisconsin, including their conception of infusion
- To investigate the reality of environmental education implementation, including infusion, into subject area curriculum in Wisconsin
- To assess the pervasiveness of environmental education implementation, including infusion, into subject area curriculum in Wisconsin

Investigating the following research questions will help to address this three-part purpose:

- How do professional environmental educators currently envision the implementation of EE into school curriculum? How does this vision relate to infusion of EE that has been recommended in the literature?
- How do teachers reputed to be effective environmental educators teach about (and/or for) the environment? What strategies do they use to integrate or infuse environmental concepts into their curriculum? How do their EE teaching practices compare to the methods prescribed by professional environmental educators?
- To what extent are EE implementation strategies practiced by teachers throughout Wisconsin?

An overview of the research methods used to address the purposes and research questions listed above is provided below. The topics discussed include the following:

Introduction

Overview of Qualitative Data Collection Methods Used in this Study

Sampling Methods

In-depth Interview Methods

Considerations for Project Validity

Data Analysis

Considerations for Generalizing the Project Results

Part I: Interviews with Professional Environmental Educators

Sampling Procedures

In-depth Interviews

Data Analysis

Part II: Teacher Interviews and Supplementary Observations and Document Analysis

Data Collection Methods

Pilot

Sampling Procedures

In-depth Interviews

Observations

Document Analysis

Data Analysis

Supplemental Interviews

Part III: Survey Development and Implementation

Overview of Advantages and Disadvantages of Mailed and Internet Survey

Limitations

Introduction

To gain insights into EE implementation in Wisconsin, I primarily collected data through in-depth interviews, with additional insights provided through observations and document analysis. The literature review along with some supplemental interviews also helped to define and refine some of my understandings. I developed and administered a statewide survey to get an idea of the pervasiveness of EE implementation in Wisconsin. The survey method of data collection is the quantitative aspect of my study, although it too was designed to provide insight rather than representative findings about EE in Wisconsin.

Following is an outline of methods used to address each purpose of the investigation:

- To gain an understanding of professional environmental educators' opinions as to how EE should be implemented in Wisconsin, including their conception of infusion

Seven professional environmental educators were interviewed to ascertain their conception of environmental education infusion.
- To investigate the reality of environmental education implementation, including infusion, into subject area curriculum in Wisconsin

Thirteen teachers in Wisconsin participated in in-depth interviews to analyze the EE implementation strategies. Eight of these teachers (including one team of two teachers) presented a classroom lesson and provided documents that further explained how they teach about the environment. Teachers were interviewed after the observation of the lesson (post-observation interview) to share any relevant documents (e.g., lesson plans, resources, student work and projects) that illustrate their EE implementation strategies. The teachers were given pseudonyms, and their school name and district were not mentioned.
- To assess the pervasiveness of environmental education implementation, including infusion, into subject area curriculum in Wisconsin

This purpose was addressed through a statewide survey/questionnaire. It mirrored a survey conducted in 1992 and was sent out to 1539 randomly selected teachers throughout Wisconsin. This list was generated through the Department of Public Instruction. The teachers will remain anonymous.

Overview of Qualitative Data Collection Methods Used in this Study

This applied study used qualitative research methods (in-depth interviews, observations, and document analysis) to collect data for analysis. The participants of the study were selected because they were key informants and expert insiders. Through a series of interviews with professional environmental educators and then with exemplary environmental educators in the field—teaching in the classroom—the aim was to accumulate data and synthesize the findings to enhance perspectives into the reality of EE implementation. The collaborative, reiterative, and

professional nature of the interviews and observations provided these informants and experts with the opportunity to participate in the analysis. Through in-depth interviews, the participants were able to provide meaningful and useful insights into Environmental Education in Wisconsin.

Sampling Methods

Specific information about the samples for Parts I and II of this study is provided below. In general, the approach used to identify the sample population in this research did not fall cleanly into one sampling method. Various criteria for selecting participants were identified ahead of time, so elements of purposive or criterion-based sampling were involved (Ritchie, Lewis, and Elam 2003). The “sampling typical cases” described by Patton (2002) also applies. As most of the professional environmental educators work at UWSP, there was also an element of convenience sampling. However, they are also recognized nation-wide for EE implementation. The teachers are known to care about the environment and most played some leadership role in their school; they could best provide insight into the reality of teaching about the environment in their school or district.

In-depth Interview Methods

The primary method used to collect data in this project was through in-depth interviews. I reviewed a number of handbooks and research guides to prepare myself for the interview process (e.g., Holstein & Gubrium 2003; Kvale 1996; Rubin & Rubin 2005). The format I ended up using most closely followed the “Interview Guide” strategy as described by Patton (2002). It has more structure than an informational, conversational interview but is less restrictive than a standardized, open-ended strategy, and especially more open than a closed, fixed-response interview.

An interview guide is prepared to ensure that the same basic lines of inquiry are pursued in each personal interview. [It] provides topics or subject areas within which the interviewer is free to explore, probe, and ask questions that will elucidate and illuminate that particular subject. Thus, the interviewer remains free to build a conversation within a particular subject area, to word questions spontaneously, and to establish a conversation

style but with the focus on a particular subject that has been predetermined (Patton 2002, p. 343).

In preparation for the interview, the informants were provided with a list of questions that would be discussed. This list helped prepare them for the session and to guide our conversation. Some items were asked more explicitly to ensure they were discussed. For example, with the professional environmental educators, each informant was asked to describe their understanding of infusion and if it differed from integration or other approaches to implement EE. By not having a structured interview, the interviewee was given the opportunity to expound on a topic related to EE that was of significant concern to him or her. Patton (2002) acknowledges that a limitation of this approach is that important topics might be overlooked or omitted and that how the question is asked might influence the response.

To help address these weaknesses I made sure to take time to review the guiding questions before and after the interview sessions. I also had the good fortune to have existing positive working relationships with the interviewees or was able to develop a good rapport so that it was possible to follow up the interview with phone calls or emails to ask specific questions. The diversity of responses to the questions facilitated an emergent advantage to the study. As ideas evolved during the study, I could share them with the informant currently being interviewed to ascertain his or her opinions and reactions. The intent of this approach was to gain a diversity of perspectives and insights to this study's research questions.

In this way, both the professional environmental educators and the teachers served as the "key informants" for this study.

One of the mainstays of much fieldwork is the use of key informants as sources of information about what the observer has not or cannot experience, as well as sources of explanation for events the observer has actually witnessed. *Key informants* are people who are particularly knowledgeable about the inquiry setting and articulate about their

knowledge—people whose insights can prove particularly useful in helping an observer understand what is happening and why (Patton 2002, p. 321, emphasis original).

Patton cautions though that the researcher should refrain from using these informants as the sole source of data or to rely too much on what they say. It should be remembered that the insights of the interviewees are limited, selective, and biased. “Data from informants represents perceptions, not truths” (Patton 2002, p. 321). Therefore, it is important to verify findings by relating them to other sources of data, including the literature review, other interviews, observations, and documentation. In other words, the validity of the data needs to be confirmed as well as possible.

Considerations for Project Validity:

What steps were taken to ensure the information gathered and analyzed was trustworthy?

In the quantitative realm—especially with survey instrument development—there are prescriptive steps one can take to ensure validity. These include statistical formulas as well as peer reviews and pilot testing. Each of these approaches and others essentially help confirm that the data gathered truly reflects what was intended to be collected (Hammersly 1992; Lewis & Ritchie 2003). In the positivist extreme, the steps ensure that the data reflects the truth, untarnished by researcher bias. In qualitative research, it is understood that the researcher is the instrument used to collect data, rather than a survey or some other objective tool often used in quantitative studies. Therefore, it is up to the researcher to ensure the reader that his or her data collection and analysis is valid, or as alternatively labeled: trustworthy or credible (Glaser & Strauss 1967; Hammersly 1992; Lincoln & Guba 1985).

For this project, the following steps were taken to support the validity of the data collection and analysis:

- Professional environmental educators who had expert knowledge and experience in EE were selected to share their views and opinions.

- Criteria were established to identify a sample of teachers who could provide trustworthy insights into their own EE teaching experiences as well as their perceptions of the state of EE in their school and district.
- A variety of methods were used to collect data from the teachers including in-depth interviews, observations, and document analysis.
- Interviews were recorded and extensive field notes were taken during the interview as well as during the observations.
- As needed, the researcher followed up with the environmental educators as well as the teachers to confirm or disconfirm ideas and conclusions as well as to provide supplementary information.

The use of triangulation is often referenced and discussed in qualitative research design (e.g., Creswell 1998; Denscombe 1998; Fontana & Frey 1994). Essentially, triangulation is using multiple research methods to acquire data and to investigate a research problem. This study had features of triangulation on three different levels. On the first level, three different populations were accessed to collect data: professional environmental educators, the exemplary teachers of environmental education, and a representative sample of teachers from Wisconsin K-12 schools (Triangulation through Multiple Analysis [Denzin 1978]). Within the second population—the exemplary teachers—there was a second level of triangulation: data was collected via in-depth interviews, observations, and document analysis (Triangulation of Sources [Denzin 1978]). Using these multiple approaches provided a variety of perspectives into the situation being studied (EE implementation). Finally, as both qualitative and quantitative research methods were employed, this study incorporated “Methods Triangulation” (Denzin 1978).

The interviews, observations, and document analysis conducted with the exemplary teachers were especially important to strengthen the validity of the findings. Each method helped to cross-reference and cross-check the other.

Data Analysis

It was challenging to label the method of analysis used in this study as it employed a variety of data analysis strategies (Eisenhardt 1989). For example, it had aspects of modified analytic induction (Bogdan & Biklen 1992; Gilgun 1994; Ryan & Bernard 2000), case study research (Yin 1994), and related to practices described in the grounded theory approach as well (Flick 2002; Glaser & Strauss 1967; Ragin & Becker 1992).

Analysis of the data gained from the interviews, observations, and documents was inductive and emergent. Data was accumulated through a series of interview sessions and supplemented with observations and document analysis. The expert insights were used to develop overarching concepts that were checked against further interviews for clarification, confirmations, and disconfirmations. This reiterative process helped to develop generalizable insights, with the professional environmental educators and teachers serving as co-researchers who helped explain the reality of EE implementation in school districts in Wisconsin.

Extensive analysis took place after the interviews and observations as well. The recorded interviews were listened to repeatedly and key comments and quotes transcribed. On average, each interview was listened to four times. The first time was during the live interview when it was recorded and accompanied by field notes. Then, I listened to the recording a second time while reviewing my notes. The third time I listened, I noted key comments and jotted down the time they occurred. The final time I listened, I transcribed the key findings when I came upon them.

This process of repeated listening and transcribing key comments rather than transcribing the entire interview avoided excess absorption of time and energy of the researcher (Flick 2002; Strauss 1987) and also helped to gain understanding of the broader meaning of the interviews (familiarization [Ritchie, Spencer, & O'Conner 2003, p. 221]). After several reviews of the recordings and the transcribed notes along with daily examinations and considerations of the data, categories of themes or ideas began to emerge (Ritchie, Spencer, & O'Conner 2003). Categories were formed based upon their similarity (Lincoln & Guba 1985; thematic coding [Flick 2002]). These categories were summarized and further transcriptions were made as needed to illustrate

them. Data analysis, both during and after interviews, also sought to identify evidence that “disconfirmed” or countered the categories (Flick 2002). When found, these negations usually evolved into new categories that enriched insights into the reality of EE implementation.

The analysis of the interviews with the professional environmental educators and the teachers differed slightly. With the teachers, each session was reviewed and written up as a separate vignette and then cross-analyzed, while data collected from professional environmental educators was accumulated, synthesized and presented as a single vignette. The professional environmental educators worked with me to gain a general understanding of EE implementation, while with the teachers I was trying to understand EE implementation in their particular setting. So, it was important to first look deeper into the results of their individual interviews and observations before looking at all the vignettes in combination.

Additional information about the interviews conducted with the professional environmental educators is provided below (Part I). The results of the analysis, the findings, are presented in Chapter 4. The report provides major themes drawn from the interview analysis. Quotations helped to illustrate emergent themes and prevalent findings. To assist with clarity of reading, minor editing was either conducted by the educator or by me with permission of the educator. This involved removing “ums” “ahs” and redundant or aborted sentences (Weiss 1994). The original passages along with other transcribed text are available upon request to the advisory committee.

The findings resulting from the analysis of the teacher vignettes are found in Chapter 5. Additional information on how the data was collected is described below (see Part II). Each session was analyzed in isolation first. The purpose of this initial analysis was to provide a rich description of each teacher’s situation related to his or her EE implementation (Eisenhardt 1989). Similar to the treatment of the textual presentation for the professional interviews, some quoted passages underwent minor editing to assist the reader with understanding text. Again, original transcribed information is available upon request to the advisory committee. Along with the details provided through the interviews—the primary source of data for the vignettes—

descriptions of the observations and supporting documents are included to provide more contextual insights into the teacher's setting. The observations and referenced documents help to illustrate and verify what was stated in the interviews.

The concluding chapter of this study compiles the analysis among the teachers and relates it to the professional environmental educator findings. The survey plays an ancillary role in that it is used to clarify and quantify some of the findings from the vignettes while providing new opportunities for future in-depth studies.

Considerations for Generalizing the Project Results

What steps were taken to ensure the findings and insights could be useful to the field of EE in general and to EE implementation in Wisconsin in particular?

This research project was designed to gain insights into the reality of EE implementation in Wisconsin; however I had the undeniable and unavoidable desire to hope that my findings might be useful to the field of EE. One particular focus of the study was to learn how teachers implement EE (e.g., through infusion, integration, or some other approach), but ancillary information about the status of EE in Wisconsin was also investigated. Although the barriers to EE have already been extensively investigated, this study gained insights into known and new reasons why environmental education is no longer "in vogue" as one educator stated. More than just learning that EE teachers are in the minority, this study also worked with the research participants to suggest approaches to increase district and teacher interest in environmental education. The analysis of these insights was designed to be relevant and useful to current and future professional environmental educators interested in improving the status of EE. In other words, it is hoped that the results will be generalizable to the field of environmental education.

Traditionally, generalizing the results of a study means applying the findings from a sample population to the larger population from which the sample is drawn. Care is taken to glean a representative sample from the larger population and to remove researcher bias while collecting data. It is often said that with qualitative research, it is the reader who generalizes the findings by considering if the information relates to their experience and understandings (Stake

2000; also called transferability [Mertens 1998; Guba & Lincoln 1989]). Mertens (1998) explains that “in qualitative research, the burden of transferability is on the reader to determine the degree of similarity between the study site and the receiving context. The researcher’s responsibility is to provide sufficient detail to enable the reader to make such a judgment” (p. 183).

An inherent challenge with qualitative research, however, is that the researcher is collector and interpreter of data. Not only does the researcher have subjective viewpoints entering the field, usually the sampled population is small so generalizing findings to a broader population is often questioned (Firestone 1993; Maxwell 1992). Nevertheless, various researchers suggest ways in which qualitative research can be generalized. Ritchie and Lewis (2003), for example, assert that results from qualitative research can be generalized to the parent population (representational generalization) or to other similar populations (inferential generalization). They emphasize that the criteria used to generalize quantitative data, namely statistical processes, do not apply to qualitative data. Rather, the steps taken to validate the data and ensure its validity contribute to the generalizability of the results. For this study, the results will be generalized to insights of practice.

By supporting the external validity of a study one makes sure his or her investigation is thorough and sound and verified. With this verification, one can propose to the reader that the findings are relevant to other situations. Many of the steps taken to ensure internal validity can support external validity. Another strategy to enhance the external validity of the study is to investigate multiple cases (Yin 1994). Stake (2000) calls this a collective case study which can be used to understand a general phenomenon. More important than the number of cases investigated, it is the quality of cases that is valued (e.g., instrumental case study [Stake 2000]). The researcher looks for examples that strategically help to formulate or illustrate a conception of ideas or insights. Researchers also recommend looking for confirming as well as disconfirming data (Eisenhardt 1989; Firestone 1993; Ritchie and Lewis 2003). Schofield (1990) warns that an increase of breadth of the study can jeopardize depth if the researcher is not careful. Another issue that arises when studying multiple situations is that the amount of data increases

proportionally and it is possible to overlook unique aspects of individual situations in the pursuit of generalizable “wholes” (Eisenhardt 1989; Firestone 1993; Patton 2002). As de Vaus (2001) puts forth:

We could go on forever and check things out under any number of different conditions. In the end we must make judgments about the likely variations and have good reasons for expecting that these different conditions might affect the patterns. We must also be guided by what is practical within the constraints of time, money and access to relevant cases. The critical thing is to select the most strategic cases to test our propositions rather than aiming for a large number of cases (p. 241).

Consequently, while looking at a larger number of situations can enhance external validity, a challenge is that the amount of data generated increases proportionally. A variety of approaches have been put forth to analyze the myriad sources of data and to generate generalizable insights. An often referenced strategy to analyze data is through grounded theory (Glaser & Strauss 1967). Several researchers reference Ragin (1987) who uses Boolean algebra to systematically compare data and to draw conclusions (e.g., Firestone 1993; Schofield 1990). Still others highlight Miles and Huberman (1984) who use tables and matrices to organize and present data. A number of other strategies are outlined and sometimes it is difficult to discriminate among them and to determine which is best to use for which particular study (Eisenhardt 1989).

Although it can be overwhelming to encounter so many recommended approaches to analyze data generated from multiple sources of informants, it is possible to find commonalities among them. Attention to detail is of particular importance. While attending to the detail, it is often recommended to begin to build a bigger picture and to keep the picture in mind while proceeding with the study. Here is when it is vital to keep an open mind though and look for instances that might negate the picture being formed. Essentially, what is happening here is that some ideas or constructs are being formed which may lead to hypotheses that can validate or refute the idea (Marshall & Rossman 1989).

To develop generalizable insights that could be helpful to the field of EE in Wisconsin, a number of steps were taken during data collection and analysis to justify that the conclusions made were relevant and meaningful to professional environmental educators. The three purposes put forth for this study were designed in part to contribute to generalizable insights for the field of EE. First, the professional environmental educators along with a literature review provided a foundation for EE, what it is and what it should achieve. Their insights were used to provide an overall picture of EE in Wisconsin, including their hopes for successful implementation and concerns about its current status. Second, the teachers who participated in the study provided insights into the reality of EE in Wisconsin. These educators were selected to illustrate how teachers from different grade levels and subject areas and from different school settings use a variety of similar and diverse approaches to teaching about the environment. Separate vignettes describe the situation of each teacher separately while cross-analysis strategies identified patterns and themes among the vignettes. Third, surveying a randomly selected sample of teachers from a general population could fit conventional strategy to achieve generalizability. That is, the sample population is representative of the parent population. However, for this study, rather than providing conclusive information about EE in Wisconsin, the survey results are used to further illustrate insights gained through the qualitative aspects of the study.

As discussed above, as data was being collected from each of the three parts, a “big picture” of EE in Wisconsin was being developed by the researcher. The insights from all the participants were used to confirm and to disconfirm insights that were being developed. It was not until the findings from each of the three parts had been written that the overall insights were made. It is hoped that these insights provide a theoretical framework for how EE in Wisconsin can be improved. It will be up to the investigations of other researchers to test this framework to confirm if the insights drawn here truly are applicable and helpful to the field of EE.

Part I: Interviews with Professional Environmental Educators

Sampling Procedures

I conducted interviews with professional environmental educators to gain insights into their perspective of EE implementation. These individuals were selected because they have played significant roles in the history of EE implementation in Wisconsin.

Dr. Randy Champeau is the founding and current director of the Wisconsin Center for Environmental Education. He also helped establish the Wisconsin Environmental Education Board.

Dave Engleson was selected because he served the Department of Public Instruction for 24 years as its first Environmental Education Consultant. He was the primary author of the 1985 and 1994 editions of *A Guide to Curriculum Planning in Environmental Education* and is recognized as a pioneer of environmental education in Wisconsin.

Pat Marinac is the staff development director for the school district of Appleton and is a former Environmental Science teacher. She has been extensively involved in setting EE policy in the state and is the current chair of the Wisconsin Environmental Education Board.

Dr. Dan Sivek has worked with the Wisconsin Center for Environmental Education since its inception and has conducted research into predictors of environmental sensitivity.

Sterling Strathe is the program director for LEAF, a statewide forestry education program. His other experiences include directing outdoor and recreational centers in central and southern Wisconsin. While program director at the Central Wisconsin Environmental Station, a UWSP field station specializing in residential environmental education programs, Sterling served as the environmental education practicum instructor for all UWSP environmental education majors.

Dr. Rick Wilke was interviewed because he played a key role in establishing the Department of Public Instruction's EE mandates. He is currently the director of the Environmental Protection Agency's Environmental Education and Training Program.

Dr. Dennis Yockers is a faculty member of the University of Wisconsin-Stevens Point and was formerly the Environmental Education Consultant for the Department of Public Instruction, and the Environmental Education Coordinator for the Department of

Natural Resources. He is the co-author of the 1994 edition of *A Guide to Curriculum Planning in Environmental Education*.

As I mentioned before, it was convenient that most of the participants work at UWSP where I work. However, I purposefully spoke with Dave Engleson first. In many ways the history of Environmental Education in Wisconsin K-12 schools is a history of Dave Engleson's career. I wanted to learn how he worked to encourage teachers to include EE into their subject area teaching. More importantly, Dave Engleson was the author of the 1985 edition of the *A Guide to Curriculum Planning in Environmental Education* and co-author of the revised edition. I first came upon this book in 1988 while I was a teacher in Maine and recalled being envious of Wisconsin and its advanced support of environmental education. Engleson told me the book sold over 15,000 copies and has been translated into Japanese and Chinese, and the book's revenue was actually used to publish the other DPI curriculum guides.

After meeting with Dave Engleson, I was just planning on interviewing professors at UWSP, those involved in teaching undergraduate courses in EE. However, after I completed interviews with the professors, I felt it important to interview professional environmental educators who had more frequent contact with practicing teachers. Therefore, I added Pat Marinac and Sterling Strathe to my list.

In-depth Interviews

The interview format I used with these professional environmental educators is described in the Overview of Qualitative Data Collection Methods. I provided each interviewee with the following framing questions at least a week before our interview date:

- What do you think is the ideal approach to implement environmental education into K-12 curriculum? Do you know of any schools or teachers who display this approach?
- How would you envision the infusion of environmental education? How would you define infusion?

- What are the strengths and limitations of infusion? What are barriers to infusion? What are the facilitators?
- It seems that the infusion approach was advocated in the late 1980s and early 1990s, but is not so prevalent today. Do you agree? If so, what are reasons for this decline? If not, what evidence do you have of infused environmental education?
- To what degree do you believe the goals of EE can be achieved through infusion? In particular, how would you envision the more action-oriented goals of EE to be infused into K-12 curriculum?

While all the interviews covered the framing questions I provided, occasionally the conversation would drift to cover a topic of particular interest to the educators (e.g., lack of DPI support for EE). Also, as I would learn something from earlier interviews and begin to develop a category theme in my mind, I would share this theme or idea with subsequent interviewees to get their perspective. In this way, I involved the participants as co-researchers in my project.

Data Analysis

I interpreted the information I received from the interviews by listening and re-listening to the recorded interviews and reviewing my field notes (see Data Analysis provided with Overview of Qualitative Data Collection Methods Used in this Study). As I listened I would take notes and mark passages that needed to be transcribed. While each educator could be considered an individual study, I decided to treat the entire profession as a single vignette. Therefore, rather than write up an extended analysis for each interview, I gathered all the transcribed information and organized the quotes based on the thematic categories that emerged from the data.

After I had organized and written my findings, I assigned code letters to each educator's name. Then, I shared the document with the educators for them to review and to comment on the findings. I gave them two weeks to submit their review to me. While some chose to edit the text, others approved the document as written. They all gave me permission to use their names. The findings are found in Chapter 4.

Part II: Teacher Interviews and Supplementary Observations and Document Analysis

Data Collection Methods

To use the selected teachers to create rich descriptions of EE in Wisconsin, each meeting with a teacher included the following methods for data collection:

An introductory or orientation interview: The purpose of this first conversation was to ascertain the role of environmental education in the teacher's practice. This first in-depth interview, conducted before the observation, was the primary method of data collection for this study. With one exception, the interviews were recorded and extensive field notes were taken. A description of the interview practice employed is described in the Overview of Qualitative Data Collection Methods Used in this Study; the framing questions are listed below:

- What strategies do environmental educators use to integrate or infuse environmental concepts into curriculum?
- What resources, teaching methods, and support systems do environmental educators use to teach about the environment?
- What are the motivations and attitudes of teachers reputed to be effective environmental educators?
- What assessment strategies do teachers use to determine the effectiveness of their efforts to educate students about the environment?
- What aspects, if any, of teachers' professional development contributed to the formation of the above qualities and practices?

Observation of classroom environmental education: The teacher was asked to conduct a lesson that exemplified how he or she teaches about the environment.

Document analysis: During the introductory and/or follow up interviews, the teacher was asked to share examples of lesson plans, curriculum guides, and resources that he or she uses to design lessons about the environment.

Post-Observation Interview: The main purpose of this and other subsequent interviews was to analyze the reality of environmental education in the teaching experience of the teacher. The “shared experience” of the classroom observation was used to help illustrate issues, challenges, and accomplishments in the teacher’s EE practice.

Given the significance of the collaborative role of the teachers involved in this study, it was important to view the teachers as experts who are providing insight and advice into the reality of EE in their teaching practice.

Pilot

To prepare for this part of the project, I conducted a pilot interview and observation with a classroom teacher who is also a professional colleague of mine (she is a member of the KEEP adjunct faculty). She also met the criteria listed for an expert insider and has won numerous awards in environmental education practice. In addition to the interview and classroom observation, I asked her to provide feedback on the interview approach and to help assess how effectively it would measure the teachers’ insights regarding the reality of EE implementation in Wisconsin. The purpose of the pilot was to give me practice in data collection and to help assure the efficacy of the selected research methods.

Sampling Procedures

I conducted interviews with classroom teachers to gain insight into the reality of EE implementation in Wisconsin. In particular, I was looking to see if and how they infused environmental education into their subject matter teaching. I was looking for teachers who met one or more of the following criteria:

- The teachers have taken inservice courses in environmental education and may possess a master’s degree in environmental education (of particular interest will be teachers who have taken a KEEP course)
- The teachers have been involved in EE for at least five years

- The teachers have given presentations about their EE teaching practices at state conferences
- The teachers have participated on EE curriculum development projects and policies
- The teachers have conducted leadership projects in EE within their school
- The teachers are known to support the integration of EE into their school curriculum

Table 3: Core Teacher Participants Table outlines the teachers and their grade level, subject area, and location in the state/socioeconomic level. The selection of teachers from these different grade levels, subject areas, and regions provides different perspectives and increases the ability to generalize to insights of practice. Focusing on these exemplary environmental educators afforded me the opportunity to gain insight into the strategies and processes these teachers use to infuse or integrate environmental education concepts into their classroom lessons. By conducting in-depth interviews with these teachers, I hoped to gain more than just snapshots of their teaching situation. The aim was to create “rich pictures” of EE in Wisconsin that facilitate analytical thinking which can be used to inform professional development in EE.

As I mentioned in Overview of Qualitative Data Collection Methods Used in this Study, purposive sampling was involved in selecting these teachers. I wanted to make sure to include at least two elementary, two middle, and two high school teachers. I also tried to make sure the teachers from each pair taught in districts of varying socioeconomic status. For the middle and high school teachers, I selected teachers from a variety of disciplines (i.e., not just science teachers). The reason for this last criterion is that EE is often equated with science teaching and district administrators often designate the Science teacher as their environmental educator. To examine the extent of EE infusion in Wisconsin, it is important to look at other disciplines besides science. These selection categories were designed to help me explore EE infusion within varying teaching contexts, exploring the various contextual barriers and facilitators to EE.

Table 3: Core Teacher Participants Table

Teacher “Name”	Grade level/subject area	Location, socioeconomic level	Some reasons why selected to participate in the study
Eleanor	K-5 Science	Southern Wisconsin, Urban/Low income	Recognized by several school district curriculum planners for being a leader in environmental and science education. Involves her students in community environmental action projects
Jane	Kindergarten	North Central Wisconsin, Rural/Low income	EE master’s teacher, involved in her district school forest curriculum program, has organized EE staff development programs for her district.
Kathy	High School Mathematics	Central Wisconsin, Urban/Middle income	Graduate of the EE master’s program and also the only Math teacher to have participated in the program. Her thesis recognized for connecting math to environmental education.
Ann	High School Art	Eastern Wisconsin, Suburban/Middle Income	Has been recognized by the media and teacher organizations for involving her students in environmental art projects. Has participated in a number of inservice courses in environmental education, including international trips.
James/Carl	High School Integrated Social Studies and Language Arts	Central Wisconsin, Suburban/Middle income	Recommended by a teacher who teaches environmental education methods classes and is from a district that has a model EE curriculum plan. He was asked to recommend any non-Science teachers he knew that were teaching about the environment. He believed that they integrated environmental concepts into their courses.
Tom	Middle School Integrated Science	Southern Wisconsin, Suburban/Upper Middle income	Graduate of the EE master’s program. Developed a thesis with a co-worker that integrated energy, including KEEP activities, into their middle school Science classes.
Brad	Middle School Technology Education	Northwest Rural/Low income	Has been instrumental in starting a statewide electrathon program, where students design, build, and race electric-powered cars.

I contacted the teachers by both telephone and email, finding that both worked equally well; however, using the phone was a more direct approach and possibly harder for them to turn me down. When I contacted them, I explained my project and why I selected them and what I needed from them (interview, observation, follow up interview, documentation of lessons). I also

told the teachers I would provide them with a \$100 stipend to compensate them for their time and attention.

In-depth Interviews

For the most part I conducted the in-depth interview after school on one day and observed them the next day with the post-observation interview usually right after the lesson (during their preparation or lunch period). The interviews occurred over a five month period (from September to February). Although it would have been useful to observe several lessons consecutively and at different times of the year, my time restrictions as well as the teachers' prevented this opportunity. For the most part, when setting up the meeting times, I provided the teachers with a time frame for my project and asked them when it would be best to come in and see a lesson in which they infuse or integrate environmental topics. The teacher then examined his or her curriculum and shared a time that best suited both our schedules.

I took notes during the interviews and field notes during the observations. With permission of the teachers, I recorded our meetings. I recorded the interviews using a digital recorder with one exception. This particular interview took place throughout the course of one evening, including over dinner at a restaurant and was not conducive to recording. Instead, I took even more extensive notes and made sure to transcribe them shortly after our meeting. The interviews that were recorded, I downloaded onto a computer. The interviews lasted an hour to an hour-and-a-half. The post-observation interview, which focused on the observation and also addressed any topics not covered during the main interview, usually lasted around a half hour. The observations and document analysis helped the teachers further illustrate how they teach about the environment.

Observations

The purpose of the observation was to see an example of how a teacher included environmental education into their curriculum. In preparation for the observations, I reviewed a number of guide books on qualitative research design (e.g., Glesne 1999; Flick 2002; Ritchie and Lewis 2003). I took the role of an onlooker rather than a participant, mainly because the students

were not the focus of the study. It was not expected to “catch” the teacher at a random moment to see if there were environmental concepts infused into the daily lessons. The observations were scheduled to accommodate the teacher as well as the researcher; the teachers were not expected to design a lesson to please the researcher (although a team of teachers decided to do this for the study). During the observations, I took extensive field notes which I reviewed, transcribed, and analyzed following the observation. In the post-observation interview, I asked teachers to share their insights and to help interpret the lesson and how it illustrates EE implementation.

Observation enables the researcher to obtain information directly rather than through the perspective of the participant or “expert insider” (Adler & Adler 1994; Denscombe 1998). However, there are also a number of shortcomings with observations including biases of the observer (Merriam 1988). This study was also challenged by having a single observation that may or may not have best exemplified teachers’ EE implementation strategies. For example, one of the lessons observed for this study involved students watching *The Lorax* video. I have to admit, I was disappointed and might have been doubtful of the teacher’s testimonies of EE infusion had there not been evidence of student-built environmental projects in progress situated around the room. The single observation approach used for this study did provide many useful and interesting insights, but only provided a tiny exposure into how the teacher infuses or integrates EE.

Document Analysis

During the interviews, teachers would share examples of lesson plans, student handouts, and student work, to help explain to me how they included environmental concepts into their lessons and how they teach students about the environment. Of the three data collection methods, the document analysis was admittedly the weakest link. Most of the teachers interviewed were seasoned teachers who had neither an explicit curriculum nor detailed lesson plans. Several of the teachers did have units they shared; however, these were usually developed as part of an assignment for a workshop or their master’s program. Another form of document analysis was the teachers’ personal libraries. Several teachers had shelves of resources, including environmental education activity guides, which they used to help include environmental

education concepts into their curriculum. These publications were often dog-eared and tagged, providing evidence of their frequent use.

Data Analysis

After the meetings with the teachers, I analyzed the results of the interviews using the methods described in the Overview of Qualitative Methods above. The first step was to develop a descriptive narrative to provide a “rich picture” of the insights provided by the teachers (vignettes). I gave each teacher a pseudonym and took care not to mention their school name and district. I emailed these narratives to the teachers for their review. While some chose to edit the text, others approved the document as written. The findings are found in Chapter 5.

Supplemental Interviews

In addition to the teachers who participated in the core study, I conducted interviews with an additional five teachers. These sessions focused on particular insights being formulated rather than following the discussion framework used for the classroom teachers. The teachers who participated in the supplementary interviews are exemplary environmental educators and played a double role as EE professionals since they are involved in staff development activities in EE. I used these individuals to help me reflect on my emerging understandings and to get their perspectives and reactions. Their interviews were recorded and transcribed, but rather than develop a descriptive narrative of the results, I reviewed the data to identify the information needed to develop generalizable insights. In common language, they served as my “reality-check,” helping to confirm or disconfirm what I was concluding from my data analysis.

Specific findings from these supplemental interviews are incorporated into the cross-analysis provided in Chapter 5. Pseudonyms are given when referencing specific quotes or viewpoints. Following are the “names” of the supplemental participants and reason they were included in this study.

Andy: A fifth grade teacher in an inner-city school who has created integrated field study units that involve taking students out to the district’s school forest.

Bob: A suburban high school biology teacher who offers professional development classes in EE to teachers around the state.

Sue: A rural middle school Science teacher who has created extensive units that include environmental concepts for her students.

Megan: A suburban fifth grade teacher who is considered a pioneer of EE in Wisconsin, she has played an active role in establishing the EE mandate.

Kevin: A middle school Science teacher who works at an urban EE magnet school.

Part III: Survey Development and Implementation

Based on the EE implementation strategies ascertained from the professional environmental educator and teacher interviews, I conducted a statewide survey to gain insights into the pervasiveness of EE implementation. It has been over twelve years since I completed my statewide survey of teachers to assess environmental education in Wisconsin (Lane 1993). One reason for adding a quantitative survey component to this qualitative research project was to learn if the response rate for a survey conducted in 2006 would be comparable to one completed in 1992. This survey, simply by its response rate, could indicate whether EE is as popular today as it was in the early 1990s.

