To the Graduate Council:

I am submitting herewith a dissertation written by Theodore Scott May entitled "Elements of Success in Environmental Education, Through Practitioner Eyes." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Education.

Russell R. French, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Associate Vice Chancellor and
Dean of The Graduate School

Elements of Success in Environmental Education, Through Practitioner Eyes

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Theodore Scott May
August, 1997

Acknowledgments

I greatly appreciate the steady I received support from my faculty committee throughout the research process. Dr. Russell French, committee chair, was especially patient and supportive with his many challenging and guiding questions, and took incredible time out during an office move to provide careful review comments near the end. Dr. Robert Jones assisted with his interest and insight, and insisted that my dissertation be significant both to myself and the environmental education field (EE) as a whole. Dr. Phyllis Huff and Dr. Lester Knight provided their perspective and support from start to finish.

I want to thank my previous colleagues-in-research who inspired this doctoral adventure with their encouragement and belief in me: Drs. Richard Wilke and Randy Champeau from the University of Wisconsin-Stevens Point; Drs. Harold Hungerford, Trudi Volk and Bill Bluhm from Southern Illinois University-Carbondale; and Dr. Tom Marcinkowski from the Florida Institute of Technology in Melbourne.

I also appreciate the assistance from my informal National EE Advisory Panel members, who helped especially at the earlier stages of the research. Dr. Bora Simmons, Northern Illinois University, made time even as she took on additional responsibilities as NAAEE president. Each of them - Dr. Martha Monroe from Washington, D.C., Dr. Tina Allen from Arizona, Dr. Darlene Stoner from California, Dr. Dennis Yockers from Wisconsin and Dr. Harold Hungerford again from Illinois - took time from their busy schedules to assist as out-of-state mentors to a graduate student seeking to contribute to the EE teacher education field. Numerous other EE professionals provided names of environmental educators for this research, and helped out in other ways.

I had no inkling of the incredible learning experience this research would prove to be. I am fortunate to have embarked on this interview-based venture, and am indebted to Dr. Kathleen deMarrais - now in Arizona - for her inspiration. I also feel much appreciation for the time investment of all the interviewed teachers. Not only were they willing to make time to respond to a series of questions, but also assisted with later research phases. While their names and locations will remain anonymous in this report, their efforts are certainly warmly regarded.

My overall experience at the University of Tennessee has been notably colored by the friendships developed. Weekly meetings over the past two years with a *Wholistic Education* group have sharpened my own understandings of education, and brought some sanity to the sometimes crazy doctoral student life. A warm thanks to Amadou Sall, from Mauritania, who was my sole fellow-environmental education graduate student at the start. He fostered in me a deeper understanding of multiculturalism, and opened my eyes and heart to continued growth in this area. His friendship continues to be invaluable. Kudos also to Bob Gaddis, who is helping me learn how to listen better.

Finally, I am deeply grateful for the support, patience and love of my family. Words fail to express the depth of appreciation for a loving home throughout this demanding three-year doctoral program. In addition maintaining a home environment, my wife, Cyndi, also provided insightful proofreading of key early drafts as well as this final product. And I dedicate this study to my daughter, Sarah, as bringing her into this world was an expression of faith in the future. Age four at the time I now complete this dissertation, she kept me smiling and laughing - "forcing" ☺ me to play each day, and thus keeping me sane (or nearly so) through it all. I now look at every teacher and potential teacher as if they were to be Sarah's teacher. And I pray that from this stage in my life onward, I might inspire and guide others toward excellence as teachers - and as responsible citizens of their family, their community, and our one Earth.

Abstract

This two-phase study was designed to provide a clear vision of the major elements which support successful teaching in environmental education. The research yielded a valid and reliable framework consisting of forty-two elements which work inter-dynamically to foster student growth in environment-related knowledge, attitudes, skills and responsible behaviors.

Prior to the field research, the researcher conducted an extensive literature review which served as a reference point for subsequent research focused on the experiences and perceptions of practicing teachers. The review generated a three-part theoretical construct - based upon social cognitive theory - and a literature-derived framework of elements.

In the first research phase, the researcher conducted interviews with eighteen accomplished environmental educators from eleven of the United States. Their narratives, coupled with input from the extensive literature review, enabled the construction of the three-part framework composed of the thirteen teaching conditions, fourteen teacher competencies and fifteen teaching practices which support environmental education efficacy.

In the second research phase, the framework was sent in survey form to 500 teachers across the country who had environmental education experience. Over 65 percent of the surveys were returned, with the respondents expressing strong support for the interview-

derived framework. Nearly all items on the survey - including the two overall framework evaluations and the three framework categories - were judged to have high or very high significance in fostering student growth of environment-related knowledge, attitudes, skills and responsible behaviors. The full framework had a very high Cronbach's alpha measure of internal consistency (α=.94), as did its three component categories. All identified demographic sub-groups showed consistent support for the framework and its categories. And extensive survey comments brought pointed evidence of support for the framework and its utility to teacher practitioners.

The overall research identifies forty-two elements which teachers believe play a significant role in environmental education efficacy. In addition to strong framework validation by this audience, the survey yielded extensive rating and comment data which enabled framework "fine-tuning," and offer opportunities for additional research. There is strong and consistent confirmation that educators across the country believe the framework provides a valid and useful representation of the major elements which contribute to successful environmental education. Thus the three-part framework provides a suitable structure upon which to build comprehensive environmental educator standards.

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Chapter 1
Introductory Sections

Introduction (pp. 2-5) - environmental education (EE), and specifically teacher education in EE, is an essential ingredient in efforts to address local-to-global declines in environmental quality.

Problem (pp. 5-6) - the absence of a wholistic teacher perspective on the components of effective EE.

Assumptions (pp. 10-11) - EE is desirable, responses are honest, and narrative data is valid.

Purpose (pp. 6-7) - to create a wholistic picture of elements of success in EE.

Delimitations (pp. 11-12) - research participants are from traditional schools, and not randomly selected.

Rationale (pp. 7-10):

* global environmental quality is declining;
* EE can play a key role in restoring environ. quality;
* the relevance & quality of public education as a whole is contested;
* university teacher education is seen as disconnected from school-based realities.

Research Question (p. 14-15)

Where third to eighth grade teachers conduct environmental education, what are the major teacher-identified factors which foster student growth in environment-related knowledge, attitudes, skills and/or responsible behaviors?

Definition of Terms (pp. 12-14) - describes common and special EE terms, terms related to the research design, and elements which contribute to effective teaching.

Organization of Study (pp. 15-16)

* *Chapter 1* presents the setting, goal and rationale for the research project.
* *Chapter 2* provides a review of the literature which relates to teacher efficacy, then more explicitly successful teaching with environmental education.
* *Chapter 3* outlines the two-phased research project methodology.
* *Chapter 4* presents research phase one - the interview data and analysis which were used to generate the survey used in the second research phase.
* *Chapter 5* displays research phase two - the survey results and analysis.
* *Chapter 6* summarizes the research, with conclusions, implications and recommendations.

Introduction

The doubling of global human population since mid-century, coupled with escalating per-capita rates of resource consumption, has brought accelerated impacts upon both social and bio-physical **environments***. The expressed intention of **environmental educators** around the world is to restrain continued exacerbation of the (bio-physical/social/political/economic) environmental problems (Kastenholz and Erdmann, 1994).

Developed countries play a major role in changing the rate of global impact. The United States has but 4.7 percent of the world's human population, yet consumes thirty percent of its resources (ZPG, 1995). In a Roper Starch Worldwide 1994 interview survey of youth in the United States, a "nationally representative cross-section of 982 youth in 42 schools" (Rockland, 1995, p. 12) ranked environmental problems second only to AIDS among ten critical issues affecting youth that they would personally like to make better. From this and other surveys, it is apparent that youth, who inherit the earth from preceding generations, share the dreams of forward-looking environmental educators.

The goal of **environmental education** (EE) is to provide students with the tools and the inspiration to capacitate this change "and develop social and individual well-being in harmony with the biophysical and man-made environment" (UNESCO, 1976, p. 2); to promote "responsible individual and societal environmental behavior" (Disinger, 1993, p. 35). EE does not stand in isolation, but in the context of the overall educational system. While there are ongoing debates as to the relative importance of education as transmissive or transformative, the consequences associated with increasing human numbers suggest a future that demands changes in the ways humans live.

* All terms in the *Definition of Terms* (pp. 12-14) section are bolded when first used.

"Environmental education can provide a convenient and challenging mechanism for overcoming the shortcomings of monodisciplinary education, by using the interdisciplinary entity that is the environment as a focus for teaching and learning" (Disinger, 1993, p. 41).

There is growing recognition of the importance of *meaning making* in schools (Cohen, McLaughlin and Talbert, 1993; Knapp, Shields and Turnbull, 1995) and of the essential role of interdisciplinary instruction toward this end (AAAS, 1993). Students gain greater meaning from their schooling when the educational process has increased relevance and applicability. Brandt (1991) defends **interdisciplinary education** with three points: (1) knowledge has outgrown traditional disciplinary boundaries and may now "fall between the cracks;" (2) integrated education can bring relevance to schools where students feel unconnected; and (3) the world is transdisciplinary, so integrated education makes common sense. "The kind of discipline-centric education that enabled us to industrialize the Earth will not necessarily help us heal the damage caused by 150 years of industrialization" (Orr, 1996, p. 7).

Research suggests "a natural alliance between those making a special effort to teach for understanding and those making a special effort toward integrative education" (Perkins, 1991, p. 7). Curriculum integration "has two crucial aspects ... wholeness and unity..."; it "occurs when young people confront personally meaningful questions and engage in experiences related to those questions" (Beane, 1991, p. 9); and "...nothing of significance is likely to happen if curriculum forms ignore issues that pervade the lives of students and the larger society" (Beane, 1990, p. *xii*). In a 1994 national survey of 237,777 college freshmen conducted by the Higher Education Research Institute at the University of California at Los Angeles, the "biggest single issue was the environment" (Shea, 1995, p. A29), with 84 per cent supporting greater governmental efforts to protect it. Environmental education (EE) is meaningful, interdisciplinary, and is seen as valuable throughout the world by students (Bardwell and Manning, 1993). **Effective EE programs** can

develop the knowledge and skills young citizens need to constructively address the many local to global environmental challenges.

To provide an estimate of the extent to which the goal of an environmentally responsible citizenry is being attained, educational researchers strive to measure student **environmental literacy** - which includes the cognitive, affective and behavioral dimensions that contribute to responsible environmental citizenry. Recent research by the Environmental Literacy Assessment Consortium (ELAC, 1995), while not nationally representative, suggests educators are far from attaining their targeted level of environmental literacy. The findings to date reaffirm perceptions of the environmental education community: (1) students score quite low on measures of environmental literacy; (2) teachers strongly support EE in K-12 schools, feel a responsibility to teach environmental literacy to students, but feel inadequately prepared to do so; and (3) teacher education institutions "are not systematically preparing future teachers to effectively teach about the environment" (ELAC, 1995, p. 87).

For education to be transformative and contribute to the development of an environmentally literate citizenry, teachers play a crucial role. "If teachers do not have the knowledge, skills, or commitment to environmentalize their curriculum, it is unlikely that environmentally literate students will be produced by our K-12 schools" (Wilke, 1985, p. 1).

Recently, there has been significant national effort to develop educational *standards*, which articulate "voluntary benchmarks" (Geography Education Standards Project, 1994) as targets for educational change (Ravitch, 1993). Clear standards can direct educational efforts and raise associated outcomes. Carefully crafted and communicated standards, adapted at the local level (Marzano and Kendall, 1995) and utilized in the classroom, can be of great service to all educators pursuing a comprehensive educational program (Simmons, 1995a).

While these efforts initially targeted students in grades K-12, the benefits of standards are also

available to students of teaching. Teaching standards have been developed for mathematics (NCTM, 1991), science (National Research Council, 1996) and other disciplines. This study is designed to identify a framework of elements which sustain effective teaching in the interdisciplinary field of environmental education. In addition to its immediate utility to teachers as a succinct framework, this research also provides a foundation for the careful construction of comprehensive environmental educator standards.

The Problem

"A need for education about the environment has been verbalized over the past century-plus, increasing dramatically in volume and intensity since the publication of Rachel Carson's *Silent Spring* in 1962" (Disinger, 1993, p. 24). The 1990 *National Environmental Education Act* established governmental support for EE at the federal level (National Environmental Education Act of 1990). The North American Association for Environmental Education (NAAEE) has provided leadership to the EE professional community on a growing scale - initially in the United States, now spread to Canada and Mexico - with membership and participation from around the globe.

In the fall of 1995, the NAAEE initiated concerted efforts to develop environmental education content and materials **standards** (re-named *guidelines for excellence*) - intending to finish the process by 1997 (Simmons, 1995c). At the time of this writing, the EE materials *guidelines* are published (NAAEE, 1996), and the student guidelines for excellence are in the latter stages of development (NAAEE, 1997).

Simmons anticipated a 1997 start-up date for the third set of EE standards - *environmental educator standards*. She compiled a summary framework of desired environmental educator competencies from diverse research efforts (Simmons, 1995b; see also Wilke, et al., 1994).

However, the Holmes Group, a consortium of educational institutions and agencies, criticizes much teacher education research as disconnected from the "real world" of teachers (Holmes Group, 1986; 1995). Some vocal critics of what could be called "mainstream" EE in the United States have presented similar concerns of EE and associated teacher preparation programs (e.g., Corcoran and Sievers, 1994; Gigliotti, 1992; Hart, 1990, Leeming, et al., 1993, Robottom, 1987, 1990).

The problem addressed in this study is to identify the factors - identified by environmental educators - that contribute to effective EE school programs. Research which combines the insights of well-designed research with the practical day-to-day experiences of teachers can yield a more wholistic and meaningful picture of effective EE, assisting both teachers and teacher educators.

The Purpose

This research touches an issue of global concern: the quality of life on Earth. While trends over the past several decades have pointed toward degrading environmental and economic well-being, there are numerous examples of transformational consequences of concerned citizens in action (some examples are found in Bardwell, Monroe and Tudor, 1994; Mann, McCrea and Medina, 1988; Ramsey, 1993; Renew America, 1995). Successful actions have been taken by individuals or groups of citizens who had the awareness and knowledge of a problem, the desire and willingness to try to make a difference, and the skills they needed to see the change through. The expressed goal of environmental education is to nurture these capacities-for-action.

The purpose of this research is to identify the school-related factors - **elements of success** - which contribute to student growth in environment-related knowledge, attitudes, skills and responsible citizen environmental behaviors, and to create a synthesized framework of these elements, derived from the experiences of successful teachers. The framework will concisely display:

* the *conditions* which facilitate desired EE outcomes;

* the teacher *competencies* that are necessary for efficacy in EE; and

* the contextual *practices* that work toward the attainment of desired EE outcomes.

Rationale

Six major factors encouraged this research project. The factors as presented here range from the general importance of EE in the schools to the more explicit research rationale.

First, as the global human population nears six billion, and resource use per capita continues to expand, the nature and influence of the human factor in environmental equations increases daily (Gore, 1992; Orr, 1992). There is wide-spread agreement that global life-support system quality is deteriorating (Brown, et al., 1995). Some effort to arrest these declines and restore environmental quality is assuredly needed.

Second, one plausible means of working toward environmental restoration is through education. There is at least some global agreement that sustained wide-spread high-quality environmental education (EE) can engender a notable change in human activities, thus reducing negative impacts (UNESCO-UNEP, 1976, 1995 and 1996; Wilke, 1993). The far-reaching "total environment" effects of comprehensive EE school programs are not fully appreciated. EE content and pedagogy include "problem solving skills, valuing activities, and information about environmental issues..." which applies to such "...topics such as homelessness, gang warfare, or international development" (Disinger and Monroe, 1993, p. 10, see also Stoner, 1990), in addition to the more well-known environmental issues.

Third, public education as a whole has been severely criticized as of late for having lax standards attained by students completing their K-12 schooling (Floden, Goertz and O'Day, 1995; Glines and

Long, 1992; Smith, F., 1995). The relevance of current educational content is challenged in the K-12 public schools (Knapp, Shields and Turnbull, 1995; Shulman, 1986), most prominently for the disjunct and isolated nature of discipline-based education (Anderson, 1995; Brooks & Brooks, 1993; Grady, 1994; Hurd, 1991; Janssen-O'Leary, 1994; Mayer and Armstrong, 1990; Salomon and Perkins, 1989). In contrast, EE is a cross-disciplinary issue-oriented approach to education that centers on issues of importance to the quality of students' lives - and the lives of their children (Engleson & Disinger, 1990; Peyton, 1984; Wilke, 1993).

Fourth, the university programs that prepare the nation's public school teachers have been heavily criticized as disconnected from the realities of public school environments (Holmes Group, 1995). The Holmes Group suggests substantial benefits from an increased dialogue between the university and the public schools. Comparable concerns are expressed by critics of much EE research, demanding a greater connection with the practitioners (Hart, 1990; Robottom, 1987, 1990). School curricula are often designed "by determining what students... should know, then worked backwards..." (Carroll, et al., 1996, p. 254). Similarly, a clear vision of what teachers need can inform teacher education programs.

Fifth, efforts to enhance the quality of U.S. schools have been ongoing since their inception several centuries ago. John Dewey and other progressive educators initiated substantial **re-thinking** of schooling in the early twentieth century, but were less successful in bringing substantive **change** in educational practices. The 1957 launching of the Soviet Sputnik spurred a strong U.S. "race to space" response which brought notable advancements to science education. In the 1970s, schools were to be held "accountable" for expected outcomes, hoping that accountability measures would be adequate to upgrade school quality. In 1983, *A Nation at Risk* was published, trying to convey an urgency for education that would spark extended change. By the late 1980s *America 2000* was born, which became *Goals 2000* under the Clinton administration. The foundation for the changes are

national standards which describe what students should know and be able to do (Eisner, 1995).

Many kinds of standards have been suggested: curriculum content, performance, opportunity to learn, teaching outcomes and methodologies, certification of teachers and more (Lewis, 1995). Mathematics content standards released in 1989 emphasized critical thinking and application (NCTM, 1989), and quickly became the norm for other standards-developing efforts.

While student standards have received much visibility and debate, it has become more and more apparent that the school systems must be adequately prepared to help students achieve the desired abilities. Teacher standards have typically followed student standards by several years (e.g., NCTM, 1991). The need for capable teachers in EE has long been recognized (e.g., Wilke, 1985). As part of the UNESCO-UNEP International Environmental Education Programme, several EE professionals compiled a list of *competencies required of an effective environmental educator* as part of a larger publication on strategies for training teachers in EE (Wilke, Hungerford, Lane and Peyton, 1994).

Sixth, in 1995, Dr. Deborah Simmons amassed twenty years of EE research, state level EE certification or endorsement requirements, and guidelines proposed as part of other standards development projects. From this extensive literature review, she presented a tentative synthesis "toward a framework for environmental educator performance standards" (Simmons, 1995, p. 88). The research drew together a breadth and depth of perspectives on elements that contribute to effective environmental education. The compilation made clear the lack of consensus in the EE community as to the specific desired capacities of K-12 teachers: "Looking at the various guidelines, no particular structure or model for the development of environmental educator performance standards is readily evident" (p. 88).

This study seeks to provide new data valuable to consensus-building. It identifies the *elements of success in EE*, based upon the experiences of practicing teachers. The elements are framed in three interactive categories which describe the teaching conditions, competencies and practices which

foster student growth in environment-related knowledge, attitudes, skills and responsible environmental behaviors.

In essence, the research provides a context-based framework which may be of service to EE teacher education and assessment. Further, the study is completed at a time when the results and recommendations can support the environmental educator standards development process.

Assumptions

The following assumptions are researcher-held convictions that may be contestable. They are presented with supportive rationale.

1) *Environmental education is desirable.* This statement, while still contested by some people (e.g., Bailey, 1995), is strongly defended in the previous sections of this document. The achievement of an environmentally literate citizenry is also considered desirable.
2) *Interviewees and survey respondents were honest.* The initial framework was constructed from the narratives of 18 teacher interviews. The second phase of the research involved a survey of 300 teachers across the country. Neither the interviewees nor the survey respondents had any reason to provide dishonest responses, so the narratives and survey responses are assumed to be trustworthy. The validity of narratives are based upon the accurate recollection of the interviewed teachers, their understanding of the questions asked, and their willingness to cooperate with the interviewer (Wiegand, 1996).
3) *Teacher narratives provide valid evidence of elements in action.* Experiential evidence, carefully supported through the narrative data, documents the existence of the teaching conditions, and the competencies and practices of the teacher (Polkinghorne, 1988).
4) *Practitioner stories can represent voices and perspectives beyond their individual experiences.*

Interview narratives describe "the product of the whole complex social situation in which it occurred" (Casey, 1993, p. 26). The contextual basis for the stories suggests their relevance beyond the small number of participants (Eisner, 1991).

5) *Educational elements can be categorized.* The interviews provided extensive narrative data, which were "reduced" to discreet elements and categorized using Albert Bandura's social cognitive theory (1986) for framing. The researcher made every effort to retain the contextual flavor of the practitioners' experiences, though data reduction undoubtedly resulted in some loss of richness.

6) *Alternative integrated methodologies add integrity to the research as a whole.* The research design included both qualitative (interview) and quantitative (survey) components. "Where studies using different methods have similar results, one can be more certain that the results are not influenced by the methodology" (Marcinkowski, 1993, p. 65; also Corney, 1996).

Delimitations

1) *The target population for this research was practicing U.S. teachers in traditional schools, grades three through eight, who conduct EE.* Research participants were a purposive, diverse sample of teachers engaging in EE. Elements which contribute to successful teaching may vary across grade levels, disciplines, and various school and broader-cultural conditions such as community size, ethnicity, geographic region and so forth. While the these different populations were involved in the study, the focus of the report is on the commonalities which apply across sub-populations.

2) *Direct, long-term impacts of teachers on their students were not assessed.* The teachers who participated in the interview research were recommended by others for their exceptional educational history. Survey respondent names were obtained from peers or EE professionals. In

neither case were student outcomes linked with participating teachers; thus definitive confirmation of teacher efficacy was not ascertained. Henry Adams once noted: "a teacher affects eternity, he can never tell where his influence starts" (Jackson, 1986, p. 53). Yet, it is also clear - as Jackson surmised - that "near and far, the limits of a teacher's influence remain forever obscure" (p. 74).

3) *The research was designed to identify the* ***major*** *elements which foster growth in environment-related educational outcomes, defined in general terms of ability "to alter environmentally relevant knowledge, attitudes or behaviors"* (Leeming, et al., 1993, p. 9). General descriptors such as these had been used recurrently over the previous two decades of EE research. This research presents an integrated picture of **the major elements** for *opportunity to learn* - or in this case, *opportunity to teach* - standards, side-by-side with standards for teacher *competencies* and *practices* pertaining to environmental education.

Definition of Terms

Elements of success - Factors - including environmental conditions, teacher competencies and teacher practices - which contribute to successful EE programs (see below).

Environment - Everything which surrounds and influences organisms - including people - during their life spans (ELAC, 1995, p. VI-16).

Environmental education (EE) - The process of helping students learn about both natural and built environments, and develop skills and attitudes so that they will engage in inquiry, problem-solving, decision-making and action to assure environmental quality (ELAC, 1995, p. VI-16).

Environmental educators - Teachers who are actively engaged in striving to contribute to the environment-related knowledge, attitudes, skills and responsible behaviors of their students.

Environmental literacy - Environmentally knowledgeable and skilled in working, individually and

collectively, toward achieving and/or maintaining a dynamic equilibrium between quality of life and quality of the environment (ELAC, 1995, p. VI-16).

Interdisciplinary education - This term, while diversely used in the literature, is used in this research to mean *between or among disciplines*, taken directly from the root words. Typically with EE, this definition suggests that environmental content is incorporated into the teaching of the other disciplines. Alternatively, terms used with slightly different meanings, including:

* *Cross disciplinary teaching* - education where the same subject matter is addressed simultaneously from the perspective of two or more disciplines.
* *Holistic education* - teaching which combines disciplines in active learning with curriculum goals which "include all aspects of one's being-whether cognitive, affective, physical, spiritual or aesthetic..." (Miller, Cassie and Drake, 1990, p. 67).
* *Integrated education* - a term applied when multiple disciplines are used simultaneously to accomplish varied ends.
* *Multidisciplinary* - comparable to *integrated.*
* *Thematic teaching* - using themes to facilitate the accomplishment of curricular goals covering more than one discipline.
* *Transdisciplinary education* - boundaries between disciplines become fully blended.

Narratives - A written record of human experiences, based upon verbalized reflections after their occurrence, and studied to identify the meaning or significance of the experiences. "The narrative scheme serves as a lens through which the apparently independent and disconnected elements of existence are seen as related parts of a whole" (Polkinghorne, 1988, p. 36).

Purposive sample - A sampling method used in this research, where participant selection is based upon subjective judgment of diversity which is representative of the larger targeted population (from Salant and Dillman, 1994).

Standards - In a broad sense, standards are benchmark measures of educational goals. More explicitly, there are three categories of standards (Diegmueller, 1995; Lewis, 1995):

* *Content standards* - describe what school-age learners should know and be able to do.
* *Performance standards* - define what levels of learning are considered satisfactory.
* *Opportunity-to-learn standards* - describe the conditions and resources that must be present to enable students to achieve the performance standards.

Successful EE programs - Teaching efforts which result in student growth toward the goal of environmental education: "to help students become environmentally aware, knowledgeable, skilled, dedicated citizens who are committed to work, individually and collectively, to defend, improve, and sustain the quality of the environment on behalf of present and future generations of all living things" (Engleson and Yockers, 1994, p. 14).

Teaching practices - Teaching behaviors - including both in-school and out-of-school actions - which influence student outcomes.

Wholistic education - The different spelling of (w)holistic education is used to differentiate from "holistic education," due to the highly varied ways in which the term "holistic" is used in the literature. In this report, *wholistic education* refers to education of whole persons - nourishing their personal growth within the cultural setting - in consideration of their local-to-global surrounding environment, and the quality of life for future generations.

Research Question

Where third to eighth grade teachers conduct environmental education, what are the major teacher-identified factors which foster student growth in environment-related knowledge, attitudes, skills and/or responsible behaviors?

Research Sub-Questions

These sub-questions identify different aspects of the research, and are used to frame the concluding sections in the sixth chapter.

1) *To what extent is practitioner-based research - consisting of interviews and a national survey - able to paint a wholistic picture of the* ***Elements of Success in Environmental Education****?* This question assesses the validity/utility of the research design.

2) *To what extent are the* ***Elements of Success in EE****, as generated through three forms of research - literature review, teacher interviews, and teacher surveys - congruent?* Specifically, how do these three forms of research compare and contrast in their identification of the:

   - **teaching conditions** that enable/support student growth in environment-related knowledge, attitudes, skills and/or responsible behaviors?
   - **teacher competencies** that are necessary to foster such student growth?
   - **teacher practices** frequently applied to accomplish the environment-related goals?

3) *Will teacher sub-groups - defined by regional representation, grade level, years of teaching, gender, or level of educational attainment - provide similar support for the framework constructed by this research?*

Organization of the Study*

Chapter 1 includes the setting, goal and rationale for this research project. The "state of the world," coupled with the current status of education, suggests the need for an increased emphasis on EE. Since schools provide a major opportunity to effect student development, the research is

* Some people who read research prefer that writing is completed in the third person. On the other hand, people involved in narrative and other forms of qualitative research **prefer** the use of "I," to allow consistent use of active verbs. In deference to both parties, I strive to avoid the use of "I" in much of the paper, but where the first person singular pronoun seems more clear, I shall use it.

designed to paint a picture of the salient elements in the school teaching environment that contribute to student growth in environment-related knowledge, attitudes, skills and responsible behaviors.