My 1992 survey was administered two years after an extensive media celebration of the twentieth anniversary of Earth Day. Teachers were inundated with resources about rainforests, endangered species, and recycling. Teaching about the environment was very popular in the early 1990s. The response rate for the 1992 survey, mailed to 1,545 teachers was 59 percent. Nearly 70 percent of the respondents indicated that they do infuse environmental education into their classroom lessons. Also of interest is the fact that 296 teachers who stated they did not teach about the environment took the time to complete and submit the survey.

The original survey went through extensive assessments to assure that it was valid and reliable. A validity panel determined face and internal validity, while a hypothesis tested construct validity. I used a pilot survey to determine reliability, using analysis by Cronbach's alpha correlation coefficient (see Lane 1993).

Rather than repeat the entire survey project, which was rather extensive and included items irrelevant to the current study, I created a revised shorter version containing 15 items to gain insight into the prevalence of EE implementation in Wisconsin. I included items that were relevant to the current study and that had been assessed for validity and reliability in the original version. The items selected were those that focused on teachers' opinion of EE, if they are aware of their district's EE curriculum, and whether they teach about the environment (see Appendix B and C).

I designed two of the items to provide quantitative data that might complement qualitative data collected during this study. I used preliminary analysis of vignettes to inform the items (see Chapter 5). The first item was designed to gather information on *how* teachers include environmental topics into their curriculum (e.g., insertion, infusion, integration). The second item was designed to ascertain *why* teachers include environmental topics into their curriculum. The internal validity of the two items was assessed with a validity panel and evaluation tool similar to that used in my earlier research (see Appendix D). The panel consisted of five professional environmental educators and a classroom teacher.

I piloted this Web-based survey using 100 teachers who have graduated or are currently enrolled in the UWSP EE master's program. The response rate was initially 16 percent and, after a reminder email, finally reached 37 percent. Based on the pilot results, one of the items was revised to provide more clarification among the stem choices. The revised item was also sent to the pilot teachers to see if the changes helped teachers discriminate among the stem choices. The pilot helped determine how much time would be involved to take the survey. The pilot included a question on how long it took to complete the survey that was omitted from the final survey. It was concluded that teachers could complete the survey in 15 minutes or less.

The link to the revised survey was emailed to 1539 teachers. Similar demographics and selection processes that were used for the 1992 study were used to identify teachers for the current study. The disciplines chosen were based on those mentioned in the EE mandates. Three

percent from each discipline were pulled. The table below identifies the disciplines selected and sample numbers for the study.

Table 4: Survey Sample Population		
SUBJECT AREA	TOTAL TEACHING POPULATION	3% SELECTED
ELEMENTARY	33,067	992
LANGUAGE ARTS (ENGLISH)	4,255	128
MATH	3,771	113
SCIENCE	4,268	128
SOCIAL STUDIES	2,110	63
ART	1,292	39
TECHNICAL EDUCATION	1,397	42
HEALTH	814	23
AGRICULTURE	378	11
Total	51,352	1539

The UW Extension service provided the teacher names and school addresses using a database from the Department of Public Instruction. Only name and school contact information was provided. The email address for each of the teachers had to be located. Two workstudy students spent many hours looking up the addresses. They found most of them by going to the school Web site and accessing the staff directory. However, some schools did not have Web sites. In those cases, the addresses were guessed based on the format used for the school district email. This format was based on information provided through the DPI school directory. The entire process was quite tedious and time consuming. Upon review of the generated list, typographical errors were found and corrected; however, there are chances that undetected incorrect addresses remained.

Indeed, 295 emails were returned or “bounced back” after the first sending. These emails were collected and by happenstance served as the basis for a comparative mailed version of the study. It was not possible to determine to what extent the teachers in the mailed survey were comparable to the demographics of the main population as their subject area was not included in the mailing list sent by the database manager. However, a variety of different districts was

included among the failed emails. The mailed survey consisted of a cover letter, the survey, and a pre-paid return envelope.

The text of the cover letter for both the emailed and the mailed survey was the same, except the emailed survey included a link to the Internet survey (along with the URL in case the link did not work for teachers). The due dates were different for each as the mailed survey had to account for mail delivery time. Neither letter included actual signatures, but indicated that the researcher, along with the director of the Wisconsin Center for Environmental Education and the Science Consultant for the Department of Public Instruction were the authors of the letter.

It seems that response rates for surveys in general have been decreasing over the years (Sax, Gilmartin, and Bryant 2003). This is compounded by findings among many researchers that the response rate for Internet surveys is generally lower than for mailed surveys, although there have been some exceptions (Kiernan et al. 2005). Reasons for low response rates in electronic surveys are discussed below. A summary of the frequencies and means for the study, along with results of open-ended questions are included in Chapter 6 as well as in Appendix E.

When I proposed the idea of the survey administration, I hoped the results could provide insight into the pervasiveness of EE in Wisconsin. Given the limitations of time and funding, I decided to administer a Web-based survey via email (rather than paper copies sent by surface mail). A review of the literature reveals that while there are many benefits of Internet surveys, the shortcomings can negatively affect response rate and response bias (Couper et al. 2004, Dillman & Bowker 2001, Idleman 2003, Kiernan et al. 2005, Mertler 2003, Montez 2003, Morrell-Samuels 2003, Sax, Gilmartin, & Bryant 2003, Shannon & Bradshaw 2002). A summary of these benefits and shortcomings is listed below. Furthermore, only frequencies and response means were proposed, rather than any extensive statistical analysis. Therefore, given these limitations, the survey results can provide a different perspective for looking at EE in Wisconsin, but should not be generalized to the entire teaching population of Wisconsin.

Overview of Advantages and Disadvantages of Mailed and Internet Surveys

- Electronic surveys are less costly, often less than a third of the cost of a mailed survey. The cost for the electronic survey used for this study was negligible since individuals provided services as part of their normal job (e.g., database manager, workstudy, information technology assistant). The cost of printing and postage for the mailed surveys was accountable and totaled nearly \$300.
- Data entry can occur simultaneously with electronic survey submission. The survey used in this study was designed so that when teachers submitted their survey, their responses automatically entered a Microsoft Excel spreadsheet.
- Both electronic and mailed surveys have problems with defunct addresses and returned mail, however this seems to be more extensive with the electronic versions. Surface mail is often forwarded, while this is rare to nonexistent with email. Often, sympathetic mail carriers will interpret faulty addresses, while computers lack this ability: either the address is correct or it is not. Even if it is correct, the fickle nature of email servers and SPAM and junk mail screens affect mail delivery. Similar to this study, other studies found that subsequent mailings to email lists have varied outcomes (addresses that worked one time did not work the second and vice versa).
- Some respondents in electronic surveys appreciate the ease of participation. A survey may simply be opened and submitted with a click of a button compared with the need to physically write out answers longhand and to put the survey in an envelope and in the mail. Written responses have been found to be more explicit and extensive with electronic surveys since the responses can be typed in. Contrarily, the literature reports that non-response studies reveal that individuals have problems and resistance to emails in general and online surveys in particular. There are concerns over junk mail, computer viruses, and security. Therefore, chances are the respondents will be limited to those who are comfortable with computers and the Internet and trust the source of the email.
- Response rates for electronic surveys have generally been found to be smaller than for mailed surveys. A number of the studies examined reasons for non-response rates. The aforementioned aversion to email and the Internet was among the reasons listed.

- Although response rate may be low, the response time is often faster for electronic surveys. For example, in the midst of sending out the emails for this study, teachers from the first batch of emails were already submitting responses. Therefore, a researcher can get an idea of what the respondents are saying within hours of administering the survey.
- An additional limitation considered for this study that was not readily found in the literature included risk of multiple submissions or surveys being sent to unintended respondents. There was no password or code needed to complete this survey. Therefore, a teacher could purposefully or unintentionally submit a survey more than once. Because the submissions were anonymous it was not possible to determine if a survey was a duplicate unless the text in the open-ended questions was worded identically.

Limitations

Many of the limitations of this study have been described in various sections above. A few of them will be revisited here. There are inherent limitations with qualitative research in general and collecting data through in-depth interviews in particular.

The strength of this study is that taken as a whole, the “reality” of EE implementation was looked at from a variety of viewpoints and methods. Yet, as discussed above, there are limitations to how each setting was investigated. With the EE professionals, the only method of data collection was interviews. The only teacher preparation institution represented in the study is the University of Wisconsin–Stevens Point. While there were multiple methods with the teachers, because of time restrictions for both the researcher and the teachers and because of limited funds, the amount of time spent in the field was around three hours per study site. While it would have been worthwhile to see the teachers in action for multiple lessons throughout the school year, with the researcher working full time this was not feasible. This is a key reason that teacher “experts” in EE were asked to participate, so they could efficiently share their EE perspective in a limited amount of time. Even the teachers who were self-professed non-environmental educators provided expert insights on the integration approach. Although the teachers who participated in this study taught in districts of varying socioeconomic levels, race

populations, and geographic regions, it was of course impossible to find representations from each and every setting. Likewise, teachers represented a variety of grade levels and subject areas, but not every one.

As mentioned above, the researcher was the primary “instrument” for this study. In quantitative studies, steps are taken to make the instrument as neutral and objective as possible. This instrument was neither neutral nor objective. Being an environmental educator myself, I have my biases. Moreover, limitations of my time, energy, and funds undoubtedly affected this project as well. The teachers are also limited in time and have their biases. While they may have tried to present an objective view of the reality of EE in their district, chances are they presented me with an adjusted view or tried to tell me what I wanted to hear. The semi-structured format and informal setting may have helped them to be more frank and forthcoming, but they still may have been concerned about how they and their district were represented. The section Considerations for Project Validity above describes the steps I took to verify what I was being told. For example, interviews were triangulated with observations and document analysis, but even these data sources had their shortcomings.

As with the qualitative portion of the study, limitations associated with the quantitative portion have been described above. To summarize, the validity and reliability of the survey had been assessed in 1992 and additional steps were taken to assure the validity of new items introduced to the survey. The survey is self-administered and its response rate, validity, and reliability are affected by whether and how teachers respond to the survey. Although teachers were randomly selected to strive toward sampling a representative population, response rate affects this effort. Furthermore, the use of an electronic-based survey compounded shortcomings of response rate since it has its own barriers that affect response. It would be informative to have the time and resources to follow up with non-respondents to learn more about them and if their perceptions of EE affected willingness to participate in the study. This additional investigation was beyond the scope of the study. For these reasons, it is recommended that the survey results be used to provide additional insights rather than to claim any representation of the entire Wisconsin teaching population.

Summary of Chapter 3 and Introduction to Chapters 4, 5, 6, and 7

This chapter detailed the qualitative and quantitative research methods used for this study. The primary data collection method was in-depth interviews, supplemented with observations and document analysis for a core group of teacher participants. For the qualitative aspects of this study, I described general research and analysis processes and then provided more specific details relevant to the various parts of the study. The quantitative portion includes an overview of survey development and administration. There are acknowledged project limitations which have been included, along with ways in which I tried to accommodate for these restrictions. I took extensive steps to ensure project validity and to make sure the analysis and results are meaningful and relevant to professionals and practitioners in the field.

The next three chapters include descriptions of the findings for the three parts of this study. Chapter 4 provides the results of interviews with EE professionals (Part I), Chapter 5 presents seven vignettes resulting from the investigations of teacher EE practices (Part II), and Chapter 6 discusses the responses I received from the statewide survey (Part III). Each chapter concludes with a section of preliminary insights based on the data analysis. Chapter 5 is the core portion of this study as it involves a more in-depth look at teacher perceptions of EE in Wisconsin. The chapter includes a cross-analysis section where I explore a comprehensive review of the seven vignettes supplemented with interviews from five other teachers. Conclusions, derived from analysis of all three parts of the study, are found in Chapter 7.

CHAPTER FOUR

FINDINGS FROM INTERVIEWS WITH PROFESSIONAL ENVIRONMENTAL EDUCATORS

This chapter discusses findings that address the first purpose of this study:

- To learn how professional environmental educators perceive EE should be implemented in Wisconsin, including their conception of infusion

The narratives are further analyzed along with findings from other aspects of this study to address the following research questions:

- How do professional environmental educators currently envision the implementation of EE into school curriculum? How does this vision relate to infusion of EE that has been recommended in the literature?

Following is an outline of the chapter content:

Introduction

Infusion

The EE Mandate and Preservice Teacher Education

The EE Mandate and Curriculum Planning

Current Perceptions of EE

Future Prospects for EE

Introduction

There is a rich history of environmental education, including discussions of its origins from conservation education and how it branched off from outdoor education. Much of the discussion surrounding EE concerns how it should be included in the school curriculum. Although many believe EE should be its own course, this approach is not feasible given tight school schedules. Therefore, many policies suggest, even require, that EE be infused or integrated into existing curriculum. This investigation focused on environmental education in Wisconsin, particularly from 1985 to the present. The date of 1985 is significant because that is

when the Department of Public Instruction passed mandates requiring that environmental education be included in teacher licensing for four specific content areas and three specific methodology areas (Wisconsin Administrative Code PI 3.5(4)) and that each school district develop an EE curriculum plan. Both these mandates were designed to support the integration of EE into schools (Wisconsin Administrative Code PI 8.01(3)(K)).

Seven professional environmental educators were interviewed for this study (see Chapter 3). As outlined in Chapter 3, these individuals were chosen because they play an active role in implementing environmental education in Wisconsin. In this study, they were instrumental in providing conceptualizations of EE implementation in Wisconsin.

This chapter provides the results of interviews with the EE professionals listed in Chapter 3. Whenever relevant, information and conclusions from the literature review were referenced to provide context and connections among the viewpoints and participants' quotes. In subsequent chapters, these viewpoints will be aligned with insights provided by classroom teachers as well as inductive analysis conducted through the research.

Infusion

Each participant in the study was asked to share his or her perception of what infusion is and if and how it differs from integration or some other method of incorporating EE into the curriculum.

Wilke's definition of infusion succinctly mirrors a definition often stated in the literature, when he said that infusion is "incorporating instruction about environmental knowledge, attitudes, skills, and actions within traditional subject areas while still accomplishing the goals for the subject area." Dan Sivek noted that it "is incorporating environmental education (or any other topic) into a subject area. . . . Integration on the other hand would be integration of subject areas such as English and Science and Math into a class . . . and they also infuse EE into it." He affirmed that it was not too simplistic to say that infusion was putting one subject into another, while integration was mixing several subjects together. He agreed that the words integration and

interdisciplinary were synonymous. Dave Engleson says he has often argued there is no such thing as “EE,” but rather it is bits and pieces of environmental concepts found within various subject areas. Regarding the infusion-integration debate, he provided the following explanation:

Infusion means to permeate, and usually to improve whatever is permeated (the subject area). Integration means to blend with or unite with. With infusion, that which is infused “disappears,” or at least is hard to discover. With integration, that which is integrated is much easier to determine. Infusion is much more difficult to accomplish than integration.

Dennis Yockers had a hierarchy for explaining EE implementation. He described the first—or lowest—level as insertion. This is where teachers pick and choose activities from EE resources and plug them into their curriculum; they essentially replace an existing activity with another. Regarding infusion and integration, he explained,

Some people use infusion and integration interchangeably. But I think integration is even at a higher level than infusion. Because I think I can infuse EE into my biology curriculum by looking at what I’m trying to accomplish and making those environmental connections. But the majority [of the environmental connections] are awareness or knowledge based with some attitudes or values because we might talk about issues. . . . What I mean by [integration] is a teacher taking a topic such as an endangered species and looking at it in terms of Math, Science, Social Studies, Language Arts, and then making it relevant to students so that they’re accomplishing those goals. But at the same time I think it’s a higher level type of understanding and commitment than just plugging in an activity here and there.

Randy Champeau agreed that it was possible to differentiate between infusion and integration, although the difference is “subtle”:

Infusion is when you blend environmental education into existing curriculum and integration is when you insert an environmental topic into your existing curriculum. Infusion seems to be the most contemporary approach: which means blending it into your curriculum. So if you’re going to be teaching a particular topic like history you would ask if there is an environmental slant you can put on it. Is there an environmental emphasis you can throw in? That’s infusion. . . . integration might be more in line with teaching a unit or course on Environmental History.

When asked specifically if he thought there was a difference between infusion and integration and what was actually taking place in schools, Champeau said,

I think we could talk about the subtleties between infusion and integration but what is happening is teachers are using both approaches with probably more being done on the infusion side. It's not realistic anymore to totally push infusion at the risk of saying that somebody who has an integrated approach is wrong because we don't know that that's true.

All the professional environmental educators stressed that for either infusion or integration to work the teacher has to plan where and when environmental topics are to be logically included. Ironically, despite this need for planning, teachers may unknowingly infuse environmental education. The environment is often in the news and teachers' own concern and interest might reference environmental topics in the process of conducting their lessons. Pat Marinac described this observation as follows:

I'm not sure teachers are aware that they're actually integrating EE in schools. I see it happening in classrooms by virtue of content that they're addressing, but not intentionally. I think that teachers who have had experience or exposure to it in their preservice program [or] take advantage of staff development opportunities . . . perhaps recognize it more, that this is EE. I think that other teachers do it indirectly simply because the focus of the environment is just a natural.

Dave Engleson described a situation that illustrates how infused EE might go unnoticed by teachers (although he termed it "integration"). In his description, Engleson said he asked a group of teachers from a school if they teach about the environment and he noted the English Literature teacher indicated she did not.

. . . After we talked for a while and she said, "Well you know I do have kids read *Sand County Almanac*." And I said, "Well you do?" And I said, "I would call that environmental education. . . . You're looking at a fantastic publication and everything. I assume you are promoting some of the ideas that are in there?" And she said, "Oh sure, sure." And I gave her a slew of other ideas of things she could do. And that's how teachers don't understand what integration is. Actually the real problem is teacher training. And it's not being critical of them it's simply stating a fact.

When asked exactly how purposeful and planned infusion does occur, there were common elements among the responses. Rick Wilke said that first,

[Teachers] should have an understanding of what EE is. Too few teachers understand what the goals of EE are. If you don't know what the goals are that you're trying to accomplish, how can you ever achieve them unless it's by luck and happenstance? . . . If they had that training/preparation they would be aware of and understand Wisconsin's EE standards.

And through infusion they should attempt to address both the EE and the subject matter standards. The EE standards are able to be addressed at the same time that the teacher is addressing standards related to Language Arts or Math or Science. They can see the connections.

And in many cases curricula that have been developed have helped teachers see the connections. [These curricula provide] rubrics and cross referencing to the subject matter standards as well as EE standards [and] assist the teacher in understanding how they can accomplish both sets of standards.

Wilke's descriptions had some similarities to the infusion process outlined in the first edition of *A Guide to Curriculum Planning in Environmental Education* published by the Department of Public Instruction (Engleson 1985). As mentioned in the literature review, this step-by-step process is missing from the second, revised edition. Both Engleson and Yockers were asked why it was omitted from the second version. They explained that the second version focused more on the framework of environmental education and its holistic implementation in schools. While Engleson noted it could have been an oversight that it was not included, he also said that his revised view of EE implementation was described in the introduction of the 5th chapter of the 1994 edition. He explains, "District curriculum committees (K-12) need to identify objectives for each of the five subgoals. The rest of that chapter describes how the various subject areas can contribute to this process, and where infusion/integration might take place." Yockers' response to the question about the absence of the infusion guide is that he hoped most people would have the first version for reference. He also admitted that space limitations dictated what was included and what was excluded from the second edition. He notes that a new version is needed, an electronic version that includes the EE standards. Sivek, who teaches an infusion unit in his classroom, said that he used to use the DPI model, but "thought the model in the first

guide was kind of cumbersome. . . Tried using it with limited success . . . [and] found it awkward.” He now uses a more flexible approach where students pick a topic in their subject area and identify environmental concepts that can be addressed through that topic.

Infusion Summary

The professional environmental educators do discriminate between infusion and integration, although they admit the differences are difficult to discern. Part of the challenge was that they did not have a clear and concise definition for either infusion or integration. Attending to what infusion is and looks like is further complicated now that it seems the term integration has become more popular.

Despite the ambiguity of infusion, enough detail was provided to develop the following preliminary definition of infusion: To blend environmental concepts into existing lessons when the opportunity arises. Infusion occurs at opportune moments and may even be inadvertent. In comparison, integration is defined as intentionally designing lessons to include environmental concepts. Integration seems to be a more purposeful approach where an environmental topic is accentuated and studied in correlation with other subject areas.

The interdisciplinary nature of EE is therefore a mixed blessing. The blessing or strength is that environmental concepts can easily be blended into other subjects; the shortcoming (or curse) is that the concepts may be so infused the teacher does not even know he or she is implementing environmental education.

The participants were not asked about other approaches to implementing EE, although several mentioned the ideal of having a capstone course at the high school level to focus on environmental issues. Only Yockers mentioned insertion, indicating that it was the least desirable approach to include EE because activities can be easily added or removed with little relation to prior or subsequent lessons in the curriculum. Overall, rather than labeling how EE was implemented, their main interest was that EE be implemented. Much of the discussions therefore

focused on steps that have been taken to support EE implementation, including mandating its integration.

The EE Mandate and Preservice Teacher Education

In an effort to help ensure many teachers would learn how to infuse or integrate EE, professional environmental educators along with many other advocates for EE worked to pass mandates requiring teacher preparation in EE. Rick Wilke was actively involved in spearheading the 1985 EE mandates. He provided the following perspective on his hopes for the mandate:

Well, the reason I thought that the mandate was so important [and] I led the efforts in the state to bring together a coalition of over sixty organizations to develop that mandate was that I thought we needed to have adequate teacher training in EE before we could really incorporate EE into the K-12 curriculum. Without the teachers being adequately trained we had no hope of being truly successful in developing environmental literacy in students of the state . . .

Thus, the need to provide that training was so critical and that is why we spent a lot of time and effort over quite a long period of time to work politically actually to get that mandate incorporated. We were very pleased when it was incorporated. And those teachers that are seeking certification at the elementary early childhood levels and also secondary Science, Social Studies, Agriculture teachers have to have what we call adequate preparation in environmental education. And it's further defined in that mandate and several other places.

The other professional environmental educators mentioned the intent of the mandate and the importance of preparing teachers. Teachers' preservice experience was to provide them with not only content knowledge related to the environment, but methodology as well. A crucial component of this methodology was how to include EE into the curriculum.

The professional environmental educators acknowledged that, despite this mandate, teachers may be receiving inadequate preparation in EE. As Rick Wilke stated:

What we've seen over the years is that there's been quite a variation in the implementation of EE at teacher training programs at different universities and colleges across the state. Some have done a very good job while others have been *very* poor in their implementation of the teacher training required by the mandate. Thus we've got

teachers that have graduated and that vary in their preparation and in their abilities to incorporate EE in their curriculum. . . .

A common concern was that there was no longer any oversight or enforcement from the Department of Public Instruction to ensure that teacher education institutions provide teachers with EE content and methodology. Dennis Yockers described his responsibilities as the EE consultant with the Department of Public Instruction:

. . . Part of my job was to examine the teacher training programs. We actually looked at their program of study for their students and I would review how they were addressing EE requirements. Each year, DPI would visit six to seven institutions, so that means they could expect a visit every five or six years.

But since 1994 there hasn't been . . . a lot of the one-on-one from DPI with pre-service teacher training institutions. So what happens is even though the requirement is still there . . . maybe some of the professors have been there for a while that have developed programs and are doing a fairly good job. The problem there has been turnover in the methods teachers at the various universities . . . my feeling is that there are a lot of professors that have come in the last ten years that aren't as grounded as they should be in terms of the EE and there's really no—I don't know, maybe the word's enforcement that this is actually taking place.

It's pretty much up to the individual university to say, "Well here's what we're doing . . ." but I don't think anyone from the DPI is really questioning what they're doing.

Pat Marinac expressed frustration over the dependence on the preservice teaching mandate to ensure EE preparation. She stresses that because of PI 34, there are more recent requirements that the institutions are required to meet and EE is not one of them, "It hurts me sometimes when I go to meetings and listen to people talking about 'Oh this has to be done and teachers are required to take an EE course so they can be certified.' Well they don't. I mean they really don't. They need to meet the PI certifications of that institution's program. A course in EE isn't necessarily there." Although professional environmental educators have attempted to make sure EE content standards are included in the PI 34 certification requirements, EE is neither noticed nor recognized by institutions as a content area that needs to be addressed. Yockers disagrees with this and says that there are PI 34 content standards in EE that institutions need to

address. Yet, as noted above, he admits he is concerned that nothing is in place to ensure the standards are being included in the methods classes.

Both Yockers and Sivek referenced an event that further illustrates the decline of interest in EE at teacher education institutions in Wisconsin. This event was a project that took place in 1995 and then again in 2001. The project was called Teacher Educators Networking for Environmental Education, and was funded by a grant from the Wisconsin Environmental Education Board. In 1995, representatives from 19 institutions participated to share and discuss how they included EE into their preservice teacher preparation. When the project was repeated in 2001, only 9 institutions chose to attend. There was low participation despite the fact the grant covered lodging, travel, provided a \$350 stipend, and provided each institution with over \$500 worth of resources. When Dan Sivek was asked why he thought turnout was low, he said “I think it’s an indication of time; no one having enough time. And I don’t know; they’re not required to, well, supposedly they’re required to do it, but there’s no teeth behind the requirement. There’s no one in DPI enforcing it [now].”

Despite this lack of enforcement, Champeau believes teachers are receiving more environmental education as part of their preservice training and subsequently including it in their classroom lessons.

In Wisconsin we require certain EE objectives or standards be met in their preservice training. So teachers are coming out of teacher education programs with a better awareness and skills related to environmental education. In some places it’s infused into the preservice teacher curriculum. Here at Point it’s actually a separate course. And we know from research that teachers from our program are coming out more EE literate. Could we be doing more? Yes of course, but at this point this is what the system will tolerate.

When asked how he knows there is more EE being infused, he referenced perceptions he received from his own teaching experiences at the college level:

I taught an environmental studies course for 15 years to undergraduates. When I first started teaching it they didn’t have a clue about ecosystem, you know, energy transfer,

matter cycling, all basic ecological concepts. The last years I was teaching it they were very much more literate coming in, much more literate as a group. . . . Where were they getting it? They might have got it in their college education but generally I would get them early in their teaching career. So it's telling me they're coming out of the schools with much more literacy. You know we have 100 people in the program. When I first started we never could have gotten that many in a master's program. So now it's much more acceptable and much more interesting. So I know it's going on out there.

The other professional environmental educators also believed that there is more environmental education in schools; however, they acknowledged that mandates requiring EE preparation at the preservice level are not being addressed to the level they should be.

The EE Mandate and Preservice Teacher Education Summary

The EE teacher preparation mandate was implemented to help develop teaching competencies in environmental content as well as teaching methodology. In particular, the future teachers were to learn how to integrate (or infuse) EE into their subject area teaching.

When the mandate was created, it was hoped that the Department of Public Instruction would take an active and regulatory role in ensuring that EE was included in teacher institutions' methods classes. When Dave Engleson and then Dennis Yockers were with the DPI, they recalled visiting the institutions and reviewing course syllabi to examine their EE content. When Yockers left the DPI, the EE consultant position was not replaced and EE has been dropped as a priority in the DPI.

Despite this lack of enforcement, UWSP continues to offer a separate course in EE and offers an EE minor to education students. Moreover, the professors interviewed in this study believe that teachers are better prepared to teach EE than before the mandate was passed in 1985. In the 1990s, the UWSP environmental educators knew of professors from other institutions who were EE advocates. However, many of these professors have retired and Rick Wilke, Dennis Yockers, and Dan Sivek in particular suspect that their replacements are not aware of the need to include EE in their coursework. Therefore, although they feel the 1985 mandate has successfully

increased the number of teachers infusing EE, it seems they are concerned that with the lack of enforcement of the mandate, the success might be short-lived.

The EE Mandate and Curriculum Planning

Although incorporating EE into other subject areas might be the most realistic way to ensure EE is part of K-12 school programs, the professional environmental educators admitted it would be difficult if not impossible to meet the goals of EE (awareness to action) through either infusion or integration. As Sivek states, “with infusion it’s too disperse. I think if we relied on infusion K through 12, students probably wouldn’t be able to pull all those things together from all the different classes and then say ‘Oh OK I see how all these tie together.’ Instead I think they get a very fragmented approach.”

Champeau further emphasizes the challenges of the infusion approach to EE implementation and meeting the goals of EE:

[Infusion] takes an enormous amount of planning to be effective. . . Really for it to work you have to plan K through 12 as to what’s introduced at what level. That is, you have to have a well planned scope and sequence with a majority of the teachers involved. But that’s a really difficult ideal to achieve.

I don’t believe (infusion is) creating the true citizen problem solving potential as it relates to the environment. We need people to solve problems . . . to work with their governments and legislators, and scientists in their daily lives to prevent environmental issues from developing and solve those that exist. Infusion is a start but as it is practiced today it is probably falling short of the ultimate goal.

Dennis Yockers explained a challenge in Wisconsin school systems with any type of curriculum development and implementation: there is no standardized curriculum for the state. Each school district, and often each school, designs its own curriculum plans. While this allows the flexibility for districts to develop curriculum unique to the needs of their students and their region of the state, it also allows for such an enormous amount of diversity among various plans that it is hard for an outside agency to compare and evaluate them. “What is needed,” according to Yockers, “is a scope and sequence of the concepts and skills and standards that could serve as a template

for school districts as they develop and revise curriculum plans.” He went on to describe how this challenge affected his role while working with the Department of Public Instruction when they tried to investigate school districts’ plans:

I think what the original curriculum rules said that was we would like a scope and sequence and to integrate EE into the other curriculum areas. I’m not sure they use the word infusion but we can look it up.

So, what would happen is that as they were putting together their Science curriculum and Social Studies curriculum they would look where it is appropriate to infuse and/or integrate . . . into the curriculum. But then, if they step back and look at the whole curriculum, would the entire district’s curriculum address the various goals of EE as we perceive them? Because in the late 80s there wasn’t any state standards, there wasn’t any national standards [for EE]. . .

Well, what happened back then [to] . . . enforce this rule was that DPI felt that they didn’t want to give one standardized scope and sequence to Science, Math, Social Studies or whatever it was because they felt that the school districts could make those decisions. However, the challenge is, are we covering the gamut of what needed to be done in EE?

So, a lot of school districts back in the 80s put together their own scope and sequence since there was not a guiding state EE document. And DPI came in, which was myself and a team, and we were looking at all subject areas and I would look at primarily if they had a written type plan and how they had hoped to address that at the specific levels. Some districts did it better than others. But I think back then our main concern was that at least school districts got together to start to make the attempt . . . I think some districts put it strongly to heart. Started to implement things and doing some professional development for teachers.

When discussing the EE goals, the professional environmental educators acknowledged that it would be difficult for a teacher to infuse something as extensive and comprehensive as an issue analysis activity. Marinac noted that most secondary education teachers see their students for only 50 minutes a day, and those students have had a variety of teachers throughout the day teaching a variety of different topics that most likely do not relate to the issue being investigated. Strathe, Yockers, and Engleson expressed concern over teachers improperly involving the class in environmental action or citizen action activities. This often happens when the teacher has a concern of his or her own and will use the students to take action to address that concern. On the other end of the spectrum, teachers might avoid providing students with opportunities to become

involved in community environmental issues. As Engleson states, “Whenever you get kids politically involved, the teacher takes the rap for it most of the time.” He recommends instead that students be allowed to study and investigate an issue and be provided with resources to develop an action plan.

There’s no reason you can’t take your controversial issue in the classroom and discuss it and have a debate. I’ve always felt you can have kids studying action thoroughly and create an action plan and that’s about as far as you can go. Because the decision to act upon the plan has to be the students’. The teacher can’t say, “O.K. you’ve got an action plan now go out and do it.” Not only can’t the school tell a student to do something like that, the plan has to be created based on the student values. Then he or she has to make the decision whether or not they’re going to do something about it. If they feel strongly about it they’ll try to do something.

Wilke asserts that it is possible to infuse issue analysis, “if the curriculum is properly structured and the teachers have the training and motivation to provide EE instruction.” Sivek elaborates by saying:

Well when you start talking issue investigation and action I don’t see how you can do that very effectively without large blocks of time dedicated to it. And perhaps if it was a big unit in a class it would work, but it almost requires—it would require at least a big unit or—maybe even a separate class. I think that in the Wisconsin DPI guide to curriculum in EE we talk about the idea that one desirable approach is to use infusion throughout the elementary and middle school grades and have a capstone course on the environment. Like environmental issues investigation and action.

Several of the other environmental educators mentioned the ideal implementation of EE would be infusion in the elementary and middle school years with a “capstone” course at the secondary level. Usually, an environmental Science course was identified as the capstone, where students could assimilate their previous EE experiences and have a semester or year-long opportunity to conduct an issue investigation.

The EE Mandate and Curriculum Planning Summary

There is an acknowledged challenge to addressing all the goals of EE through integration or infusion of environmental topics and concepts into curriculum. While it might be easier for the goals of awareness and knowledge to be discussed in Science classes, the skills and actions level goals are too involved to be easily infused. In the ideal EE world, there would be a K-12 curriculum plan for EE. Both editions of the Department of Public Instruction's *A Guide to Curriculum Planning in Environmental Education* provide extensive suggestions for how this plan should be developed and implemented. They stress the importance of forming a curriculum team comprised of representatives from many subject areas who would collaborate to discuss efficacious integration of EE into respective disciplines. Unfortunately, the EE mandate regarding curriculum planning for EE simply states that it should be integrated, with no details of what, when, or how. When the DPI audited school curriculum, Engleson and Yockers did keep the goals in mind when reviewing curriculum, but because of the vagueness of the mandate they had to be satisfied when they found that any type of plan had been developed. With the lack of DPI enforcement, there is now even less knowledge of when and how school districts are infusing EE. As discussed in the literature review, when teachers were surveyed in 1992—even when there was active DPI support of EE—only 30 percent of the teachers knew if their district had an EE plan.

Current Perceptions of EE

As Yockers mentioned above, the Department of Public Instruction spent a number of years visiting school districts to examine the presence and quality of their EE plans, “then, of course, what happened was about in 1992 . . . DPI no longer audited school district curriculum plans and the DPI's EE position became eliminated when it was vacated in 1994. So therefore there was really no direct contact with the schools from the Department of Public Instruction.” What this means is that, for nearly 15 years, there has been no enforcement from the DPI to ensure EE plans are being developed or utilized. Champeau referenced a survey of administrators conducted in 1994 that found very few of them even knew if they had a plan and Strathe comments, “the generations within the district have changed to the point so no one knows it's on the shelf anymore.”

Although the professionals often referenced the mandates as achievements in ensuring EE implementation, they are disappointed in how the mandates have been followed. As Wilke admits, “When I think about it, where we are now, after that mandate passed I would’ve predicted that we would have been further along in terms of providing EE to our state’s K-12 population than where we are at this time.” Nonetheless, he strongly states, “Although EE doesn’t have the same level of priority as it did in . . . the 80s and 90s, it could be worse. It’s a matter of . . . is the glass half empty or the glass half full. I look at it as the glass half full and we need to turn the spout to fill it up.”