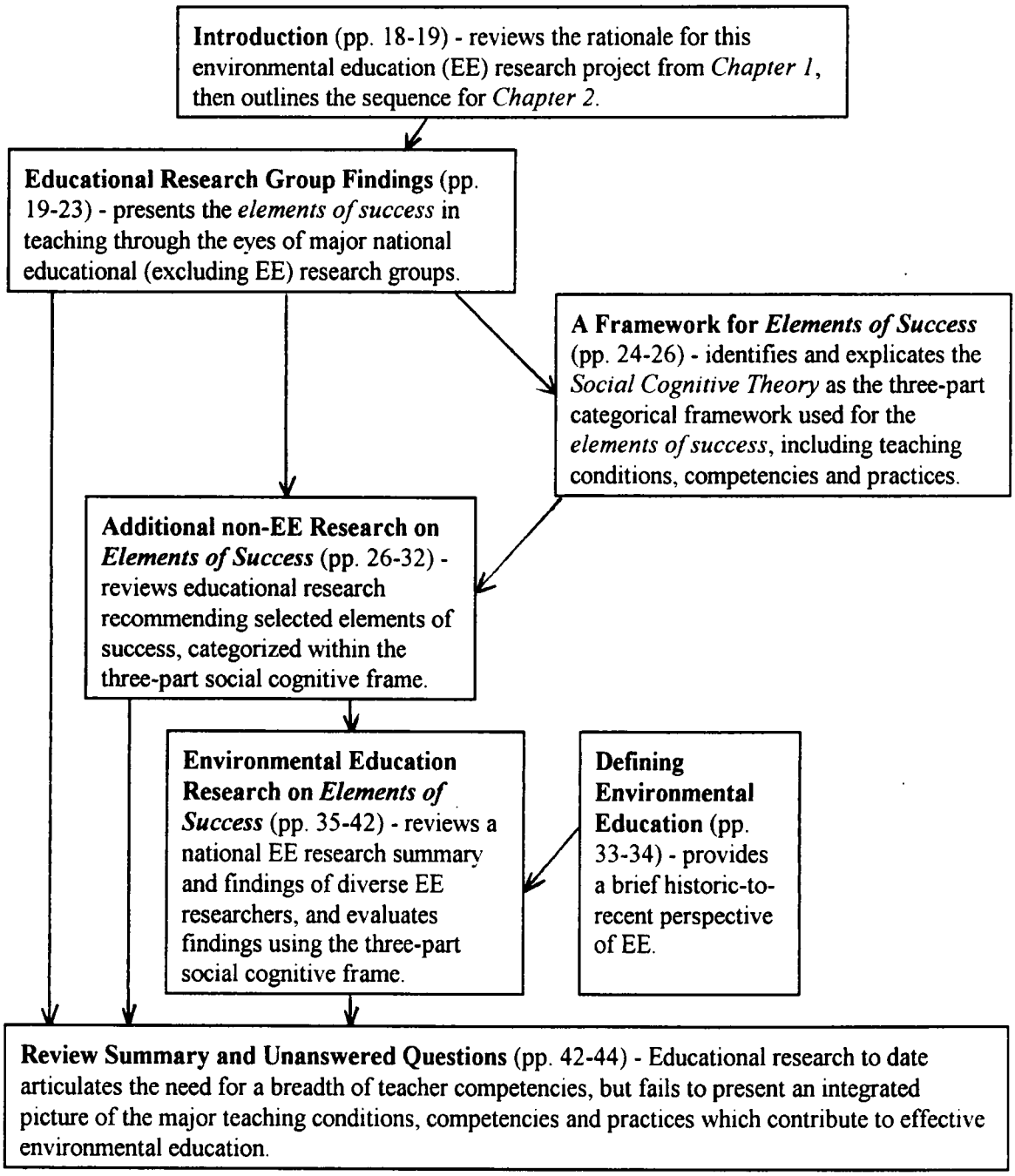
In *Chapter 2*, the literature review reinforces the importance of contextual and relevant teaching to enable meaningful student learning experiences. The research to date identifies certain teaching conditions, teacher competencies and teacher practices which support the attainment of EE goals.

Chapter 3 provides a brief explanation of the research methodology - which included both qualitative and quantitative procedures. The chapter conveys how the quantitative survey research was built upon the findings of the qualitative interview database and the literature review.

The results and analyses are divided into two chapters to differentiate between the contributions from each phase. *Chapter 4* presents highlights of the extensive data collected from interviews with eighteen practicing environmental educators from eleven of the United States. The interview data analysis concludes with a presentation of a preliminary *Elements of Success in EE* framework gleaned from these interviews and enriched with prior research findings. The framework, integrated into a survey, was sent to a diverse national sample of 500 educators for validation. *Chapter 5* presents the data and analysis from this survey - frequencies of ratings for each element, coupled with excerpts from the extensive comments received.

Chapter 6 is composed of three major sub-sections. In the **Conclusions** sub-section, I evaluate the research methodology as a whole, and articulate the strength and relative importance of each element in the *Elements of Success in EE* framework as suggested from the survey results and supported by the literature. The **Implications** relate survey methodology implications, and propose a final revised/validated framework based upon previous educational research, the eighteen interviews, and the survey data. Finally, in the **Recommendations**, I articulate specific suggestions relating to the survey methodology, utility of the resulting framework and subsequent research that could further enhance both the quality of the framework and its utility in teacher education.

Chapter 2
Literature Review



Introduction

The contents of the first chapter set the stage for a more in-depth evaluation of research pertaining to *elements of success in environmental education*. To briefly reiterate, the research and rationale for it are based upon:

* the wide-spread concern about apparent declines in the quality of the global resource-base upon which all living organisms - human and other - are dependent;
* the extent to which a single species - homo sapiens - exerts a profound and growing pressure upon the Earth's resource base;
* faith that wide-spread, sustained, high-quality environmental education (EE) can engender a notable change in human activities, resulting in more benign treatment of the Earth;
* the contention that current education is lacking in relevance and efficacy, whereas EE provides relevant content in an **wholistic** setting with real-world issues; and
* the criticism that teacher education programs are disconnected from the real-world of the practitioners, and thus low in efficacy.

In response, this research captures perspectives from teachers actively engaged in contributing to student growth in environment-related knowledge, attitudes, skills and responsible behaviors. This chapter presents previous research relating to the topic, following the sequence portrayed in the chapter graphic organizer (p. 17), and briefly described here.

1) ***Elements of success*** **through the eyes of research groups** - Highlights the major contributors to effective teaching, as identified by several major educational research groups.
2) **A framework for the** ***elements of success*** - The research groups had many different ways of organizing their competencies or standards, which led to a search for an alternative design. In this section, I explain how *social cognitive theory*'s three-part model provides a suitable way to frame

the components of educational efficacy.

3) **Additional research contributing to *elements of success*** - Educational researchers beyond the major research groups have sought to identify successful teaching elements. Their additions to the developing three-part *elements of success* framework are presented here.

4) **Environmental education: What is it?** - This section is included to furnish a succinct description of EE, leading into the following EE-specific *elements of success* section.

5) **Environmental education research on *elements of success*** - A review of educational research which identify elements which support effective teaching specifically in EE.

6) **Literature review summary, unanswered questions and practitioner-based research** - Following the literature review, there are a number of unanswered questions with respect to *elements of success* in EE. Specifically, there is a dearth of practitioner-based research.

Elements of Success Through Research Group Eyes

The standards for educational excellence published by major educational research groups show substantial variation in organizational structure and associated items. The diverse ways of describing excellence in education conveys the dynamic and artistic nature of education. Even within a single organization responsible for setting teacher standards (NBPTS, 1995), there are notable variations among disciplines. I present the principal categories as identified by each of four research groups who have developed teaching-related standards.

National Board for Professional Teaching Standards

The National Board for Professional Teaching Standards (NBPTS, 1995) developed a series of discipline-specific standards for evaluating teachers based upon five core propositions. Teachers:

(1) are committed to students and their learning; (2) know the subjects they teach and how to teach those subjects to students; (3) are responsible for managing and monitoring student learning; (4) think systematically about their practice and learn from experience; and (5) are members of learning communities.

The discipline-specific committee standards were developed by teachers and specialists in the field, which resulted in a variety of framing strategies for their standards. However there were some recurrent categories apparent across most of the standards.

1) **Students** - Teachers are to have a profound knowledge of their students.
2) **Content** - Teachers should know their content and its associated curriculum.
3) **Multiple strategies** - Teachers should have a familiarity and practical utility with diverse teaching strategies to adapt to diverse students and learning styles.
4) **Learning environment** - Teachers must construct a learning environment which is conducive to student learning.
5) **Meaningful learning** - Teachers should actively engage students, provide opportunity to learn across disciplines, and connect important issues to students' lives/world - thus stimulating interest in a sustained participation in learning.
6) **Assessment** - Teachers must engage in ongoing assessment to analyze, evaluate and strengthen their efficacy with students.
7) **Collaborate with families and communities** - Teachers should find ways to creatively building supportive relationships with students' families and their communities.
8) **Collaborate with colleagues** - Teachers should work with their colleagues to improve schools and student growth.
9) **Reflective practitioners** - Teachers should regularly analyze, evaluate and strengthen the efficacy of their efforts.

National Research Council

The National Research Council (1996), in the National Science Education Standards, stated five assumptions similar to the "five core propositions" used by NBPTS - and consistent with constructivist learning theory (Brooks & Brooks, 1994). Following these assumptions, their standards which pertain to teacher efficacy included:

1) **Teaching standards** - Teaching should be inquiry-based, and include challenging constructive engagement of students, coupled with ongoing assessment in an appropriate learning environment in the context of the community as a whole.
2) **Professional development standards** - These elements outline desirable long-term competencies, encouraging continued growth in science content and pedagogy, a commitment to life-long learning, and congruency of teaching with teacher intentions.
3) **Assessment standards** - Teachers are expected to match assessment with desired outcomes, be fair, authentic, transferable and consistent, and derive sound inferences which reflect the criteria and/or learning opportunities, and make appropriate adjustments in reporting and subsequent teaching efforts.
4) **System standards** - These suggest the requisite teaching conditions or context, including program consistency, integration with the other disciplines, adequacy of resources, equity and excellence, and system-wide support and sustenance of education as a whole.

National Council of Teachers of Mathematics

The National Council of Teachers of Mathematics' (NCTM, 1991) initial assumption is that teachers are key figures in changing ways of teaching and learning, and changes require long-term support and adequate resources. The math teacher standards have a framework similar to that

derived for science teachers.

1) **Teaching standards** - Teachers are to set goals and select tasks to help students achieve goals, stimulate and manage classroom discourse to enhance clarity regarding what is learned, construct a learning environment and participate in ongoing analysis (assessment).
2) **Evaluation standards** - The last teaching standards component is "analysis," which is given separate categorical emphasis here. Teachers are to conduct systematic and cyclical evaluation, to enhance teaching practices.
3) **Professional development standards** - Teachers actively pursue their own educational development, enriching their understanding of students and math pedagogy through experiential learning under diverse educational settings.
4) **Support and development of teachers** - These guidelines suggest the responsibilities of policy-makers in government, business and industry, schools and school systems, colleges and universities, and professional organizations.

The Holmes Group

A consortium of more than ninety universities has been highly critical of current educational quality (Holmes Group, 1986) and teacher education (1995) in the United States. Their recommendations are more process or guideline-oriented, not explicitly targeted toward enhanced efficacy of teachers per se. The recommendations are listed here due to the extensive publicity the group has received. In their first publication, *Tomorrow's Teachers* (1986), they set forth five goals:

1) **To make teaching intellectually sound** - Teachers are to have a broad liberal arts education, coupled with in-depth knowledge of their discipline, and an understanding of diverse cultural values and forms of inquiry.

2) **To recognize differences in teachers' knowledge, skill and commitment** - They suggest new teachers receive substantive and appropriate assistance and supervision with talented and experienced teachers, then continued support for growth throughout their careers, sustained by team- and inter-disciplinary teaching efforts.

3) **To create relevant and intellectually defensible standards of entry into teaching** - Targeting the methods by which teachers gain entry to the profession, the Holmes Group supports rigorous measures for teaching proficiency, coupled with active recruitment and preparation of people of color to achieve greater teacher educator diversity.

4) **To connect schools of education to the schools** - They recommend (reinforced in Holmes Group, 1995) the creation of *Professional Development Schools*, where there are more inter-relations between university faculty and school personnel.

5) **To make schools better places, where practicing teachers can work and learn** - The evolving *Professional Development Schools* can work to revise the professional education of school administrators and other school professionals.

Major Research Group Summary

Stepping back and looking at these four major research efforts, one can identify three major recurring emphases: (1) *a strong cognitive base* - where teachers have broad content knowledge, and pedagogical knowledge and skill including diverse teaching and assessment strategies; (2) *excellence in teaching practices* - teachers must constructively engage students in meaningful learning, and are continuously growing through reflective practice and other forms of life-long learning; and (3) *contextual elements* - collaboration within the classroom, community and colleagues, and having adequate system-wide support are important. These recurrent themes point to a plausible three-part framework for the *elements of success*.

A Framework for the *Elements of Success*: Social Cognitive Theory

An evaluation of the research findings and recommendations from these major research groups reveals diverse perceptions of what could be called *elements of success* in teaching. A common framework, difficult to extract due to pronounced variations in how the components are presented, would enable useful comparisons and potential blending of the selected research group elements.

Albert Bandura, in his extensive research with social cognitive theory, states that "human functioning is explained in terms of a model of triadic reciprocity in which behavior, cognitive and other personal factors, and environmental events all operate as interacting determinants of each other" (Bandura, 1986, p. 18). This triadic–or three-part–model provides a simplified framing for the interactions that characterize the educational or teaching environment. I re-titled the categories as: (1) *teaching conditions* - from Bandura's "environmental events;" (2) *teacher competencies* - from Bandura's "cognitive and other personal factors;" and (3) *teaching practices* - from Bandura's "behavior." The three categories overlap (see *Figure 1*) - some elements can not be segregated in one category, and all elements are interactive both within and between categories. The categories are described below, supported by additional research to reinforce their importance.

1) **Teaching Conditions** - Teaching conditions include the entire teaching environment and other environmental influences upon students' lives. Some researchers (Floden, Goertz and O'Day, 1995; Holmes Group, 1995; and others) contend that the teaching environment has often been overlooked in the construction of teacher competencies. On the other hand, the perceived importance of a *constructive teaching/learning environment* is nearly universal. While teachers profoundly influence their teaching environs, research broadly supports the educational influence of the context within which teaching takes place.