All the professionals interviewed expressed concern over the current status of EE implementation. They were asked what they thought contributed to EE not being a priority in K-12 school systems. The lack of DPI support as discussed above was frequently attributed to causing a decline of district interest in EE. The pressure to address the standards in core subject areas of Language Arts, Mathematics, Science, and Social Studies was mentioned several times during the interviews. Although it was not necessarily that having standards was the problem, it was that environmental education concepts were not included within the standards. True, there are environmental education standards, yet these are not recognized by content area teachers and more importantly, they are not part of the state assessments.

As Engleson bemoans, “the testing is . . . we’re never going to get into the curriculum again like we should be unless we get rid of that testing.” Marinac pointedly describes how testing has affected teaching in the schools and the fate of environmental education, “Why teachers don’t have the opportunities to do environmental education is they’re much more responsible for . . . test scores. That’s it. And we really have gone back to Reading, Writing, and Arithmetic. They are reverting to the standard, ‘OK I have to teach you to read and I have to teach you math’ and looking at it in a much more classical approach.” Sivek concurs that testing is a barrier to EE implementation:

Well, you know I think the big problem is test, test, and everything is tested; and EE isn't an assessed area, the standards. That's probably true in the majority of states, it's true in Wisconsin. I know from talking to . . . teachers in Wisconsin that in other states like Florida the test is the be all and end all and teachers know what's on the test and if environment isn't on the test they're not going to spend much time on it. And I've heard teachers say I can't teach this because it's not in the standards that we have to test. And states like Florida where it's pretty high stakes or you get money or you lose money depending on how your students do, well there's pretty strong disincentive to do anything that isn't tested.

Yockers provides additional insights to the testing challenge:

So in . . . the Science test or Social Studies exam, once in a while you'll see an environmental question come up on it that relates to knowledge and skills but I don't think it's to the level that we in the EE field would like it to be. And there are some environmentally focused standards in Science and Social Studies, but I'm not sure they address the gamut or the scope—probably more the scope—of what we feel that a student graduating from high school should be able to demonstrate in terms of their understanding of the environment. Not just knowledge, but demonstrate for us the skills that we feel are important for the environmentally literate individual.

When asked about the fate of environmental education in schools, the reaction was generally hopeful. In alignment with Wilke's comment about the glass being half full, they perceived there is EE being taught in schools, even asserting that compared to 20 years ago there is more rather than less EE. However, there was also some frustration and concern expressed as Sivek says,

Oh, I don't know. It's hard not to be pessimistic. I guess the hope is that programs like ours, the Center for EE where we bring teachers in, can proliferate somehow and at least hang on until the pendulum swings the other direction maybe. And there's more money and recognition that the environment is important. And that it may be an assessed standard or become part of the standards in other areas. But I think that as long as we have these tests that don't address it it's going to be very difficult and we'll rely on individual teachers with strong interest in the environment. And it'll be hit or miss. This is the way it's always been, I think, in my history.

Current Perceptions of EE Summary

Both of the mandates that were promulgated to promote EE integration have met with minimal success. To a large extent, this can be attributed to the lack of DPI enforcement because the agency no longer houses a Consultant who is responsible for promoting environmental education. Furthermore, the DPI prioritizes core academic standards above EE, and has assessments designed for these subject areas. It is doubtful EE is included in those assessments. Classroom teachers are pressured to ensure their students can do well on the statewide assessments, and exclude EE because it is not included in the exams. The professionals would not go so far as to say the mandates failed, however. They believe teachers include EE in their subject area teaching more now than twenty years ago.

Future Prospects for EE

In consideration of the challenges to EE implementation, the environmental educators had various ideas and suggestions for “hanging on” and even facilitating the pendulum’s change of direction. The ideas suggested range from continuing to pursue the current approach of advocating environmental education and its implementation to changing the name and goals of environmental education in order to better meet the current needs and demands of teachers.

Wilke, Yockers, and Champeau advocated promotion of EE to the Department of Public Instruction and to legislative bodies to secure the implementation of EE. Wilke suggested “more political pressure be brought to bear on the DPI, the legislature, school boards, resulting in better teacher training at the university and college level, hopefully resulting in the implementation of state assessments of environmental literacy.” Yockers also emphasized the need for EE to be part of the state assessments. Champeau says “whenever we ask [the administrators and the teachers] why they aren’t doing EE—as you well know we surveyed them—the teachers point the fingers at the administrators, administrators point their fingers at the teachers, and for some reason nobody even mentions the school boards which is a political body that can really step in and require a strong environmental education.”

Although the need for political action was suggested, the importance of the individual teacher to determine the success of EE implementation was not denied. The professionals discussed how to support teachers' efforts to include EE in their classroom lessons. All the professional environmental educators referenced the need for opportunities for professional development in EE for in-service teachers. In particular, the master's program in EE was discussed and credited with promoting leadership in EE implementation.

To provide on-going support for teachers in general, Champeau suggested a "cookbook" approach. The cookbook approach involves identifying not only EE standards but also what activities can be used within curriculum to address both subject area standards and EE standards. This "cookbook" would be documented, so that current and incoming teachers would know what is available to them to address the standards.

I think the teachers are coming out of their pre-service programs more aware of the need for EE. So I think the general atmosphere for teachers is that the environment's an important concept. I'm thinking not all, but a lot of the teachers have that basic feeling of wanting to deal with it. For those teachers that want to deal with it we have to help them build their toolbox, that is, the resources and the confidence to do effective EE. I believe that can be done with a cookbook approach. Cookbooks help people cook..... Builds their confidence relative to cooking. I don't mean to oversimplify, but I don't think that we can make it overly complex either as has been done in the past.

Wilke supports this strategy, noting that through EE, teachers can better prepare students for state assessments.

Teachers are feeling the pressure of assessment . . . and addressing the standards, but unfortunately too few of them are aware and understand fully those EE standards and how they can both meet the EE standards and those of other subjects. We frequently see that students are more motivated to learn when real world problems and examples taken from the environment are used to help them understand math problems or science or Social Studies, etc.

It would be very useful for teachers to have a graphic or rubric they could use to see where EE standards and the standards for the subject matter overlap and where they can thus both be accomplished by a particular activity . . . that they could identify activities where they can accomplish both the EE standard and the standard in Science

through one activity. They need to recognize that they do not need to teach additional and different activities to address EE than what they teach to address Science, Social Studies, Math, Language Arts, etc. They can select activities as they plan the curriculum that do both and might be even more motivational to the students. In fact there is research that's been done related to the improving test scores through the work of Jerry Lieberman that others have followed up on. Improving scores through use of the environment as an integrating context, EIC, is what Jerry calls it.

Marinac also noted that through the environment, learning standards can be more effectively addressed:

I know students will do reading, writing, and arithmetic far better if it's framed in a content that they're excited about. And the environment is a classic thing. The kids are really excited. At least when they're young. That's how we would get to a more acknowledged understanding that we're doing EE. Teachers can do Reading, Writing, and Arithmetic instruction around topics that students enjoy; I'm not sure that that's happening.

Both Marinac and Strathe emphasized the importance of designing environmental education materials that address the current needs of teachers. In addition to the testing mentioned above, teachers have students with health problems, reading challenges, learning disabilities, and attention deficit issues. Marinac opined, "I would have to say that with everything teachers are being handed now, to go to them and say, 'Oh, I know! Let's add environmental education' that's not going to happen. But if we can go and say, 'Using these resources, your students will be more interested in reading, writing, and arithmetic . . .'" Strathe concurred that we need to look "for those novel ways to connect with teachers—and maybe novel's not the right term—but it's something not direct like, 'you should teach about the environment .' But instead, it's, 'Gee, this will solve a problem you're having in the classroom and it just happens to be about the environment.'" Strathe also promotes the development and implementation of units rather than single activities. Although the unit might still be inserted into the curriculum, it will have more depth than activities infused here and there. The unit can be designed to better connect with not only the subject matter but with other learning principles and classroom teaching needs.

As discussed above, it is challenging to meet the citizen action skill goals of environmental education through infusion. Strathe suggests,

Let's teach the skills but maybe we don't use the environmental context. Or maybe we do. But the skill's still important irregardless of where it's taught. To me, there may not be time, it definitely doesn't fit in . . . Biology, and it might in an Environmental Science class based on how you teach your class. But to me it seems it has value in civics or government or somewhere in the social studies anyway. And I don't know if issues analysis has ever been introduced to those folks as a technique or skills. It's important that the skill is being taught, so it should be done in an area where students can actually make use of it.

Other environmental educators, including Engleson and Yockers, also mentioned that the amount of EE in Social Studies should be increased since it also provides a good fit. Strathe and Marinac brought up that Service Learning is becoming more popular in school districts and that might be a good fit for applying the EE goals of citizen action skills and participation.

However, the suggestion that EE relates to Social Studies or other non-Science subject areas introduces additional barriers. Marinac stated, "The fact that it's called environmental education scares the Social Studies teachers away from it. And sometimes we do ourselves a huge disservice calling it environmental education because we're never—I don't know if we're ever going to get around that immediate connection with science."

Since EE is an outgrowth of other nature study programs, including outdoor education, a couple of the professionals interviewed recognized that school districts and teacher education institutions do not appreciate the full scope of EE. Wilke illustrates this by saying, "Some people that call themselves environmental educators are just dealing with leading people on nature hikes and focusing on ecological knowledge and natural history. They don't understand the full set of goals that we hope to achieve through EE."

Another acknowledged limitation with the name “environmental” education is that often people will associate environmental education with environmentalism. Wilke concurs this is a challenge to EE: “When some people hear the words environmental education they think only of single-focused individuals that might use radical means to achieve environmental goals, rather than an environmental educator as being someone that is interested in preserving and protecting the environment but also understands the need to balance the environment and the economy in helping others acquire the information they need to make those decisions.”

Wilke mentioned that within some national programs, EE is called conservation education rather than EE. When he mentions this he puts it in the context that the legislators within the current administration support environmental literacy, they would just like EE termed something else. Several of the professionals interviewed were asked if EE should be renamed or if it should avoid being named at all. Champeau’s quip perhaps reflects the underlying convictions that motivate most professional environmental educators in the field today:

Back in the beginning there were debates over what’s the difference between environmental education, outdoor education, and conservation education, and yada yada yada. I think at some point it became obvious that you could argue specifics but they have the same outcome in mind. Which is an environmentally literate person maintaining environmental quality.

Future Prospects for EE Summary

Suggestions for reviving the ailing state of EE ranged from doing more of the same (putting “teeth” back into the mandates) to changing the name of EE to a title that is more amenable to the non-science disciplines. The current focus on statewide testing is a significant barrier to EE implementation. The primary suggestion for dealing with this barrier was trying to help districts and teachers understand that through EE students can be better prepared to perform well on assessments in core subject areas. The environment and environmental topics provide an attractive format for making concepts in other subject areas more interesting. The real world applications of EE help students apply abstract concepts to events happening in their daily lives. A common message for the growth and survival of EE is to put more effort into expanding its

implementation to other subject areas than just Science; Social Studies in particular was suggested as an ideal niche for EE.

Summary of Chapter 4 Findings, Preliminary Insights, and Introduction to Chapters 5, 6, and 7

Although EE mandates have been passed to require preservice EE preparation and EE curriculum development, the professional environmental educators regret that these mandates are no longer enforced by the Department of Public Instruction and suspect that neither teacher education institutions nor school districts are complying with them. They also recognize that current issues such as standards and state testing are dominating the teaching field and have compromised EE inclusion.

Teachers are the key to EE implementation, and ultimately they are the ones who need the knowledge and skills to effectively include EE into Wisconsin school curriculum. UWSP has developed a master's program in EE to provide extensive, in-depth professional development experiences for teachers. The professional environmental educators admit more needs to be done to support teachers before they enter the field and while they are practicing teachers. Without this support, teachers will be working in isolation and EE will continue to be implemented in a piecemeal and happenstance fashion.

When asked to discuss the fate of EE, the interviewees provided a number of ideas and suggestions. While there was interest in promoting adherence to the existing mandates for EE implementation, they also contemplated revisions to the field of EE. Such new approaches included making better connections with EE and Social Studies as well as considering changing the name of EE to make it more attractive to teachers and administrators.

It almost seems that despite the evidence of decline and even resistance to EE, the professionals have confidence in the strong undercurrent of support for education about the environment. Despite challenges and some pessimistic outlooks, the overall conclusion of the interviewed EE professionals is more EE being implemented in Wisconsin schools than 20 years

ago. They credit the mandates, especially preservice teacher education in EE, for fueling this increase. They cite national polls and conversations they have had with teachers to support these perceptions. Most of the professionals interviewed in this study have been working to promote EE implementation for over 20 years and are nearing retirement (or are already retired). Having focused much of their career around building support of EE implementation, they believe in the foundational support of EE they have created. While recognizing current challenges and barriers, they have confidence in the persistence of an environmental ethic. More importantly, they have faith in teachers, knowing that their concern for future generations will encourage them to continue to promote environmental literacy among their students.

Based on analysis of interviews with professionals in the field of environmental education, it appears that they do perceive a difference between infusion and integration. They feel that integration is a more advanced form of EE implementation. However, each professional had different ways to define infusion and it was difficult to discern an exact description of what infusion is and what it looks like when implemented in the classroom. Despite the ambiguity of infusion, enough detail was provided to develop the following preliminary definition of infusion: To blend environmental concepts into existing lessons when the opportunity arises. In comparison integration is defined as intentionally designing lessons to include environmental concepts.

They acknowledge that a shortcoming of both infusion and integration is that it is challenging to address all the goals of EE through these approaches. Students' exposure to EE may be happenstance and piecemeal and it is too much to expect them to connect these disparate experiences on their own. Moreover, the goals of citizen action skills and participation require significant amounts of class time and are not conducive to being taught through the infusion approach. Therefore, they recognize that infusion may not be the best approach to implement EE, even going so far as to say the old approach to infusion "is dead and gone, or should be" (Marinac).

Additional terms that were used when describing how to include EE were incorporation and insertion. Insertion was reviewed in the literature as being one way to add an environmentally-focused activity, unit, or course. Yockers brought up the term as the least desirable way to include EE since the inserted activities may easily be removed. The term incorporation seems to be used as a verb, synonymous to the verb include, rather than an implementation strategy.

The following chapter further explores conceptualizations of EE implementation in Wisconsin. In addition, practices of EE implementation are examined by sharing the results of interviews and observations with thirteen teachers who provided their insights into EE implementation in Wisconsin. These teachers were included in the study because they met one or more of the criteria for exemplary environmental educators outlined in Chapter 3. The definitions for insertion, infusion, and integration were used as a reference when discussing EE implementation strategies with teachers. The teachers provided further insights into the reality of infusion and integration and helped to further clarify these terms. They also helped gain perspective of the status of EE in their schools and made suggestions for improving professional development in EE.

Of the thirteen teachers who participated in the study, eight provided more in-depth information by presenting a lesson on how they include environmental topics in their subject area. The next chapter begins with seven vignettes highlighting the outcome of these sessions (two teachers worked as a team, resulting in seven sessions). These teachers are referred to as core teachers while the remaining five are labeled supplementary. They provided additional information related to the research questions and issues of EE implementation. The chapter concludes with a cross-analysis of the information gained from all 13 teachers.

The professionals who participated in this study helped develop the survey discussed in Chapter 3, the results of which are presented in Chapter 6. In particular, their expertise was used to design items pertaining to the way or ways teachers include EE in their classroom lessons. The definitions of insertion, infusion, and integration developed as a result of interviews with the EE

professionals were used in the survey. These definitions were further refined as a result of analysis of findings from the interviews with teachers and observations of their practice.

The final chapter of this study, Chapter 7, provides a comprehensive overview of findings from this chapter along with Chapters 5 and 6. It identifies implications and recommendations for EE in Wisconsin based on the insights drawn from this comprehensive analysis.

CHAPTER 5

FINDINGS FROM INTERVIEWS WITH AND OBSERVATIONS OF TEACHERS

This chapter provides vignettes that provide insights into the second purpose of this study:

- To investigate the reality of environmental education implementation, including infusion, into subject area curriculum in Wisconsin

The vignettes are further analyzed along with findings from other aspects of this study to address the following research questions:

- How do teachers reputed to be effective environmental educators teach about (and/or for) the environment? How do they integrate or infuse environmental concepts into their curriculum? How do their EE teaching practices compare to the methods prescribed by professional environmental educators?

Following is an outline of the contents of this chapter:

Introduction

Vignettes (Eleanor, Jane, Kathy, Alice, James and Carl, Tom, Brad)

Teacher Insights: The Reality of EE Implementation in Wisconsin

Findings from the Cross Analysis

Implementation Strategies

Goals for Environmental Education

Motivation

Other Influences of EE Implementation

Effects of EE Implementation on Student Learning

EE Implementation School, District, and Statewide

Introduction

To gain insights into EE implementation in Wisconsin, I collected data through in-depth interviews, with additional insights provided through observations and document analysis. To investigate the reality of environmental education implementation, including infusion, into

subject area curriculum in Wisconsin eight teachers (including one team of two teachers—seven vignettes total) participated in in-depth interviews to analyze the EE implementation strategies. I took field notes to record observations gained during the lesson. The teachers were interviewed after the observation of the lesson where they also shared any relevant documents (e.g., lesson plans, resources, projects) that illustrated their EE infusion strategies. Further detail about the data collection process is described in Chapter 3.

The teachers who participated in this project were considered exemplary environmental educators. The criteria used to select these teachers are described in Chapter 3 (see Table 3: Core Teachers Participants Table). The teachers were given pseudonyms and their school name and location was not mentioned.

Analysis of the data gained from the interviews, observations, and documents was inductive and emergent. As discussed in Chapter 3, each setting was analyzed in isolation first. The result of this analysis is the descriptions found on the following pages. The purpose of this initial analysis is to provide a rich description of each teacher's situation related to his or her EE implementation (Eisenhardt 1989). Along with the details provided through the interviews—the primary source of data for the vignettes—descriptions of the observations and supporting documents are included to provide more contextual insights into the teacher's setting. The observations and referenced documents help to illustrate and verify what was stated in the interviews.

This chapter concludes with a cross-analysis of the vignettes, which incorporates data from the other portions of this study—interviews with professional environmental educators, a statewide survey, and supplemental interviews conducted with other teachers. The framing questions asked during the interviews guide the analysis, with other emergent findings being discussed as well.

Teacher's "name": Eleanor

Grade/Subject: K-5 Science Education Specialist

Location: Inner city

School demographics: Mix of white and children of color; 78 percent free or reduced lunch

Teaching experience: 16 years

EE professional development experience: Inservice courses in EE

Pre-observation Interview: September 29, 2005, 3:00 P.M. – 4:00 P.M.

Observation: September 30, 2005 10:00 A.M. – 11:00 A.M.

Post-observation Interview: September 30, 2005, 11:00 A.M. – 11:30 A.M.

Eleanor is the elementary Science Education Specialist within an urban school setting. She has a position that used to be common in other elementary schools in the district, but now is the only teacher that maintains this practice. (Other schools have opted to evolve the position to a technology/computer education specialist). Being the school Science specialist, every student in the school attends her class for one period a week (about one hour). Therefore, she is able to meet with each class around 38 times during the school year, with one week between each class meeting. Her program has designated science topics she is to address throughout the year, but it also allows her some freedom to teach science-related topics which are of personal interest to her and many of these include the environment. She describes the way she teaches about the environment as follows:

I tend to do more scientific aspects than social, but you can't really separate it out. Some of it involves encouraging students to appreciate and be aware of the environment. I have a lot of students who don't get outside much, and they just haven't had the experience of really looking at things. And it's elementary education, so I try to get them using their senses more.

She explains that her position provides her a lot of "leeway" in how she designs and presents her lessons:

Some of the science topics I'm expected to teach are easy to infuse with environmental education. For example, I teach an electricity and magnetism unit to fourth graders and I can infuse energy issues into that unit. In fifth grade, there's a unit on land forms that uses stream tables to explore land use, erosion, runoff pollution, etc. So there's some infusion I can do with that one. In third grade, we have a sound unit, which is a little less infusible. Also there's one that I do that's a little more my own choosing. That one has to do with designing and building and creating little cars and things. So I usually work in fuel efficiency and car design with that.

With other units, she is able to emphasize the environment more, such as the Wisconsin homegrown lunch program where she works in sustainable agriculture and food systems.

The goal is to get locally sustainable food into the lunch, an almost insurmountable task. So, I've been taking on the educational part of that. Every year, I teach about three or four activities associated with that project. I would say they're definitely environmental education. There's one we just finished up doing where students taste a variety of foods from the local area and we talk what it means to grow things organically, what is sustainable agriculture and things like that. At the same time they have the experience of tasting the different foods, using their senses, and describing their observations. Later in the year, one of the local CSA farmers will come in and give a presentation concerning energy and food, and how food can come all the way from California or from your backyard. We have had and we hope to do again a worm composting lesson and some recycling. We also discuss the whole idea of organic farming, soil enrichment, and alternatives to pesticides.

Her energy units are even more explicitly about environmental topics, including environmental issues. Every year, she has students sell compact fluorescent light bulbs and teaches about energy efficiency as part of the KEEP Bright Idea Fundraiser program. Here is what an employee of Focus on Energy reported to KEEP when he staffed a booth at the school's Earth Day Fair in 2003:

I just wanted to take a moment and share with you my experience last night at the Middle School Earth Day Fair. As you may know, this school is an exceptionally diverse school in a low-income neighborhood. Thanks to the efforts of teacher Eleanor, they sold over 1,000 CFL's during their fundraiser last year, which in my eyes, is an enormous success by any standard. But I think the real value of the fundraiser, and of KEEP itself, was on display at the Earth Day event. I attended with the standard Focus materials and both the hand-crank generator and light-bar with wattmeter. My experience in the past has been that the hand-crank is fairly entertaining but can miss the mark with kids; the light bar goes over a lot of heads because it takes some time and attention to get the whole concept.

These kids were unbelievable - half of the kids already knew what a CFL was, understood the concept of efficiency, understood the wattmeter, everything. There were kids there explaining the light bar to their parents as I stood and watched. One ten-year-old stood next to the wattmeter and walked other kids through using it for 20 minutes. The level of knowledge and awareness was really remarkable, and I am certain that the CFL Fundraiser (and Eleanor's energy teaching) played a huge role. For me, it was a very real testament to the KEEP model and its effectiveness, and to the real value in what we're trying to accomplish (Ackerstein 2003).

In addition to trying to blend in environmental education, she says she has the "luxury" to teach about it directly. When the city started a single stream recycling program, she said,

I've noticed—because I often bike to work, and I bike through the neighborhood—that no one really gets it. I've seen people put out their recycling bins that are full of garbage, so then I'm thinking I want to do a lesson with my students about what goes in the bin and what is single stream recycling. I can reach 350 some kids and their families right here in this program. It's kind of neat. It's a really unique opportunity.

Eleanor admits it is her own personal bias that motivates her to teach about the environment. She attributes her interest in the environment to her upbringing:

I guess it comes from my upbringing and from my home life. I had parents who were really concerned about the environment and did a lot of camping and outdoor sorts of things with family. I grew up in the 60's and early 70's and the whole ecology thing was big. I remember the first earth day. I was probably in fourth grade and got to go out and pull tires out of the creek. That kind of thing had a big impression on me. As long as I can remember I've just been concerned about the environment. I can remember some school experiences, but mostly it came from my parents.

There was a student teacher that I had in fourth or fifth grade, and she was really aware and did some activities. I think she's the one who actually organized the Earth Day clean up the creek activity and got us out doing that.

She was unsure if environmental education was in any of her preservice teaching courses at UW Madison. She knew it was not discouraged in any way, but she was unable to recall any specific lessons about EE teaching methods that were taught. On her own she has opted to take in-service classes on the environment, including a KEEP course. When asked what her goal is regarding environmental education, she says it is for students to be

more aware of the outdoors, the environment around the school and their own backyards and neighborhoods. Also there are the social issues. I'm always struggling with how to get into it because they are elementary kids and I feel, especially for a lot them who haven't experienced nature much that I don't want to hit them over the head with the idea that everything is going to heck in a hand bucket. I want them to first enjoy and appreciate the natural world and feel some connection to it. From there, I hope they'll be able to feel concern for the condition of the environment and be motivated to take some action.

I really want to balance the appreciation with awareness of problems. I think if it's all problems, it just could be overwhelming. Because I have a lot of kids who have a lot of problems to begin with in their lives, I don't want it to be too heavy. So, it's always a bit of a trick.

When discussing the overall goal for K-12 environmental education, she surmised:

The first thing that jumps into my mind is that they should care about the environment. That's my hope and dream, that by having some wonderment and awareness of how much we affect it and how much we can change the way we affect it, they would actually care about the environment. Even in small ways, but preferably bigger ways. I guess the worst possible outcome would be that they just would not care. . . and if someone knows a lot about it and they still don't care, they haven't learned what they need to learn.

When asked to compare the amount of EE she is teaching now to when she first started teaching, she says she is teaching more. The reasons are her "sense of urgency" and her increased skill at efficiently addressing environmental topics within her program design schedule (one hour slots per week). Because she is a "hands-on" Science teacher, she is challenged to find activities that are "engaging" and memorable" and can be started, conducted, and completed within an hour.

For me [time's] a tough one, because I do just have these one hour slots. I've really had to work at it over the years, how do you get at these topics in one hour blocks of time in a way that has some kind of long lasting impact? It's tough. It would be a lot easier if I were working with one group of kids for an entire year and trying to build it into ongoing projects, service projects. I've had to think more in increments. It's tricky in a little kid brain to go from one week to a whole week later. So, it's a different kind of building. . But I do have kids for three years. That's a good amount of time. I should be able to have some impact. And I just have to go with that. What difference can I make in that period of time?

Eleanor provided an example of a paper recycling activity that she has fit into a one-hour time frame. When she does a tin-can paper recycling activity, there is a blender on every table and each student is able to make a mother's day card. Regarding her attitude about this situation, she summarizes, "It's all the time I have. I keep getting back to this. I can't think about the limitations. I can only think of the possibilities of what I do have."

Looking around Eleanor's classroom one is able to see many of the activities she conducts with her students. Radiometers are spinning in the windows, items to touch and explore are displayed on a table, and posters about recycling hang on the walls. Each time a teacher drops his or her class off in Eleanor's classroom, they experience a different lesson about science or the environment. While there are times when the lessons Eleanor provides are related to what the primary teacher is addressing in his or her Science classes, she admits that since they all teach different topics at different times it is difficult to correlate what she does with their curriculum plans. Also, since seven days pass between meeting any particular class, it is challenging to continue a lesson from week to week. Occasionally all the teachers in a grade level will focus on a particular unit and Eleanor is able to use her lessons to enrich the unit. For the most part, therefore, students experience a new and different activity with each visit to Eleanor's classroom.

Although she only has one class period to meet with the students, she finds time to provide the children with outside experiences even if it is only within the schoolyard. Five years ago, with a grant from the DNR, the school planted a variety of trees along the edge of the school's playing field. Eleanor uses these trees to involve students in identification, classification, and observation skills. Prior to taking the students outside, Eleanor explains the activity to students and has them practice using a tree identification guidebook. Teams of students are given a packet of tree descriptions that were written by each of the classes in the school the previous week, each describing their "class tree." The teams are challenged to use the descriptions, the field guides, and measuring tools to correctly match the descriptions with each tree.

It was sunny and September when the class got to go outside and do their tree sleuthing; the fall wind brought a chill in the air and most students wore jackets to keep warm. They enjoyed being outdoors, laughing and running and calling out to each other. Armed with a guidebook and a tape measure, the students worked in teams to match the descriptions on their worksheets to a particular species of tree. Clustering together as they huddled around one tree for several minutes, they would then leave that tree—either in success or frustration—to seek out another. Back and forth the teams would run—often in a coordinated effort, sometimes in splintered fragments—to different trees. Eventually they would convene at the same tree, trying to relate the information on their worksheets to what was provided in their guidebooks. Some of the descriptions on the worksheets were vague or cryptic, so they often pursued Eleanor to have her clarify items and to provide hints. In the end, through logic, common sense, and occasionally spying on other groups, the students were able to identify a tree species that matched each description. After reviewing the answers with the class, Eleanor led the students back inside where their primary teacher was waiting to return them to their main classroom.

The lesson Eleanor demonstrated was about nature, about trees in particular, rather than a strictly science topic that had an infused environmental message. Nevertheless, there were environmental education concepts and skills found that enhanced this activity, which she reports as follows:

To raise awareness of the trees. To use the identifying guide book. Working in teams. Possibly using the measuring tool as well. The environmental part is appreciation and knowing the names of things. Knowing the names of things has a value. I can't quite put my finger on why, but I think it's good. Knowing what things are and knowing them by name. It's more of a personal connection.

Since Eleanor meets with all the classes in the school, she says she has a pretty good sense of what other teachers are doing regarding environmental education and reports that it is a “mixed bag.”

There are some diehards who just love to do it and have these things going that they're not going to stop doing. But I think they do them despite a lot of pressure and despite a lot of emphasis on getting kids ready for the test. We're just under enormous pressure

with that, with no child left behind and the standardized testing that has just taken up so much time. It's what we talk about at every staff meeting. We are constantly looking at the achievement gap. I think it's very important, especially looking at the question of why students of color are often not achieving. I think things like that are important, but I think it puts a lot of pressure on teachers and teachers feel like they have to justify everything they do in terms of the standards. Which is unfortunate. It can be a good thing. But it's often detrimental. When people feel that they can't just take their class on a trip to the park just for the sake of doing that as a class. And it's not that hard anyway to find standards to justify what you're doing. I think you can tie anything to [the environment] and you can and that's a good thing to do. On the other hand, I think just taking the class out on a beautiful day to sit under a tree is also good in ways that can't necessarily be itemized.

I don't think there's any force out there or encouragement for teachers to spend more time taking their kids out. It's happening despite all of the pressure to get them ready for the test. And what I see is that the people who are really doing these environmental things . . . are veteran teachers. I think about it in this school, all of the younger teachers, the ones that just recently got out of the school of ed, well, I don't get the sense that they have any motivation to do environmental ed. I don't think they think it's important.

Her view is that if teachers are interested in the environment, they'll find ways to teach about it.

There are so many ways you can tie it together and you have to think "what can I do?" So, O.K. they have to do a lot of reading. Well what kind of reading can they do that would tie into the environment or trees or energy or such? And just go from there. And that's what I see classroom teachers doing that really care about teaching environmental ed. They build it in. Like the teacher who did the garlic mustard project last year that was a fully integrated unit. They had everything going on with garlic mustard, they had geography, they had math, they had Science of course, reading, and a lot of writing about it. So, it's perfectly possible to do it that way.

Teachers who care tie it in. They find ways to relate environmental topics to what they have to do.

Teacher's "name": Jane

Grade/Subject: Kindergarten

Location: Northern Wisconsin

School demographics: nearly 100 percent Caucasian; 60 percent free or reduced lunch

Teaching experience: 21 years

EE professional development experience: Master's in Environmental Education - UWSP

Pre-observation Interview: October 13, 2005, 7:00 P.M. – 9:00 P.M.

Observation: October 14, 2005 9:00 A.M. – 3:00 P.M.

Post-observation Interview: October 14, 2005, 3:00 P.M. – 3:30 P.M.

For any visitor walking into Jane's classroom it is apparent that providing her students with a sense of warmth and coziness is important. Jane will quip the reason for the coziness is that she is a kindergarten teacher teaching in a classroom designed to house second grade students. Her district is downsizing which resulted in the closing of three schools, including the one she taught at until last year. Her room in that school was two-thirds larger than this one and she also has to teach twice as many students this year—25 compared to the 13 she taught last year.

Yet the coziness Jane's room exudes comes from more than just the closeness of everything. Throughout the room, there are shelves of toys and models; the walls are covered with posters and pictures. These items are common to many kindergarten classrooms, but many of the models and images in Jane's classroom are of nature and wildlife.

She also has other objects that bring the outdoors inside. Stuffed mounts of birds of prey and a bobcat are displayed on shelves built into the walls of her room. She also has live animals, including a guinea pig, and "Toad" and "Frog" (a live toad and a live frog) which live in an aquarium on her nature table (her old room used to have a nature *corner*). To be allowed live animals in the classroom Jane had to get written permission from every parent along with

approval from her principal. Jane's determination to go through all these steps indicates her interest in exposing students to the natural world.

During a typical day of teaching, it is possible to observe other ways Jane promotes environmental awareness in her lessons. She starts her day by having children notice the time of year (autumn or spring) and asks them to look outside the window to determine if it is cloudy, sunny, rainy, or windy. The record-keeping of weather types introduces students to graphing where they can compare the number of cloudy days that occurred one month to the next.

When the children line up to go to recess, she makes lining up at the door a game where students compete to answer environmental questions such as "What do Frog and Toad eat?" and "How many times should you pull on the paper towel dispenser handle?" If a child answers the question correctly, he or she gets to line up at the door.

Jane models actions such as recycling and turning lights out when leaving the room; on this day she fished a plastic bottle out of the trash the art teacher had thrown away and had the class confirm that bottles marked with a 2 could be recycled.

At the end of the day, Jane took the children outside to walk on the school's nature trail to identify patterns. In preparation for the walk, she had them identify patterns around the room and then showed photos of plants and animals that illustrated patterns in nature. When she presented the class with a photo of a monarch butterfly the children began to chatter excitedly. Earlier in the school year, the class watched a monarch butterfly emerge from its cocoon and they released it and believe it is migrating to Mexico. In addition to recognizing a pattern on the butterfly's wings, they could also determine if the insect was male or female by certain spots on the wing.

Once outside, the kids knew exactly where they were going because they had explored the area behind the school during previous classes. Although they got caught up in the excitement of being outside on a beautiful fall day, they remembered their mission to look for

patterns and students picked up leaves, pine cones, and pieces of bark to show patterns they had found. Eventually, it became a free-for-all as everything pulled at their interest and each child wanted to find and share something. They looked for trees, colored leaves, insects, and birds. Jane had to tell them more than once to keep their voices down so they would not scare birds away. They would be quiet for a few minutes, but then one student would see something and run to check it out and their voices would once again rise up as they called out with curiosity and anticipation. Jane was able to round them up and herd them back to the classroom. To the cozy classroom, where there were still hints of the outside even though they were inside.

Jane's teaching is not just infused with environmental education; her entire classroom is infused with nature. Yet, Jane says infusion "isn't the right word. It's just part of what I say or do. It is who I am." Including environmental concepts in her teaching is "second nature" to her. "It just comes naturally."

When asked why she teaches about the environment in her classroom, she replies, "It's our future." Her face lights up when she describes how the environment is the connection between all of us and our sustainability depends on it. It is "a web that ties us all together."

Jane's passion for nature—she used the word passion—started in her childhood. Her "entertainment was nature." Her fondest memories were the times she spent in the woods with her father, camping and fishing. Jane is comfortable in the outdoors; she notes that this is not a common trait among many of her colleagues. She expected that when she moved to the north woods, most people would have extensive outdoors experience given they lived in such a rural setting; she found that the opposite was true. Although she grew up in the southern part of the state, near Lake Monona, she had spent more time outdoors during her childhood than teachers who were born and raised in the northern part of the state.

Recognizing the importance of early exposure to the outdoors in promoting environmental sensitivity has motivated Jane to include environmental education in her kindergarten lessons. Children are like "sponges," they soak up what you share with them. With

most of her lessons, she easily finds some way to connect the topic to nature and the environment. In addition to her desire to promote awareness and sensitivity, she shares that children find lessons more interesting if she includes the natural world. “I’ve had parents request me because they feel their kids really like animals and wildlife and the environment. So they requested me. Because maybe I had their brothers or sisters. So, they kind of knew what I had in the classroom. I’m more comfortable with all this stuff around me.”

Jane discussed several ways in which she includes environmental topics in her classroom lessons. For example, when she teaches about the senses she will address the sense of hearing by taking students into the woods and creating a “listening circle.” This involves the children finding a spot to sit and drawing a circle on a piece of paper with an X in the center of the circle. The X represents the child. As the child hears things, he or she is to make a mark on the circle indicating the direction from which they heard the sound. This is an activity that could be done indoors, but she likes to take children into nature to increase their comfort level outdoors and encourage them to become more aware of sounds in nature. Depending on the child’s skill level, he or she can draw a picture of what was heard. Jane also has a “touch and feel” box for the sense of touch. Again, this is a common kindergarten activity where students reach inside a box and feel items they cannot see while trying to guess what they are. In Jane’s case, the box includes items from the natural world such as an antler and a pine cone.

When asked what her goals are regarding her environmental teaching, she says that children need to “respect the land they live on.” Teaching respect is a common goal of kindergarten teaching in general, and she expands that to include the natural world. She wants to “soften” her learners toward the environment so they will not have hard or impervious feelings about nature. “When we go on field trips, I talk about recycling or reusing or even reducing. They know my thoughts on bringing items such as ‘lunchables’! I do talk about the impacts to the land, how it can impact the environment and the critters. I do talk about why we turn off the lights, but I don’t really get much more in-depth than that because they won’t understand it.” She highlights how the environment “affects them personally” and builds a foundation of respect so

they are willing and interested in learning more about the environment. This approach teaches students to “make their own decisions” about managing environmental resources.

As a kindergarten teacher, Jane does not have formal assessment strategies such as tests and projects in her classroom. Through observations she notes how students respond to her lessons and monitors their enthusiasm toward the natural world. She says it is hard to tell if she has had any long-term effect on her students’ care for nature. She did recall one time when she was asked to review an Eagle Scout project, it turned out the student doing the project had been in her kindergarten class years ago. The project involved designing and installing interpretive signs for a nature trail. The student told her that he remembered going on the trail during her class and because of his positive experiences, had continued to visit and explore the site as he grew older. So, for this one student at least, she was successful in instilling a love and interest in nature.

Jane’s desire to be an effective environmental educator led her to take a number of environmental education inservice courses throughout her professional career. The bookshelf in her office is lined with activity guides and resource books for teaching about the environment. These include Project Wild, Project Learning Tree, Project WET, and the KEEP activity guide. Kindergarten teachers often complain that activities in those resources are geared toward older learners, but she finds them very useful. She says other teachers in her school are often borrowing them and she worries at times they will not be returned. She bemoans the recently increased demands on her time and curriculum because they prevent her from using her EE resources as often as she would like.

Jane received most of these resources through the courses she took at Trees for Tomorrow as well as at Treehaven, including a series of professional development opportunities in EE offered through UWSP. The series of four one-credit courses were developed through an NSF grant and included an introduction to EE, an ecology class, a course on environmental issues, and a citizen action experience. The Treehaven program director was the instructor for these classes and after having Jane in all his classes he came to know Jane and her dedication to

the environment very well. Jane credits him with motivating her to go beyond teaching about nature in her classroom and to become an active environmental educator.

With encouragement from the Treehaven director, Jane enrolled in the extended master's in EE for teachers program at UWSP. This program was also developed through the NSF grant. At the time of her enrollment, most of the courses were free and there were also funds to support travel and lodging. Jane was hesitant at first to pursue her master's; she had many demands on her time including being a single mother. But her interest in learning more about the environment and the financial incentives of the program made it too hard to resist.

Jane has worked with her administrators to try to increase the amount of environmental education in her district. The primary means by which the district addresses EE is through its school forest which is the largest in the state. Jane reports that when she first started teaching in the district, there was a School Forest liaison who was very dedicated and worked with all the teachers in the district to bring their classes to the site. Every student had an opportunity to visit the school forest at least two times during each year of their K-12 learning experience. In 1992 however, the liaison retired and the use of the school forest declined dramatically. In the late 1990s, the district hired an assistant superintendent who had a biology background. He "appreciated the value of the school forest" and revitalized the district to include it in its school programming. He toured other school forests to learn about their educational programs and called meetings of key people in the community to develop an operational plan for the site. He found funding for teachers to serve on curriculum committees and meet monthly to develop educational programs for each grade level in the district.

When the superintendent interested in biology came, interest in the environment and the school forest went up. I mean way up! We had opportunities to go to [the school forest] twice a year with lead teachers. And then he was tracking how many teachers were going out there. And then we started scheduling. One week was scheduled for kindergarten and another week for first grade, etc. So the track record went way up and interest level increased. Again, that came from strong leadership.

Unfortunately, he retired last year. There are still funds to guarantee each class one fieldtrip to the site, but Jane says strong leadership needs to continue to keep usage up.

I don't know honestly what's going to happen now. I don't know this person who's taken the superintendent's position as the head of the [school forest] committee. I don't know her that well; but in time I hope our committee members stay committed and we work with her. My hope is that the strength of the committee members will keep this moving forward; the momentum is there.

The school forest committee is presently working with a group of local citizens and businesses in developing a strategic plan for their school district. This plan includes a possible environmental charter high school.

Jane concludes that strong administrative support is the key to successful environmental education in schools. "Administrative support has a huge influence on EE in the district ... it can motivate passion." By this Jane means that she thinks many teachers care about the environment, but other demands on their time and curriculum can discourage their commitment to EE.

These days, the administration is focusing on state testing. Jane shares that pressure to prepare students to take the tests is significantly affecting their curriculum. She says that she is teaching what used to be the first grade curriculum at the kindergarten level. Her district faces a number of other challenges as well. Her community is "property rich but people poor." In other words, residents who live there year round have lower incomes than people who own land but live and pay taxes in different parts of the state or in other states. Although her district representatives say this is not the case, she and others believe the taxes collected from these property owners stay in other parts of the state rather than benefiting the community. Jane's own teaching situation—closing her school, combining with another school and having her class size double—is evidence of the poor economic conditions of her district.

Despite these challenges, Jane continues to include environmental education into her lessons because it is "who she is." In fact, she is proud of her nickname, "nature mama," which was given to her by a past student. Although she may have a nature table instead of a nature

corner and there is no room to mount many of her environmental displays, she still finds ways to environmentalize her teaching. To environmentalize the entire district is a more challenging feat that she feels needs administrative support. She would also like to know what other kindergarten teachers are doing in EE. “It would be nice to have something at the lower level, a chat room or something, to share ideas and to support each other.” It seems that although Jane’s commitment to EE remains strong, having a stronger support system from administrators and other teachers would further ensure the success of her efforts to teach about the environment.

Teacher's "name": Kathy

Grade/Subject: High School Math

Location: Urban setting, Central Wisconsin

School demographics: Mostly Caucasian with some Hmong and Hispanic

Teaching experience: 11 years

EE professional development experience: Master's in Environmental Education – UWSP

Pre-observation Interview: November 12, 2005, 3:00 P.M. – 4:00 P.M.

Observation: December 2, 2005 9:00 A.M. – 10:00 A.M.

Post-observation Interview: December 2, 2005, 10:00 A.M. – 10:30 A.M.

Kathy has a very practical approach to environmental education, although she stresses that she includes it because it is important. "First of all for me personally, I just think it's important. It's part of my life style, part of my beliefs." She couldn't easily target a particular reason why it was a part of her beliefs, but after some thought she replied,

One thing that comes to my mind is I'm an outdoorsy type person. I just generally gravitate toward that type of activity. As I was growing up, recycling became kind of something we would do. When we were kids we would recycle aluminum cans. Then, when we were in college the recycling bins showed up for other things. So, maybe partly it's just my age that things just changed then. Had to start recycling, which is a small part of the environment and things like that.

She got her master's in EE because of her interest in the environment, but also because the program was located near her in Stevens Point and was available at the time when she decided to pursue an advanced degree. She credits the master's program "100 percent" for the reason that she includes the environmental education activities.

Prior to that program I wasn't aware of Project WET, Project Wild, Project Learning Tree. The idea of infusing something else into the curriculum. Knowledge, just general knowledge."

She uses environmental activities to illustrate the mathematical concepts she teaches her students, providing them with real world examples.

Sometimes I will use an activity as an introduction to a chapter to spark a little interest. And sometimes it is the finale. Like we learned these math skills, let's see how we can use them. For example, when we're working on the circle chapter, one of the days we'll go outside and we'll work with the handheld compasses and do an orienteering course. Another day when we're doing angle measurements, like simple trigonometry, and we'll find tree heights using simple trig. So, I'll incorporate it somewhere into the chapter, kind of reinforce the skills or here's a real place you might use this.

Most of my activities came from Project WET, Project Wild, Project Learning Tree which I got through the master's program. That's where I mainly found my activities. And if there wasn't something available then I developed something on my own.

The students just in general are interested in something different than the usual day. So, overall the activities are usually of interest because it's something different. As far as differentiating between some other activities versus an environmental ed one, they like the connections that they get between other classes. They might say, "When I was taking Ag class, we did this or that" or, "In Science, we were talking about this," and they might have gone further on. It helps them see a connection. It's not just math class all by itself. Or Science class all by itself. There are connections between the two. And they like to see that. It's exciting for me when they notice that.

She believes including these environmental topics benefits the class and it is a priority for her to include them. In fact, their value makes them more important than some other math topics she might choose. Although she is not sure the activities help students get a better grade in the class, she believes they make the topic more "enjoyable and memorable" for students. Therefore, she will decide to skip certain chapters that she thinks are less important rather than omit the activity. This decision is supported when she encounters former students,

When I run into my past students in the hallway or the community, they say, "Oh I remember your class we did this or that." Many of the times the things that they'll say are the activities we did with them. Not, "the homework on page 100 was so good!" The [environmental education] activities will be the ones they remember most from the class . . . students are appreciative of it.

She says she is fortunate that she has never been questioned about what approach she uses to teach her subject, so her decision to use environmental education activities is not a problem. She also does not feel any pressure from the state testing. She knows the district is

struggling to be more accountable, but she has a general idea of the topics which are on the test and knows she already covers them.

Kathy's planning book shows how she schedules her teaching to include activities. "On Monday, Tuesday, Wednesday, I teach new material. On Thursday we review. Friday we take a quiz and then we do one of the activities. It would be approximately half of a class hour we use it with." So, to observe an environmental activity in Kathy's class, one should show up on a Friday (after the quiz).

In Kathy's class, there is one poster illustrating biodiversity on the bulletin board in the room in which she teaches, but nothing else related to the environment or the outdoors displayed on the walls or around the room. She explains that she shares the room with other Mathematics teachers, so it is not conducive to putting personal effects on the wall or around the room. The poster is hers, though, and her way of bringing an environmental message into her teaching situation. Kathy explains the activity as follows:

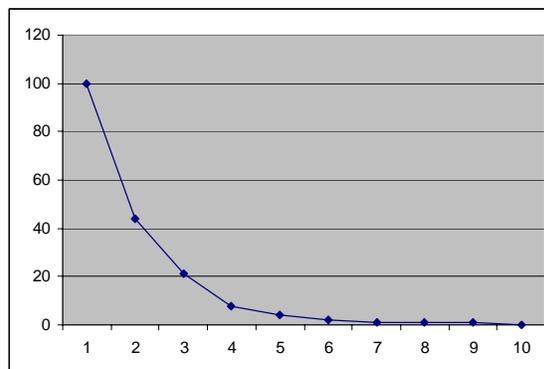
The activity is you have a shoe box and it has 100 pennies in it. You shake the box, take out all the heads, shake the box, take out all the heads. And then when we make a graph of it, what we realize is that it's an exponential graph which is a unique shape of graph for Math teachers. So, it is related to an environmental topic (issues with nuclear waste) and I can also make connections to chemistry, but it's not quite as good as the ones I included in my [graduate project] I use to teach about geometry.

After students complete the quiz, Kathy prepares them for the activity.

		She asks how many had heard of the term half-life. Except that it is the name
0	100	of a video game, none of the students had heard of the term and were not
1	44	aware of its association with nuclear radioactivity. She described the activity to
2	21	students and had students come to the front of the class two at a time to shake
3	8	the box of pennies and remove the heads. She noted that this class' outcome of
4	4	penny shakes turned out well, as there was a problem last class where the
5	2	results didn't turn out as expected. This session revealed the numbers
6	1	
7	1	
8	1	
9	0	presented to the left.

She asked the class to help her create the axis for the graph and plotted the data as follows:

She concluded the class by asking the class how this might be related to Science and explained that scientists use half life to determine when a radioactive material is safe. She identified the graph as an exponential graph which would be explained more in next week's lesson.



Kathy acknowledged that the radioactivity and half-life lesson was not the best example of her environmental education efforts and explains that the unit she developed as part of her master's project is better.

When I worked on my master's I picked the ten typical topics anyone in any school would use if they were teaching geometry. For example, one of them is congruent triangles. No matter who you are, you're going to teach about that when you teach geometry. And then I found an environmental ed activity that went with it . . . I wanted to make sure it was broad so that anyone who picked it up could use it wherever in their class if they did congruent triangles at the beginning of the year, at the end, in the middle, they could use it wherever.

She indicated that she has tried to share the product she developed with other teachers, but she advised that teachers need to try using the activities as part of a workshop before they will feel comfortable using them. Without this exposure, it is a "slim chance" they will use the activity themselves. For Kathy's part, she has found that they do work for her; it has been five years since she completed her master's and the EE lessons she developed then are still apparent in her lesson planning book.

Teacher's "name": Alice

Grade/Subject: High School Art

Location: Eastern Wisconsin

School demographics: nearly 100 percent Caucasian

Teaching experience: 16 years

EE professional development experience: Inservice courses in EE

Pre-observation Interview: December 5, 2005, 3:00 P.M. – 5:00 P.M.

Observation: December 6, 2005 10:00 A.M. – 11:00 A.M.

Post-observation Interview: December 6, 2005, 11:00 A.M. – 11:30 A.M.

Alice is an art teacher who sees how art “ties into” all other subject areas and how other subject areas “tie into” art. She has a strong appreciation for nature, not only for its contribution toward art supplies and mediums, but for its inherent environmental worth. She believes we need to protect our natural resources, including endangered species, and strives to develop similar passion and concern for the environment in her students through artwork.

Like many teachers in this study, Alice can trace her “passion” for the environment (and she, too, used that word) to her upbringing. She credits her father with instilling her environmental sensitivity. “Be very observant and recognize things like even the goldfinches and the thistle, he’d explain to me. You know, everything that he knew about the natural species that were in the area.” Going to college during the 70s, a time she describes as a “turnaround period,” she saw people becoming more aware of pollution and the need for environmental protection. She recalls a class in college that involved her in water analysis, learning how sewage dumping was affecting water quality. Although she was majoring in Art, she continued to have a strong interest in Science believing that they go “hand in hand.”

Art and Science definitely go hand and hand, Alfred Billings back in the 1800s—he was a writer—and he even said nature was man’s teacher. I think that’s a powerful statement. As an artist you can certainly draw on nature or any kind of inspirational and motivational resources for ideas in art. It’s a wonderful teaching tool just to get kids

outside because it's one thing to look and it's another thing to see. I think we have a society of kids that are lookers but they don't see. It's good for them to go outside and just take the time to observe their world around them. And I think as you do that they start to develop an appreciation and awareness of even the microspecies instead of always the whales or save the Siberian tiger. Sometimes it's the little things that are very important.

There are a number of ways in which Alice includes environmental information in her art instruction. She summarizes her approach to environmental education as follows:

Almost every project we do has some little environmental insert into it. Whether it's just a recognition of this is what these people would do, or this is what we can do with it, or this is how we're going to save that, or we're not going to waste this. Drawing and painting is very easy to tie environmental curriculum into because there's so much you can use as a resource from nature. And why use a book when you can actually go out there and touch it and feel it and smell it. And really see what it completely looks like on all sides. That sparks more curiosity.

As she just mentioned, she often uses the natural world as a model or focus of their artwork. When students painted pictures of whooping cranes, they also learned about the natural history of the birds and current efforts to preserve their numbers and return them to their natural migration paths.

It's not just a matter of drawing a bird. The kids have to have a passion and a sensitivity and an understanding of what's happening. One of the things they do when they're completely done with a project is they write a self reflection on that project. The reflection is interesting. The kids are writing that, "I didn't know that this bird was nearly destroyed, there were only 15 left, I'm really glad I can do something to let the world know how beautiful this bird species is. And I'm glad that I'm making a visual statement." That's very important because not only have they learned something personally, but they feel good about themselves that they can send the message to another group of people. And I think that's where art has a lot of power. Words are one thing and you can read a book about something, but again the tone or way it was written maybe can be interpreted many different ways. But when you—and not that visual arts can't be interpreted in many ways—but when you make something that is very beautiful it is usually interpreted as being beautiful.

Alice emphasizes how natural materials are important for creating art, including baskets and jewelry. Alice's face lit up when she started describing how she learned about native cultures

and identified connections between what she experienced and her art classes and the environment. She described it as

“a perfect tie in” using the natural materials to make art, the birch bark baskets—the winnowing baskets for rice. Making string and rope from basswood trees. Making string and rope from dead nettles in the winter. The beadwork design and the porcupine quills. All of that as a natural material, found materials, reeds and rushes and grasses, all of this was this resource of material that was right there. Using clay and taking clay out of the river and using that as a natural material.

Alice’s interest in the clay and pottery helped her decide to go to the southwestern states, the “four corners,” and take courses from the experts in Native American pottery. She stressed,

That is the one true art form that this country can claim as theirs and that is the Pueblo pottery. And it’s just exceptional. Digging the clay out of the mountainside, bringing it back, drying it up, grinding it down to a powder, straining it, soaking it, re-straining it, knowing how to mix the right amount of volcanic ash with it. Again, here you are, taking materials from nature and clay, clay you can’t run out of really—what is it, 90 some percent of the earth is made out of clay or whatever—it’s a resource that’s plentiful. You can tie everything into it. You can tie history, foods, and all subject areas can be tied into that whole pottery subject.

Even when not teaching an art unit that overtly integrates an environmental subject, her concern for responsible environmental behavior does infuse her teaching. While students were deciding which pieces of glass to gather for their stained glass art project, Alice told them to make sure they put leftover pieces into a box to use for future art projects. “I don’t care which ones you pick, but I do care about what you waste.” She explained that the class would be making a mural of a wolf pack and would need the scraps for the mosaic pieces.

Alice also demonstrates environmentally friendly practices associated with choosing and maintaining art supplies.

As an artist because at the time when I went to school they still were using turpentine and mineral spirits and paint thinners and just dumping them down the drain. No regard to what it may do to the water. I know a few years later, when I was a teacher, I thought I’m not going to be like that. They had these garbage cans for mineral spirits and flammable type materials. We don’t even use that any more; I have completely gotten away from

that stuff in the school. We use all water-based paints and don't use oils anymore. It's a little more environmentally friendly. If we do happen to . . . like we use a little paint thinner for cleaning stained glass, getting the flux off. But the kids are good about doing that on newspapers so that it goes in the trash and no one's allowed to work around the sink area. But that's like the only area we would have a solvent of some kind.

She advocates the importance of what she calls "tying in" concepts from other subject areas. For example, when she teaches about gold which has been used in many pieces of art and why it is an appealing metal: "gold has no memory, it can be recycled and reused many, many times." She also teaches students about the chemistry of gold, human history related to gold, and also the environmental and social issues related to gold. She reveals that students, especially when she first started teaching at the school, expected they would only do art activities in the class and complained about having to learn formulas and do worksheets. Now they more readily accept that they will learn about Math, chemistry, vocabulary and will take tests and quizzes as part of art.

She believes that other teachers in her school also infuse environmental education. She specifically mentioned a Language Arts teacher who includes Thoreau and Leopold in her classes.

One of the things that was stressed at a curriculum related faculty meeting at one time was the fact that yes, the testing is all built around the four core areas. But then they reminded us in all the elective areas that it's our job to integrate as much as we can into these four core areas. I think that integration is extremely important because I always tell my kids it's better to be whole brained than half brained. You know science and math, history, all the left brained subject, you've got this really powerful left brain, but it's half a brain. And I say what about the arts? Sometimes the arts will help you understand the left brain subjects . . . it gives you a different kind of way to have your brain solve the problem. And I said the arts are a great way of learning to solve problems—it's not just a method of like let's repeat the information, let's spew out the knowledge you just had pumped into your head. It gives you a different way to solve the problem. And I think they can appreciate that. I think a student that has a good balance of the academics and their environments and social family, you have a well-balanced kid. That way they're going to do well all the way around.

Instilling a sense of passion in her students is a primary goal of Alice's. When asked if she thinks her efforts have been successful, she says, "You can tell by their artwork. If they didn't care so much, they wouldn't bother doing it. And I don't have one piece out there and I don't care what level of talent those kids happen to have had, they try the best that they could to do an excellent job. That says something right there. That they definitely care about what they're doing."

The artwork—the paintings, the murals, the sculptures—displayed around the school concurs with Alice's perceptions. For example, beautiful illustrations of cranes created in a variety of art media line the hallway while a stairwell landing has been decorated with a detailed mosaic illustrating marine life. Look outside the window of Alice's classroom and you will see signs of a native garden and a retaining pond, both used to display sculptures and art designs as well as enhance an appreciation for indigenous plants and animals.

Alice shares many ways in which she ties environmental, science, and cultural concepts into her lesson plans. She acknowledges that some teachers might just teach drawing or art technique, but it is apparent Alice likes to use art to change students' minds about their world and not just to make them better drawers or painters.

Education is powerful and can change the way people think. Because if people are afraid of something, you destroy what you're afraid of. That's just a natural inclination. If you don't understand—if it's a group of people, if it's a certain animal—if you don't understand you will destroy it.

I think that's why we as educators, even if you can incorporate some little tidbit every opportunity you have that's something with an environmental slant to it, you're going to change the way these young people think. And of course, they're going to teach their children. Because the most powerful influence in a child's life is number one their parents and number two their teachers.

Teachers' "names": James and Carl

Grade/Subject: High School Language Arts (James) and Social Studies (Carl)

Location: Central Wisconsin

School demographics: Predominately white, middle class

Teaching Experience: James, 17 years; Carl 10 years

EE professional development experience: Carl - Undergraduate from UWSP

Pre-observation Interview: January 10, 2006, 3:30 P.M. – 4:30 P.M.

Observation: January 12, 2006, 11:00 A.M. – 1:00 P.M.

Post-observation Interview: January 12, 2006, 1:00 P.M. – 1:30 P.M.

When a leading environmental educator was asked to identify non-science teachers from his district who teach about the environment, he recommended James and Carl. It turns out that James and Carl do reference the environment during their integrated American Literature and American History course (ALAH), but it was not an intentional part of their overall curriculum design.

Being contacted to participate in this study, however, motivated them to consider including an environmental component. ALAH was created 13 years ago to integrate American Literature and American History to create a new course that includes key elements from both classes. Essentially, the course focuses on particular periods during American history and uses literature to help illustrate those times; “The kid’s have something to attach their history to, they have a storyline to go on and that seems to work very well” (James). When designing the class, they strive to pull in activities that make both the history and the literature relevant and meaningful to students’ lives today. James provides additional motivation for how they design the class: “Kids learn when things impact their own lives. They learn more and retain the information that they learned. They start looking around their own world and realizing that one: there’s a problem and two: there’s something they can do about it.”

The class is currently studying the rise of big business and Upton Sinclair's *The Jungle* is the book used to illustrate this time. Carl explains the book's setting is the meat packing plants in Chicago in 1904.

[Sinclair is] giving the case against capitalism here, monopolies, trusts, stuff like that; the impact that it has on the life of working class and proletariat. So, we're taking a look at the pollution that's coming out these factories and coming out of Packingtown. Bubbly Creek is mentioned in the book. They're just dumping all that in the creek and there's stuff coming up and acidic chemicals and all that crap and it's just being dumped. We're looking at not only that, but how does our society set up a system that's conducive to pollution. And that's where this lesson's going to go.

James further describes their approach by saying:

The reality is . . . we're reading a novel that's 100 years old, kind of dry, has to do with people from Lithuania that these kids don't really have much of a connection with. But they're looking at the impact of big business on people's lives. What we want to do is show them this isn't just history we're looking at because big business impacts your life each and every day. And one of the ways it does is look at the ditches along the roads. . . And we've talked about lots of impacts of big business on the consumer and the worker. But we're now taking a look at what's the impact of big business on the environment.

This year—because of the phone call they received inviting them to be a part of this environmental education research project, they decided that adding an environmental slant will make the topic even more meaningful to students.

The environmental slant involved keeping a garbage journal. For one week, they monitored the garbage they generated and also looked for litter. Students were to work in groups to share their journals, identifying one product in particular that was of concern or of interest to them. They were asked to consider, "who owns the problem?" They also discussed if they could make a difference and how. Their assignment was to write a letter to the entity they identified as the problem owner. They were cautioned to consider a realistic person to address, rather than writing a letter to, say, "Dear McDonalds." They were also to come up with an "Action Plan" and were provided with a list of options such as signs, bumper stickers, a song, a skit, or an exposé. For most of the rest of the two hour session, the students worked in their groups of three

to five, discussing, debating, and collaborating. Several of the groups selected cigarettes as their product because they saw so many discarded butts. While a couple of the groups opted to write to individuals associated with the company, many of the other letters were written to politicians—such as their mayor. When the class ended, the groups filed out discussing what their action plans would be and when and where to get together to prepare them.

Both James and Carl were pleased with how the activity went, although Carl expressed some concern that several of the groups chose to focus on the government rather than big business, the topic of their unit. He noted that it was part of the overall learning process for them as well as for the students, and would assist planning for the next time they do the unit. James stressed that it was important to see that students concluded that they could be most effective by addressing their letters to elected officials. He said it helped them illustrate who owns the problem and connect the issue to their own lives. He agreed that they would include this environmental component the next time they taught the unit.

According to James, the primary reason for teaching ALAH “is so that kids can become informed citizens . . . make all kinds of good decisions with their lives. Understand how the world works, how the systems work, understand their place in the world, not only their place, but their responsibility because they are a citizen of the world.” So adding an environmental component only helps to make history more relevant. Although they admitted that they had not consciously considered integrating environmental education before, environmental awareness is “one of those strings they keep pulling through the curriculum” (James). The justification for this “string” is the role of natural resources in American history and the early belief that there were unlimited natural resources along with the attitude that we are entitled to natural resources. For this particular unit, James hopes that by inventorying the litter they see along the roadsides, students will see that these attitudes prevail today and that the results still affect their lives.

Both Carl and James have an interest in the environment, but only Carl recalls receiving any coursework in environmental education—as part of his preservice preparation at UWSP. James has always had a love for the outdoors and frequently goes on camping and hiking trips

with other teachers in the school. As a Language Arts teacher, it was not surprising to learn that it was a book, Edward Abbey's *Desert Solitaire*, which played an instrumental role in changing his attitude toward the environment. He became aware of sensitivity and beauty of the environment and became concerned about environmental issues.

Because James and Carl have their own interests in the environment, they believe they “weave” environmental concepts into their lessons. However, they acknowledged that “the times that we do, we don’t do so with an awareness that this is how we’re gonna attack this book. It’s kind of an aside thing. We talk about it . . . but it’s not like we make a point of doing that” (Carl). They now see that “Environmental education is one more thing you can connect to get kids to see the broader picture” (James).

Although it turns out that James and Carl were atypical participants in this study as they are not exemplary environmental educators, they were able to provide valuable insights into the process of integration. In their case, it involves two teachers from different disciplines planning together (rather than a single teacher pulling in topic matter from other disciplines into his or her subject area). James acknowledges that it takes more work and planning time, but that the outcome is worthwhile. He also emphasizes that with the team approach it is imperative to work with someone who is like-minded and cooperative. The basic process of integration involves deciding what ideas in history need to be taught and looking for literature that reflects those ideas. The ideas selected have been influenced by the academic standards which resulted in some adjustments to the curriculum, teaching about the bill of rights in more depth for example. James says the outcome is a “seamless” blend of the two subject areas and it is hard to pick out who contributed what idea. The basic message though is that two separate ideas came together to make one new idea.

James is an advocate for integrating concepts from subject areas to make them more meaningful for students. When asked if he thought that the original courses might be compromised or that components from the original courses might be lost because of integration, he stresses:

I wouldn't agree with that at all (that what you teach about is going to get lost). I think that what we do actually increases the understanding and the learning that these kids get. Because you're taking two ideas and putting them together and showing the relationship between these ideas. And if you're losing something from both of them in the process, then you're doing it wrong. . . . Sure you're giving something up, but what you create together should be better than what you've given up. Otherwise, why are you doing it in the first place?

Through ALAH, they're creating something new—with its own curriculum and its own ideas—that covers in more depth key concepts from either subject area. “Nothing is lost” (James). They believe it is a benefit for the students to see the connections between things they have never seen connected before. James hopes that these connections facilitate students relating to the characters in the book, examining the choices the characters make while reflecting upon their own lives. “And may change accordingly. . . . I have no idea that's going to happen. But without bringing their awareness to it; it probably never would.”

James and Carl indicated they would consider integrating environmental concepts in the future. Carl reported that he has used environmental education activities in the past when he first started teaching. These were from Project Wild and they helped illustrate concepts in his World History class, such as issues with dam construction. The activity guide had “a ton of neat things you could use as a Social Studies teacher.” At one time, he used around four activities a year for his class. He notes however, “the more time passed and you start changing, tweaking things here and there, and you don't put that emphasis on it anymore and you haven't gotten any new professional development things on it, they start getting dropped and before you know it, you're not highlighting it any more.”

Both James and Carl recommended professional development opportunities to show teachers how environmental education would work in their subject area teaching. “Teachers are so busy with what they do in their own curriculum and what they know that they have to teach that sometimes they lose sight of what they can teach instead. And things that could make what

they do teach more interesting or more relevant” (James). Both of them agreed that Social Studies, with its emphasis on developing informed and responsible citizens, is a good fit for aspects of environmental education. Carl suggested that bringing Social Studies teachers together to explore ways to integrate environmental topics would be useful, especially if the session was led by a Social Studies teacher. ALAH is a popular class among the students, and they believe one reason for its popularity is that integrating ideas from subjects makes learning more attractive to students.

Teacher's "name": Tom

Grade/Subject: Middle School, Science

Location: South-central Wisconsin

School demographics: Predominantly white, middle class

Teaching Experience: 13 years

EE professional development experience: Master's in Environmental Education – UWSP

Pre-observation Interview: January 23, 2006, 3:30 P.M. – 4:30 P.M.

Observation: January 24, 2006, 9:45 A.M. – 10:30 A.M.

Post-observation Interview: January 24, 2006, 10:30 A.M. – 11:00 A.M.

The lesson within Tom's ecology unit was on the topic of owls. Students were primed for the activity by answering the question, "What are producers?" that was written on the board. They wrote their answers in their journals and then discussed the question at the beginning of class. The discussion was tied to a homework assignment where students made a food chain that involved the topic of the lesson, owls. While describing the role owls play in the food chain and eating rodents which are often pests to farmers, he mentioned how some farmers like owls as an effective alternative to pesticides. Tom reviewed some of the owls they have studied, and used a computer to allow them to hear some of the calls of owls in Wisconsin.

The students were then given their lab instructions and gathered their materials to begin their "dissection." The noise level of the class increased dramatically as the children tentatively explored the tin-foil wrapped egg-shaped object each group received. With probes and tweezers they carefully unwrapped the object and began picking apart their sample. Cries of disgust competed with those of excitement as they discovered tiny bones and teeth among the fur they poked through. Some students got bolder, feeling brave enough to use their fingers after seeing their teacher tear apart one sample. Other students continued to use the probe and tweezers to make their discoveries. Of course, a common query was, "What is it?" To which Tom replied, "What do you think it is?" When he insisted that he "did not buy poop" for this lab, students

started to think of other explanations for the bone-filled balls of fur they dissected. One student commented that it looked like one of his cat's fur balls, and Tom indicated he was going in the right direction. Never giving his students the answer, he expected them to read about owls on their own to learn what the dissected items were and how they were made.

When asked what environmental concepts were included in this activity, Tom replied,

I think some of the aspects of EE are which owls are found in Wisconsin. Just raising awareness of what's here. Developing skills of recognizing what do we find that's around here. While a pure science would be what's a food web, what are producers, what are consumers. When we look at applications to every day lives. Like when a kid said he was out hunting and saw an owl landed near him and he stayed there for a minute or so and watched that. I think that ties into that environmental education where they become informed about things that they see when they're outside. Whether hunting or hiking when they're out in the environment, I'm not telling them what to think about that owl, what's right or wrong. But certain species are there. But they'll have some background knowledge and some first steps. What do we see when we go into nature? How does it affect them? How it might impact their lives?

Tom's teaching practice helps illustrate how the subject area of Science can be environmentalized. Environmental Education is most often associated with Science classes, and while this study sought out non-Science teachers to learn how EE is infused into their subject areas, it was also important to speak with a Science teacher to learn how Science and EE are related and how they differ. More importantly, Tom helped to illustrate how EE can be infused or integrated into Science classes.

Tom is a graduate student of the UWSP extended EE master's program for teachers. His graduate project, which he co-wrote with a colleague at his school, dealt with the infusion of energy into their curriculum. Although initially he had difficulty discriminating between the terms infusion and integration, after some contemplation, he explains why they used the word infusion in their title rather than integration:

Our [graduate project] was about energy infusion, it [used] our current curriculum where we just put in energy. That's why we thought infusion was better than integration. [If it integrated, the master's project might be] about how we got together with the other

subjects and integrated [energy] into the Math and Social Studies and Language Arts program. Or, if we did it just in Science, covering branches of Science with energy as the focus, doing a quarter of chemistry with energy as the focus, then a quarter of physical with energy as the focus.... rather than keeping the curriculum as it was and just adding energy where applicable.

Tom also reflects that the lesson he demonstrated illustrated infusion rather than integration.

Infusion would be more of here's our unit, I just add, put this in, tie it in, like here's a great place to talk about owls and pest control might be a type of infusion. Now, if we went back and looked at the Spotted Owl controversy in the Pacific northwest that would be integration. Or if we integrated other subjects, bringing in Language Arts and writing, linking their opinions as newspaper articles or letters to the editor. Infusion is more like putting it in with everything else, while with integration I might be taking out parts and adding whole new parts and making more adjustments.

Tom teaches an integrated Science class, so he knows what is involved in taking out parts and adding new parts and making adjustments. He explains state tests were the impetus for redesigning their course to create an integrated curriculum.

The 8th grade test is really a 7th grade test because they take it at the beginning of the year. Then, if 8th grade is Physical Science, they really haven't had much Physical Science. If they get tested on it, they don't know it. Before we changed the curriculum, the last time the kids got Earth Science was in 6th grade. Then, they get obviously tested on 8th and 10th but there's this big gap there where it's not being covered. So, what [my co-worker] and I did, we integrated our middle school curriculum, so we get some of Earth Science, some chemistry, some Life Science, and some Physical Science in 6th grade, 7th grade, and 8th grade. So, now they should be better prepared for it because they've had some in 6th and some in 7th. They've covered all those, maybe not as much depth as they would have if they would've had a whole year, yet, they've gotten some exposure and background to all those.