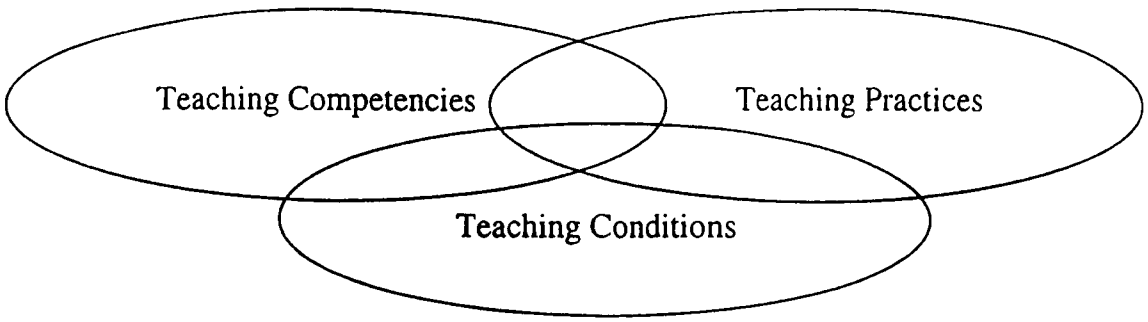


Figure 1: Social Cognitive Theory

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2) **Teacher Competencies** - Competencies are often described as what a person knows and is able to do. The major research group *professional development* standards are essentially long-term targeted teacher competencies, guiding professional development programs. Competencies might plausibly be titled *performance standards* if they were to be played out in practice. However the title *performance standards* in the literature frequently refers to the knowledge and skill level considered satisfactory, which is notably different than a simple application of a competency. Consequently, while competencies can be assessed through performance assessments, the terms will not be mixed in this paper.

3) **Teaching Practices** - Teaching practices include what happens within and beyond the classroom - what teachers and students do - including the content and nature of the classroom experiences, teacher treatment of themselves, students and colleagues, and how they perform as a role model. Teacher practices are evident in the planning-through-evaluation that takes place in the whole process surrounding student-teacher interactions. Teaching practices are highly contextual, and the literature suggests the **way** in which practices are implemented makes a notable difference.

While some of the standards frameworks present *assessment* under a different heading, it is frequently listed as a practice, and certainly fits well under this heading.

The teaching conditions, including the students themselves, determine the *context* within which teachers apply their competencies - or where teaching practices are made evident (see *Figure 2*). Research with practitioners demands that this context be included, based upon the conviction that teaching practices must be enacted in the teacher's individual style, adapted to the prevailing environment. The indispensable role of teaching context (e.g., Bandura, 1986; Brooks and Brooks, 1994; Robottom, 1987, 1990) provides the foundation for the research question and methodology.

Figure 2 illustrates the inter-dynamics of the three-part social cognitive framing, with many of the components listed derived from the standards categories developed by NBPTS (1995). The *practices* are the dynamic application of teacher *competencies*, adapted to the specific students and overall teaching environment, or the *conditions* in which the practices are implemented. Teaching practices can also profoundly influence the conditions under which teaching continues.

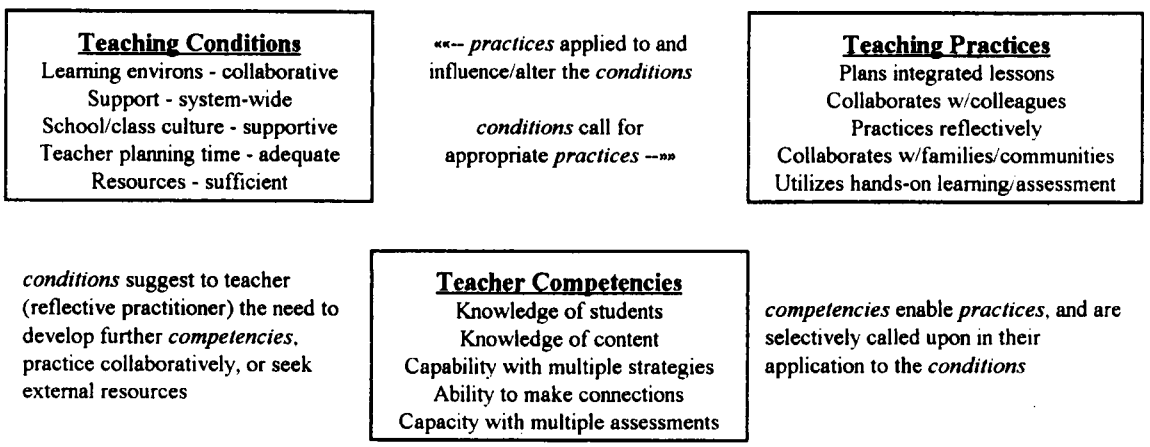


Figure 2: Dynamic Interaction Between Three *Elements of Success* Categories

Additional Research Contributing to *Elements of Success*

This review section explores the research which suggests *elements of success* in teaching, **excluding** environmental education (EE) research, which is covered later. The research is presented within the three-part social cognitive framing: (1) **teaching conditions** - the context conducive to, or supportive of, teacher efficacy; (2) **teacher competencies** - what teachers know and are able to do to enhance learning; and (3) **teaching practices** - teaching performance which is instrumental to classroom efficacy.

Teaching Conditions

In many respects, these conditions are comparable to the *opportunity-to-learn standards* in the literature. They describe circumstances and resources that must be present for students to achieve the performance standards, or those present when student growth is achieved. "*Teaching conditions* can empower or constrain teachers..." (Stasz, 1994, p. 3).

The science and math teaching standards included items such as (1) adequacy of resources such as physical facility, materials, time and human support staff; (2) program consistency, where linkages are built across the curriculum; (3) community involvement; and (4) equity - where equal opportunity is of both ethical and practical importance to enhance education as a whole (NCTM, 1991; National Research Council, 1994).

Schulman (1995) conducted site visits to numerous "Blue Ribbon Schools" for the United States Department of Education. In these schools, teachers were treated like professionals, there was shared decision-making, community/parental involvement, varying cooperative student groups, with up-to-date curriculum, thematically based, interdisciplinary, and often written by teachers (p. 35).

Teaching *conditions* can be moderately to heavily influenced by teacher *practices*. The inter-

dynamics, as illustrated in *Figure 2*, make discreet categorization difficult. While in some cases there is overlap or repetition, the importance of a "learning environment" - repeatedly noted in the research - is worth presenting in both categories. The following could be regarded as advantageous "conditions for learning."

* **Ownership by the learner** - The learner has the responsibility to establish and monitor their own learning goals (Collopy and Green, 1995; Magnusson and Palincsar, 1995; Mamchur, 1990). Collopy and Green worked with a school district with increasing numbers of at-risk and underachieving students in a neighborhood school near Detroit suffering from economic downturn. The major ingredient of their program was constructing a "learner-centered school," leading to substantial improvement in achievement, interest and motivation. Through case study research, Kohn (1993) noted that increased student choice was associated with improved: (1) general student well-being, (2) behavior and values, and (3) academic achievement.
* **Cultural connection** - Ladsten-Billings has conducted in-depth research with predominantly African American audiences, and consistently identified the negative consequences of culturally **inappropriate** education with this and other ethnic groups. Personal growth can "emerge from the learner's experience and activity" (Magnusson and Palincsar, 1995, p. 43; also Ladsten-Billings, 1995), thus the teaching conditions must foster such connections.
* **Contextual practice** - Learners must have opportunity to "practice..., in socially situated activity" (Magnusson and Palincsar, 1995, p. 43; see also under *teaching practices*).

Teacher Competencies

If surveys were conducted in teacher education institutions across the United States, a tremendous variety of specifically desired teacher competencies would be identified. The diversity even within

individual institutions is substantial. This literature review targets commonalities - **major** research-identified elements.

McLaughlin and Talbert (1993) provide a brief outline of the major competencies. They present five competency categories, which appear below, coupled with additional supportive research. It is interesting to note these are very similar to Rodger Bybee's description of an ideal elementary science teacher in 1975 (Bybee, 1975). I add a sixth - assessment - which is frequently mentioned in recent education literature.

1) **Depth and Breadth of Subject-Matter Knowledge** - Teachers must have in-depth knowledge of subject matter, and content-specific instructional strategies. By mastering the richness of the interconnections within their discipline base, teachers have greater flexibility in teaching strategies. Lee, in a series of in-depth interviews with middle school science teachers, concluded that "inadequate knowledge of science content seemed to be a primary barrier to effective instruction" (1995, p. 437).
2) **Pedagogical Content Knowledge** - An understanding of how to select, represent and organize information, concepts and procedures to teach for understanding within the discipline. Subject-specific pedagogy is an important competency that has been advanced especially by Shulman (1986 and 1987). In a geographical education - closely related to EE - study by Ormrod and Cole (1996), teachers in a two-week institute learned content and pedagogical content knowledge together. Implications from their study suggest strong benefits of linking the two together. The same linkage is evident in a study of an EE course for pre-service teachers (Champeau, 1990).
3) **Knowledge of the Learner** - Teachers need to understand learner experiences and preconceptions to facilitate student construction of knowledge. They must start with general insights relating to their student age group. Some background and understanding of the qualities of diverse learners is important for comparative and preparatory purposes. A grasp of cultural

distinctions (e.g., Ladsten-Billings, 1995) or Gardner's theory of multiple intelligences (recently clarified in Gardner, 1995), and other such general knowledge of learners helps teachers acquire a more comprehensive understanding of a specific group of students. Detailed knowledge of the specific learners in a classroom demands interaction in practice.

4) **Effective Classroom Management Strategies** - Teachers must be able to manage student behaviors, and be proficient with cooperative learning techniques, facilitate open communication among students and the teacher and be responsive to classroom diversity (see also Atwater, et al., 1994).

5) **Exercise Good Judgment** - Teachers must be able to discern appropriateness of various strategies based upon content, students, timing and other factors. Tripp (1993) reinforces this with numerous case studies and interviews, recommending that teachers develop professional judgment through continual critical reflection of personal practice. Good judgment is both a competency and a practice, evolving over the years of service (see more under *practices*).

6) **Educationally Supportive Assessment Strategies** - While alternative educational assessments are promoted in many states, few states require assessment competence by teachers (Stiggins, 1995). Research supports the assertion that performance, and other forms of alternative assessment, integrated with instruction, enhances educational efficacy by increasing the relevancy of and student interest in the associated learning experience (Forester and Reinhard, 1991; Khattri, Kane and Reeve, 1995; and others).

Teaching Practices

Research has long pointed to key elements of classroom practices which maximize achievement. These include high emphasis on student on-task time with academics, an effective blend of whole class instruction, effective question-answer and seatwork practices, and minimal disruptive behavior

with prompt student feedback (Crocker, 1986).

Floden, Goertz and O'Day (1995) studied schools in three states that had reputations for being active in reform - California, Michigan and Vermont. They interviewed teachers, administrators and school board members from two school districts in each state, searching for "capacity-building" elements in mathematics, and reading or writing. They found, in addition to building understanding and skill, that teachers need "to alter the goals they hold for their students and to change the way they see themselves" (p. 20). Their article did not identify explicit practices, but the emphasis appears to be upon willingness to make the personal changes in teaching approach needed to attain higher order thinking skills. In short, teachers need determination, resiliency and persistence to master the practices necessary to achieve high-quality educational outcomes.

The importance of reflection-in-action is widely supported in educational publications (Boud, Keogh and Walker, 1985; Kochendorfer, 1994; Schön, 1987; Tripp, 1993). Teachers must learn to...

> "make decisions, adjust what they are doing based on student responses and their own insights, and continue the search to accomplish their most important goals.... The process of reflection, leading to desired action, is one of the most important aspects of a teacher's career development" (Bellon, Bellon and Blank, 1992, pp. 12-13).

Anderson (1995) conducted case studies in nine schools "with program outcomes that indicated success on the part of their students" (p. 33). Anderson defined success as students using information to solve problems instead of passively absorbing information. While the schools involved in the case studies were supportive and actively involved in pursuing these goals (supportive *conditions*), there was substantial variation in teacher performance within these schools. Those "engaged in reform" - those who were striving to effect higher order thinking skills in their students - were actively engaged in applying the learned strategies. While the "more passive" teachers might be considered "competent," their failure to apply themselves limited their opportunity for success. Finally, Anderson found attaining the targeted higher level student process skills to be more likely with student-centered teaching strategies and integrated themes.

The profound importance of **context** (teaching conditions) is well-substantiated in the literature (e.g., Bennis, 1989; Serpell and Boykin, 1994). A teacher may be competent with a "generic" understanding of students at a specific grade level or "generic" conditions of urban schools. However, a contextual understanding of students and their diverse cultural perspectives and experiences demands an on-going process of observation, listening and reflection - an active practice.

"To be truly effective, people [teachers] must not only be aware, but they must make every effort to master their contexts" (Bellon, Bellon and Blank, 1992, p. 7). "This is especially important for those in the teaching profession where the context is seldom in a steady state, but constantly changing and evolving in response to social and environmental conditions" (p. 8). Teaching practices adapt to a constantly evolving context, while seeking to constructively influence that context.

Onosko (1992) interviewed twenty social studies teachers. Ten were rated "outstanding," having "scored high" on six criteria used to rate instructional practices that promote student thinking. The high scorers believed "content coverage impedes students' thinking and in turn were more willing to reduce coverage to pursue the goal of thinking" (p. 42). The concept of reducing coverage to concentrate on depth and higher level thinking skills is frequently apparent in the literature (Bellon, Bellon and Blank, 1992; National Research Council, 1996).

Finally, teacher behaviors beyond the classroom have profound influence on the success of teaching efforts within the classroom. Anderson (1995), in research cited above, also pointed to the importance of active collegial networks which maintain energy and provide diverse perspectives and strategies to overcome barriers. The label of teachers as *life-long learners*, as evident in the professional research group frameworks, finds broad-based research support for its importance. While the professionalization of teaching may be beyond the individual teacher, the individual can benefit from qualities which are congruent with professional behavior, such as on-going reflection, research and meaningful dialogue with colleagues (Clark & Astuto, 1994; Heaton & Lampert, 1993).

Environmental Education: What Is It?

The preceding review comes from diverse educational fields. The targeted field for this research is environmental education (EE). Since EE is, by definition, wholistic in nature, it is important to consider the other research field contributions. To provide context for the remainder of this report, the recent history of the relatively young EE field is visited here.

EE is built upon the foundations of three previous educational endeavors: (1) *nature study* - which emphasized direct observation and building appreciation for the wonders of the natural world; (2) *conservation education* - which targeted conserving natural resources; and (3) *outdoor education* - more accurately a medium for study, where all educational activities are completed outdoors (Disinger, 1993; Disinger and Monroe, 1993).

Environmental education became a distinct field in the late 1960s as an interdisciplinary, holistic study "concerned with the total environment--its social, cultural, economic, and esthetic, as well as its physical and biological aspects" - as noted by Clay Schoenfeld in the first edition of the *Journal of Environmental Education* (1969, p. 1). Humans were becoming an increasingly integral part of the environment, inseparable from the analysis of environmental problems and issues.