Tom shared a curriculum mapping project their district is conducting to ensure the standards are being addressed in the courses within the school district. The map outlines the guiding questions, the concepts, the assessment, and the state standards that are covered for each unit. "Then, if we take like from 4th to 8th, we can see we've covered these standards. Are we getting all the ones we're supposed to for standardized testing and covering all the ones we

should? So, it's just sort of like a spreadsheet document that shows what we're covering and what time." The notion that the testing is squeezing environmental education out of the curriculum is a legitimate concern in his opinion. "I think [testing is] brought up as a reason why certain things aren't done ...our districts are held accountable, especially to the public, because that's what gets published in newspapers and stuff. A lot of times, we're asked to prove or validate what we're doing to make these scores better."

If Tom were to assess the quality of environmental education in his district, he says it would be "fair." He knows that he and two other teachers that went through the UWSP master's program do some. "Other teachers, especially elementary, talk about environmental topics with kids and stuff like that. I think maybe it's one of those things to get slighted, one of the first things to get sort of pushed aside or to the back burner. It's one more thing to do." He did note that their Language Arts teacher is doing a consumerism unit where they "talk about consequences of lifestyle or consequences of using particular products and things like that." He expressed hope for future collaborations among teachers in his school and potential for integrating topics including environmental education:

Our schedules never worked well before but now we have team meetings, for all the 7th grade team meetings, 8th grade team meetings. Actually the Language Arts teacher and I have talked about combining my unit on resources and pollution with her consumerism unit. And working together that way. So, it wouldn't be a far stretch to combine some of the Social Studies with certain other areas. Now that we have some common meeting time where we all sit together.

Similar to other teachers who include EE in their lessons, Tom has had childhood experiences of living near and recreating in nature. He noted that environmental issues are frequently in the news and affect the daily lives of his students and their parents. He shared that his interest in the environment "comes from my Christian background, that God commands us to take care of the earth and to be good stewards of the land and the resources and everything. That it is not there to be abused and use whatever you want, but to nurture and develop and take care. So that was a strong part of it, too."

Another overarching motivation is for students to appreciate the complexity of environmental issues, but also to realize that they can still play a significant role in improving environmental quality.

And there's just so many easy things we can do that make a big difference....I'm always amazed that people think you have to do big changes and alter huge life styles, which is great if you want to. But small changes can just make such a big difference. That's one of the main focuses that I try and teach about, when I talk about resources and conservation, is that little things that you do can add up to be a huge difference.

He is an advocate for having students learn about an environmental issue, especially about all the players involved in the issue, and coming to their own conclusion about what changes they want to make in their lives to address the issue. He eschews the idea that radical changes are needed to protect the environment.

There's a need for a balance between say an environmentalist perspective and a non-environmentalist perspective. You don't need to be one or the other. A lot of times you see things very political like a democratic viewpoint versus a republican viewpoint....You can have some of both. You can say I really care about the environment. But I want business to go and develop.... It doesn't have to be black or white, one or the other, there should be a balance between both...Just like balancing out both sides. Each side gives some. I think everyone can do a lot. That's another way I feel, I always feel you're either on one side or the other. I don't think it has to be that way.

When asked if he has seen evidence of students becoming informed and seeing both sides, he replies that there are some students who get it. They start to "make connections," seeing how environmental issues affect them now and will affect their futures. They also learn what motivates others to choose the decisions they make. Although he acknowledges that not all his students get it, he has seen what he calls "awakenings" happen among his students. He recalls how it dawned on one student that companies may knowingly pollute the environment because they believe the expense of cleaner practices is cost-prohibitive. He said "that just kind of totally blew her mind. To see that businesses or even people won't do what's right just because it's right. There's a big financial component, which make sense for business." Here Tom has illustrated

how a student has become aware of the business side of an environmental issue, understanding its motivations.

Tom explains how this awareness can be facilitated by analyzing issues.

So let's say there's a problem and an issue and two different sides of it. How do you work together, how do you problem-solve, how do you come up with an acceptable solution for everybody? The big one down here for the last year or two is agricultural runoff. Obviously, farmers have a stake in that, conservationists have a stake, fishermen have a stake. How do you work together to solve that problem? So, a lot of the modeling in town meetings and things that we try and talk about having a different view doesn't mean one's right and one's wrong. But how does it work for the benefit of everyone?

When asked if he has used this town meeting with his students, he reported that he has although he has focused on the issue associated with Pacific Salmon in the past and in the future plans to focus on a local issue. "I mean we don't really have salmon around here (laughs) so I'm trying to tie in more local things."

Tom acknowledged that tying in more things and adding environmental education to his science units did take more time.

There's a lot of stuff to cover and it seems like there's less and less time to do it. Because you miss days for testing and you miss days for this and for that. I usually try to make some sort of balance between, I won't make like a *whole* environmental education unit, but I'll add it at the end or where it's appropriate. So, it may add an extra day or two or maybe three. But I think covering extra standards, and giving them the skills to be able to deal with that the benefit we get from that type of education that would normally have been missed, I think it outweighs the fact that maybe we miss two weeks at the end or ... another topic we could have covered. I think especially middle school. Less topics and maybe more depth is better.

Tom provided an overview of the variety of ways he teaches environmental education in his Science class. Throughout his description, a common term he used was that he would "tie in" awareness of the environment and associated issues (he used the term 19 times during the 1 hour interview). He shares that he focuses a lot on "teaching the headlines. Things that are out there,

that their parents know, that they've probably heard about. We're not trying to grasp these far out concepts and things. Okay, what's on the newspaper. Talking about gas prices or energy prices. Talking about hunting, fishing; things kids know about. Small town kind of stuff. They're very much knowledgeable about. Try and tie things in that way."

Following are a few examples of how Tom ties environmental education into his Science course:

- We talk about what are natural resources, natural resources in Wisconsin. History of logging and timber and things like that. We also talk about like minerals and things like that. And what we do then is this mining activity out of plaster of Paris. They make a mountain and they put in beads and bb's and pieces of wire. And once it hardens and stuff, they have to mine it out, they have to dig it out. They have to pay workers, how long does it take? And they get money for the stuff they get out. But we also tie into pollution and pollution aspects. If someone's living near here, they're not going to want all this noise and pollution, how are you going to work with them? What controls are you going to put on there. We usually try to do activities where we tie in or arrive with different viewpoints. We look at the business of operating the mine, you've got workers, insurance to pay for, but you've also got pollution. They can get fined if there's too much noise pollution. Too much mess around. We try to tie it in like that.
- I ask them to do home assessments. Particularly when we've talked about energy. Look at several of your appliances and look at the little sticker on the back and find out how much energy does it use. I think it comes from the KEEP guide and doing a home energy audit. Then you calculate how much is it on a day, how much energy does it use, calculate that all out. So they see that. Talk about ways to reduce energy use, talk about home heating, bringing in articles and talking to their parents. I have them go home and talk to their parents about energy—like home heating lately and gasoline prices; you know, what kind of car do you want? How much does that get per gallon, how much does that cost you? Different things like that.
- We do models, like modeled landfills this year. And they used a pop can to see how much stuff they can fit there. The more stuff they can fit in the pop can compacted the better. So we talked landfills of having finite space and the importance of recycling. And buying we talk about reduce, reuse, and recycle. Less things end up in the landfill, more things can be recycled, more things can be reused. So we did some model building.
- We read *The Lorax*. And tied the environmental component into *The Lorax*, obviously. That's a kids story. You know, making the parallel to the story to what does that mean? They wrote *The Lorax II*, what happened after the end of the story. They built LEGO models of different things. You know, you're the trees, Truffula trees, what do you want to say to the people cutting you down? So I tied it in with some stories as well.
- When we talk about natural resources, natural resources of Wisconsin and we do a big insect unit, we do insects of Wisconsin. We do field guides out of that. I'll show you those, those are kind of neat.... we talk about what's in field guides and things like that.

They put in facts and common names and scientific names. Not only is it good to just be a little bit more aware of what's out there. But they are things that are found in Wisconsin. What are some cool things about it? What do we expect to see when we go outside?

To find the activities to add on to his units, Tom uses a variety of resources, including activity guides and Internet. He also credits the master's program at UWSP with providing him with many of the ideas he uses in his classes. He and a colleague enrolled in the program at the same time and completed a joint project for their degrees.

And then once we got to the EE program and it's got so much great information on how to incorporate different strategies and lesson types. They gave us some lessons, and here's some things you can do, and a lot of that came from even talking to other classmates. What do you do here and what do you do there. But strategies and using resources and using the community and a lot of the things we took there are just so directly applicable to the class teaching situation. You just take them and incorporate them right in.

The master's program showed him strategies he could "add on" to his existing units, "I may have added a town meeting scenario or something like that. May've just added a letter writing thing or something like that. Just added things, not really rewritten everything or added whole big chunks of things."

Tom uses a variety of methods to assess student learning. He has found that the activities he adds on help students understand concepts. "I think it does. They obviously have fun acting it out. I think it really gives them an extra way that sort of solidifies and reinforces those topics." He explains that the experiences help students answer questions more thoroughly on his exams. He also assesses student learning through their projects, such as presentations and posters.

When asked how other teachers might be motivated to teach about the environment, he commented that because of tight schedules teachers find it hard to fit it in. He did suggest however,

we could maybe do a better job modeling of how it could be incorporated into things. I think teachers always like new things and fresh ideas and ways to make things fun. I

think this can add lots of good and interesting new angles to Social Studies and Math and make it particularly applicable. If you do it like on local issues or local topics. For math, you know with doing something with calculating deer with CWD from a smaller sample size. Ways to tie it in would be really neat. Maybe a lot of teachers need it modeled for them. That's how I always feel like when you get new ideas at professional development stuff, we get an idea but no one ever shows us what to do with it. How do you incorporate that? What are the steps for incorporating it effectively? So, it never gets used. They probably remember it from their education. Just given some concrete examples and modeling how we can do it.

He went on further to propose the idea that there could be professional development opportunities for teachers of specific disciplines to explore how they might include environmental education into their curriculum. “ ... Get all the Social Studies teachers together here, Math teachers here, give you a topic and brainstorm some ideas and what do you teach now. Not adding new content, necessarily, but getting new angles and new perspectives into the same stuff they're already doing.”

Teacher's "name": Brad

Grade/Subject: Middle School, Technology Education

Location: Northwestern Wisconsin

School demographics: 80 percent Native American; 20 percent Caucasian

Teaching experience: 16 years

EE professional development experience: Inservice courses in EE

Pre-observation Interview: February 2, 2006, 2:30 P.M. – 3:30 P.M.

Observation: February 3, 2006, 10:00 A.M. – 11:00 A.M.

Post-observation Interview: February 3, 2006, 11:00 A.M. – 11:30 A.M.

Technology Education for everyone. That's the real movement. We live in a technological world. By technology we don't mean computers. We mean tools and machines that change our world. For me, it's always been an overriding principal that our choices of technology will determine what kind of future we have. That's always been my viewpoint. I have a hard time imagining that someone could say that Tech Ed wouldn't play a role in environmental concerns because it's so much a part of the way I see things.

Brad presented this viewpoint when describing challenges he has faced modernizing his field and getting the community to appreciate new perspectives toward Technology Education. The traditional industrial arts and associated knowledge and skills are important, but he strives to provide real world applications to these practices. Brad further explains,

People used to think in shop class you take your head off and you go to work. I always thought, well why not keep your head on and understand the broader concept as to what you're doing. It's engaging multiple intelligences. Everyone learns a different way; it's just another way of learning. . . . And then take all that and apply environmental concepts to it, even better yet.

Brad commonly uses his Technology Education classes to promote environmental awareness. He finds his field an ideal venue for environmental education because it provides students with an opportunity to actually build something, to not just talk about environmental

concerns but to do something. He credits this appreciation to a college teacher of his who modeled to his students on how to “walk the talk.” He always had a care for the environment, and he became frustrated over the years because he heard about environmental problems but no one was doing anything. This professor showed him that you can actually do something. Brad says he was going to major in Computer Science, but this mentor inspired him to change his career path and pursue Technology Education.

What’s nice about Tech Ed is that we can actually build something. Like our food production module is hydroponics . . . Often in Science they do a lot of hands-on too, but in Tech Ed we’re out there building. We make technical drawings of these hydroponics units which is a real traditional industrial arts skill, but here we are . . . studying how plants grow and we’re talking about the environment. We’re talking about what kind of nutrients we’re going to feed these plants, we get into organic nutrients and chemical-based nutrients. You seeing a real direct connection between what you feed the plants and then we’re going to be eating those plants, and students start seeing those connections.

The food production unit is part of his 7th grade class where he uses an integrated Math, Science, and Technology Education curriculum. The program also includes waste management, health and wellness, manufacturing, and energy transformations where they build solar-powered model cars. He used to teach the curriculum with the Math and Science teachers; they no longer participate, which he blames in part on the pressure of standardized testing. Although he emphasizes,

Now there wasn’t any proof that their standardized test scores in Math or Science were going down. There was no proof at all. They were not going down, they were in fact getting better because of the . . . curriculum. But when you get an administrator that wants a traditional Math class, there’s nothing you can really do about it.

So, Brad now teaches the integrated curriculum alone. Environmental topics are highlighted in the program, yet Brad realizes because of the community in which he teaches he needs to avoid being blatant about how he includes environmental education.

I’ve evolved over the time to kind of like sneak it, not really sneak it in, but try to come at it from their level. For example we were talking about packaging yesterday with my 7th graders. Rather than saying right off the bat, packaging is an environmental disaster, what I did is I pulled money out of my wallet and I threw it in the garbage. I came at it from

something they could understand no matter what their view of the environment is, money. So I'll often, with high school students especially, talk about the monetary aspect of environmental concerns.

Brad also uses teaching aids, such as the Dr. Seuss video *The Lorax* to introduce the importance of conserving resources. After watching the video he asks students to relate the topics in the story to real world situations. In particular, he discusses how paper is often wasted and how it might be reused rather than just recycled. He introduces the students to their next activity, which is to make note pads out of paper that has only been used on one side. He explains that some students in the class have collected paper from recycling bins and later the class will separate the paper based on whether it has been used on one versus two sides. They will see that one-sided paper outnumbers two sided paper. The traditional industrial skills applied include using a paper cutter and a paper press.

Brad has six prep periods and is the sole Technology Education teacher for his district, he teaches both the middle and high school classes. In each of his classes, he "infuses" environmental education, he takes a realistic approach where he "sprinkles it throughout the curriculum." In his 6th grade class, students are introduced to Technology Education and build bat houses. During this lesson, students learn the importance of bats to control mosquito populations and as an alternative to pesticides. His 8th grade class also explores facets of Technology Education, where students learn about home design including alternative building practices. In addition, home building design is also a part of his high school construction class. "We study different types of houses. We study traditional houses, we study earth-bermed houses, we study houses that are built out of alternative materials. Solar houses. They get at least some knowledge. Then they design their own house." Environmental awareness does indeed infuse Brad's teaching; even when acquiring materials for class construction projects he discusses the importance of using local materials or reusing supplies whenever possible. For example, one class is making signboards for a sports arena, and they are recycling discarded bleacher board to make the signs.

Projects in progress are situated throughout Brad's Tech Ed classroom. The hydroponics unit, built out of PVC piping, is located near the entrance. Tiny plants are growing out of what looks like wads of cotton stuffed into holes within the piping. The sign board project is situated in another part of the room. Near the back wall, what looks like the skeleton of a car is being worked on by a couple of students. This car will eventually become an electric-powered car which the students will race as part of the Electrathon program.

The Electrathon unit is one of the showpieces of Brad's teaching. Electrathon is an international program where students design, build, and race electric cars. He reminisces that such activities at first concerned the traditional industrial arts advocates. They were afraid that important skills were being omitted from his class. Plus, he had decided to drop a repair and maintenance class from his coursework. Consequently, his superintendent formed a Technology Education advisory committee to provide oversight to his program. Brad's response was to implement a promotional campaign to advertise the educational worth of his projects, as well as their benefit to the community. He was able to show the committee and the community that students could apply important skills such as welding while learning about a modern Technology and becoming aware of issues associated with transportation. As a result, the committee became strong supporters of Brad's efforts. He did reinstate the repair and maintenance class, but he has been able to adapt it to include concepts he feels are important such as fuel efficiency and oil recycling.

There are broad—to the point of being vague—academic standards for Technology Education of which Brad is aware. He notes that being a teacher within a non-assessed discipline, he has a lot of flexibility and freedom with what and how he teaches. His lessons easily comply with the standards because they are so broad (e.g., human ingenuity). With his assessments, he encourages students to examine their own learning. He shared a rubric he uses to help students know what he is looking for and to help them monitor their own progress. He also has tangible ways to see if students are achieving by observing if their projects are successful. Obviously, with projects such as the Electrathon a telling test of success is if the car runs. He likes to work

with the students so they realize that assessment is throughout the project and is ongoing, not just something that occurs at its end.

The Technology Education building is separated from the rest of the school and Brad admits that, along with the nature of separated subject areas, makes it hard to tell what other teachers are doing, especially in the realm of environmental education. Based on what he does know and his communications with other teachers, he would give his district a grade of C or a B- for the amount of EE they do. He recognizes it would be worthwhile to have an individual person dedicated to environmental education who might promote EE and coordinate the efforts of all the teachers to teach EE, but also advises that with all the demands teachers have on their time adding one more might not be well received.

Teacher Insights: The Reality of EE Implementation in Wisconsin

This section reviews the preceding vignettes in combination, comparing teacher conceptions of and practices in environmental education. It uses their insights to gain a better perspective of the reality of EE implementation. This section will address the following topic areas:

Findings from the Cross-Analysis

Implementation Strategies

Insertion

Infusion (Minor and Major)

Integration

Outdoor Education

Goals for Environmental Education

Motivation

Other Influences of EE Implementation

Effects of EE Implementation on Student Learning

EE Implementation at the School, District, and State Levels

Thirteen teachers were interviewed to ascertain how (and why) they teach about the environment. Eight of these teachers participated in more extensive investigations (interviews, observations, and document analysis), while the remaining five were interviewed only and provided supplemental information (see Chapter 3). The findings from the former group of teachers were presented in the seven vignettes presented previously. The teachers in the vignettes are referred to as “teachers from the core study” or “core teachers” while the teachers who provided supplementary information are called “supplementary teachers.” I sent all 13 teachers the following questions to frame the interview session.

- What strategies do you use to integrate or infuse environmental concepts into your curriculum?

- What resources, teaching methods, and support systems do you use to teach about the environment?
- What motivates you to teach about the environment?
- What challenges or barriers limit your ability to include environmental topics in your classroom teaching? What helps you overcome these challenges?
- What are your perceptions of other teachers' inclusion of EE in your school? Your district?
- What assessment strategies help you determine effectiveness of their efforts to educate students about the environment?
- What aspects, if any, of your professional development contributed to the formation of the above qualities and practices?

The questions guided the cross-analysis of the teacher interviews and observations. As mentioned above, information from the supplemental teacher interviews is incorporated into this cross-analysis. Below are the names (pseudonyms) of these supplemental teachers and why they were asked to participate:

Andy: A fifth grade teacher in an inner-city school who has created integrated field study units that involve taking students out to the district's school forest.

Bob: A suburban high school Biology teacher who offers professional development classes in EE to teachers around the state.

Sue: A rural middle school Science teacher who has created extensive units that include environmental concepts for her students.

Megan: A suburban fifth grade teacher who is considered a pioneer of EE in Wisconsin, she has played an active role in establishing the EE mandate.

Kevin: A middle school Science teacher who works at a city EE magnet school.

Most of this section focuses on the compiled findings from the core teachers, with ancillary information provided by the supplemental teacher interviews. As discussed in Chapter

3, the supplemental teachers helped the researcher reflect upon specific understandings that were being formed, providing specific examples from their teaching or professional development experiences. The insights and information they shared were used to confirm or disconfirm the inductive analysis processes.

Findings from the Cross-Analysis

The following discussion is based on the Cross-Analysis Overview Chart (below). It explains and interprets findings related to strategies participants in this study use to include EE. It considers the goals these strategies address and what motivates teachers to include EE in their lesson plans.

Table 5: Cross-Analysis Overview Chart

Teacher	Grade/Subject Area	Implementation Strategy	EE Goal addressed	Motivation
Jane	Kindergarten	Minor Infusion and Outdoor Education (Major Infusion)	Awareness, Ethics	Passionate
Eleanor	Elementary Education Science	Major Infusion and Outdoor Education	Awareness, Ethics, Skills	Passionate
Tom	Middle School, Science	Insertion and Infusion (Major And Minor)	Knowledge, Skills, Ethics	Practical
Brad	Middle School, Technology Education	Infusion (Major And Minor) and Integration	Knowledge, Skills	Passionate / Practical
Kathy	High school, Mathematics	Insertion/Major Infusion	Skills	Practical
Alice	High School, Art	Integration and Infusion (Major And Minor)	Awareness, Knowledge, Skills	Passionate
Carl & James	High School, Integrated Language Arts and Social Studies	Integration (and Minor Infusion and Outdoor Education?)	Knowledge, Skills, Action	Practical

Implementation Strategies

Much of this study focused on trying to understand the concept of infusion and if and how it differs from integration. The simple conclusion is that there are subtle differences, and some EE professionals would say there are subtle and inconsequential differences. Further discussion of the analysis of these strategies is found in Chapter 7.

To create a founding basis for comparing infusion and integration, another implementation strategy, insertion, is also addressed in this analysis. This approach was reviewed in Chapter 2 and involves adding environmental concepts on to an existing program or replacing existing components with EE. The shortcomings of insertion are that it might involve extra time and that the added unit might not relate to the core subject area into which it is added. The inserted EE component might be viewed as nonessential or supplementary and be removed as time and funds dictate other priorities. To ensure that EE would be more integral to the core curriculum, implementation approaches such as infusion and integration have been endorsed by professionals in the field (see Chapter 2).

To help analyze the implementation strategies used by teachers in this study, the following definitions were created to help make distinctions among inserting, infusing, and integrating EE. These definitions were based on a review of the literature (Chapter 2) and discussions with professional environmental educators (Chapter 4).

- Insertion: To add separate activities about the environment into the curriculum
- Infusion: to blend environmental concepts into existing lessons when the opportunity arises
- Integration: To intentionally design lessons to include environmental concepts

When I arranged the meetings with the teachers, I asked them to explain and demonstrate how they infuse or integrate environmental concepts into their curriculum; I did not start out by asking them to define the terms. Eventually I would ask them how they would describe the strategy they use to include EE. They used terms like “tie” “blend” and “link,” but they also said they would integrate and infuse EE. When asked directly how they might compare infusion with integration, their answers mirrored discussions with the EE professionals: With infusion the inclusion of EE is more passive, while it is more intentional with integration.

Upon observation of the teachers, however, their demonstrated lessons for the most part taught directly about the environment. Eleanor took students outside to identify trees, Jane took students outside to look for patterns in nature, Alice had students illustrate Whooping Cranes, Kathy discussed radioactive dating through a graphing exercise, Tom’s students investigated owl

pellets, James and Carl had students inventory litter, and Brad showed a video on environmental degradation. Rather than infusing environmental concepts into the unit of study for their discipline, they taught about the environment directly and used that context to address content and skills in their subject area. It almost seems that they infused their content area into EE!

Upon further reflection, the definition of infusion developed for this study needed to be revised. Since the lessons observed taught about the environment directly, the environmental topic is more than infused; it imbued the lesson. Therefore, this analysis found minor and major ways to infuse EE or any other topic. Following are ways of including concepts from one subject—EE—into another. If X = subject area concepts (not EE), then,

Inserted activity: Teaches about the environment only with little or no connection to X

Minor infusion: Teaches about X and mentions EE concepts that relate to X

Major infusion (imbuement): Teaches about the environment and relates it to X

Based on this further analysis, the initial definitions developed for this study were revised as follows:

- Insertion: To add separate activities about the environment into the curriculum
- Infusion:
 - Minor: to blend environmental concepts into existing lessons when the opportunity arises
 - Major: To teach about the environment to illustrate subject area concepts, may take place in the outdoors
- Integration: To intentionally design lessons to include concepts from a number of disciplines, including environmental education

Using these definitions, the following categories of implementation were created for the cross-analysis of the vignettes and supplementary teacher interviews: Insertion, Minor infusion, Major infusion, and Integration.

Within the Cross-Analysis Chart above, Outdoor Education is also listed. The reason for creating a separate category for Outdoor Education is because of the undeniable and persistent importance of this component to environmental education. It will be discussed last, because

ironically, it provides an ideal—but not an exclusive—avenue for an interdisciplinary curriculum development that includes environmental education.

Although these categories were created, it was difficult to associate each teacher to a single approach since they seemed to use a combination of many approaches. Nevertheless, the teachers' implementation strategies were categorized based on the approach that seemed most prevalent based on the discussions and the observed lesson.

Insertion

Inserting activities is a direct approach to adding activities. The practice of inserting EE activities was mentioned by one EE professional interviewed for this study (see Chapter 4). He indicated that infusion might be more advanced than insertion. As discussed in Chapter 2, there are activity guides created by EE organizations to help teachers include environmental concepts in their curriculum. The activities teach about an environmental concept but also use content and skills from other disciplines to illustrate the concept (e.g., mapping, debating, drawing). The insertion approach is criticized because an activity can be added with little thought to how it relates to lessons preceding or following or to the overall discipline objectives.

Three of the teachers in this study discussed adding EE activities to their curriculum. Kathy adds or inserts extra activities into units to illustrate the math concept reviewed that week. Her planning book shows how Monday through Thursday she teaches Math lessons out of the text book and on Friday she conducts an activity. At certain times of the year, the activity is an environmental activity. One way to tell they are environmental activities is that they come from resources that are produced by environmental education programs such as Project WET and KEEP. She learned of these resources through the UWSP master's program in EE.

Tom and Jane who are also graduates of the UWSP master's program, use these resources to add EE activities to their curriculum—although Jane says she used to use them more often, but does not have enough time to include them now. Tom shared that including EE activities probably extends his units by a couple weeks. Because of these additions, he has to

make choices between EE and science topics, but through prioritization he decides that using EE to study a topic more thoroughly is more important than adding another topic.

Carl, who received his undergraduate degree from UWSP, was introduced to some of these resources, and used to add Project Wild into his Social Studies classes. He provides an example of how inserted activities might drop out over time. He reported that as a new Social Studies teacher he found Project Wild lessons helped exemplify topics in his discipline. As years went by and he further refined his curriculum, eventually he phased out those activities. His preservice experiences in EE introduced him to these activities; he suggested that additional inservice workshops might have influenced him to continue using these or other inserted activities.

Minor Infusion

Carl and James provide the best example of minor infusion even though they are categorized as such with a question mark. The observed lesson was not infusion, but the way they describe their environmental ethic indicates the environment permeates their lessons: When the opportunity arises, they reference the environment. Both Alice and Tom during their observed lesson provided examples of an opportunistic reference to the environment that might exemplify minor infusion. Alice instructed her students to salvage scraps for future art projects and Tom mentioned that owls provide an alternative to chemicals for pest management. Having had the opportunity to observe Jane for an entire day, I saw how she would use natural elements to relay concepts to her students (e.g., patterns).

Sue, a supplemental teacher, probably infuses environmental concepts into her science lessons. Yet, being an Earth Science teacher she also acknowledges many of the concepts are “already there,” although she might emphasize them more by relating them to real world and current events.

To facilitate infusion, Sue recommended that EE should not have its own set of standards. Instead, the EE professionals should look through all the standards of other subject areas and

note which address the goals of EE. Bob also suggested this might be the best approach to ensure EE implementation, but asserts that Environmental Science is more important to students' lives and should be a requirement for graduation.

Major Infusion

Most of the core teacher lessons observed are categorized as major infusion. They taught directly about the environment, using the environment as a context to address concepts in their subject area (see Implementation Strategies above). Brad claimed he infused EE because he had to "sneak it in." Yet the lesson observed, and much of his teaching, seems to have a deliberate environmental emphasis. Students build electric cars, build structures designed for hydroponics, and make notepads out of recycled paper. In fact, the observed lesson included a viewing of *The Lorax*, a video that has drawn much criticism from the groups that oppose environmental advocacy. Brad's lessons depend so heavily on environmental concepts, that his teaching borders more on integration because he uses the environment as an integrating factor.

Integration

James provided the most in-depth explanation of what might distinguish integration from infusion. He stated that it takes more time to create an integrated unit and that you create something new. You are doing it wrong if you lose something that is integral to the disciplines being combined. He strongly believes that as far as student learning is concerned, the integrated unit is much more meaningful.

None of the lessons observed for this study typified integration, although Brad reported he used to collaborate with the Math and Science teacher to present integrated units to his students. The lessons described by most of the supplemental teachers interviewed for the study use the environment as an integrating factor. Both Andy and Bob use the school forest as a focal theme to tie in concepts from many other subject areas. As part of her Language Arts curriculum, Megan has her students write speeches that focus on endangered species, requiring research of the organism's natural history. Kevin's teaching situation typifies the interdisciplinary teaching approach where teachers collaborate to involve all the students in one grade level in various

school-wide projects. Frequently, these projects address an environmental theme such as energy. Kevin reports that his school has one of the highest academic records for the district, but more research is needed to determine if it is the small class-sizes rather than using the environment as an integrating factor that attributes to the successful student achievements.

Outdoor Education

Kevin's school has a lake nearby and his students get involved in forest and prairie restoration. He says that studying outdoors is an "absolute necessity" to environmental education. Outdoor Education was listed as an implementation strategy for Jane, Andy, and Eleanor as well. Jane frequently referenced their school forest as instrumental to the fate of EE in her district. Bob essentially said that EE and Outdoor Education are the same thing, and stressed the importance of providing students with experiences in nature. Megan discussed the varying learning needs of students and said that some students just are not "classroom learners."

Other teachers in this study seemed to equate the outdoors to environmental education. When asked if there are other teachers in her school teaching environmental education, Kathy said she knew of teachers that took their classes to study the wild areas around the school grounds. It is possible that James and Carl were identified as environmental educators because their unit on Transcendentalism involves taking students outside to "see" nature as described by Annie Dillard. The EE professional who recommended James and Carl, a teacher in the same school, probably is aware that they take their students outside at the beginning of the school year.

Goals for Environmental Education

The goals for environmental education have been outlined in the literature review (Chapter 2). Basically, they start with awareness and appreciation which builds a base for gaining knowledge and skills that can eventually be used to participate in environmental issue resolution. Throughout the students' EE learning career, they also explore attitudes and values (their own as well as others') that relate to the environment and to issues. The ultimate goal of EE is for students to become environmentally literate, and this has been defined in a number of ways. It essentially involves students being responsible citizens in regards to the environment.

While the teachers in this study were not asked to define environmental education, it was possible to discern why they thought teaching about the environment was important. A common purpose among the teachers was to increase students' awareness of the environment. As mentioned within the implementation strategies above, it seems some teachers equate environmental education with outdoor education, so it follows that they want students to be aware of nature and the outdoors (Jane, Eleanor, Andy, Bob, Kevin, Megan). Another aspect of awareness is appreciation of our natural resources, not only where they reside in nature but the role they play in our daily lives (Tom, Sue, and Alice). Other teachers wanted to increase student awareness of environmental issues, in particular pollution and depletion of natural resources (Carl and James, Tom, Brad).

Therefore, all the teachers in this study, both core and supplemental, work to increase student awareness of the environment. The other goals of EE—knowledge, skills, analysis of values and attitudes, and actions—are addressed, but less thoroughly. According to the DPI curriculum guide, knowledge and skills are best addressed at the middle school level while issue analysis and action are appropriate for high school students.

The middle school teachers in both the core and supplemental study report they involve students in learning facts about the environment and gaining skills to investigate the natural world. The high school teachers addressed a wide range of EE goals including issue analysis. With Alice being an art teacher, it makes sense that her approach is more aesthetic. Yet, she also has taken the lead in creating gardens and ponds where students can take an active role in applying skills to learn more about nature. Kathy uses environmental activities to show how math concepts are used in the real world, and relays environmental knowledge along the way. The lesson presented by James and Carl directed students to take action related to an issue by writing letters to those responsible for the issue.

The only teacher who indicated that issue analysis was a part of his coursework was Tom, as he has students analyze the various players involved in environmental issues and what their

motivations are. Tom has been through the UWSP master's program, where EE classes focus on the steps of issue analysis. Kevin indicates his school has extensive units where students from the entire grade level get involved in a mock town meeting, but he did not specifically mention values analysis. Bob, however, commented that given the conservative nature of many community and parental concerns, it just is not wise these days to explore values with students.

A number of the teachers shared stories of having their students study real world issues. A popular topic seems to be the restoration of the whooping crane population and returning the flocks to their historic migration paths (Alice, Andy, Kevin, and Megan). Myriad skills can be addressed by following the seasonal trips of these birds as they travel from Wisconsin to Florida and back. Yet, most of these activities are studying an issue, not necessarily taking action. Andy did report that his class does action projects, including getting his students involved in eradicating garlic mustard, an invasive plant threatening many natural plant populations in Wisconsin.

Megan, who has extensive experiences in environmental education curriculum development, talks about the wolf study she conducted with her fifth grade students a number of years ago. She said the purpose of the project was to find out how people in Northern Wisconsin viewed wolves. She did not set out to create a love of wolves among her students and a number of her students continued to harbor negative feelings towards the species, but others learned to appreciate the animals and also predators in general as they learned more about them and their role in natural ecosystems.

Motivation

Motivation has been divided into "passionate" or "practical." Teachers who seemed motivated by practical reasons of course cared about the environment and likewise passionate teachers had functional applications for EE. Nonetheless, the teachers were categorized by which motivation seemed more dominant.

Kathy and Tom emphasized practical reasons for EE inclusion, sharing how the environmental topics illustrate concepts in their primary teaching area. Kathy was the most explicit, saying that she is the type of teacher that always uses examples to help students appreciate math concepts, and if it was not the environment it would be something else. The overarching purpose of James and Carl's class is to promote responsible citizenship, and they strive to apply their units of study to the real world. Brad's class focuses on technical skills; through his subject area he provides students with practical means to protect and improve the environment.

Jane was the most expressively passionate teacher, although Eleanor and Alice were driven by their commitment to the natural world. All three of these teachers used the word passion to describe what drives them to teach about the environment and emphasized the importance of promoting student concern for nature.

Of the supplementary teachers interviewed, passion seemed to be the primary motivator. Andy, a fifth grade teacher in an urban school, takes almost every opportunity he can to involve his students in field studies, making the studies the core of his teaching. Megan takes most of the months of April and May to take students—two or three at a time—on personalized, after-school nature study trips. She repeats these trips until all of her students get a chance to go (unless parents do not allow the child to go). Each group of students conducts a study that contributes to an overall class investigative project. That she submits all paperwork to get these trips approved by parents and the administration and that she takes personal time to organize and conduct these trips, portrays her dedication to the environment. Megan has advanced degrees in Environmental Education and her own research has found that the field experiences “have to be in a small group of students where they can actually see things. With too many kids it just gets un-doable and it doesn't work.” Kevin remembers being inspired by a couple of his middle school teachers, who instilled a sense of curiosity that he wants to pass on to his students. Bob and Sue might have a passionate/practical mix to their motivation, as they want to provide students with knowledge and skills they need to become responsible citizens who can help improve and protect the environment.

Other Influences of EE Implementation

This study focused primarily on how and why teachers implement EE. Other topics arose during interviews that affect the fate of EE, including administrative support, academic standards, and testing.

Jane was the most expressive about the role of administrative support affecting the amount of EE she and other teachers include in their lessons. In particular, Jane was referring to her district's school forest and providing funds and time for professional development related to that resource. Brad mentioned how his administrator discouraged the Math and Science teachers from participating in a team teaching integrated program that included environmental topics. Eleanor indicated that her administrators are supportive of environmental education, but used to be more so in the past. Kevin, who teaches in an environmental magnet school, states that it is the staff rather than the administration who ensure that environmental topics are included in the curriculum. Bob reported that his school has an effective curriculum coordinator who helps ensure that disciplines work together. The other teachers rarely if ever mentioned their administrators; this could mean that their administrators neither support nor discourage EE in their school programs.

Generally, teachers did not mind, and even approved of, academic standards. These guidelines help outline what concepts are to be taught and where and when. Tom, Carl and James, Andy, and Megan mentioned having to modify their curriculum to address the standards. Bob noted that a number of them are related to the environment and therefore can be used to justify teaching EE.

Testing was not received with much enthusiasm, although most of the teachers said it does not directly affect them. The teachers—who were for the most part veterans—commented on how newer teachers entering the field were overwhelmed by the demands of testing. Megan, Eleanor, and Bob specifically noted that there were teachers who felt pressured to teach to the test to ensure their students would perform well. Brad says that he lost his teaching team of Math and Science teachers because his administrator pushed them to prepare students for standardized

testing. The one teacher who seemed to be most directly affected by testing pressures is Jane, who has had to change her kindergarten curriculum to one more oriented to first grade competencies. This alteration puts the students ahead of the game, so that they can pass the fourth grade tests which are given at the beginning rather than the end of fourth grade. The word “luxury” was mentioned by a couple of teachers (Megan and Eleanor) who do not directly feel the pressure of testing and can still teach how they want. Megan emphasizes that because she is a veteran teacher, she possesses the skills that easily allow her to fit in EE, while newer teachers lack this experience. She provided one of the most poignant statements against testing when she said the tests “suck the fun out of teaching!” Rather than feeling like they have the time to explore creative ways to address standards, new teachers resort to teaching the facts, and significant portions of their teaching involves training students how to take tests.

As discussed above, both emotional and practical reasons influenced teachers to include EE in their classroom lessons. The teachers were also asked about professional or staff development and if it affected their desire and competency to include environmental topics in their curriculum. Most of the teachers would reflect on their preservice experiences and could not recall any experience that influenced their interest and ability to teach about the environment. The most notable exception was Brad who had a teacher whom he credits with inspiring him to change his career path to become a Technology Education teacher and to include constructive environmental methods in his curriculum. Carl mentioned his undergrad experience at UWSP and how experiencing Project Wild lessons encouraged him to use those activities in his Social Studies classes—at least for a while.

As far as inservice experiences in EE, Kathy presents the most dramatic case of post-graduate influence. She says she would not be teaching about the environment at all if not for her master’s degree at UWSP. Tom and Jane, who also graduated from the master’s program, indicated that the program motivated them to teach about EE “to a large extent.”

Effects of EE Implementation on Student Learning

The core teachers were asked if they assessed students to evaluate the effectiveness of EE implementation. This was probably the most difficult question for the teachers to answer, and the short answer is, “No.” There were some exceptions. Tom said that he might reference an activity on a test to see if his students recalled the intent of the lesson. Brad showed a rubric he has developed where students assess their projects for achieving certain objectives, such as an understanding of energy transfers. Alice can view student art projects to ascertain student investment and interest in the subject.

All the teachers were asked if they had any evidence of long-term influences on their students’ attitudes toward the environment. They said with so many influences on students’ lives it is hard to tell, but three did mention examples. Kathy noted that students would recall the hands-on activities they experienced in her class with positive reactions. Jane recalled encountering a student several years later who said his outdoor experiences in her classes motivated him to learn more about the environment. Megan knows of some of her students who have gone on to major in environmental studies and says they report that she was a mentor to their decision.

EE Implementation at the School, District, and State Levels

Teachers were asked to share their insights on the quality of EE in their school and district and their responses varied. Sue said that no other teachers in her school indicated they teach about the environment (she asked for a show of hands at a school meeting). Most of the other participants could identify two or three teachers. Megan, among others, blamed the pressures of testing for discouraging teachers from including environmental topics.

Bob teaches EE inservice courses for teachers around the state and works with educators from different districts. He can evaluate the EE implementation in his district by comparing it to the past and to other districts. Compared to the past, he can see that the efforts he and other teachers in his district have taken have improved students environmental knowledge; students are entering his high school class with a better understanding of key environmental concepts. This

means that they are receiving more exposure to environmental concepts in their earlier learning experiences. Since he works with teachers around the state, he is able to present an informal assessment of the status of EE. His assessment is that perhaps five percent of the districts are implementing strong EE curriculum plans—like his district, most of these are associated with a healthy school forest program. Perhaps 15 to 20 percent are doing a decent job of trying to address EE goals to some extent. The rest, if they are doing anything, are in the developmental stages and for the most part it is “hit or miss” with one or two teachers doing activities here or there.

Summary of Chapter 5, Preliminary Insights, and Introduction to Chapters 6 and 7

The teachers who participated in this study helped investigate the reality of environmental education implementation, including infusion, into subject area curriculum in Wisconsin. They explained and demonstrated how they taught about the environment and discussed how they include EE in their subject area teaching.

Findings from these investigations along with the interviews with the professional environmental educators were intended to help gain a better understanding of the infusion approach to EE implementation. While teacher observations did help create categories of infusion, it was difficult to categorize the ways teachers actually include EE because they use a variety of strategies.

Given this ongoing ambiguity among insertion, infusion, and integration, it is no wonder teachers and EE professionals might have difficulty discerning how much EE is taking place in schools. Infused EE might be as subtle as an environmental reference or as obvious as an illustrative activity about an environmental phenomenon that addresses content area standards.

In hopes of assessing the pervasiveness of EE throughout the state, I administered a statewide survey of a representative sample of teachers. The following chapter discusses the survey results and the insights they provide into the status of EE in Wisconsin.

The final chapter of this study brings together the findings from Chapter 4 and 5, further exploring how the insights from the EE professionals and the teachers comply with and oppose each other. The survey results lend perspective to the conclusions, yet the key findings are derived from the conceptual and practical insights provided by the participants. Analysis of their findings is used to develop the generalizations into insights of practice used for this study along with recommendations for future research.

CHAPTER 6

FINDINGS FROM THE TEACHER SURVEY

This chapter discusses findings that address the third purpose of this study:

- To assess the pervasiveness of environmental education implementation, including infusion, into subject area curriculum in Wisconsin

The survey results are further analyzed along with findings from other aspects of this study to address the following research question:

- To what extent are EE infusion strategies practiced by teachers throughout Wisconsin?

Following is an outline of Chapter 6 discussion topics:

Introduction

Response Rate

Response Rate and the Pervasiveness of EE Implementation in Wisconsin

Discussion of Results

Introduction

This study included a statewide survey that was to assess the pervasiveness of environmental education implementation, including infusion, into subject area curriculum in Wisconsin. This survey was adapted from a 1992 study conducted by Lane (1993) that assessed teacher competencies in, attitudes toward, and amount of class time devoted to teaching about the environment. Compared to the earlier version, the survey used in this study was shorter (15 questions compared to 40), was Web-based rather than traditional paper and pencil format, and was administered via email instead of surface mail.

Most of the questions used in the survey for this study were derived from the earlier version; however, two questions were created to provide greater insight into this project's purposes. Preliminary analysis of the qualitative data was used to inform the development of the

new items (see Chapter 4 and 5). The first item was designed to gather information on *how* teachers include environmental topics into their curriculum (e.g., infusion, integration, insertion). The second item was designed to ascertain *why* teachers include environmental topics in their curriculum. Further information about the development and validity assessment of these items along with a discussion of the pilot administration is found in Chapter 3.

It was hoped that this survey would reveal the extent to which teachers throughout the state employed various EE implementation strategies. It was also hoped that, similar to the results of the 1992 study, the pervasiveness of EE implementation could be ascertained from the findings.

Another incentive for conducting this study was to learn how response rates from the two surveys would compare. The studies are completely different and had distinct purposes, so statistical comparison was never an objective. In fact, the only statistical analysis planned for this current study was to determine response frequencies and mean responses to certain items. Nevertheless, it was expected that the results could help confirm or disconfirm perceptions that EE was not much of a priority among teachers that it was in 1992 when the earlier survey was administered. The comparison would be descriptive and anecdotal at best.

Unfortunately, the response rate was much lower than anticipated. A review of the literature revealed that the decision to use an Internet-based survey disseminated via email might have contributed in part to the poor response rate (see Chapter 3). However, a number of surveys that could not be emailed were disseminated through surface mail, and the response rate for these was not much better.

The low response rate along with other limitations discussed in Chapter 3 have led to the conclusion that the survey results can provide a different perspective of EE in Wisconsin, but should not be generalized to the entire teaching population of Wisconsin. What follows is a discussion of response rates and what insights they might provide into the pervasiveness of EE in Wisconsin. Although email, Internet, and shortcomings of surveys in general must have affected

the response rate, lack of teacher interest and time to teach about the environment might have influenced their decision to ignore the survey they received. While not statistically analyzed, the discussion of the results can provide possible insights into the pervasiveness of EE implementation in Wisconsin. This chapter concludes with an overview of the frequency of responses that were received from the survey.

Response Rate

The final response rate for the electronic survey was disappointingly low (7.6 percent). Two reminder emails were sent to teachers, the first reminder also extended the due date. The first reminder did double the response rate; however, it remained unacceptably low nonetheless. The response rate for the mailed survey was only 8 percent (however, budget and time restrictions prevented reminders from being sent). The estimated response rate for the combined surveys is 8 percent. The primary reason for an estimated response rate is because of the complications associated with using email addresses. Within Chapter 3 there is an extended discussion—including a literature review—of the challenges of using Web-based surveys, especially those administered through email. The emails for this study were further compromised because each one had to be individually investigated through a Web search or guessed at based on Internet server formatting for the school district. With the initial sending of the emails, 295 bounced back (i.e., failed). Three reminders were sent to teachers for whom the emails seemed to work in the first mailing, and while that did encourage more teachers to respond, it also revealed email failures that were not presented by various servers previously. Therefore, the response rate is estimated because of the likelihood that other emails failed as well and were either not returned or could have been diverted by teachers' spam filters.

Paper (traditional) surveys were delivered to the 295 teachers whose emails failed during the first mailing (the project timeline did not provide for mailing copies to teachers with subsequent failed emails). The response rate to the paper-only survey was also very low: 8.5 percent.

The combined total for the returned surveys from both the Web-based and mailed administrations is 116. While it could be said that 116 out of 1,539 teachers responded to the survey making the response rate seven percent, as discussed above and in Chapter 3, a portion of the 1,539 teachers never received the email and unfortunately, it is impossible to tell how many emails were actually received by teachers. Yet, chances are a number of the emails did succeed and the teachers—a large number of them—simply chose not to respond. Therefore, for this study the estimated total response rate is 8 percent.

Response Rate and the Pervasiveness of EE Implementation in Wisconsin

Surveys are used to glean information from a representative sample population in hopes of generalizing to the parent population from which the sample was drawn. A number of statistical assessments and tests and balances can be conducted to ensure valid representation. A high response rate facilitates such statistical aid to representation.

The main reason this survey was administered for this study was to assess the pervasiveness of EE implementation in Wisconsin. The 1992 survey, from which the current survey was adapted, was lengthy (eleven pages with forty questions), yet it garnered a 59 percent response rate. Given that EE was more enforced and endorsed in the early 1990s and given the sense that it is no longer a priority among teachers and their districts, it was anticipated the response rate would be low—but not quite as low as 8 percent!

Might the response rate have been so low because EE is no longer a priority in Wisconsin? It may be, but because of the many barriers to surveys in general and Internet surveys in particular, one must be cautious of reaching this conclusion.

The pilot survey for this study also had challenges with lack of response. It was sent out to 110 teachers who are in or have graduated from the UWSP Extended EE master's program. There were failed emails with this administration as well (ten), and the response rate was 36 percent. This is better than seven percent, but given that the population was teachers who have received extensive professional development in EE and the survey was about EE, one might

think they would be more likely to respond (they too received three reminders). For both the pilot and the actual survey, mysteries remain about how many surveys actually made it into the teachers' inboxes.

Despite complications of email delivery, it is likely that teachers in the pilot population did receive the survey and chose not to respond—even though they teach about and support EE. It is likely the same holds true for the actual survey administration. Some studies have the time and funds to conduct non-response surveys, where individuals are contacted via phone to ascertain reasons for not returning the survey. While this study lacked the time and funds for this follow up, the teachers in the pilot study were asked to provide suggestions for the low response rate. Their number one reason was that teachers are busy.

Because the response rate for this survey was so very low, it is neither practical nor possible to use the results to assess the pervasiveness of EE implementation in Wisconsin. However, insights provided by the teachers who were interviewed for this study do reveal that EE has become a lower priority among teachers and school districts. A proposed conclusion is that because teachers do not have time (to take surveys and/or to teach about the environment) the majority of those who received the survey chose not to complete and submit it.

Discussion of Results

Regardless of the disappointing response rate, 116 teachers took the time to respond to the survey and their information should be considered. A report of their compiled responses (frequencies and means) is found in Appendix E. There were 15 items in the survey, all of which were designed to provide some insights into teachers' perceptions of and practices in EE. This section of this chapter provides an overview of the items that revealed findings that most directly pertain to the general purpose of this study: To gain insight into the reality of EE implementation in Wisconsin.

Of the teachers who responded to the survey, the largest population was elementary teachers (40 percent), the next largest population was middle and secondary level Science

teachers (15 percent). The majority of the teachers sampled for the main survey were elementary teachers, since they represent the largest portion of the teaching population (three percent from each teaching category was selected for the sample).

SUBJECT AREA	3% SELECTED	Responses	Rate*
ELEMENTARY	992	47	5%
SCIENCE	128	17	13%
LANGUAGE ARTS	128	10	8%
MATH	113	6	5%
SOCIAL STUDIES	63	7	11%
ART/MUSIC	39	11	28%
TECHNICAL EDUCATION	42	5	12%
HEALTH	23	1	4%
AGRICULTURE	11	4	36%
Other		8	
Total	1539	116	

*This rate assumes that all the sampled teachers received the survey which as discussed may not be the case given challenges with email and the Internet.

Just over half (n=59; 51 percent) of the teachers who responded received their license in 1985 or after. This date is significant because the EE mandate was promulgated in 1985 and therefore teachers who received their license after this date should have received EE preparation during their teacher education. Of these teachers, 36 (61 percent) indicated they attended a Wisconsin institution, 25 of whom (69 percent) reported receiving EE preparation. Information about the institutions from which teachers received their preservice education and their perceptions of their EE preparation is found in Appendix E.

Less than half (43 percent) reported taking an inservice course in EE, with the majority of those (60 percent) having taken only one or two classes. Only 30 percent of the respondents knew if their district had an EE plan. Teachers were not asked if they used the plan, but 21 percent of the respondents said they do reference the EE academic standards. Most of the teachers who responded either agreed or strongly agreed with each of the following statements:

1 = strongly agree 2 = agree 3 = undecided 4= disagree 5 = strongly disagree

- EE should be considered a priority in our K-12 school system N=113; M=2.11
- Pre-service teachers should be required to take an environmental education content and methods class. N=114; M=1.87
- It is a good idea to mandate that school districts develop and implement an environmental curriculum plan. N=114; M=2.05
- It is important to take the time to integrate environmental concepts and issues that are related to my discipline into my teaching. N=114; M=1.82

These questions were identical to the ones asked in the 1992 survey. One reason these questions and others were asked was to see how the 2006 responses would compare to the earlier survey. Given the low response rate for this more recent survey, it is not practical to compare the two.

Of the respondents, 99 (88 percent) reported they do teach about the environment. Only these teachers were asked to complete the rest of the survey (five additional questions) although two teachers who said they did not teach about the environment still responded to the remaining questions (N=101). Of these teachers, 32 percent said less than five percent of their teaching includes environmental topics and 38 percent reported that 5 to 14 percent of their teaching includes EE.

Two of the last five questions were designed especially for the present study. Insights gained from the professional environmental educators and teacher interviews helped inform these questions. One question dealt with the methods by which teachers include environmental education in their curriculum, and the second addressed why they teach about the environment. It was hoped the survey would reveal the pervasiveness of the implementation of the methods, and provide further insights into what motivates teachers to include EE in their teaching. The results do provide worthwhile information; however, as mentioned above, they should not be used to assume pervasiveness.

The following table records responses to the items developed for this survey to assess how teachers include EE concepts in their classroom lessons. The teachers were asked to review each of the choices to indicate how accurately it described their situation. They were not asked to pick only one or the best choice, and they were allowed to add their own description if none of the choices fit; thus the responses do not tally to 100 percent. Discussion of the conclusions and implications for the responses to this item regarding the ways EE is taught is found in Chapter 7.

Table 7: Ways of Including EE Item: For each of the following statements, indicate how accurately it describes the way or ways in which you include environmental education in your teaching situation.	Accurate	Somewhat Accurate	Not Accurate	Not sure
I blend environmental concepts into my existing lessons when the opportunity arises (also known as infusion)	76	25	0	0
I intentionally design my lessons to incorporate environmental concepts (also known as integration)	27	45	28	1
I insert separate activities about the environment into my curriculum	26	40	31	1
I teach one or more units on the environment during the school year	29	32	36	0
I teach a separate course about the environment	8	11	78	1
I teach an integrated course, where concepts from many disciplines—including EE—are addressed simultaneously	19	43	32	5

Teachers had eight statements to review to identify what motivates them to teach EE. They were asked to rate each based on the extent to which it described their motivation (again they were not limited to one choice nor did they have to pick the best one).

Table 8: Motivations for Including EE Item: Please review all of the statements below and indicate to what extent each describes what motivates you to teach about the environment.	To a large extent	To some extent	To a small extent	Not at all	Not sure
My commitment to the environment	54	8	7	0	0
My preservice teacher preparation experience	3	19	24	48	5
Useful experiences from EE inservice courses/workshops	18	23	20	36	2
It is mandated	5	14	25	44	10
It is part of my curriculum	16	32	24	25	2
It makes learning relevant to my students	48	38	12	2	1
It makes learning fun for my students	41	39	13	4	2
My responsibility to address the EE standards	25	37	22	14	2

Summary of Chapter 6, Preliminary Insights, and Introduction to Chapter 7

Although the low response rate for the survey thwarted any hopes of generalizing the results to the teaching population of Wisconsin, the findings do provide complementary insights for the other study findings. For example, Bob, a supplementary teacher for this study who teaches EE inservice courses around the state, was asked his perspective of the status of EE in school districts. His assessment of the quality of EE implementation could be used to verify the low response rate for this survey (see Chapter 5). If his perception is correct and only five percent of the districts have strong programs and less than 20 percent have decent programs, maybe a large number of teachers chose not to respond to the survey because it had to do with EE—a topic that seems irrelevant to their teaching situation. In other words, perhaps the perception that EE is simply not in “vogue” as it was 15 years ago is valid.

The next and final chapter of this study provides an overview of the findings from Chapters 4, 5, and 6, including overall insights. A comprehensive discussion of EE implementation strategies, insertion, infusion, and insertion, follows. Finally, relating to the survey results, the concluding chapter explores the fate of EE and how its status can be improved. In particular, it addresses Wisconsin’s modernistic approach to EE implementation and how alternative perspectives may be useful for increasing the inclusion of EE among teachers’ professional development plans.

CHAPTER 7

DISCUSSION OF FINDINGS, IMPLICATIONS, AND RECOMMENDATIONS FOR FUTURE RESEARCH

There were three purposes to this study:

- To learn how professional environmental educators perceive EE should be implemented in Wisconsin, including their conception of infusion
- To investigate the reality of environmental education implementation, including infusion, into subject area curriculum in Wisconsin
- To assess the pervasiveness of environmental education implementation, including infusion, into subject area curriculum in Wisconsin

This chapter presents the following topics:

Introduction

Summary of Findings

Purpose One

Purpose Two

Purpose Three

Conceptualizations of EE Implementation: Insertion, Infusion, Integration

Insertion, Infusion, Integration, Infusion conclusions

Generalizability Revisited

Generalizations into Insights of Practice

Evolution of Research and Practice in EE

Implications for EE in Wisconsin and Recommendations for Future Investigations

Avoiding Infusion Confusion

EE Mandates: To Enforce or not to Enforce

Professional Development in Environmental Education

Redefining EE in Wisconsin?

Limitations Revisited

The Rise and Fall and Rise(?) of EE

Introduction

To address the purposes of this study, in-depth interviews were conducted with EE professionals and with teachers in the field. The overall aim was to gain insights into conceptualizations and practices of EE implementation. A statewide survey supplemented the findings in attempts to assess the pervasiveness of implementation practices. This chapter reviews the findings from the three parts of this study and provides a summative discussion of the various data analyses. Based on these summations, implications for EE in Wisconsin are reviewed along with recommendations for future initiatives, projects, and research.

Summary of Findings

Purpose One: To learn how professional environmental educators perceive EE should be implemented in Wisconsin, including their conception of infusion

- Related research questions: How do professional environmental educators currently envision the implementation of EE into school curriculum? How does this vision relate to infusion of EE that has been recommended in the literature?

In general, the professional environmental educators interviewed for this study believe there is more EE in Wisconsin now than twenty years ago. They credit this in part to the EE mandates and teacher interest in the environment motivating them to take EE inservice courses. They believe teachers are infusing EE. The ideal approach to implementing EE in K-12 curriculum would be to infuse it in grades K-12, with more concentrated courses in EE—a capstone course—available to students at the upper grade levels.

The participants in this study indicated that there are slight differences between infusion and integration. Infusion might be adding an environmental slant to a topic in a core subject area, while integration is a more intentional lesson design that combines the concepts from two or more disciplines. It takes less effort to infuse EE as it essentially involves identifying and highlighting the environmentally-related concepts already present in curriculum. In some cases, the lessons may need to be adjusted or enhanced to be environmentalized and activity guides available from environmental education organizations are available to help teachers do this.

When teachers use these activities, then infusion might be more comparable to insertion. Although insertion was not initially a point of investigation in this study, it became apparent during the analysis. Infusion is preferable to insertion because it implies a more pervasive addition of environmental concepts. Yet, support materials provided teachers to infuse EE ironically lend themselves to inserting activities. Perhaps this is acceptable to professional environmental educators because it is better than nothing?

Whether EE is inserted or infused, it is most likely that environmental concepts are addressed in a hit or miss fashion throughout students' K-12 learning experience. This piecemeal nature of EE is compounded because not only might teachers within a single class randomly use activities, some teachers may choose to exclude EE altogether. Another shortcoming of the disjointed nature of EE implementation is that there is no assurance that its goals are being met. The professionals in EE interviewed in this study believe that teachers are including lessons that increase awareness of the environment and ecological knowledge, but the goals related to values and attitudes, and citizen action skills and experience may not be addressed as thoroughly or efficiently.

The state mandate requiring districts to develop a K-12 curriculum plan for EE was designed to support a more cohesive and comprehensive inclusion of environmental concepts and skills. The professional environmental educators in this study acknowledged that this mandate is no longer being enforced by the Department of Public Instruction, and even when it was, statewide surveys of teachers and administrators revealed that districts were not following the rule. Despite these challenges, the professionals believed the amount of EE has increased since 1985 even though it may not be as high as it once was in the intervening period. Yet they could not deny that the pressure of testing and attention to the assessed academic standards was compromising the inclusion of EE in Wisconsin classrooms.

Implications: With the EE mandates no longer being enforced and with increased demands on teachers' time to address standards in other disciplines to improve student test scores, the outlook for EE is dim. However, the EE professionals advised that the field should adopt an optimistic

approach, recognizing the progress that has been made and looking for ways to counter the backslide of the place of EE in K-12 curriculum. The participants in this study had mixed opinions as to steps that should be taken to improve the status of EE. Some believed the EE mandates work when followed and should be enforced; others suggested that newer, fresher approaches should be considered. Those that support enforcement note that there are content standards for EE and that EE is included in the Department of Public Instruction's teacher certification requirements (PI 34). They also suggest that administrators and school board members be approached to support EE inclusion within school districts. Expecting that these rules related to EE be followed without enforcement is unrealistic, argue other professionals, especially with EE no longer a priority within the DPI, school districts, and among many teachers. Instead, they suggest that the field of EE needs to be redesigned to meet the needs of today's teachers. Supporters of EE need to examine the discipline and school programs to determine a better fit for EE and even consider if the goals and name of the field should be changed. In their view, past efforts to implement EE worked to some extent in the past; for the present and future we need new strategies because the past ones do not apply.

Recommendations for future research: EE professionals from institutions within and outside of Wisconsin should be interviewed to investigate if their perceptions confirm or disconfirm insights from this study. Some of their views can be found in the literature which shares the findings and practices of contemporary researchers in EE.

Purpose Two: To investigate the reality of environmental education implementation, including infusion, into subject area curriculum in Wisconsin

- Related research questions: How do teachers reputed to be effective environmental educators teach about (and/or for) the environment? How do they integrate or infuse environmental concepts into their curriculum? How do their EE teaching practices compare to the methods prescribed by professional environmental educators?

Teachers who participated in this study include environmental concepts in their lesson plans in a variety of ways. They take students outside to study nature, they reference environmental issues during classroom discussions, they use the environment to illustrate concepts in their subject area, and they conduct activities indoors to help them learn ecological concepts. Teachers sprinkle these references throughout their lessons, but sometimes they are blended more thoroughly to the point where their connections are seamless. This study has attempted to categorize their methods into insertion, infusion, and integration; however, it has become apparent the distinctions between them remain elusive.

The strategies used to categorize the methods were based mainly on insights from the EE professionals and the teachers themselves. There was indication, based on the observations and interviews, that insertion of EE activities is a common practice used to teach about the environment. It may be this is more prevalent among teachers who have been exposed to EE inservice workshops that provide activity guides designed to supplement existing curriculum plans. Teachers will add, move, and adjust their lesson plans to meet the changing demands of their curriculum. The attraction of prepared activities provided through supplementary EE programs such as Project Wild and KEEP is that activities can easily be inserted to help teachers address certain concepts or to make learning more interesting for students. The shortcoming of this approach is that activities can just as easily be removed.

For the most part, they agreed that infusion was a more passive approach to EE implementation, while integration required more planning and preparation. The EE professionals indicated that infusion may be a higher level of EE implementation, perhaps because it is more integral to the curriculum.

Perhaps a hope of infusing EE is that it will indeed permeate the curriculum and become more embedded, less easy to remove. One of the aims of this study was to find explicit illustrations of infused EE, to learn if this approach was distinguishable from other strategies. The conclusion is there may be differences between infusion and other strategies, but the differences are subtle. More research could be conducted to definitely identify and describe

infused EE, but this study found there are more pressing issues affecting the field that need attention.

The main issue facing EE is not *how* it is being included, but *if* it is being included. There are teachers who continue to teach about the environment, yet they report that sometimes it is challenging to justify including environmental topics and perceive that few other teachers take the time to include EE. While the teachers in this study might not give their district a failing grade, the best report was “fair.” This reserved view of the status of EE is accompanied by the recognition that other demands, especially academic testing, are influencing how much class time teachers believe they can devote to the environment. Despite these demands, the teachers who participated in this study do find the time to include EE.

There were a variety of reasons teachers in this study include environmental concepts in their lessons. The strongest rationale was their passion for nature and their desire to increase student awareness of the environment and issues that affect it. The participants also mentioned that students are interested in their environment, natural and human-built, and EE makes subject area content more relevant to students. While the main objective is to increase student awareness of the outdoors and the natural world, they want to encourage students to become more environmentally responsible. It appears the goals of EE as outlined in the Department of Public Instruction’s *A Guide to Curriculum Development in Environmental Education* are being addressed. However, one still must ask how thoroughly or cohesively they are being considered on a district-wide basis.

Implications: If students are receiving lessons in EE—inserted, infused, or integrated—randomly scattered throughout their K-12 career, there is little chance they will receive a comprehensive exposure to all aspects of EE. According to the goals of EE, students need a progressive and continual involvement in EE experiences to develop environmental literacy. Although EE is interdisciplinary in nature, it may not be realistic to expect subject area teachers to include environmental topics in their curriculum—especially when they perceive EE is not a priority.

Recommendations for research: A more thorough investigation into competent and exemplary EE teachers is needed. This investigation can be accomplished in a number of ways. It can be conducted through a collaborative project with an ethnographic researcher, through an extensive case study, or by having teachers examine their own practice through action research.

Purpose Three: To assess the pervasiveness of environmental education implementation, including infusion, into subject area curriculum in Wisconsin

- Related research question: To what extent are EE implementation strategies practiced by teachers throughout Wisconsin?

This study administered a survey to a representative sample of teachers and received an estimated response rate of 8 percent. Reasons for the estimated response rate and explorations into the low return of surveys are discussed in Chapter 6. It was hoped that this survey would provide insights into the pervasiveness of EE implementation statewide. A literal interpretation of pervasiveness based on response rate would indicate EE implementation is not very pervasive at all. This study resisted unequivocally making this claim because of challenges and shortcomings of surveys in general and electronic surveys in particular. Nonetheless, the low response rate could lead to the perception that EE has been marginalized in Wisconsin schools.

Support of this perception might be reflected in some of the concerns voiced by the EE professionals interviewed. Their main concern was that the Department of Public Instruction no longer employs an EE consultant. This person would be responsible for ensuring that the EE mandates are being followed. They would be visiting teacher education institutions, evaluating the preservice courses for EE content and methodology. Without this enforcement, it appears that the quality and quantity of teacher preparation in EE has declined. Consequently, new teachers are entering the field with little or no EE experience.

Another reason for the decline of the popularity of EE may be that school districts withdrew their support of the topic. In the mid 1990s, a number of parents and legislators began

expressing concern over teachers advocating environmental protection. Environmental education became equated with environmentalism. The pressure of standardized testing also caused a shift in priorities, resulting in EE becoming even more peripheral to the core curriculum. Finally, the public in general has changed its views about the environment. Despite the push to reduce, reuse, and recycle in the early 1990s, people began consuming more resources, buying larger vehicles, and generating more waste. Other important societal issues such as world terrorism have taken precedence over the environment. This change in values reflects what parents want their children taught in schools. Although they may still think the environment is important, parents want their children to perform well on academic tests.

Implications: If EE has indeed become a low priority in Wisconsin's schools, then obviously students have received limited exposure to lessons about the environment. This lack of exposure implies that students are graduating environmentally illiterate. Students may not possess the knowledge, skills, or experience they need to make wise choices about their consumption of natural resources.

Recommendations: Although there are challenges to survey administration, the way to assess pervasiveness of something inevitably requires some sort of surveying. Perhaps a repeat of Rossow's 1994 investigation of administrators is called for. Another tactic might be to conduct face-to-face surveys during professional conferences of various disciplines (e.g., attend the state Social Studies teacher conference and ask teachers about their EE implementation). These recommendations for further research would help confirm if EE in Wisconsin is truly limited. If it can be assumed that this is the case, then it might be more worthwhile to invest time and energy researching ways into improving the status of EE rather than confirming its lack of pervasiveness.

Conceptualizations of EE Implementation: Insertion, Infusion, Integration

A significant portion of this study was devoted to ascertaining how professional environmental educators and teachers envision the implementation of EE. In particular, the idea of infusion was explored as this was of particular interest during the examination. It was hoped

to form a conceptualization of what infusion is and what it looks like. Although this study did develop a definition of infusion and provides some examples, the reality of infusion remains elusive.

During discussions, EE professionals and teachers will use the terms infusion and integration interchangeably. When teachers demonstrated how they taught about the environment, most often they did just that: they taught about the environment. Yet, the teachers were not only teaching about the environment; they were addressing concepts and skills in their teaching area as well. More often than not, the environment became the main vehicle by which they communicated those concepts and skills.

Despite the ambiguities among insertion, infusion, and integration, this study was able to—with the help of the literature review, EE professionals, and teachers—find distinctions among the terms. A primary insight came from listening to the words used by the professionals and educators. Following are verbs and adjectives most commonly associated with each approach:

Infusion: tie in, weave in, connect, blend, relate, sneak it in, twist, slant

Insertion: add, extend, find a fit

Integration: correlate, incorporate, design, create, thematic, project-based,
interdisciplinary

Based on a review of the literature (Chapter 2), discussions with professional environmental educators (Chapter 4), and interviews with teachers (Chapter 5), the following definitions for each term were created for this study:

- Insertion: To add separate activities about the environment into the curriculum
- Infusion:
 - Minor: to blend environmental concepts into existing lessons when the opportunity arises

- Major: To teach about the environment to illustrate subject area concepts, may take place in the outdoors
- Integration: To intentionally design lessons to include concepts from a number of disciplines, including environmental education

Within the literature review, Cantrell (1987) explored the integration of lessons from Project Wild, an activity guide. She developed a scale to rank the integration of environmental education activities into existing curriculum. In adapting Cantrell's scale, this study has labeled each range based on analysis of the findings (see Figure 2: Degrees of Implementation). A shortcoming of this revision is that the integration label does not account for the inclusion of multiple subject areas. However, if particular concepts are intermingled with a number of concepts from various disciplines, then it may indeed be hard to distinguish one from another. As the teacher James mentioned, integration involves combining separate content areas to create something new.

Figure 2: Degrees of EE Implementation

(Modified from Cantrell 1987, p. 351)

Unanchored	Loosely anchored	Moderately anchored	Firmly anchored	Tautly anchored
Unconnected	Related but not directly connected	Directly connected but not essential	Essential but still discernible	Completely integrated and no longer discernible
	Insertion	Minor Infusion	Major Infusion	Integration

Although these degrees have been labeled, based on observations of and interviews with teachers, it is difficult to categorize the actual way or ways teachers implement EE because they use a variety of approaches. As discussed in Chapter 5, during the observed lessons, teachers would teach about the environment and reference subject area content. Likewise, they would mention the environment while teaching about their main subject area. For the most part, the observations revealed examples of minor and major infusion. However, activities were inserted

emphasized more strongly (major infusion). For example, one of the darker shaded boxes in the younger grades might be an art class that focuses on awareness and appreciation of the natural world. At the upper grade levels, students could be involved in investigating issues and learning ways they can help solve environmental problems and issues (Engelson 1985; Hungerford, Peyton, & Wilke 1980). Therefore, the darker shaded boxes might be Social Studies and Language Arts classes where students are learning skills they can use to participate productively as responsible citizens.

The infusion approach to EE implementation may be ideal because it does not require significant changes to the existing curriculum. In essence, because environmental education is so pervasive it is seamlessly included into subject area teaching matter. However, its very pervasiveness—one of its key strengths—might also be its primary shortcoming. Teachers may report that they do not teach about the environment, when in fact they do—they just do not recognize it.