By 1976, EE was a well-established global educational movement, well-articulated by what came to be known as the *Belgrade Charter*, published after a 10-day international EE workshop at Belgrade in 1975. The charter established a global frame for EE, with the goal:

> To develop a world population that is aware of, and concerned about the environment and its associated problems and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones (UNESCO-UNEP, 1976, p. 2).

Two years after Belgrade, EE goals were refined at the world's first Intergovernmental Conference on Environmental Education in Tbilisi, Georgia, USSR. The *Tbilisi Declaration* was adopted by acclamation at the close of the conference with these stated EE goals:

- to foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas;
- to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment; and
- to create new patterns of behaviour of individuals, groups and society as a whole towards the environment (UNESCO-UNEP, 1978, p. 2).

Toward that end, environmental educators progress today with a sequential agenda to build environmental *awareness* and sensitivity, supported by *knowledge* about the environment, influenced by environmental *attitudes* and values, enabled by supportive issue investigation and action *skills*, to result in environmentally *responsible citizen behaviors*. The four factors preceding the action phase - awareness, knowledge, attitudes and skills - serve as environmental education *subgoals* which ostensibly lead to environmentally responsible citizen behaviors, the fifth subgoal (Engleson and Yockers, 1994).

The extent to which EE "should" nurture environmentally-responsible attitudes, values, and citizen behaviors is hotly debated within and beyond the EE profession (see Adler, 1992; Bardwell, Monroe, and Tudor, 1994; Engleson and Disinger, 1990; and Poore, 1993). One of the notable features of EE that has earned distinction is its inclusion of values and action skills to complement cognitive growth. Since cultivating responsible citizens is a major tenet of a democratic society's educational system (Caldwell, et al., 1976), and the quality of life on earth has been seriously eroded by human abuses, I believe educators have responsibility to "foster proactive involvement" (Disinger and Monroe, 1993, p. 1-6) to restore environmental quality.

While the goal for EE has been refined over the years, the major tenets and focus remain the same - to build an environmentally responsible citizenry. Today, people in the EE field seek to develop *environmentally literate citizens*, which encompasses all aspects of the Tbilisi Declaration - awareness, concern, knowledge, values, attitudes, commitment, skills and patterns of behavior.

Elements of Success - In Environmental Education

While not universally accepted, Shulman (1986 and 1987; Shulman and Sparks, 1992) makes a strong case for discipline-specific pedagogy. He recently presented a model to develop pedagogical content knowledge which "was seen as accessible and practical by almost all the preservice teachers, as being robust and adaptable across specialist fields" (Wilkes, 1994). This investigator's research is directed toward the end of producing *elements of success* explicitly for teaching in EE.

Comparable to the previous section on "non-EE" educational research, there are both major research group efforts and a large diversity of additional researchers in EE. The NAAEE has made notable progress toward the development of competency standards for environmental educators (Simmons, 1995b). Other elements of success in EE are manifest in research beyond that compiled by Simmons. I present these EE research findings and recommendations - which appear conjointly with some "generic" elements of effective teaching - again within the three-part social cognitive frame.

North American Association for Environmental Education

Dr. Deborah Simmons, working with the NAAEE, reviewed findings from major research efforts relating to EE teacher efficacy (Simmons, 1995b). The review included state-level EE certification or endorsement requirements and guidelines proposed as part of other standards development projects (ASTM, 1991; NSTA, undated; National Committee on Science Education Standards and Assessment, 1993). She also proposed a synthesis of the guidelines, structured along six themes she extracted from the review:

1) **Learner knowledge and skills base** - Teachers are expected to have mastered the "what school-age learners should know and be able to do" *guidelines for excellence* which were in process of

development at the time of this writing (NAAEE, 1997).

2) **Educational and psychological foundations** - Teachers should have a broad foundation in these areas, exhibiting depth in cognizance of the learner and the learning process.
3) **Environmental education foundations** - Teachers should be familiar with the history, philosophy and theory behind EE, and thus able to infuse environmental concepts wherever suitable for their curricula.
4) **Instructional methodologies** - Teachers should have facility with numerous instructional strategies so they can select and apply appropriate teaching practices under varied circumstances.
5) **Learning environment** - This categorical listing stresses the importance of building a constructive learning environment - specifically geared to EE.
6) **Assessment** - Assessment is to be ongoing and fully integrated into instructional processes.

While there are notable similarities to other teacher education frameworks, Simmons favors *performance standards*, where teacher competencies are demonstrated in performance. Comparable to the preceding reviews, these include assessment and building a constructive learning environment.

At the time this research project was designed, content standards (NAAEE, 1997) were in their *working* August, 1995 version. NAAEE plans were to focus on these standards, plus those for EE materials (completed in 1996), prior to furthering work on teacher standards.

Desirable EE Teaching Conditions

Much EE research has brought to light the barriers or limitations to EE in the schools (Ham and Sewing, 1988; ELAC, 1995). From this research, inferences have been made regarding desirable conditions. Ham, Rellergert-Taylor and Krumpe used four broad categories of barriers - conceptual, logistical, educational and attitudinal - to in-service teacher workshops seeking to address the

identified barriers (Ham, Rellergert-Taylor and Krumpe, 1988). The *logistical* barriers were defined as "barriers stemming from a perceived lack of time, funding, instructional resources, suitable class sizes, and so forth" (p. 25).

Samuel (1993) conducted a case study of an EE program implemented in an Ontario school. Major *conditions* which hampered the program were poorly defined school philosophy and goals, difficulties in project coordination, and a break in communications between administration and teachers.

ELAC (1995), in research cited previously, confirmed many of the barriers identified by Ham in earlier research, and the participating teachers from five states also ranked potential incentives which could enhance the amount and efficacy of their EE teaching efforts. The results reaffirmed earlier findings with a broader audience of teachers.

In 1991, the National Environmental Education Advocacy Project (NEEAP) was established in collaboration with numerous other national organizations, to "assist states and local communities in achieving comprehensive EE programs" (Ruskey & Wilke, 1994, p. 9). Their goal is to develop and nurture the *conditions* which advance effective EE programs.

NEEAP uses a process-oriented approach, to develop what they see as "components of comprehensive local-level (or state-level) EE programs" (pp. 5-7). These components include three major divisions (at the local-level): (1) **structure** - consisting of an EE advisory committee, board of directors, coordinator and staff and a local EE center; (2) **funding** - obtained from local revenue, grants and donations, in-kind support, special events and items sales, and organization or individual membership dues; and (3) **program** - within a network of local EE facilities, staff and programs, a K-12 EE infusion plan, locally developed EE curriculum, teacher EE education and support, and parent/community education.

A composite research literature-generated summary *Elements of Success in EE* framework can be

found in *Appendix A*. The *conditions* section of the framework draws heavily from the NEEAP, and includes components from other research, most explicitly Simmons (1995b), and some parts of ELAC (1995), the Ham, et al., 1988 research, Johnson (1980), and Samuel (1993).

Desirable EE Teacher Competencies

Some EE teacher competency lists require broad and deep environmental content knowledge to facilitate comfort with the topic. Gigliotti argues that EE, without an adequate cognitive base, may result in "a citizenry that is emotionally charged but woefully lacking in basic ecological knowledge" (1990, p. 9). Ballantyne and Packer address these flaws in some existing EE practices by suggesting that "environmental educators need to consider the adoption of a more holistic approach to teaching/learning that recognizes the interrelatedness of environmental knowledge, attitudes/values, and behaviors..." (1996, p. 27). Such research suggests the need for not just ecological knowledge, but also an understanding of EE theory and integrated strategies.

Callicott (1982) takes a philosophical perspective in a case study of Aldo Leopold, an advocate of EE before the name was coined. He suggests a need to (1) "know something worth imparting to others" (p. 38), (2) have a genuine interest in students, and (3) be keenly aware of the thrill of personal discovery. Leopold was a staunch advocate of learning to read the landscape, understanding the cycles of life and gaining a deep understanding and affinity for the land. It was he who suggested the need for humans to develop a "land ethic" (Leopold, 1949/70).

Bardwell's perspective (1991b), suggests teachers have a combination of *concern* - an ability to recognize an issue with significant environmental consequences, *competence* - where teachers have the capability to address an issue with their students, and *imagery* - a perception of alternative strategies. Numerous publications provide guidelines to assist educators with environmental issue investigation and problem-solving (Bardwell, 1991a; Bardwell, Monroe & Tudor, 1994; Heathcote,

1997; Hungerford, et al., 1996; and others), suggesting strong support for their merit, and importance of related teaching skills as a teacher competency.

The great majority of EE efficacy research centers on refining strategies, seeking to identify variables to enhance a particular methodology. Leeming and others have been sharply critical of much EE research as being technically flawed, misleading in selection of the units of analysis, avoiding alternative explanations and providing little follow-up data to determine if observed effects endure over time (Leeming et al., 1993). While one could debate interminably the relative merits of different teaching strategies, competence with a diversity of instructional methods is consistently valued.

Braus and Wood (1993) not only provide strong support for developing diverse teaching strategies, but emphasize the critical importance of context. They emphasize the importance of learning about the community, educational system, students, available resources, political economy and cultural history of a region. It is within this rich contextual picture that teachers become most capable of successfully applying diverse teaching strategies. The importance of context-based EE is also apparent in Greenall Gough and Robottom (1993), and frequently in holistic education research (e.g., Pigdon and Woolley, 1993; Wilson, et al., 1993).

The *competencies* section of the research-derived summary *Elements of Success in EE* (*Appendix A*) presents an extensive outline of teacher competencies extracted from Simmons (1995b), Engleson and Yockers (1994), Wilke et al. (1994), and others. With all competencies, an ability to **apply** the competencies is implicit with their listing.

Desirable EE Teaching Practices

Some of the elements of success described in the research are not readily categorized as conditions or competencies. The way in which teaching practices are performed integrates the two: they might

be described as contextual teacher behaviors, enabled by competencies and both *influenced by* - as well as *influencing* - the conditions. For clarity, the practices are broken into subcategories.

* ***Generic* desirable teaching practices** - Termed "generic" in that they find equal applicability in other disciplines. One of the most notable practices is *reflection-in-action*, as noted under the general research. Knapp (1992) reinforces this explicitly in EE, suggesting not just that the teacher be reflective, but that students also be provided time for reflection during their learning experiences (see also Hart, 1990).

* **Teaching adapted to the nature of EE** - Effective EE instruction draws disciplines together, using diverse resources to address significant local issues. Singletary (1992), in high school teacher case studies, found the more successful teachers to be those who fully integrated their courses using multiple disciplines. Singletary's research affirmed that there were significant merits of an holistic approach to teaching EE.

  An interesting facet of EE: Howard Gardner, initiator of the theory of multiple intelligences has recently considered adding "an eighth intelligence–that of the naturalist" (Gardner, 1995, p. 206). The relative importance of natural history in EE is still under contention in the profession (Weilbacher, 1993).

* **Teaching adapted to the specific school culture** - An adaptation to "local significant environmental issues" is frequently encouraged in EE literature. The importance of local relevance is most clearly evident in urban environments, where "urban EE programs should strive to start where the audience is, rather than pack them off on field trips to more `edifying' environments" (Frank & Zamm, 1993, p. 5; see also Medina, 1984).

* **Teaching adapted to a post-modern world** - While the complex institutional and bureaucratic nature of education produces resistance to change, several trends have been emerging/evolving over the past several decades that demand consideration in EE. These include the importance of

teaching which:

- *integrates computers* into instructional practices as a form of research and communication (Merseth, 1992; Rohwedder, 1990);
- *encompasses a global perspective*, as the world becomes more inter-connected, less dominated by one civilization and more culturally heterogenous (Anderson, 1982; Woyach and Remy, 1982), and environmental issues are frequently trans-national; and
- *includes multi-cultural perspectives*, highly relevant to the expanding circles of environmental issues and EE (NCEET, 1995; Wilson, 1982).

* **Teacher qualities** - Lyons (1972) provided educational support to help three elementary school teachers "environmentalize" their practices. In her analysis of the efficacy of their transition toward more EE in their classrooms, the most consistent indicator of successful implementation of the EE programs was a *positive*, "can-do" attitude by the teacher toward the subject and the students.

Knapp and Goodman (1981), based upon extensive work with student groups in the outdoors, are staunch advocates for a "humanistic" approach in teaching. One of the major components is a belief in the students, applying strategies to nurture self-directed, intrinsically-motivated students. This is further reinforced in Schulman's (1995) work with "Blue Ribbon Schools."

Kastenholz and Erdmann (1994) integrated ideas from UNESCO EE plans into a conceptual model for EE. They assert that, if teacher objectives include promotion of environmentally conscious behaviors, "teachers should impart humanistic values such as social responsibility, compassion, nonviolence, and equality" (p. 19). Success depends "particularly on teachers' personalities and their function as examples" (p. 19).

* **Teaching practices which create desirable conditions** - In response to teacher surveys that consistently indicate the presence of barriers to EE, Ham, Rellergert-Taylor and Krumpe (1988)

conducted workshops to address these constraints. Their contention was that teachers could overcome *perceived* barriers - conceptual, logistical, attitudinal and educational - and implement EE in their schools. Their workshop enhanced teacher competencies, and inspired the behaviors that enabled teachers to get beyond some of the barriers within their districts.

The National Consortium for Environmental Education and Training (NCEET) compiled a series of stories from "everyday teachers who initiated not-so-everyday environmental programs in their classrooms and schools" (Bones, 1994, p. 6). These stories provide representations of teaching practices, illustrating the contextual experiences of teachers using adaptive strategies to enhance EE program efforts. The major "focuses" extracted from these stories included ways in which the teachers sought to build their own and their colleagues' skills (workshops, courses, in-services), ways they enlisted the support of their administration or community, how they located adequate funding through fundraising or grantwriting, and ongoing networking they maintained with other educators.

The *practices* section of the research-derived summary *Elements of Success in EE* (*Appendix A*) draws largely from the general education research, with reinforced direction from the EE literature noted above.

Literature Review Summary, Unanswered Questions and Practitioner-Based Research

This review synthesized major findings of environmental and general education research into the factors that contribute to effective teaching. The research suggests a number of features that are generic to teaching, and some additional factors which might be considered content-specific to EE.