Another dilemma with the infusion approach is whether it can include all aspects of EE. Some components of EE are more “infusible.” For example, art classes stress awareness, and ecological concepts are part of Biology classes. During interviews with EE professionals, they were asked if the more action-oriented goals of EE (citizen action skills and participation) could be addressed through infusion. In general, they recommended a “capstone” course where students could draw from earlier experiences and be provided with an opportunity to focus on an environmental issue. In this case, concepts from other disciplines might actually be infused into EE.

Therefore, both the insertion and the infusion approaches allow strategies to implement EE, yet both have their shortcomings. Infused EE can be so diffuse that it is not apparent, and inserted activities do not guarantee a sequential K-12 EE experience. In both cases, EE might be lost or omitted without intentional planning to address environmental concepts. Ideally, inserted activities would be complemented by infused content before and after the activity, thus embedding it in the curriculum.

Integration

Another term used to describe how EE can be implemented is integration. Although the terms infusion and integration are often used interchangeably, most EE professionals and teachers agree that there is something more intentional with integration.

One teacher said that infusion means you get a flavor of something, while with integration he thinks of the cogs of a wheel, working together (“Kevin”). With integration, each component is integral to the whole. The adjacent image of a rope illustrates integration because like the intertwined fibers in a rope, concepts from many disciplines intertwine to create a new, comprehensive program. The environment may be the integrating theme that draws the concepts together.



Looking at the rope diagram, it is important to note that the individual fibers and braided strands are still discernable. This represents how with integration the elements of the combined disciplines are interdependent but still discernable. While a thoroughly infused topic might become lost, with integration a new product is created that highlights key aspects of the product sources.

Integration can take place in a single classroom with one teacher pulling together interdisciplinary concepts into a single lesson or unit; or a team of teachers can work together to create an interdisciplinary curriculum. These teachers can teach a class together or they can work cooperatively in separate classes given that they teach the same student population (i.e., the same group of students travel from one class to another).

The three approaches to including EE into school curriculum discussed in this overview include insertion, infusion, and integration. It seems that integration is the method that is being promoted most often these days. Through this interdisciplinary approach, environmental topics while still distinct are interwoven and integral to a comprehensive understanding of a broad theme of knowledge or skills.

Infusion conclusions

Upon examining three implementation strategies for EE, the simplified conclusion is that there are subtle differences, and some EE professionals would say there are subtle and insignificant differences. Although this study did produce definitions for the various strategies, because the terms are used interchangeably in the field (especially infusion and integration), it may not be practical to use the definitions to label and categorize implementation strategies.

If, however, infusion can be equated with one discipline permeating another, EE may already be present in Wisconsin K-12 curriculum. As Engelson and Yockers (1994) point out, many subject areas already include EE concepts; the trick is to identify when and where. In other words, EE may lose its identity when it blends in with another discipline. Hirsh (1982) warned about this challenge, indicating that the infusion approach may be used to assuage parties interested in implementing a discipline. Those wishing to appease the stakeholders can convey that a topic will be infused without following through and ensuring its inclusion. Infusion of EE could have been successful; we are just not able to tell.

A solution to avoiding infusion confusion is to avoid using the term altogether. Although the term infusion is still used, it seems to have fallen out of fashion and there are probably practical reasons for that. One reason as stated above is that it is nearly synonymous with integration. A second reason is because of its ambiguity, it is difficult to determine if it has been accomplished. A successfully infused topic may essentially be indistinguishable from the topic into which it has been blended. If one is able to discern the environmental content in a lesson, chances are the content is not infused and actually has been inserted. Third, because integration implies intentional planning to combine topics, it may be favored over the more passive infusion approach. Finally, there are some aspects of EE that are not “infusible.” Investigating an environmental issue would require a significant amount of class time, essentially dominating the class. With this situation, the environment would be the integrating theme that would connect and interlink concepts from a number of different disciplines.

With these findings and recommendations in mind, the following summative insights for the study are presented. They provide the foundation for recommendations for future research into EE implementation.

Generalizability revisited

Chapter 3 includes an extensive discussion of issues with generalizing from a small study sample. The findings from this research relate to the insights provided by the study participants based on my analysis of what they told and showed me. Rather than drawing conclusions that apply to the field of EE in general, this study has developed generalizations into insights of practice based on the study findings. These findings were drawn from analysis of the literature, interviews with EE professionals, classroom teacher interviews and observations, and a statewide survey. Following are implications of the findings from this study. Although they are based on analysis of the sample population investigated, EE professionals might consider these insights as they relate to EE in their setting. By taking steps to ensure that my data collection and analysis was reliable and valid, I hope these ideas and suggestions might be useful considerations for program developers, researchers, and evaluators of EE in Wisconsin—including me.

Generalizations into Insights of Practice

Effective teachers are opportunistic. They find those teachable moments to make learning relevant and meaningful to students. Frequently, the natural environment supplies these moments. These moments can be spontaneous events that crop up and make themselves known. A robin nesting in the schoolyard, a community garbage strike, or a spike in gasoline prices can provide teachers with chances to point out environmental events and how they relate to subject area learning. In this study, these moments have been labeled “minor infusion.” They occur throughout the school year, and sometimes without even noticing it, teachers include environmental concepts in their classroom lessons.

Other times, teachable moments that involve the environment are more extensive. Rather than just a few minutes about the environment, entire lessons and thematic units are devoted to using the environment to illustrate subject area concepts. These planned environmental teachings

are called “major infusion” in this project’s analysis. By keying out tree species students learn about trees but also apply science process skills such as classifying. Or recycling is the backdrop for learning how to use machinery that makes notepads out of used paper.

Some teachers will seek out these environmental teaching opportunities. They are passionate about the natural world and want to increase student awareness of environmental issues. Other teachers were introduced to these opportunities through inservice courses or workshops. They learned how activities that involve the environment can make learning fun and relevant to students. This latter strategy is often used by environmental education organizations to encourage teachers to include environmental concepts in their lesson plans.

In the late 1980s and early 1990s the term infusion was often used to describe including environmental activities in curriculum plans. This approach was encouraged over simply inserting activities, because inserting activities implied adding something to an already crowded teaching schedule. Also, an inserted activity may lack connections to other topics being taught in the curriculum. It was hoped through infusion environmental activities would be more securely tied into the existing curriculum.

The term integration is used more commonly among professionals in the field in the current decade. Integration alludes to a more intentional approach to including environmental concepts into the curriculum.

The common aim of *insertion*, *infusion*, and *integration* is to make sure EE is “in” the school curriculum. The professional environmental educators in this study believe there is more EE being taught today than 20 years ago. Yet, teachers in this study reported that they know of only a few teachers in their district who teach about the environment. The low response rate to the survey used in this project supports the perception that EE is not a priority among teachers. Despite efforts of professional environmental educators to ensure the inclusion of EE by securing it in curriculum, it is generally marginalized in today’s school systems. Infusion and integration

may not have secured EE's place in the curriculum any better than insertion; teachers were still able to exclude EE when other demands dominated the curriculum.

There is a chance that EE has been so successfully infused that it is unrecognizable. More extensive investigations would be needed to determine if this is true. Nevertheless, the presence of EE is questionable in schools and it will be difficult if not impossible to address the goals of EE without some direct, sequential attention to environmental concepts and skills. The goals of EE cannot be achieved through minor infusion. Major infusion and even integration will not fare much better if they occur in isolated situations throughout students' learning experiences. For the goals of EE to be achieved, a coordinated effort among teachers will be needed.

The goal of EE, according to the Department of Public Instruction, is to develop individuals who can balance the quality of life and the quality of the environment (Engleson 1985). To reach these goals, EE professionals recommend leading students from awareness to action (citizen participation). Along the way, students learn environmental concepts (knowledge), develop process skills, and analyze attitudes and values. The outcome is environmental literacy.

In Wisconsin, professional environmental educators counted on the Department of Public Instruction (DPI) to design, implement, assess, and enforce this coordinated effort. In the 1980s and early 1990s there was an EE consultant who could share the agency's curriculum guide with districts and advise them on how to address the goal and subgoals of environmental education. In addition to the efforts of the EE consultant, environmental organizations and universities offered workshops and courses for teachers on environmental topics such as wildlife, forestry, and energy. Institutions and organizations provided these opportunities out of their own interest and also because of an EE mandate requiring teaching competencies in EE for teacher licensure.

Mandating teaching competencies and curriculum development characterizes an "outside in" or "top down" approach to EE implementation. Promoters from the outside (EE professionals) endorse insiders (teachers) to take courses and workshops in EE. The idea was that by requiring teachers and districts to include (the mandates use the term integrate) EE, EE would be integral

to the school curriculum. As discussed above, there is evidence that EE is far from being an integral component of school systems.

Professionals in environmental education have some choices to make regarding the decline of EE implementation in schools. They can put their efforts behind the “outside in” that has succeeded with mixed—even minimal—results in the past or they can explore new strategies. The following section provides a brief overview of how EE professionals in other parts of the country and the world are addressing EE professional development and implementation. Their approach characterizes more of an “inside out” approach; rather than expecting teachers to align their programs to prescribed goals, teachers are insiders encouraged to examine their own practice and find their own fit for EE. This overview is presented because it informs the recommendations for future research listed below.

Evolution of Research and Practice in EE

With its goals for EE, its EE mandates, and its teacher “training” courses in EE, Wisconsin and much of the United States displays a modernist and humanist approach to curriculum design (Payne 2006; Sauv e 1999; Stables and Scott 2001). Furthermore, research in EE has been characterized as being primarily positivist and behaviorist (Robottom and Hart 1993; Wals and van der Lief 1997).

Researchers around the world are urging the field of EE to adopt a post-humanist (Stables and Scott 2001) post-modern (Hart 2003), and post-structuralist approach to EE (Gough 1999; Gough and Whitehouse 2003). They criticize the modernist approach to EE because it recommends solving the current world environmental issues by using ways of thinking that created the problems in the first place (Wals and van der Lief 1997). Stables and Scott (2001) concur and suggest a critical examination of current modes of EE implementation. They point out shortcomings of the interdisciplinary approach, mentioning incompatibility of subject discourses (e.g., the art-science divide). They indicate new ways of thinking are needed to examine and address the problems that have arisen from anthropocentrism.

Postmodern researchers recommend that EE become more reflexive and open to the varied and unique needs of teachers, their students, and their school setting (Jickling 1997). Rather than providing prescribed approaches to EE implementation, many postmodern researchers recommend teachers take an active role in investigating their own practice and if and how EE should be included (Hart 2003; Jickling 1997; Payne 2006).

New ways of knowing and thinking are encouraged, including considering EE's role in sustainable development. Knapp (2000) notes that the term environmental education was rarely mentioned at the 20th anniversary convention of the Tbilisi Declaration. This event was held in Thessaloniki, Greece in December 1997, where a new doctrine for the environment was developed. He recommends that EE consider evolving to become education for sustainable development. Sauvé (1999) supports this trend, while others argue EE has its own place in education (McKeown and Hopkins 2003). Stables and Scott (2001) approach the EE evolution to sustainability education with caution: "Is 'sustainable development' merely a piece of political rhetoric that we should deconstruct? A critical approach to environmental education should not work in the service of unproblematised modernist and humanist assumptions" (p. 277).

Sustainable development education will face the same fate as EE if the name changes without examination and evolution of the field's epistemological and ontological perspectives. It seems that while heated debates about the fate of theory and practice in EE occur around the country and the world, here in Wisconsin we continue to follow the goals and approaches to EE outlined over 20 years ago. Are we simply getting the job done while the engineers argue in the back room? Or are we the ones floundering in an outmoded way of thinking while the rest of the world leapfrogs beyond us? These questions need further examination. This study has found that EE in Wisconsin is marginalized, and professionals in the field may want to learn more about how researchers from other states and countries are addressing challenges to EE.

Implications for EE in Wisconsin and Recommendations for Future Investigations

This section discusses implications for EE in Wisconsin based on the findings from this study and the literature reviewed. In particular, it will examine the infusion conclusions,

mandates for preservice preparation and curriculum design, the needs of inservice teachers, and suggestions for redefining EE in Wisconsin.

Avoiding Infusion Confusion

As discussed above within the Infusion Conclusions section, with the term integration more prevalent it may be best to avoid using the term infusion. Although this study was able to identify examples of minor and major infusion, these labels could be replaced. More research could be done on identifying and labeling the degrees of implementation, yet it may be best to focus on supporting integration in general. Perhaps if any distinction is to be examined, it should be between insertion and integration.

There could be more extensive field studies into whether EE activities are being inserted or are truly integral to the curriculum. This should be done for all grade levels and subject areas. The purpose would be to see if and when the goals for EE are being addressed. If the district has a curriculum plan for EE, that might provide this information. However, as this and past studies have found, most districts lack this plan. Even if there is one, classrooms will need to be visited to see if the plan is being actualized and how.

Another point of study could be to see if inserted activities *can* be integral to the curriculum. Despite the promotion of infusion in the past, in reality EE workshops and courses instruct teachers to insert lessons from activity guides into curriculum. If it is found, as feared, that inserted activities do not fare well, then EE professionals ought to consider the reality of integration further. A better understanding of integration, what it is and how it should be done, is needed. The original edition of the DPI's *A Curriculum Planning Guide for Environmental Education* had a step-by-step outline for infusion that some professionals found restrictive and confusing. The second edition lacks specifics on how to infuse (or integrate for that matter). Perhaps this publication can be revisited and, keeping the academic standards in mind, revised to provide some general guidelines. A publication such as *Integrating Environmental Education into the School Curriculum* (Monroe and Cappaert 1994) might be a good reference for this revision.

A complementary study would be to investigate the practicality and benefits of integrated subject area teaching, especially that which includes EE. The NEETF/Roper publication (Coyle 2004) reports that studies have found the integration of EE supports academic improvement. There are examples of integrated units being conducted throughout Wisconsin (e.g., Kevin, Carl and James). Given the pressures of standardized testing, it might be necessary to employ traditional research practices such as surveys to investigate if student participation in integrated coursework does indeed increase student performance on academic tests in Wisconsin. The quantitative findings could be complemented and enriched by case studies and action research to provide more in-depth analysis of the effects of the interdisciplinary approach.

Rather than a blanket mandate that subject areas integrate EE, perhaps degrees of integration should be designated for specific subject areas (e.g., casual, intentional, complete). Unlike complete infusion, with complete integration key concepts of the combined disciplines are still recognizable and even highlighted (see Integration above). Figure 3: Degrees of EE Integration portrays this revised categorization of EE implementation.

Figure 3: Degrees of EE Integration

(Modified from Cantrell 1987, p. 351)

Unanchored	Loosely anchored	Moderately anchored	Firmly anchored	Tautly anchored
Unconnected	Related but not directly connected	Directly connected but not essential	Essential but still discernible	Completely integrated and Interdependent
	Insertion	Casual Integration	Intentional Integration	Complete Integration

Some aspects of EE, such as awareness, are more easily included into subject areas. These may be casually added to an Art or Language Arts class. Other topics need more intentional integration, such as process skills related to issue investigation. It will involve time

for the Math teacher, for example, to plan how to include orienteering skills into her geometry class. The more action-oriented aspects that involve investigating environmental issues require concentrated class time. While a teacher could set aside time to devote to this investigation, through complete integration, he or she could create a new unit that address key concepts of the investigation and the subject area.

Several participants noted the relevancy of Social Studies to issue investigation and citizen participation. Therefore, EE professionals might consider building partnerships with professional developers in the field of Social Studies to explore how EE might be more completely integrated into that discipline. A number of research projects could evolve focused on how Social Studies curricula currently address environmental concepts and what strategies might work to enhance EE implementation. Service learning is another trend in education that might be an effective venue for some of the more action-oriented goals of EE.

EE Mandates: To Enforce or not to Enforce

The EE mandates were designed to ensure preservice teachers entered the field with an introduction to EE content and methodology and to promote the integration of EE into K-12 curriculum. The participants in this study believe that these mandates are not being enforced. A formal investigation of teacher education institutions is needed to ascertain to what extent they do include EE into their students' course of studies. If, as suspected, the quality and quantity of EE is negligible, then EE professionals can decide how to address this deficiency. There are content standards for EE developed as part of the new certification rules under PI 34. This might be an avenue for promoting EE in preservice teacher education. Without a DPI consultant for EE, it is unlikely the enforcement approach will work. Therefore, a different strategy will need to be identified, applied, and evaluated.

Earlier studies of EE in Wisconsin have revealed that the majority of school districts do not have a curriculum plan for EE (Lane 1993; Rossow 1994). Even in those districts that had plans, the plans were deemed unsatisfactory by teachers and administrators. This study did not find any evidence to indicate these perceptions have changed. The EE mandate regarding

curriculum development was created before the EE standards were created and application of these standards could affect decisions on whether and how to promote the EE mandate. More than one participant of this current study pointed out the irony of having a separate set of EE standards when the aim of EE was to be interdisciplinary. Requiring (mandating) a separate curriculum plan for EE is not conducive to integrating EE into other subject areas. Instead, as Engleson and Yockers (1994) recommended, the existing EE concepts should be identified where they already exist in other disciplines (or in standards of other disciplines).

As discussed in the section above (Avoiding Infusion Confusion), there are aspects of EE that need more focused attention. In these cases, EE would be the main area of study that integrates other discipline concepts and skills. This concentrated exposure could take place in a Social Studies class or an Environmental Science class.

Even if the mandate is reinterpreted to have EE concepts identified within existing curriculum (rather than a separate plan), this revised approach would still need enforcement. Consequently, encouraging an integrated plan for EE needs a different approach than the state mandated effort.

Professional Development in Environmental Education

Of the 13 teachers who participated in this project, five had received advanced degrees in environmental education. While the others reported taking inservice courses in EE, in general it was their passion for the environment that motivated them to implement environmental concepts into their curriculum. They also emphasized the practical benefits of including environmental concepts. The teacher survey confirms this finding as over 80 percent of the teachers indicated that it makes learning relevant to their students. A possible conclusion is that there are two main reasons teachers include EE in their curriculum: Their commitment to the environment and their perception that it makes learning relevant and fun for their students. Further research may be needed to confirm this.

Teachers who are passionate about the environment are most likely already teaching about the environment. If EE professionals want to encourage more teachers to integrate EE, their choice is to make teachers passionate about the environment or to motivate teachers to include EE some other way. Research has found that passion for the environment often is generated from childhood experiences, so expecting to instill this passion in adults may be an unrealistic (but not impossible) endeavor. Therefore, an obvious choice is to highlight the practical benefits of EE.

Despite waning interest in EE, incentives can still encourage teachers to participate in EE professional development courses (e.g., the Wisconsin K-12 Energy Education Program provides utility-sponsored scholarships that significantly reduce teachers' tuition fees). However, instead of expecting teachers of various disciplines to come to EE, maybe EE needs to go to the disciplines. As discussed within the section, Avoiding Infusion Confusion (above), EE professionals can explore forming partnerships with key disciplines that relate to EE such as Social Studies.

This study has shown that there are teachers in non-science disciplines who include EE in their subject area. These teachers can serve as role models, demonstrating how EE helps them address their subject area standards and make learning relevant to students. A preliminary workshop can bring together experienced environmental educators in a certain discipline to network and share how they implement EE. Their expertise can be used to develop strategies that can be shared with other teachers in their field. Wisconsin has a number of existing inservice programs in EE. These might consider focusing on particular disciplines to increase their EE content.

Redefining EE in Wisconsin?

As discussed in the Evolution of Research and Practice in EE section above, EE in Wisconsin is modernist, emphasizing positivist research practices. One area in particular that needs examination is the idea of pre-determined goal and sub-goals for EE that all students are expected to achieve. Perhaps like many disciplines, there can be levels of expertise and

concentrated study in the field of EE. What is reasonable and necessary level of environmental literacy for *all* students, and what are the expected competencies of students who specialize in environmental education? Another dilemma with EE is that it still is commonly equated with Outdoor Education along with Nature Studies. How much should EE continue to distinguish itself from these fields? Should the discipline “evolve” to focus more on sustainability?

Wisconsin is fortunate to have several strong environmental education organizations. These include the Wisconsin Center for Environmental Education, the Wisconsin Environmental Education Board, and the Wisconsin Association for Environmental Education. Professionals from these organizations might want to consider researching EE in other states and countries to learn about different approaches to defining and implementing EE.

While it would certainly be worthwhile for EE professionals to engage in a critical investigation of EE in Wisconsin, teacher involvement would enhance these studies. Having teachers implement true action research projects in EE can lead the way to broadening the research base of EE in Wisconsin.

The projects that teachers complete for the master’s program in EE have been labeled Action Research, but the program defines research as developing, implementing and evaluating projects such as curriculum plans, outdoor sites, and inservice workshops (Sivek 2002). Teachers’ examination of their own practice and reflexivity was omitted from these projects. It is recommended that the EE master’s program examine its approaches to professional development, and reconsider its goal to develop leadership in EE. Rather it can involve teachers in action research, where they can investigate the effects of EE implementation on their practice and on student learning. Even when they opt to conduct a traditional research project, teachers can still take the opportunity to add a reflexive component to their work, analyzing the effect of the project on their professional development.

Out of the efforts of these teachers to implement and examine EE in Wisconsin, a definition could arise of EE grounded in the real-world needs of teachers and students. EE

professionals could support the creation of this definition by researching and providing theoretical frameworks and relevant professional development opportunities.

Limitations Revisited

The limitations for this project have been described in Chapter 3. The primary limitation was time spent in the field. While exemplary environmental educators provided key insights into the reality of EE implementation in Wisconsin, more time observing and conversing with teachers would have significantly enhanced project findings.

Other limitations include the following:

- Only a limited number of EE professionals in Wisconsin were interviewed in this study. There are other environmental educators in Wisconsin who may have similar or conflicting views. While EE professionals from other states were met with informally, their insights were not included in this study.
- Only 13 Wisconsin teachers were interviewed for this study, there are other teachers in Wisconsin and other states and countries that would have similar and alternate views and experience.
- Having access to more of the teachers' curriculum plans and lesson plans might have given a better picture of EE infusion. However, only a few of the teachers were able to produce any documents of this sort to share.
- As a professional environmental educator, the researcher entered the project with biases and preconceptions. A reflexive component that explores these ideas and notions is found in the Appendix F.

The Rise and Fall and Rise(?) of EE

It is happening again. Before it was silent springs, burning rivers, and disappearing rainforests; now it is peak oil and global climate change. What is happening is more than pending or current environmental disasters; it is media attention to these disasters. Media attention heralds national, state, and regional reactions to these disasters. Public dismay and outrage results in the formation of government agencies for the environment and the passing of environmental laws and regulations. Eventually, as happens with most societal issues, the public

demands that students become aware of these issues and learn environmentally responsible behaviors.

Conservation education and then outdoor education arose out of public interest in increasing student understanding of the environment. The first Earth Day in 1970 was a teach-in intended to increase knowledge about the environment. The United Nations sponsored an international conference on environmental education in Tbilisi, Georgia in 1978. The resulting Tbilisi declaration outlined goals and objectives for interdisciplinary environmental education, encouraging all subject areas to try to address EE goals. In Wisconsin, dozens of groups ranging from the League of Women Voters to Ducks Unlimited came together in support of the passage of environmental education mandates (Wilke 1985). Enthusiasm and support for EE encouraged its successful inclusion in classroom lessons and activities—perhaps too successfully. When students started participating in some of the actions which the goals of EE prescribed to protect the environment, including economic actions and political actions, politicians and corporations became concerned that children were being taught fear rather than facts (Sanera 1997). Instead of highlighting environmental disasters, the media then focused on ecoterrorism and the greenwashing of our students.

Eventually, like most headline events, interest in the environment and against the environment faded into the background and other issues took the limelight. In 2000, the 30th anniversary of Earth Day, the return of the young boy Elian Gonzalez to his father in Cuba stole the spotlight from carefully planned events and celebrations hoping to attract media attention. Now, six years later, it seems the spotlight is turning back. Gas prices are around \$3.00 a gallon and Time magazine's cover story is on global warming. Once again, the public may express interest in children becoming environmentally literate. How will the environmental education profession react this time around?

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APPENDIX A

CITIZEN (ACTION) PARTICIPATION SKILLS IN ENVIRONMENTAL EDUCATION

Harold Hungerford and his associates at Southern Illinois University have identified five widely use methods of citizen action that students should study and experience.

Persuasion: A logical or emotional appeal to motivate other human beings to modify their values and take positive environmental action (for example, posters, newspaper articles, advertisements, radio/television announcements, verbal discussions, speeches, letter writing, debates, newspaper articles [sic], magazine articles, and modeling behavior).

Consumer action: Primarily economic actions intended to motivate other human beings to take positive environmental actions.

- **Direct boycott:** Applying economic pressure by refusing to buy products with a negative environmental impact in order to eliminate their production (for example, refusing to buy nonrecyclable beverage containers).
- **Indirect boycott:** Applying economic pressure by refusing to buy products produced by an individual or company that engages in an action unrelated to the products but that has a negative environmental impact (for example, refusing to buy Japanese-made products because the Japanese harvest whales and rainforest lumber).
- **Conservation:** reducing consumption of a product that despite its having a negative environmental impact in its production and/or use is also needed by people (for example, electrical energy).
- **Monetary and volunteer support:** Contributions of money to or doing volunteer work on behalf of individuals, organizations, or institutions actively working for consumer action a means of maintaining and enhancing environmental quality (for example, donations and/or membership fees paid to an organization promoting energy conservation or participation in an unpaid volunteer telephone bank).
- **Economic patronage:** Buying certain products because the company producing them attempts to reduce or eliminate negative environmental impacts in their production (for example, recycled materials are used or plastic wrapping is replaced with paper wrapping).

Political action: An action to persuade an electorate, elected official, or executive governmental agency to conform to the values held by the person or persons that take action (for example, voting, campaigning, lobbying, running for office).

Legal action: Any coercive legal/judiciary action taken by an individual and/or organization that is aimed at some aspect of environmental law enforcement or a legal restraint of some environmental behavior as undesirable (for example, lawsuits, injunctions).

Ecomanagment: Positive physical action by an individual or group that improves or maintains some part of the environment (for example, ecosystem restoration, nature trail development, starting a recycling center).

Cited from: Engleson & Yockers 1994, pp. 47-48.

APPENDIX B
SURVEY COVER LETTER

Dear Educator:

The [linked survey](#) included in this email has been developed to assess the prevalence of environmental education in Wisconsin. **We'd like to learn if, how, and why you teach about the environment.**

You'll also have the opportunity to provide your opinions of environmental education, including any pre-service and in-service experiences in the field. Your serious consideration and honest responses will be of enormous value to us. Further information about the reasons for conducting this survey is provided at the end of this letter.

We would greatly appreciate ten to fifteen minutes of your time to complete this survey. Even if you do not include environmental concepts in your teaching, your response is essential to providing an accurate assessment of the prevalence of environmental education. Because your responses will be combined with all other participants, your name and your school name will be anonymous and kept confidential. Please submit the survey by March 13, 2006.

[Take the Survey Now](#)

https://www.uwsp.edu/cnr/acl/survey/ee_survey_final.htm

Thank you for your time and consideration. If you have any questions about the survey or its purpose, please contact Jennie Lane at the Wisconsin Center for Environmental Education.

Sincerely,



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Purpose of the statewide teacher environmental education survey

The purpose of this survey is to assess the pervasiveness of environmental education (EE) implementation into subject area curriculum in Wisconsin. It has been over twelve years since the Wisconsin Center for Environmental Education conducted a statewide survey of teachers to assess environmental education in Wisconsin. The motivation for repeating aspects of this study would be to highlight telling changes in the status of EE in Wisconsin. We need to know if Wisconsin environmental education efforts have been successful in helping teachers to develop environmental literacy in their student population. In conjunction with the survey, in-depth interviews have been conducted around the state with selected K-12 teachers. The findings from this survey in combination with the interview results will provide valuable insights into the reality of EE in Wisconsin. Furthermore, it is hoped that professionals in the field of environmental education can use this information to improve EE in Wisconsin by providing relevant and meaningful professional development opportunities and resources for K-12 teachers.

APPENDIX C
ENVIRONMENTAL EDUCATION IN WISCONSIN: A TEACHER SURVEY

1. In which grade level or subject area do you teach? (Choose only one response from the following list. If you teach more than one subject, please choose the subject you teach most often or in which you have the most experience.)

- | | |
|--|--------------------------|
| a. Elementary | g. Music |
| b. Middle/Secondary Level Science | h. Art |
| c. Middle/Secondary Level Social Science | i. Technology Education |
| d. Middle/Secondary Level Language Arts | j. Agriculture Education |
| e. Middle/Secondary Level Mathematics | k. Health |
| f. Family and Consumer Education | l. Other: |

2. When did you receive your Wisconsin teaching license?

- a. 1985 or before b. 1986 to 1990 c. 1991 to 1995 d. 1996 to 2000 e. 2001 to 2006

3. Did you receive pre-service teacher preparation from a Wisconsin institution?

- a. yes (answer 3a, 3b, & 3c) b. No (go to question 4) c. Not sure (go to question 4)

3a. Please provide the name of the institution:

3b. Did you receive pre-service teacher preparation in environmental education (EE) from a Wisconsin institution?

- a. yes (answer 3c) b. No (go to question 4) c. Not sure (go to question 4)

3c. To what extent do you agree your pre-service teacher education effectively prepared you in environmental content and teaching methods?

- a = to a large extent b = to some extent c = to a small extent d = not at all e = not sure

4. Have you received in-service education or taken post-graduate courses in Wisconsin relating to EE?

- a. yes (answer 4a & 4b) b. No (go to question 5) c. Not sure (go to question 5)

4a. How many courses have you taken? a. 1 b. 2 c. 3 d. 4 e. five or more

4b. Please provide the title of the course/workshop you found most useful:
(Feel free to add comments at the end of the survey)

5. Does your school have a written EE curriculum plan?

- a. Yes b. No c. Not sure

6. EE should be considered a priority in our K-12 school system

- a = strongly agree b = agree c = undecided d = disagree e = strongly disagree

7. Pre-service teachers should be required to take an environmental education content and methods class.

- a = strongly agree b = agree c = undecided d = disagree e = strongly disagree

8. It is a good idea to mandate that school districts develop and implement an environmental curriculum plan.

- a = strongly agree b = agree c = undecided d = disagree e = strongly disagree

9. It is important to take the time to integrate environmental concepts and issues that are related to my discipline into my teaching.

- a = strongly agree b = agree c = undecided d = disagree e = strongly disagree

10. Do you teach about the environment?

- a. Yes b. No c. Not sure

11. For each of the following statements, indicate how accurately it describes the way or ways in which you include environmental education in your teaching situation.

	Accurate	Somewhat Accurate	Not Accurate	Not sure
I blend environmental concepts into my existing lessons when the opportunity arises (also known as infusion)	a	b	c	d
I intentionally design my lessons to incorporate environmental concepts (also known as integration)	a	b	c	d
I insert separate activities about the environment into my curriculum	a	b	c	d
I teach one or more units on the environment during the school year	a	b	c	d
I teach a separate course about the environment	a	b	c	d
I teach an integrated course, where concepts from many disciplines—including EE—are addressed simultaneously	a	b	c	d
Other (please describe):	a	b	c	d

12. Please review all of the statements below and indicate to what extent each describes what motivates you to teach about the environment.

	To a large extent	To some extent	To a small extent	Not at all	Not sure
My commitment to the environment	a	b	c	d	e
My preservice teacher preparation experience	a	b	c	d	e
Useful experiences from EE inservice courses/workshops	a	b	c	d	e
It is mandated	a	b	c	d	e
It is part of my curriculum	a	b	c	d	e
It makes learning relevant to my students	a	b	c	d	e
It makes learning fun for my students	a	b	c	d	e
My responsibility to address the EE standards	a	b	c	d	e
Other (please describe):	a	b	c	d	e

13. Do you reference the Department of Public Instruction's Environmental Education Academic Standards during your teaching?

- a. Yes b. No c. Not sure

14. What percentage of your instructional time includes environmental concepts?

- a. Less than 5%
 b. 5% to 14%
 c. 15% to 25%
 d. 25% to 49%
 e. 50% or more

15. Are you a member of the Wisconsin Association for Environmental Education (WAEE)?

- a. Yes b. No c. Not sure

Thank you very much for completing the survey. Your responses will be valuable in assessing environmental education in Wisconsin. Please use the space below (or on an attached sheet) to provide comments, suggestions, or opinions. If you are referring to specific questions, please indicate the question number.

APPENDIX D
ITEM ANALYSIS CHART FOR ITEMS 11 AND 12

The following diagram was used for validity panel members to evaluate various aspects of item validity (see legend). They indicated their opinion of the area by circling a number (1 – 5), with the higher number indicating a more positive review.

RQ: 2	FAIR	NEUTRAL	CLEAR	FRIENDLY	GRADE
1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
COMMENTS:					
RESPONSES:					

Legend

Area	Description
RQ:	The item provides information to answer the research question to which it is assigned
FAIR:	The item can be answered by teachers of any grade level or discipline
CLEAR:	The intent of the item is understandable
NEUTRAL:	The item does not encourage respondents to answer one way or another (it is not biased)
FRIENDLY:	The item does not intimidate or threaten teachers to answer one way or another
GRADE:	Overall opinion of this item (assign a letter grade)
COMMENTS:	Write down any comments about this item
RESPONSES:	List alternative response options

APPENDIX E
Environmental Education in Wisconsin: A Teacher Survey
 Frequencies and Means

1. In which grade level or subject area do you teach? (Choose only one response from the following list. If you teach more than one subject, please choose the subject you teach most often or in which you have the most experience.) N=116

- | | |
|--|----------------------------|
| a. Elementary 47 | g. Music 4 |
| b. Middle/Secondary Level Science 17 | h. Art 7 |
| c. Middle/Secondary Level Social Science 7 | i. Technology Education 5 |
| d. Middle/Secondary Level Language Arts 10 | j. Agriculture Education 4 |
| e. Middle/Secondary Level Mathematics 6 | k. Health 1 |
| f. Family and Consumer Education 1 | l. Other: 7 |

2. When did you receive your Wisconsin teaching license? N=116

- a. 1985 or before 57 b. 1986 to 1990 24 c. 1991 to 1995 14 d. 1996 to 2000 15 e. 2001 to 2006 6

3. Did you receive pre-service teacher preparation from a Wisconsin institution? N=114

- a. yes (answer 3a, 3b, & 3c) 71 b. No (go to question 4) 33 c. Not sure (go to question 4) 10

3a. Please provide the name of the institution:

3b. Did you receive pre-service teacher preparation in environmental education (EE) from a Wisconsin institution? N=75

- a. yes (answer 3c) 32 b. No (go to question 4) 36 c. Not sure (go to question 4) 7

NOTE: 59 teachers (51%) graduated after 1985, of those 36 (61%) from Wisconsin institutions—25 of whom (69%) reported receiving EE as part of their preservice preparation.

3c. To what extent do you agree your pre-service teacher education effectively prepared you in environmental content and teaching methods? N=37

- a = to a large extent 6 b = to some extent 16 c = to a small extent 14 d = not at all 1 e = not sure 1

4. Have you received in-service education or taken post-graduate courses in Wisconsin relating to EE? N=116

- a. yes (answer 4a & 4b) 50 b. No (go to question 5) 63 c. Not sure (go to question 5) 3

4a. How many courses have you taken? N=52 a. 1 (19) b. 2 (12) c. 3 (7) d. 4 (3) e. five or more (11)

5. Does your school have a written EE curriculum plan? N=114

- a. Yes 34 b. No 33 c. Not sure 47

6. EE should be considered a priority in our K-12 school system N=113; M=2.11

- a = strongly agree 44 b = agree 46 c = undecided 18 d = disagree 4 e = strongly disagree 1

7. Pre-service teachers should be required to take an environmental education content and methods class. N=114; M=1.87

- a = strongly agree 33 b = agree 53 c = undecided 18 d = disagree 9 e = strongly disagree 1

8. It is a good idea to mandate that school districts develop and implement an environmental curriculum plan. N=114; M=2.05

- a = strongly agree 30 b = agree 58 c = undecided 19 d = disagree 4 e = strongly disagree 3

9. It is important to take the time to integrate environmental concepts and issues that are related to my discipline into my teaching. N=114; M=1.82

- a = strongly agree 43 b = agree 53 c = undecided 15 d = disagree 2 e = strongly disagree 1

10. Do you teach about the environment? N=113

a. Yes 99 (88%) b. No 12 (10%) c. Not sure 2 (2%)

11. For each of the following statements, indicate how accurately it describes the way or ways in which you include environmental education in your teaching situation.

	Accurate	Somewhat Accurate	Not Accurate	Not sure
I blend environmental concepts into my existing lessons when the opportunity arises (also known as infusion) N=101	76	25	c	d
I intentionally design my lessons to incorporate environmental concepts (also known as integration) N=101	27	45	28	1
I insert separate activities about the environment into my curriculum N=98	26	40	31	1
I teach one or more units on the environment during the school year N=97	29	32	36	d
I teach a separate course about the environment N=98	8	11	78	1
I teach an integrated course, where concepts from many disciplines—including EE—are addressed simultaneously N=99	19	43	32	5
Other (please describe):	a	b	c	d

12. Please review all of the statements below and indicate to what extent each describes what motivates you to teach about the environment.

	To a large extent	To some extent	To a small extent	Not at all	Not sure
My commitment to the environment N=69	54	8	7		
My preservice teacher preparation experience N=99	3	19	24	48	5
Useful experiences from EE inservice courses/workshops N=99	18	23	20	36	2
It is mandated N=98	5	14	25	44	10
It is part of my curriculum N=99	16	32	24	25	2
It makes learning relevant to my students N=101	48	38	12	2	1
It makes learning fun for my students N=99	41	39	13	4	2
My responsibility to address the EE standards N=100	25	37	22	14	2
Other (please describe):					

13. Do you reference the Department of Public Instruction's Environmental Education Academic Standards during your teaching? N=100

a. Yes 21 b. No 71 c. Not sure 8

14. What percentage of your instructional time includes environmental concepts? N=100

- a. Less than 5% 32
- b. 5% to 14% 38
- c. 15% to 25% 16
- d. 25% to 49% 11
- e. 50% or more 3

15. Are you a member of the Wisconsin Association for Environmental Education (WAEE)? N=101

a. Yes 4 b. No 91 c. Not sure 6

Teachers survey respondents who received their license in 1985 or after from a Wisconsin institution

Name of Institution	Preservice EE	Was it effective?
Alverno College	Yes	Some extent
Cardinal Stritch University	Yes	Small extent
Cardinal Stritch University	No	
Carroll College	Yes	Some extent
Carthage College	No	Small extent
Concordia University	Yes	Some extent
Lakeland College	No	Small extent
UW Eau Claire	Yes	Some extent
UW Eau Claire	Yes	No comment
UW Eau Claire	Not sure	
UW Eau Claire	Yes	No comment
UW Eau Claire	Yes	Some extent
UW Green Bay	No	Large extent
UW Green Bay	No	Small extent
UW La Crosse	Yes	
UW Madison	Yes	Large extent
UW Madison	Yes	No comment
UW Madison	Yes	No comment
UW Madison	Yes	Small extent
UW Madison	Yes	No comment
UW Madison	Not sure	Some extent
UW Milwaukee	Yes	Some extent
UW Oshkosh	Yes	No comment
UW Platteville	Yes	Small extent
UW River Falls	No	Small extent
UW River Falls	No	Small extent
UW River Falls	No	Large extent
UW River Falls	No	
UW Stevens Point	No	
UW Stevens Point	Yes	Some extent
UW Stevens Point	Yes	Large extent
UW Stevens Point	Yes	Small extent
UW Stevens Point	Yes	Some extent
UW Stevens Point	Yes	Large extent
UW Stevens Point	Yes	Large extent
UW Superior	Yes	No comment
UW Whitewater	Yes	No comment

Teacher Comments from the Survey

It is essential that every young student becomes committed to learning about our environment and committed to their responsibility to improve our environment. I teach kindergarten, and EE should begin here or sooner. Students need to learn good environmental habits young, so bad habits do not have to be broken. I am passionate about teaching this subject to young minds. I find it frustrating when our district does not always practice what I try to teach! An example would be our school often uses Styrofoam trays at lunch and plastic silverware everyday! Our environmental three R's: reduce, reuse, and recycle are being broken each day in our building just at lunch time. Schools should practice what is being preached!

Many of your questions lead me to believe you have a predisposition towards the need for elementary schools (or middle and high schools) to teach EE. I also assume when you speak of teaching EE you are speaking of the need to teach more conservation and environmental awareness. (If your goals would be to encourage me to teach concepts such as "There is no such thing as global warming", and "The myth of water conservation" I would be equally offended.) With these things said I resent the premise that you feel the school classroom is the place to teach such politically charged notions. The public school classroom has enough trouble with meeting the required curriculum as it is. We do not need suggestions (mandates) to teach questionable and opinionated information where accuracy is often sacrificed for an emotional "We tried". (I still come across teachers teaching that the primary reason for saving the rainforest is to save our oxygen supply.) If you'd like to enhance the learning of our student perhaps you'd like to spend some time in the classroom coming up with ways to better teach things like reading, writing, math, science, and social studies.

We use the Social Studies standards that call on us to do a local environmental study.

There is not enough time in the day to cover everything that needs to be covered and every year more is added.

I felt obligated to incorporate lessons on the environment after taking a continuing studies class from Hamline University in St. Paul, MN titled "Environmental Footprints." Since then, I include my environmental lessons each semester with a senior-level Asian literature class while we are studying China. I ask my students to consider what their global responsibility is concerning the environment. Students consider Rachel Carson's concern about if everyone in China were to get an automobile that would be the end of us. Students learn about and calculate their ecological footprints. Students learn about the Detroit artist Tyree Guyton who has transformed his city (and other cities) with his "trash art" and then students create/produce/invent something (art, campaigns, city planning, recycle logs, etc.) that will teach others about the environment.

I teach 9th and 10th grade Biology and as part of the year's coursework I integrate environmental concepts as they relate to living organisms and how those organisms become adapted. Up until this year I have taught a course called Explorations in the Environment in which I spent the whole year teaching environmental concepts.

I teach first grade. Our science units of study throughout the year are rocks, plants, magnets and weather. At the end of the year we spend a month getting ready for a science fair titled, "Circles of the Earth." The circles we study are; air, water, sun, soil and plants. As a part of each circle we discuss how we can protect our resources and what we can do as first graders.

I feel students need to be aware of the concerns and issues regarding the environment right now. They will be in charge of the environment soon enough and there are changes that they

can make even now at their young age. It is quite simple to infuse environmental issues into a regular lesson or read aloud. I just finished my masters degree last year and I did my project on recycling in the classroom and school. Not all teachers were on board. We do what we can. If students can tell you find the environment important, there is a better chance they will too.

Unfortunately, district mandated curriculum and recent acquisitions in other areas leave little time for anything else. I try to include EE concepts into science/health curriculums when appropriate. We also spend a day (I know this is hardly enough) at CWES, thus, we prepare for and review after.

Our district has to make huge budget cuts next year. We will lose our Environmental Ed. program beginning next year. That is troubling. Especially because the cost is minimal, compared to the budget overall, and compared to its need for our future. (Maria from Waukesha)

I used to be affiliated with WAEE, and received their newsletter document from time to time as well. I no longer receive it, so maybe I'm not a member anymore. It has info. that was useful and it contained workshops around the state like Trees for Tomorrow, Project Wild, Project Wet, etc. and where and when they were being held. A very useful document.

Question 11 - I teach 4th grade, all subjects, in a small elementary school - just one section of 4th grade. I teach bits and pieces of the environment mainly in Science, but also in Social Studies. The topic also comes up in other areas like Reading and Math, and I address them when they come up. Plus, there are several separate occasions where I may use a "teachable moment" to bring in some EE concepts. Since I've taken just 2 courses related to forestry I have acquired many materials that enable me to teach about EE in better, more interesting ways.

I used to be a member of the WAEE - our district used to sign one teacher up from each building - but, as of this year, I've not gotten any mailings. Fellow teachers do not value EE over all the other demands regarding curriculum and taking tests.

There also doesn't seem to be a knowledge base about EE among teachers. I planted a school prairie with my class and many of the teachers thought it was a "dumb" idea.

There seems to be a general disinterest in EE.

Very few teachers get their students outdoors. Costs for field trips have soared, unfortunately the hiking and trips to different natural areas have pretty much ceased.

A sense of environmental stewardship is almost non-existent.

I remember a year fellow teachers got mad because they were asked to participate in a variety of Earth Week activities. I hope that was an exception among schools! Sad!

I incorporate and/or discuss environmental issues/ethics as they become appropriate for what we are doing in class at the time or when an issue becomes newsworthy. Water issues are taught as a separate unit but other ecological topics are integrated into the curriculum.

I have a Masters Degree in Environmental Education from UWSP which was partly funded by the National Science Foundation. When I was an elementary teacher, I had more flexibility with my curriculum, and could infuse EE more regularly. Now I mainly teach ancient civilizations in middle school, but I use as many opportunities as possible to compare their behaviors regarding the environment to ours today. I also started an environmental club here at school, which is currently run by different teachers due to other time commitments on my part. When

we visit the school forest, I take a leadership role regarding environmental instruction, particularly regarding personal decisions and actions. I have served on the school forest curriculum committee, and I regularly look for additional opportunities to share my expertise with others. I am appalled at the lack of knowledge and interest among my peers regarding personal actions and responsibilities effecting the environment. I firmly believe we need to require a much stronger emphasis on awareness and knowledge of EE in all areas of curriculum.

I don't have a particular unit that I do but I do mention environment things

EE included in science and social studies curriculum; P.S. We have an environmental habitat on our school grounds that is maintained. Classroom teachers make good use of it and teach environmental issues in each grade.

I feel the need to model environmental concerns - recycling, using poetry to appreciate the environment, etc. In English, our curriculum doesn't specifically call for environmental content. I feel that I teach about the environment in other ways.

APPENDIX F

REFLECTIONS OF AN ENVIRONMENTAL EDUCATOR

Introduction

The quality of the environment has concerned me throughout my life. I remember being fascinated with the nature that thrived in my backyard in my childhood home in Minneapolis. As the commercial airliners roared overhead, so low I wondered if I could see the faces of people looking out the windows, I would turn to look down at the ants creating a home in the newel post of our backdoor steps. Insects did not frighten or repulse me. I was fearless as I captured and released cicadas, butterflies, and grasshoppers. I created worlds out of the melting snow in the spring. Runoff became flowing rivers that would carry leaves and twigs to Minnehaha Creek. Having read *Paddle to the Sea*—the story of a child’s toy canoe traveling through the Great Lakes to reach the Atlantic—I knew the waters near my home would venture far. As a child, nature was ageless and limitless. There was wildlife in my backyard and even more exotic wildlife, such as tigers and zebras, visible to me through my television.

It was my television, however, that first informed me that nature was not limitless and was in fact being abused. The Keep America Beautiful commercial, with the American Indian paddling through increasing degradations of water quality as he neared the polluted city, struck me to my heart. I was indignant! How could we humans treat nature with such disrespect?

During my middle school years, when my family moved to Florida, I learned of more environmental tragedies, but also learned how the government was making laws to protect the environment from the heartless polluters. I know now that my teenage years coincided with the events leading up to and following the first Earth Day. Although I don’t remember celebrating Earth Day until 1990 while teaching in Maine, news of the Environmental Protection Agency, the Clean Air Act, and Love Canal still managed to seep into the classrooms of sheltered, suburban central Florida.

These infiltrations and other more direct lessons about threats to and protection of environmental quality greatly influenced my classroom teaching experiences. I started teaching while a Peace Corps Volunteer in Thailand. Despite my rudimentary control of the language, I was able to involve students in studies of grasshopper populations and to bring in local government officials to discuss regional environmental regulations and policies. Later, while teaching in New York City, my students met with a naturalist in Central Park who introduced them to edible plants growing in the middle of the city. I found a nearby vacant lot in lower Harlem and took students there on weekly fieldtrips. I still remember a student rushing to me in excitement, amazed at the milky white substance oozing from the dandelion root she unearthed. In Maine, as I’ve already mentioned, I involved my students in extensive Earth Day activities. We planted trees, studied the local environment, and learned how other communities were celebrating the Earth around the world. The textbook for the class was my resource, but not a chapter by chapter curriculum. At the beginning of the school year, some

students were perplexed when I had them read the final chapters of their Biology textbook first. This was the section where the global environment is finally mentioned. After pages describing the innards of the cell, the parts of a tree, and the nuances of the animal kingdom, these final chapters introduced students to Earth's ecosystems and the importance of ecological balance. It was not uncommon for other biology teachers to tell me the school year ran out before they got to these final chapters. These chapters and concepts were so important to me that I put them first and made them a theme throughout the year.

By attending workshops and teacher conferences related to environmental education, sponsored by programs such as Project Learning Tree and National Wildlife Federation, I received a number of resources and networked with other teachers to improve my efforts to teach about the environment. Despite these successful professional development experiences, I felt these "piecemeal" approaches to becoming a competent environmental educator weren't enough. I needed to learn more, to become more ecologically literate and skilled in natural resource management. I decided to leave teaching for a few years to get a graduate degree in environmental education.

Upon leaving teaching, I told myself I would return to the classroom, competent at integrating environmental concepts into science classes such as biology. Was there some part of me that knew I would never return to teaching in the public school system? Did I know that getting a second graduate degree would limit the likelihood of a school district hiring me? (I got my first in secondary science education while teaching in New York City.) Perhaps. Perhaps I knew that my interests lay in designing curriculum, more than teaching it. Whether I knew my fate or not, I did become a curriculum writer, and eventually a program director with the Wisconsin K-12 Energy Education Program (KEEP).

One might wonder what an environmentalist and former biology teacher is doing directing an energy education program. Have my efforts to become a competent environmental educator gone astray? Hardly. Knowledge of energy concepts, including energy resource management, is integral to environmental education. I started with KEEP writing support materials (activity guides) that are commonly used in the field of environmental education. These guides are designed to facilitate teachers' efforts to integrate environmental concepts into their subject areas. Through inservice workshops, teachers become introduced to the guide and practice using activities, exploring how they might use the information in their classroom setting. When I was teaching, I remember paging through my first copy of *Project Wild* (an activity guide for wildlife education) and realizing it was my dream to develop an activity guide for teachers like the one I was reading. Through KEEP, my dreams have become a reality. Now, I wonder, are these materials and workshops enough?

As the director of KEEP, it is my responsibility to increase and improve energy education in Wisconsin. The primary strategy used by my program to promote energy education is to develop educational support materials and to provide teachers with professional development opportunities that encourage them to incorporate these materials into their classroom lessons.

I would like to know if the efforts of my program have been successful. We could (and our funders have) administer a survey to assess teachers' use of our materials. Sampling a random population of teachers to quantify who is and is not using our activity guide provides some insights into the effectiveness of our dissemination strategies, but does not enlighten me on how our materials are being used in the classroom.

Upon re-reading the recommendations for further research I made based on the results of my 1992 statewide survey, I realize the benefits of qualitative investigations into the practices of exemplary environmental educators. This in-depth study has the potential to reveal the reality of classroom teaching practices in relation to environmental education in general and energy education in particular.

When I started taking classes towards my PhD back in 1998, I imagined conducting a study that would evaluate the effectiveness of my program. I considered one project after another in hopes that each would provide significant "evidence" of my program's success or shortcomings. As I progressed through my coursework and learned more about qualitative research, I appreciated the value of using a graduate project to investigate and explore the reality of a situation. In particular, I became curious about the motivations and practices of exemplary environmental educators in Wisconsin's K-12 classrooms. I am interested in this study because of my own teaching background and professional development and because I now see that by conducting this research I am following the recommendations I made as a result of my master's degree project at UW-Stevens Point.

Reflections from the Literature Review

This literature review began with a discussion of the debate surrounding the definition of environmental education. I realized that I was getting frustrated finding a definition for EE and was very pleased to find Hart's (2003) statement that "environmental education is a diverse and postmodern field that resists precise definition" (p. 27). My frustration was compounded because I thought I had a clear understanding of what EE was. The literature review helped me to understand the limitations of my understandings. These limitations became especially apparent when I was reading an article published in the *Canadian Journal of Environmental Education* titled "If environmental education is to make sense for teachers, we had better rethink how we define it" (Jickling 1997). I was surprised to see one of my published papers cited by the author, but my little ego rush was dashed when I realized he was using my research as an example of an unexamined acceptance of a goal for EE that was proposed in 1980. Given that my advisor was one of the authors of that goal, I could be forgiven for utilizing it in my research. I am in a new project now, with a different advisor, and because of my coursework at the University of Wisconsin – Madison, have come to appreciate Hart's statement about EE. I also concur with the argument Jickling was presenting in his article. His point was that defining EE is a process, not a product. He stressed the importance of involving teachers in the process of defining EE as it relates to their own practice rather than trying to impose an ordered definition of EE from "above."

When I left teaching to pursue a Master's degree in environmental education at UW–Stevens Point, I learned a prescribed order for environmental education and realized that I had been practicing “bad” environmental education during my teaching career. Although I was integrating environmental topics into my teaching whenever possible (see Chapter 1 reflections) and took my students on several field trips and involved them in environmental projects such as tree planting and community clean ups, I learned that I wasn't accurately addressing the goals and objectives of EE and that chances were my efforts were doomed for failure. The reason for this imminent failure was that although I was teaching them facts about the environment, I wasn't providing them with opportunities to examine their values and attitudes regarding the environment. In other words, I was using them to accomplish my aims to improve the environment—rather than their own. The environmental action projects were designed and initiated by me, the teacher, rather than generated by student interest. Oh, they enjoyed getting outside and digging in the dirt, but for them it was more of an escape from the classroom than a dedicated interest in greening the schoolyard. Despite my newly acquired appreciation of Jickling's and others' (e.g., Robottom 1987a, b) argument, I still agree with the logic of the EE objectives outlined by the Tbilisi Declaration and revised by Hungerford, Peyton, and Wilke (1980). I still feel my EE efforts, while not “bad,” could have been more effective if I had had a better understanding of the objectives and goals of EE. Unfortunately, I was not aware of these goals when I was a classroom teacher. Furthermore, knowing the atmosphere of the administrator-dominated school at which I taught in Maine, it is very unlikely I would have been given the opportunity to become involved in developing and implementing my own theory of EE.

Although I was not achieving the goals of EE, I do think I was effectively infusing EE concepts. I was “environmentalizing” my curriculum and I was using topics and issues in the environment to address the objectives of my Science classes. Although I never examined my own goals for “environmentalizing” my curriculum, I believe they included increasing environmental awareness among my students and motivating them to examine their own behavior toward the environment. My lessons, however, did not include opportunities for students to analyze issues and develop specific skills related to responsible environmental behavior—qualities often cited when describing an environmentally literate person.

This brings me to the point of my primary dilemma regarding the implementation of environmental education: Can the goals of environmental education (especially those prescribed by the Tbilisi Declaration and Hungerford, Peyton, and Wilke [1980]) be met through the infusion of EE? Focusing on EE research studies in the United States, there are a number of findings that purport teaching practices that change learner behaviors (promote environmentally responsible behavior), but these cases often involve students conducting extensive issue analysis and investigation projects rather than an infused learning experience.

A related concern to this dilemma is if the true goal of EE involves changing learner behavior, the truth is that most school systems are resistant to any type of change, let alone one that risks the development of environmental activists. True, Wisconsin has a mandate that requires the integration of EE, but was it passed knowing that it could not and would not be enforced?

Was it passed to appease the special interests being promoted by educators and community in the early 1980's?

This latter concern is of particular interest to me because most of my professional career has involved the development of EE support materials; that is, activity guides designed to help teachers integrate environmental topics related to water and energy into their curriculum. Has my professional practice perpetuated the status quo of marginalizing environmental education?

In truth, I (and my supervisor) have resisted evaluations of the Wisconsin K-12 Energy Education Program that involve comprehensive assessments of the energy literacy of students. To promote energy literacy among students would entail involving students in extensive lessons and projects related to energy. Moreover, these students would have partaken of these experiences throughout their learning career. They would have gained an appreciation of energy during their early years, learned where and how they get their energy in middle school, analyzed and investigated energy-related issues in their lives during high school, and graduated with the knowledge and skills they needed to make wise energy use decisions as adults. Throughout their K-12 energy education experience, they would of course be examining their attitudes and values related to energy, and learning how different people in their community and the world view energy. The KEEP conceptual framework prescribes this approach to energy education, and as program director, I dream of the statewide adoption of this framework; I designed the framework to mirror the goals for environmental education as prescribed by the Tbilisi Declaration and Hungerford, Peyton, and Wilke (1980). However, in the real world, I know that if teachers use KEEP activities, they most likely use only one or two throughout the school year. Because of KEEP they may be able to help their students better understand the process of energy transfer in food chains, but it is unlikely their students are involved in a district-wide energy education program. So, am I guilty of promoting the marginalization of energy education?

It is for this reason, among others, that I am interested in talking to and observing current environmental educators, especially those who have taken a KEEP course. I am hoping they can help me gain insight into the reality of teaching about the environment and better understand the goal of environmental education.

Finally, a further note about one of the primary aims of this project, which is to examine the reality and rhetoric of the infusion approach to EE implementation. I want to investigate how teachers deal with the dilemma of infusion discussed in this literature review. I stated earlier that I believe I successfully infused environmental topics into my curriculum when I was a classroom teacher. However, if you had asked me if I was infusing EE, I wouldn't have known what you were talking about; I learned the term infusion when I came to the University of Wisconsin–Stevens Point. In my mind, I was trying to teach about the environment, trying to relate it to whatever science concept I was covering at the time. I wonder if many of the teachers I interview will have the same opinion.

As I wrote this literature review, I was frustrated by the interchangeability of terms such as infusion, integration, implementation, and incorporation. I tried to find some quintessential and unique description of infusion, but failed. Sometimes I felt I was being redundant in my wording. Even the first sentence of the previous paragraph reveals this potential redundancy (“infusion approach to EE implementation”); perhaps I should have just said “the reality and rhetoric of EE infusion”? Therefore, although I am still curious about framing my study in the investigation of infusion, I suspect the topic of infusion might become overshadowed by my efforts to gain insight into teachers’ reality of teaching about the environment. However, it will be important to examine the “infusion confusion” issue; to understand what infusion really is (and isn’t) and to explore the concept to see if it can be sufficiently defined so that it is helpful to teachers. In the process, perhaps this insight will help me learn if the goals of EE—as defined by teachers in the field—can be met through infusion.

Reflections Resulting from the Research

A quote that two of the teachers I interviewed had written on their classroom chalkboard aptly depicts the reality of my role in this study (and in my life):

We don’t see things as they are; we see things as we are. Anais Nin.

So, who am I? I am the data filter for this study. I decided whom to interview and where, when, and how. I am the one who interpreted their comments and determined what—out of everything that I heard and saw—provided key insights into environmental education in Wisconsin. As with all sapient creatures, I am constantly taking information through my senses and trying to make sense of the world. What is important is that I explain to the readers of this study how I made sense of what I heard and saw. I need to assure them that my conclusions were derived through rational and logical means, rather than whims or hunches.

The data analysis sections above describe the steps I have taken to ensure that my insights and analysis are trustworthy. Nevertheless, as a human data filter, the larger patterns through which I see and understand the world around me are bound to influence both what I see.

Upon review of the literature, I find both the interpretivist and constructivist epistemology reflects my way of knowing and how I’ve approached this project. As I was writing up the procedure for my data analysis, I realized that it did indeed mirror many aspects of how I take in and process information. When I hear something new or interesting, I find myself wanting to hear what other people think and say about that information or perspective. In my mind, I replay and shuffle through the statements (the data), trying to categorize and organize it so that it make sense to me. It is a fruitful experience to come across information that contradicts or challenges what I am hearing, to see if and how it fits into my schema of understanding.

I work full time in the field of environmental education; in particular, I direct an energy education program for teachers. I am in this field because I believe in the goal of environmental education and want to play an active role in promoting environmental literacy.

The field of EE in itself is many ways an abstract concept, so it makes sense that its reality is based on the perceptions of what people do and think. I say it is abstract because while it can exist as a subject area, more often it is transmuted through the subject matter of other disciplines.

Through our observations and interpretations, we can learn to explain and even predict why and how things happen on Earth. At one time I believed that these explanations and prediction were resolute, that we knew the truth. However, now I think that although a true reality exists, our understanding of it will always be limited.

Further evidence of my perspectives on the importance of the environment is revealed by the responses I would provide if I were asked to complete the EE survey I developed:

- EE should be considered a priority in our K-12 school system. Response: Strongly agree.
- Pre-service teachers should be required to take an environmental education content and methods class. Response: Strongly agree.
- It is a good idea to mandate that school districts develop and implement an environmental curriculum plan. Response: Undecided.

My love of and concern for the environment dictates that I think education about it should be a priority in our schools. I also believe teachers entering the field should be exposed to how they can incorporate environmental topics into their teaching. Regarding the mandate, however, I am less sure about my opinions. While I believe EE is a priority, I am not sure a mandate, especially an unfunded mandate, is the way to go. I have only heard negative reactions to the mandate when I hear any mention of it at all (e.g., I think many people do not even know it exists). In the ideal world, teachers will teach about the environment because they think it is important and believe it is their responsibility to promote environmental literacy. Furthermore, school districts should recognize that environmental literacy is an important quality of citizenship and encourage and support EE implementation in their K-12 curriculum. I support the curriculum planning approach put forth by Dave Engleson and Dennis Yockers in *A Guide to Curriculum Planning for EE in Wisconsin*. It would be wonderful if teacher representatives from various disciplines would be provided with staff development time to come together and share their curriculum and identify when, where, and how environmental concepts are being addressed in their lessons. If I didn't have these beliefs, I wouldn't have chosen the career path that I have. I wouldn't be the director of a statewide K-12 energy education program.

I share these beliefs mainly to admit my bias as I conducted, analyzed, and am now presenting my research investigations. Since my study only involved participants who practice and support EE implementation, I avoided the risk of filtering or discounting anti-environmental education statements that I might have heard—since I didn't hear any! I do perceive that the popularity of EE has waned over the past 15 years. Therefore, in addition to trying to learn how EE is currently implemented by my “expert insiders,” I also asked for advice on how its status and acceptance can be improved. This wasn't part of my original proposal but one I found myself asking the educators nonetheless.

I had an ulterior motive for this study. Like a physician, I prodded and poked into examples of environmental education, trying to assess how it was doing and what was going on (and wasn't going on). And like a physician, I am inclined to make a prognosis and prescribe a regimen of steps that can be taken to improve the health of my patient, in this case the EE in Wisconsin. Yet, knowing that I was only looking at examples—and what I hoped were robust samples—consequently, my analysis were limited. Nevertheless, I did utilize the insights I gained from these “samples” as they had inside knowledge about the status of EE in their schools and districts. Using their information and my interpretive skills, I hope to provide conclusions and recommendations that are meaningful and useful to the field of EE. Subsequently, beyond merely providing descriptive results of my findings, I also applied inductive analysis techniques to try to explain the findings and to explore insights into practice. Through this approach, I hope the results of my study can be generalized to meet the needs of the field of environmental education in Wisconsin, as well as other regions of the country.

Reflections on Findings

I'm sitting at a meeting about the progress of renewable energy installments throughout the state and my mind wanders. Suddenly I'm pondering my research project and data I've been mulling over in frustration for weeks suddenly clicks into place; it becomes clear how I should organize and present it. My renewable energy colleagues must think I am intrigued by the topic at hand because I am furiously jotting down notes and making charts and diagrams. But it isn't renewable energy that has my attention; it's a sudden comprehension of the findings of my research project.

I have stacked around me a variety of hand outs from different meetings I've attended recently, along with a dinner placemat and a piece of cardboard backing. I keep them because they have notes scribbled over them. Yes, there are sometimes meeting notes, but there are also observations about Jane and Kathy and Tom and Brad, teachers who shared their insights about how they implement EE into their classrooms. There are outlines and flowcharts that diagram the various comments made by the professional environmental educators I interviewed. And I have scrawled description after description of infusion and what it looks like in relation to what I've been told and what I saw. If I had thought to bring my field manual along with me to all my meetings and social occasions, these scattered documents might be in one bound notebook (actually I have two because I already filled one). But I was a full-time energy education director who needed to attend to the tasks of her day, yet was being invaded by thoughts about her research project.

The quantitative portion of this study was not immune from these reflections and analysis, although the numeric data did make analysis more cut and dry. Yet, the low response rate was a contentious issue that dominated many hours of my conscious and subconscious thought. The main question being can I be justified in contributing any of the low response rate to my perception that EE in Wisconsin is a low priority? And it wasn't just my perception, participants in the study also commented on challenges to effective environmental education.

Yet, I had professors telling me that there was more EE being taught in the state than 20 years ago.

Much of my attention, when I could spare it (and even when I couldn't!) focused on dealing with dilemmas of confirming and disconfirming evidence. These puzzles would dominate my mind and I would share my queries with friends and colleagues, some who were in the field of EE and some who were not. Talking out loud to them helped me reason out my observations and to deliberate on the data that was being presented to me.

Sometimes when I was purposefully focused on the data could I make sense out of what I was finding. Often though, as I described at the beginning, the understanding would dawn on me—sneak up on me really—when I least expected it.

Another tactic I used when I thought I was going crazy trying to capture all the concepts and ideas swimming around in my head, was to simply return to the guiding questions I developed for the interview (which were in turn a reflection of my research questions). Referring to these questions would ground me in the data, helping me pull together the varied insights from all the participants.

Once I had a comprehensive view of the participants' insights, I would begin to see patterns. One of my strengths as a program developer is recognizing patterns; I use this skill to create an organizational structure that guides decisions and actions. Once I create the framework, things tend to fall into place. The same thing happened with this project.

Part of creating patterns is labeling parts of the pattern. Then the various components are identified based on how they fit or do not fit the labeled aspect of the pattern. I have to be careful though. Sometimes I become so enamored with the pattern I've detected and created, that I catch myself forcing things to fit the pattern. These contrived arrangements inevitably fail, so I have learned the benefits of flexibility—allowing patterns to evolve as new components are added or existing ones evolve.

This framework shifting happened a few times with this project. A conception of how the data fits together would reveal itself to me and I would create an organizational chart of how and why the teachers in the study teach about the environment for example. After grouping similar practices and motivations together, I could label and identify them. This worked for the most part. Occasionally, after revisiting the data, I would see that someone I had categorized a certain way, didn't neatly fall into that area. I would put him or her into a different group and that wouldn't fit either! Subsequently, I knew I needed to either reexamine my category or create a new category.

Even after I make this adjustment, the thinking continues. I am an analyzer by nature, and this project has enabled me. I ponder and I ponder until sometimes I think my head will explode. Although I have mentioned several times in this report of the challenge of working full time,

there were benefits to having my mind forced away from my project. It gave my contemplations a break and allowed some of the dust to settle.

In my effort to understand the infusion of EE, this project has infused my being. It feels almost like a living organism possessing my body. I wonder if it will continue to feed off my internal energies after I have completed my degree! I have often commented to friends and family, that after having this graduate program be a part of my life for nearly seven years, I wonder if I will know myself when I am done? Who will I be and what am I going to do with myself?

One thing I know is that the project findings will continue to affect my life after I receive my degree. I took on this project because I am concerned about the fate of EE in Wisconsin as well as other parts of the world. I am fascinated with the postmodern, feminist, and other veins of EE research taking place—mainly outside of the United States. I have seen little evidence that my colleagues wish to venture into those realms of thinking and knowing. This project has whetted my appetite for exploring further. I wish to learn more not only out of curiosity, but because I believe new ways of looking at the world are needed to address the challenges EE is facing.

Reflections on Project Implications and Recommendations

As a professional environmental educator in Wisconsin, how might I receive the implications and recommendations presented in this study? In other words, how has this study affected my professional development?

My current plans are to continue to direct the Wisconsin K-12 Energy Education Program. Yet, I will have a PhD and be working within a University setting. I have already spoken with my supervisor about designing and teaching courses to undergraduates and am in line to take over for a professor on sabbatical next fall (2007).

An immediate change in my professional role at UWSP is that I will begin advising students in the master's degree program. I have a student lined up to begin working on an assistantship with KEEP in the fall. I have proposed a graduate project for her which is an outcome of this current study. I have suggested she collaborate with teachers who have taken KEEP courses to assess the effectiveness of KEEP activities in the classroom. I plan to work with her and the KEEP instructors to provide an action research option for the KEEP course assignment. The current assignment has teachers design a unit plan, but we have no way of knowing if teachers used the unit or how it went. It would be useful for us to know how teachers might implement (insert, infuse, or integrate) a single KEEP activity and investigate how it worked.

A larger change I'd like to effect relates to the UWSP EE master's program for teachers. As I mentioned in Chapter 7, teachers are currently required to develop, implement, and evaluate a

research project outside the classroom. The intention is to encourage them to become leaders in EE. However, we don't know what they are doing in the classroom!

A couple of years ago, I approached the EE professionals in charge of the master's program about incorporating a self-study component into the course of study. While they were receptive to my ideas, in reality they resisted adjusting the program. They did allow me to do a presentation to teachers about action research and several teachers thought it was a good idea. However, the professor in whose class I was presenting said they could do action research, but they would still have to complete the traditional research project as well. Teachers who initially expressed interest in examining their practice, upon realizing they'd have to essentially do two research projects, politely began to ignore my emails and phone calls.

In the near future, I'd like to take a more active role in the UW-Stevens Point's Extended Master's Program in Environmental Education for teachers. Although the leadership component of the program is admirable, I believe more attention is needed to how teachers include EE in the classroom. Teachers in the program are key insiders to providing this information. They can also be encouraged to take an active advisory role in increasing EE implementation among other teachers. Some of the teachers have conducted inservice projects for their graduate work and these projects can be revisited to assess their effectiveness.

When I began pursuing my graduate degree in Curriculum and Instruction back in 1999, my interest was in teacher professional development. Seven years later, this interest persists. As a result of my graduate courses and this research project, I have learned I need to investigate the reality of EE integration further. I look forward to working with teachers to research how these investigations might apply to real world teaching situations. Through this collaboration, I hope to improve my own skills in professional development while contributing to improving the quality of the environment through effective K-12 education.