The extensive literature review suggested the numerous elements which could be categorized

under a framework adapted from Bandura's social cognitive theory's model of triadic reciprocity. The categories: (1) *Desirable EE Teaching Conditions*, which include a supportive climate for EE, access to and involvement with the community, and adequacy of both human and non-human resources; (2) *Desirable EE Teacher Competencies*, including broadly-defined "content knowledge" with both affective and cognitive dimensions related to environmental literacy, educational/ instructional foundations such as diverse instructional strategies adapted to learners, EE foundations and alternative assessment skills; and (3) *Desirable EE Teaching Practices*, consisting of "generic" teaching practices such as planning, cooperation and collaboration, teaching adapted to the nature of EE which demands diverse perspectives and integrated teaching skills, teaching adapted to the specific school culture and the post-modern world (computer/global/multi-cultural), and teacher qualities such as creativity, self-initiative, respect, integrity, positive attitude, compassion/fairness and so forth.

While the three categories are briefly described in the preceding paragraph, such a hasty summary does not convey the richness of the literature which complements this study. For this reason, an extensive research-derived framework for EE is presented in *Appendix A*. Please refer to this appendix for a comprehensive literature review summary.

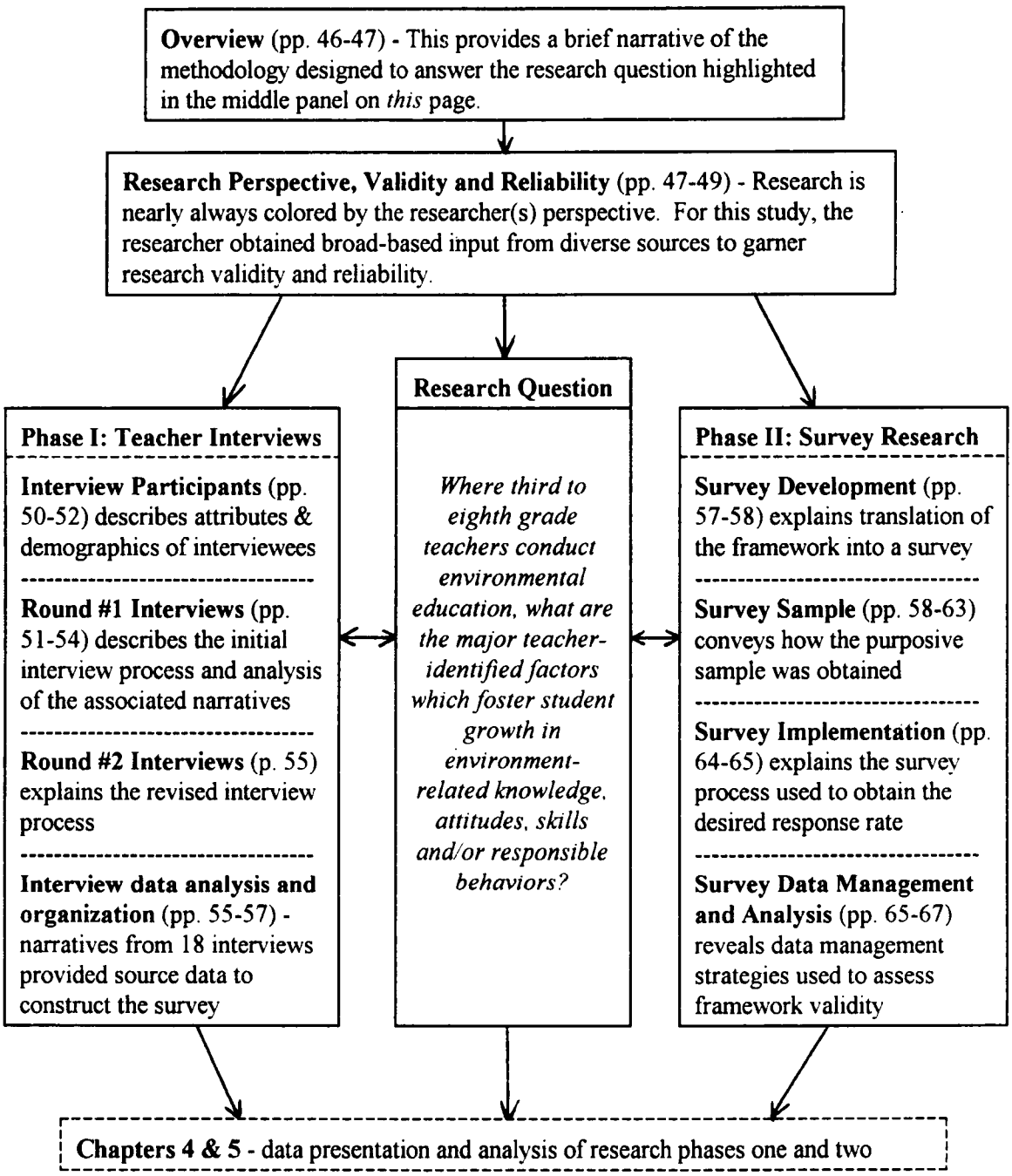
The research-derived framework (see *Appendix A*) appears to address most facets of EE in practice. Two major limitations remain: (1) the framework is a conglomeration derived from diverse sources - lacking in congruency and wholeness; and (2) much of the research is university-based, bringing with it the question of relevancy for the "real-world" of the teachers (as per Holmes Group reports, 1986, 1995; and also Hart, 1990; Robottom, 1987, 1990). Consequently, the purpose of this research project was to address these drawbacks and develop a **practitioner-derived** *elements of success in EE* framework.

The importance of contextual-based research has wide support. Polkinghorne, describing the

importance of the narrative research, noted that "human experience is enveloped in a personal and cultural realm..." (1988, p. 15). This could be re-phrased as "the *teaching* experience is enveloped in a personal and cultural realm." Teaching is highly contextual, and this research provides contextual framing for the factors which enable successful teaching to take place. Connelly and Clandinin suggest that "life's narratives are the context for making meaning of school situations" (1990, p. 3). If *elements of success* are to provide meaningful targets for teachers seeking to improve their EE efficacy, then the targets must come from the context in which they are practiced - from the practitioners. The research also provides a contextual perspective for use in teacher education efforts.

Chapter 3

Methodology



Overview

In this research, I proposed to answer the research question: *Where third to eighth grade teachers conduct environmental education, what are the major teacher-identified factors which foster student growth in environment-related knowledge, attitudes, skills and/or responsible behaviors?* The three sub-questions under investigation: (1) *To what extent is practitioner-based research - consisting of interviews and a national survey - able to paint a wholistic picture of the* ***Elements of Success in Environmental Education****?* This question is used to appraise the research design and implementation. (2) *To what extent are the* ***Elements of Success in EE****, as generated through three forms of research - literature review, teacher interviews, and teacher surveys - congruent?* This question directs the evaluation of framework validity and reliability from several different perspectives. (3) *Will teacher sub-groups - defined by regional representation, grade level, years of teaching, gender, or level of educational attainment - provide similar support for the framework constructed by this research?* This question advances framework evaluation for consistency across sub-groups.

The research question, sub-questions and procedures evolved through a series of meetings with faculty committee members and input from EE professionals across the country who served as an informal advisory panel. These questions led to a two-phased, field-based research design, built upon a three-part theoretical construct and an extensive literature review.

Prior to undertaking the essential research with teachers, I synthesized a literature-derived framework consisting of three categories, and elements pertinent to each (see *Appendix A*). The categories were adapted from Bandura's social cognitive theory. The elements placed in each category came from multiple research and development efforts reported in EE and recent educational reform literature. My own experience and perspective as an EE instructor and a contributor to a

recent national environmental literacy assessment project also played a part in the development of this first framework. Its purpose was to provide a reference point for the subsequent research focused on the experience and perceptions of practicing teachers.

In the first research phase, I interviewed eighteen accomplished practitioners who shared their environmental education (EE) experiences. From their narratives, complemented by the previous work, I constructed another framework of elements, derived from factors which appeared to contribute significantly to the interviewees' EE successes.

In phase two, I re-organized the framework into a survey format from which I could assess framework validity and refine its content. I gathered a purposive, regionally representative sample of 500 environmental educators across the country who were sent the practitioner-derived *elements of success in EE* survey. The responses provided broad-based framework validation, and enabled its refinement and the addition of one new element.

The research as a whole yielded three perspectives on *elements of success in environmental education*, in grades three through eight: a literature-derived framework (*Appendix A*), a practitioner-based framework validated by teachers across the country (*Appendix E* - the survey), and a **revised** version which reflects the survey ratings/comments and prior research (see the *Implications* section of *Chapter 6*, and also *Appendix L*). The *Elements of Success in EE* framework can be used: (1) as a wholistic professional development target for individual educators; (2) as a guide to enhance EE teacher education programs; (3) as a guide for assessing EE programs; and (4) as a foundation upon which to construct environmental educator standards.

Research Perspective, Validity and Reliability

Nearly all forms of inquiry are colored by researcher perspective. For this project, the researcher

gained considerable input from an extensive literature review, his university faculty committee, other colleagues, and an external advisory panel of EE professionals.

Researcher Perspective

Validity in narrative research is usually "based on the more general understanding of validity as a well-grounded conclusion.... The researcher presents evidence to support the conclusions and shows why alternative conclusions are not as likely, presenting the reasoning by means of which the results have been derived" (Polkinghorne, 1988, p. 175). Since understandings and perspectives change in the process of narrative research, Polkinghorne suggests reliability can be maintained by establishing "a free flow of information from participants in their studies and to describe fully how it was accomplished... [to] evoke an acceptance of the trustworthiness of the data" (p. 177). In this research, I describe procedural details and interpretive rationale, and confirm the interview-based framework with a survey.

In the first project phase, I play the role of questioner, recorder and interpreter. Yet the questions and interpretation are soundly based upon the literature and advisement of other educational professionals. While conclusions are supported by the narrative transcriptions, complemented by research literature and personal experience, I remain responsible for their selection and interpretation. Because of the role I play, the reader may find it helpful to understand my research perspective; please refer to the *Researcher Autobiography*, which appears in the first part of *Appendix B*.

Strengthening the Research Base

At various stages of this research, I sought and obtained reactions and alternative approaches from graduate students at the University of Tennessee-Knoxville (UTK), my faculty committee, and

an external EE advisory panel. The members of these two latter groups are identified below. The research design itself brought experience-based perspective from interviewees - accomplished environmental educators - and a highly diverse sample of educators across the country.

My faculty committee consisted of Dr. Russell French, who has expertise in school assessment and curriculum; Dr. Phyllis Huff, a professor in science education; Dr. Robert Jones, who has expertise in environmental sociology and survey research; and Dr. Lester Knight, a professor in holistic and whole language instruction. The reflective input of these faculty added diverse professional and personal input from the formulation of the research question all the way to the articulation of the recommendations.

I also sought and obtained perspective and assistance in the research process from an informal national environmental education advisory panel. The panel's specific roles were to review the research design, then help identify environmental educators to participate in the research; they felt no further need to assist beyond that stage. The environmental education field is characterized by great diversity in philosophy and methodology. Collectively, the panel represents the various schools of thought in EE and has some measure of regional diversity. Participants in this informal panel were: Dr. Tina Allen, vice-president of an EE consulting group in Arizona; Dr. Darlene Stoner, EE professor at San Bernardino State University, California; Dr. Harold Hungerford, emeritus professor in science and environmental education at Southern Illinois University at Carbondale; Dr. Martha Monroe, resource center director for GreenCOM in Washington, DC; Dr. Bora Simmons, 1996 president of NAAEE and initiator of their Standards effort; and Dr. Dennis Yockers, EE professor at the University of Wisconsin-Stevens Point. EE professionals in several other states were contacted to help broaden the pool of participating teachers.

Phase I Research: Teacher Interviews

Interview Participants

Interview research by nature precludes large numbers of participants, necessitating careful selection criteria. I developed proposed criteria, shared them with both advising groups and then finalized them. The four criteria are presented below, coupled with their rationale for inclusion.

1) *Teachers of students in the third through eighth grade levels* - EE priorities evolve with the age of the students. The emphases at lower grade levels (pre-K-2) are upon building awareness, knowledge and environmental sensitivity, while the upper grade levels (9-12) emphasize skills and action (Engleson and Yockers, 1994). I selected grades 3-8 for this research because the full range of EE priorities are typically covered within this grade range and I could circumvent the traditional discipline-specific approaches at the upper grades.

2) *Teachers with several to many years experience incorporating EE into their teaching* - I wanted to be certain the participants, especially in the interview phase, had substantive experience, and were speaking from personal experience, not conjecture.

3) *Teachers who - collectively - represent a diversity of grade levels (3rd-8th) and teaching environments (community size, cultural, SES, etc.)* - I sought diversity from the premise that EE is a very contextually-based process. The perspectives of teachers with experience in diverse settings could then convey the adaptable capacities of EE for the research-developing framework.

4) *Teachers who - collectively - include those who are progressive, highly successful and/or transformative in their teachings* - Spady, criticizing discipline-bound, "educentric" student content standards, suggests standards be defined in terms of "future challenges and requirements, which almost inevitably will require changes in existing curriculum and system structures" (Spady, 1995, p. 83). Consequently, practitioners were sought who may have challenged

prevailing educational norms.

The interview participants were hand-picked educators who had notable success in environmental education. Each teacher was identified as a skilled environmental educator by a person external to his/her school, indicating these teachers had some linkage to people beyond the school that helped them to earn that recognition. Most of them, especially those in the second round of interviews, had reputations as exemplary teachers, accomplished in EE. The eighteen interviewees were a **purposive sample** of commendable environmental educators, selected to represent major perspectives of that diverse population. Fourteen of the eighteen interviewees provided pointed feedback to the draft survey to assist in final revisions.

While the eighteen teachers are not a representative sample, they embody diverse audiences - evident in the *Table 1* demographics. They teach in eleven different states, a balance of rural-suburban-urban sites and SES groups, and mostly in grades three to eight - though there is an imbalance at the upper grade levels. The preponderance of females and whites in the sample coincides with current circumstances in United States elementary schools. The level of education and years of teaching are skewed higher, as the interviewees were accomplished - most having at least ten years of teaching experience.

Teacher Interviews - Round #1

In the fall of 1995, I composed the initial research question, and initial research questions which could yield narrative data to answer the research question. Gleanings from the literature review were not used at this phase of the research. My intention was to allow practitioner voices to speak for themselves. The onset of the first research phase took place during a graduate course on qualitative research. During this period, the faculty - Dr. Kathleen deMarrais - and other participating students provided pointed feedback to the initial research design and interview questions (collectively the

Table 1) Teacher Interview Participants - Demographics

Name *	Region	Gender	Ethnicity	Community Size	SES Group	Education	Grade level	Yrs. Tchg
Becky	East	F	White	urban	High	M.S.?	7th	25
Bonnie	Pacific	F	White	urban	High	M.S.	K-6	10
Connie	West	F	White	rural	Low	M.A.	6th	19
Dawn	Midwest	F	White	suburban	Mid	M.S.	3rd	11
Delora	Midwest	F	Black	urban	Low	M.S.?	1st-5th	15
Dixie**	Pacific	F	White	suburban	Low	B.A.	7th/8th	14
Jenna**	Pacific	F	White	suburban	Low	M.S.	7th/8th	4
Jim	East	M	White	urban	Mid	B.S.+	7th	8?
John	Midwest	M	White	rural	Mid	ME-PD	5th	21
Larry	West	M	White	suburban?	Mid?	M.A.	8th	13
Penny	Mountain	F	White	suburban	Low	B.S.+	1st-5th	5+
Philippe	East/Can	M	White	suburban	Mid	M.S.+	K/3/4	10
Rita	East	F	White	urban/rural	Low	Ed.S.	5th	27
Sharon	Midwest	F	Black	urban	Low	M.S.++	2nd	22
Sue	Pacific	F	White	rural	High	M.S.	7th-8th	21
Susan	Midwest	F	Black	urban	Low	M.A.	6th	22
Tim	East	M	White	suburban	Mid	B.S.+	6th	26
Vicki	Pacific	F	White	rural	Low	M.S.	6th	15
Zelda	East	F	White	suburban	High	B.S.?	4th/5th	7

* Each pseudonym was reviewed and accepted by each teacher.

** *Dixie* and *Jenna* worked together as a team, and were counted as one of the 18 interviews.

? Data not specifically confirmed by teacher, but likely - based upon narratives.

interview guide) which led to their refinement. During the semester, I conducted five preliminary interviews to assess the practicality of using interview research to derive the elements of success in EE framework. In the process, I revised the research question and interview guide (*Appendix C*) and was encouraged to continue the research. The sequence of communications I used with the practitioners is described here:

1) *Initial contact* - I obtained the teacher's name and phone number by recommendation from persons actively involved in EE. I called the practitioner, acknowledged the recommending person, introduced myself, and established a time to meet for an interview.
2) *Interview* - I conducted the interview in a mutually agreeable location - often the teacher's classroom. The interview methodology followed guidelines suggested for interpretive research as found in deMarrais (1996). The interview guide was revised and used flexibly, adapting to the individual being interviewed and the nature of their EE program.
3) *Initial follow-up* - I followed the interview with a phone call and/or letter of thanks; later sending each teacher some free EE materials.
4) *Transcriptions and biography* - I transcribed all interviews in full, and composed a short biography about the teacher. I sent both pieces to the interviewees for review and asked them to ascertain whether or not the contents were fully consonant with what they believed to be true. If necessary, follow-up phone discussions were conducted to obtain additional data.
5) *Extended opportunities* - Interviewees had opportunity to continue their participation in the research as reviewers of the draft framework, providing input toward final revisions of the *Elements of Success in EE* survey.

The completed and verified narrative transcriptions from the first five interviews were evaluated and analyzed to see how well they helped answer the research question: *Where third to eighth grade teachers conduct environmental education, what are the major teacher-identified factors which*

foster student growth in environment-related knowledge, attitudes, skills and/or responsible behaviors? Were the narrative data adequate to allow an initial practitioner-based *elements of success in EE* framework to be formulated? Yes, they were; the three-part social cognitive framework suggested by the literature review was confirmed by narrative data which suggested a similar structure. Thus, an initial practitioner-derived framework of elements was composed from these interviews. At this stage in the research, I avoided making comparisons with the literature-derived framework to retain the practitioner-derived integrity of the second framework.

I then interviewed 10-15 additional practitioners to provide greater richness in diversity and address concerns as to *representativeness* (Cantrell, 1993) of the national environmental educator population. An expanded pool of environmental educators could bring greater diversity of geographic regions, grade levels, community sizes, ethnic/cultural backgrounds, and extent of involvement with EE.

While deriving the framework from the initial interviews, I noted some areas where I needed further documentation - perhaps missed opportunities for follow-up questions due to my newness to qualitative research. I made pointed changes in the interview guide - questions regarding problematic experiences, teaching philosophy, "greatest strengths," resource use and assessment strategies - (*Appendix D*) to document, clarify and enrich the developing framework. The experience also confirmed my belief that interviews alone could not yield a comprehensive *Elements of Success in EE* framework. The perspective - though rich - was limited by my interview skills and the diversity of interviewees. At this time, I finalized my decision to complement the interviews with a follow-up survey - a design well-supported by Marcinkowski:

> When focused upon the same issue, qualitative and quantitative studies can triangulate - that is, use differing methods to assess the robustness or stability of findings. Where studies using different methods have similar results, one can be more certain that the results are not influenced by the methodology (Marcinkowski, 1993, p. 65).

Teacher Interviews - Round #2

Names for second round interviews were obtained from recommendations of the EE Advisory Panel and other EE professionals. Financial and logistical considerations led to altered strategies for obtaining the narrative data. While the first three second round interviews were conducted in person, the last ten were conducted through the mail. The communication sequence was similar to that used in the initial interviews, with alterations noted here only used for mail interviews.

1) *Initial contact* - Instead of setting up an interview time, I described the mail-interview process over the phone (see *Appendix D*).

2) *"Interview"* - I sent the teacher a cover letter which explained the process, the revised interview guide questions, a blank audio tape and an addressed, stamped return envelope. *Appendix D* includes the cover letter, *Consent Form* and complete mail *Interview Guide*.

3) *Initial follow-up* - Since I did not have opportunity to ask probing questions during the interviewee responses on tape, I transcribed the tape and composed a biography, then sent additional probing questions by mail, and an additional tape to record their responses. Several of the brief follow-up questions were discussed over the phone or via e-mail.

4 & 5) The last two steps in the interview process (*transcriptions and biography* and *extended opportunities*) were completed as described for the first interview round.

Interview Data Analysis and Organization

Following transcription, each teacher narrative was carefully reviewed to identify essential elements of the successful EE teaching experiences. Each narrative yielded a list of elements which appeared to foster student growth in the environment-related student outcomes identified with the research question. These narrative-supported lists of elements were then carefully reviewed for

common themes and patterns. Even more evident than in the literature, the patterns were consonant with the social cognitive three-part framework, and thus were placed under the same three categories.

Categorization proved problematic in that some elements could subjectively be placed under any of the three categories. For instance, cooperative teaching could be considered a classroom condition, a teacher competency or a teaching practice, depending upon how it is viewed. Consequently, I rearranged the elements a number of different times, reviewing the narratives and discussing the options with others, laboring over their placement. The final placement of each element is subjective. It is very clear that there are extensive interactions both within and among the three categories - as noted in the data analysis section and in the conclusions.

Upon completion of the interviews, I completed a first-draft framework. The framework-construction process included a subjective blend of direct interview narratives, research literature, personal experience/perspective, and colleague input. Thus, some of the elements were supported by narrative data from nearly every interviewee, others were supported by only a few interviewees but were more strongly evident in the literature.

I completed a draft framework, shared it with my faculty committee and colleagues, and solicited their comments. While their input and my further study led to extensive alterations in the wording, the framework elements were largely retained, though one competency was added - that of teaching and learning theory. This was included because of the important role a strong theoretical foundation for teaching EE plays - providing grounding to help teachers maintain their efforts and continual growth. Its relative surface-subtlety made it less visible than the other narrative-derived elements.

The revised draft was sent to all eighteen interviewed teachers, and fourteen responded with comments very supportive of the framework: "I feel this document is right on target as reflecting my ideas for success in making EE a vital part of education" (Vicki) and "I think you've done it! Way to articulate the complexity.... This is such a fantastic analysis..., with depth! I really don't have any

glaring criticisms I can think of. This is really great!" (Dixie). The interviewee-comments also provided guidance to modify element descriptions, and to add one more competency - *ability to integrate curriculum*. While this element was suggested by only one interviewee, it was included into the framework since it is implicit in the very nature of EE (Engleson and Yockers, 1994; and *Appendix A*, under Practices, 2C). With these changes, the researcher considered the framework acceptable to be sent for validation and broader review/comment.

Phase II Research: *Elements of Success in EE* Survey

Survey Development

The first research phase yielded a wealth of data and a framework which had been validated by the interviewees. But the research question demanded broader validation - ergo the survey; and the sub-questions could not be answered without it. Conducting the survey also provided opportunity to obtain even greater depth of perspective and insight, which could - and subsequently did - suggest further refinements in the framework. Such input was actively sought in the survey design, which provided space for comments.

I must note the trepidation with which I refined the rich interview data into the sequential categorized framework for the survey. I did this knowing and feeling the loss of dynamics, but felt the benefits to be obtained from the survey outweighed these costs. The survey is printed in full in *Appendix E*. The following steps describe how the practitioner-derived *elements of success in EE* framework was completed and arranged in survey format.

1) *Elements presented in subgroups* - The framework elements were organized in the three categories noted throughout this report. Subheadings were added within the categories to help teachers develop a mental image of the framework, and to facilitate data analysis and presentation.

2) *Enrichment with literature findings* - Wals, in discussing the use of *critical phenomenology* in EE (Wals, 1993), suggests that interpretive data be related back to the research foundations of the field. This external research helps to enhance the educational quality of the practitioners involved in the research. It also provides greater integrity to a narrative database which could not fully capture all of each practitioner's *elements of success*.

3) *Framework refinements* - The framework was refined to minimize length and maximize clarity and user-friendliness, which would encourage further input.

4) *Face validity from interviewees* - The draft framework, including the research-generated components, was sent to all interviewees, who were given opportunity to respond to the outline. Research suggests that interviewees be allowed to review their data and associated analyses (Cantrell, 1993; Spradley, 1979).

5) *Final survey* - The framework contents and survey design were critically reviewed by faculty advisors and colleagues. These suggestions led to extensive revisions in wording and appearance of the survey. The final survey was printed on 11"x25½" paper, then two-folded to an 8½"x11" dimension. The three framework categories were on the middle three pages, so the entire framework could be viewed together. Throughout the revision process, the contents were consistently well-received, leading to no major changes in the framework itself.

Survey Sample

I designed the sample selection process to maximize representation of the target population defined in the delimitations: "practicing U.S. teachers in traditional schools in grades three through eight, who conduct EE" (p. 11). Without a recognized definition of *environmental educator*, it was not possible to randomly or systematically sample the population. Therefore, I designed and utilized a purposive sampling method, with ideas drawn from Babbie (1990), Gay (1995), and Salant and

Dillman (1994).

For the survey, I used purposive sampling to obtain a proportional representation of United States environmental educators. United States Census Bureau 1995 estimates of persons under age eighteen from each of nine Census regions (see *Appendix F*) provided estimates of school-age and younger populations - used to estimate associated teacher populations. Within these nine regions, I asked those who provided teacher names and addresses to include diversity of gender, ethnicity, grade level of teaching (grades 3-8), and urban/rural school site.

The list of potential respondents and their addresses was compiled through recommendations provided by thirty-eight individuals, including: EE advisory panelists, other EE professionals around the country, and participants in previous EE research efforts of those making recommendations. The teacher names on the mailing list were chosen by these people because they were judged to have strong familiarity and experience with EE. I deliberately gathered names from diverse EE professionals to obtain regional representation, and to assure diversity from the different EE "camps" - or schools of thought.

If more than enough names were obtained to fulfill any regional quota (see *Appendix F*), the excess was randomly removed from the pool of potential respondents from within that particular region. A total of 500 persons were sent a copy of the survey. An estimated number of environmental educators in the United States is 100,000-200,000 - deemed acceptable by the EE advisory panelists. Consequently, the initial sample of 500 represents approximately one-half of one percent of the United States environmental educator population. According to Krejcie and Morgan (1970), a reasonable sample size for a population of one million is 384 - meaning a random sample of this number would yield findings that represent a margin or error of approximately five percent. So, the 500-name mailing list seemed adequate for the audience.

Profile of Survey Respondents

Five hundred teachers received the survey, distributed regionally as noted in *Appendix F*. The recipients included 450 individuals, 10 couples (two per home), 20 in one school - distributed by a cooperating principal, 15 in one school district - distributed by a district employee, and 5 through a New England citizen who knew other environmental educators who would like to participate. The teachers returned a total of 328 completed surveys - a useable response of 65.6 percent - a very high response rate. Several other surveys came back incomplete because the individuals were not suited to the survey, and three were returned after data entry was concluded.

As stated in the delimitations, the target population for this research was practicing U.S. teachers who conduct EE in traditional schools, grades three through eight. The demographics presented on the following pages confirm this representation. Of the returns, the seven "non-teachers" were administrators with prior teaching experience. Of the 500-name mailing list, only a handful of the school addresses were not public schools. The grade range of those responding included some beyond the target range, but over 80 percent of the respondents were teachers in grades three through eight. Finally, those completing the survey had familiarity with environmental education, with only two surveys returned - not-completed - with comments that they "didn't teach EE." Overall, the response reflects the views of third to eighth grade practicing environmental educators from United States public schools.

Table 2 illustrates the regional sampling and survey returns (*Appendix F* lists the states within each region, and the sub-regional sampling breakdown). The outer two shaded columns compare the United States regional percentage population under age eighteen with the percentage of total survey returns. At least 60% of surveys were returned from each region, with the greatest percentage response - 79 percent - from the Midwest. While a mistake occurred in the sub-regional sampling estimations (see *Appendix F*), the high Midwestern relative to South response rate resulted in

Table 2) Survey Returns by U.S. Census Bureau Region

United States Census Bureau Region	1995 U.S. Pop. %<18 yrs	Sample		Completed Responses		
		(n-size)	% of	Reg. Rate	n-size	% of
Northeast (*New England & Mid-Atlantic*	18.2	91	18.2	60%	55	16.8
South (*South Atlantic, East & West South Atlantic*)	34.6	202	40.4	63%	127	38.7
Midwest (*East & West North Central*)	23.6	89	17.8	79%	70	21.3
West (*Mountain & Pacific*)	23.6	118	23.6	64%	76	23.1
Totals	100.0	500	100.0	66%	328	99.9

regional representation within approximately four percentage points of the target population.

Demographics obtained from the "About Yourself" survey segment (see *Appendix E*) were used to assess survey sample representation of the target population discussed above. The survey items requested information on: (1) grade level currently taught by the teacher; (2) size of school; (3) type/size of school community; (4) number of years taught; (5) gender; (6) ethnicity; and (7) highest level of educational attainment. These following data convey the representative nature of the survey sample; and the breadth/balance of respondents.

For *grade level* representation (question #1, see details, *Appendix F*), over seventy percent of the responding teachers came explicitly from grades two through eight. There was a fairly even balance between teachers in the 2nd-5th grades (32.6% - due to an oversight, the survey contained overlapping grade categories of 2-4 and 3-5, so these grades were evaluated together) and those teaching in grades 6-8 (37.5%). Other teachers who fell largely within the targeted grade range were multi-grade specialists, those teaching a mix of grades, and those who checked several items. A total of 8.8 percent of the respondents came from outside the targeted grade range, though a few of these mentioned in their comments previous experience within grades three to eight.

For *school size* (question #2), most teachers (72.6%) were from schools ranging from 200-1000 students. The *community sizes* (question #3) where the teachers' schools were located represent approximately one-quarter each in: (1) rural, or city/village under 2,500; (2) city of 2500-49,999; (3) suburban to urban area over 50,000; and (4) urban over 50,000, or "other" settings. Details for both these data sets are in *Appendix F.*

In *number of years taught (Table 3 - Question #4)*, approximately one-fourth (25.3%) of the teachers had taught 0-9 years, over 42 percent had taught 10-20 years, and 32 percent greater than 20 years - compared to the corresponding national figures of 35.2, 35 and 29.8. Thus nearly three-fourths of the survey respondents have had ten or more years of experience, somewhat more than the national average.

Across the country, elementary schools have few male teachers, and few teachers of color. The survey respondents mirrored this reality (*Table 3 - Questions #5 and #6*), and in fact came very close - within one percentage point - to national estimates of 1991 public school teachers for female and white teacher figures. With the last demographic data, *level of educational attainment (Table 3 - Question #7)*, nearly two-thirds of the respondents had received their master's degrees, somewhat higher than the national estimate.

Overall, while figures are not available on the "average environmental educator," the survey respondents are clearly a balanced representation of public school teachers involved in EE. Relative to total public school teacher estimates, the sample lies within four percentage points of estimated teacher populations for each U.S. Bureau Census region, and within a percentage point on gender and racial estimates. Respondents had, on average, several more years of experience and had attained a higher level of education than the "typical" public school teacher. Finally, the respondents came from a balanced range in school - and associated community - sizes.

Table 3) Demographic Data from Survey Returns

"About Yourself" Demographic Data	Frequency	Percent	N-size	Nat. Est.*
Question #4) Number of Years Taught			328	
0-9	83	25.3		35.2
10-20	139	42.4		35.0
> 20	105	32.0		29.8
no response	1	0.3		--
Question #5) Gender			328	
female	237	72.3		72.1
male	89	27.1		27.9
no response	2	0.6		--
Question #6) Ethnicity			328	
African American	11	3.4		8.0
Asian American or Pacific Islander	4	1.2		?
Hispanic American	9	2.8		?
Native American (Am. Indian, Eskimo or Aleut)	4	1.2		?
White American	285	86.9		86.8
other, or non-response (*Appendix I*)	15	4.5		--
Q. #7) Highest Level of Educational Attainment			328	
high school diploma or GED	2	0.6		0.6
bachelor's degree	120	36.6		46.3
master's degree	201	61.3		52.6
doctorate	2	0.6		0.5
other (*Appendix I*)	3	0.9		--

* **National Estimate** - these figures are based upon data from the United States Department of Education (1996), for 1991 public school K-12 teachers.

Survey Implementation

Careful design and implementation of survey **strategy** makes a major difference in return rate and hence value of the survey process (Alreck & Settle, 1985; Babbie, 1990; Dillman, 1978; Salant and Dillman, 1994). Of the survey design strategies, the Dillman "Total Design Method" (1978) has been most recognized and referenced as one of the more successful. The specific strategy selected for this research was based largely on Salant and Dillman (1994), modified based upon personal experience and recommendations by Jones (1996).

The process is now described in sequential order, with an explanation of the stage and associated rationale for selecting that portion of the total strategy.

1) **First Mailing** - Each recipient received a cover letter, a copy of the survey and a researcher-addressed, postage-paid return envelope (see *Appendix E*). Each cover letter was both individually-addressed **and** included reference to the recommendation source - most frequently an EE professional. While Salant and Dillman (1994) recommend a letter in advance of the survey, I omitted this step due to the personal professional reference in the cover letter. In the first mailing, outgoing envelopes were hand-addressed, and environment-related stamps were used on both outgoing and return envelopes.
2) **Reminder Postcard** - One week after the survey was mailed out (Salant and Dillman, 1994), I sent a reminder postcard to all recipients (see *Appendix E*).
3) **Second Mailing** - A second mailing of the survey was sent twenty-four days after the first, which included a gentle reminder (see end of *Appendix E*), and another copy of the survey. A second mailing can add substantially to the response rate. To reduce excess mailing of second surveys, each survey in round one was numbered, matched to a name and address. The names and addresses were never entered when the data were used, thus respondents names remained

confidential and excluded from the database. Numerical associations were used to note which persons did not need to receive a second mailing.

4) **Replacement Mailings** - I received back some envelopes, postcards and surveys due to incorrect or expired forwarding addresses, persons who were no longer teaching and returned a blank survey, etc. Since I had additional addresses for each region, I was able to send a survey to another person to replace each one returned. I had 35 such replacement first-mailings, though several of these were returned too late to send a replacement. Most of those who were sent these later surveys did not receive second mailings.

Collectively, 328 out of 500 teachers completed and returned surveys, translating into an above average response rate of over sixty-five percent.

Survey Data Management and Analysis

Data Management

As surveys were received, they were recorded, dated for reference, and checked for completeness of response. Data were entered into an SPSS for Windows document in accordance with a protocol established in advance of the returns. Details of the data management strategies are presented in *Appendix G.*

The data - item-ratings and comments - include responses from all completed and returned surveys. The few respondents not teaching in grades three-to-eight - administrators or grades 9-12 teachers - are reviewed for respondent consistency across sub-groups. While several respondents used the framework to rate themselves (the few examples cited later), the survey clearly requested teachers to "rate the significance of the items for fostering third to eighth grade student growth...." (*Appendix E*). The large majority of completed surveys came from persons within the target range, who completed the survey as intended. Consequently, this report includes all survey responses.

Data Coding

The survey asked respondents to rate each element from the *Elements of Success in EE* framework with respect to its significance in fostering "third-to-eighth grade student growth in environment-related knowledge, attitudes, skills and/or responsible behaviors," as stated in the research question. On each survey, every element was judged on a scale of one to five points, which corresponded to descriptions ranging from very low (1) to very high (5) significance (*Appendix G*).

In addition to the element-by-element ratings for significance, the survey included items to evaluate each category and the overall framework on a similar scale of one to five. Respondents were asked to rate the extent to which elements listed under the teaching conditions, teacher competencies, and teaching practices, included the major elements associated with each respective category. Finally, the two overall framework evaluation items asked the teachers to assess the extent to which the entire framework: (1) included all major elements and (2) illustrated the complexity of elements that enable teachers to excel with EE in the classroom (see the complete survey in *Appendix E*).

Data Analysis

The survey was designed to assess the validity of the framework constructed in the first research phase, and to provide insight to further refine the framework. One way to assess framework quality is by its internal consistency - how well the items adhere to one another. Cronbach's alpha was the statistical measure chosen to evaluate such consistency, with values ranging from 0 to 1. Any measure over 0.7 is considered internally consistent, though typically the longer the instrument the higher the reliability score. High reliability measures would indicate the framework elements fit together as a single coherent framework.

The average mean score for each survey element was calculated by multiplying the number of responses at each rating level by its associated value, adding the total, then dividing by the number of

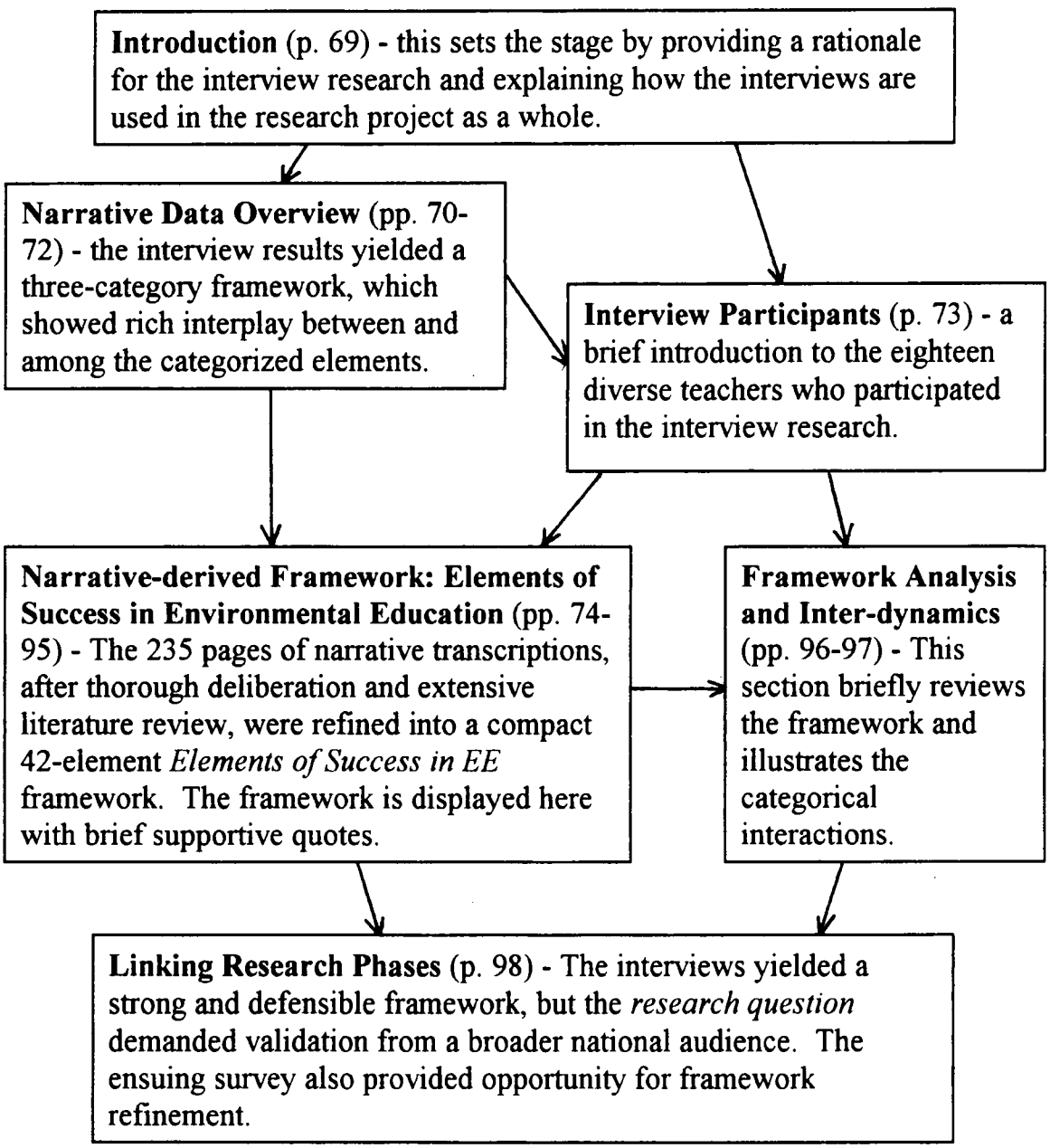
item responses. This score represents the respondents' perceived importance of that element toward the overall goal of fostering student growth in desired EE-related outcomes. The average mean score was also calculated for the overall framework and categorical evaluations. Consistently high to very high ratings of the framework, its categories and the individual elements, would confirm, respectively, the validity of the framework and its categories, and the significant contributions of the individual elements.

In some instances, the mean item ratings - between two elements in the full sample, or between two sub-groups (see below) for the same element - differed. Sample mean differences of less than one-tenth point were considered essentially identical. Where differences were between one- and two-tenths, they were considered of interest. But only those with greater than two-tenths were considered meaningful, and their statistical significance was explored using paired sample t-tests at the .05 level of probability. Though not a "random sample," the statistical analysis can help identify elements which have different levels of importance to the responding teachers or sub-groups of the sample.

Finally, analysis was made by sub-group data sets identified through the survey demographics. These explorations were performed to determine if the sub-groups provided consistent support for the framework and its categories. The criteria for assessing differences, as explained in the previous paragraph, were used to evaluate educational and statistical significance. The paired analyses performed were those which seemed to have the most plausible interest based upon previous literature, the interviews, or the survey ratings and comments.

Findings from the two research phases are presented in chapter 4 (interview research) and 5 (survey research). The conclusions in the sixth chapter are clustered as responses to the research question and sub-questions.

Chapter 4
Research Phase I - Interviews: Data Overview, Presentation and Analysis



Introduction

As noted in the introduction, I considered first-hand research with practitioners imperative due to the nature of the research question. Having conducted an extended literature review, I wanted to see if the "real world" painted the same picture of elements. In light of the Holmes Group's and other critiques of university-based teacher education, what would the teachers be able to tell me through their stories?

I tackled the interview process with tentative belief that interviewees would generate a rough framework. The first round of interviews changed my attitude toward qualitative research. I gained an open window into teacher lives, enabling me to grasp the "world of the teacher" today - significantly changed since my days as a classroom teacher nearly twenty years ago. The interviews also extended my depth of appreciation for teachers who surmounted numerous challenges to achieve their successes.

At the same time, I was learning a new research skill - that of interviewing. I believed I could obtain an accurate picture - the basic structures for a framework - from the interviews. The literature review brought me a deep appreciation for the research-to-date on the subject, and I knew that this research, coupled with my own extensive EE experience, could be utilized to complement the narrative records.

So, as I listened, transcribed, and poured over the transcriptions, I struggled to see how I might best convey the elements that came to light. At times I recognized an element based upon a single voice - when the support was available beyond the narratives. This chapter describes the translation of the narratives - supported by previous research and experience - into a forty-two element framework.

Narrative Data Overview

The eighteen interviews yielded 235 pages of transcribed narratives, ranging from six to twenty-nine pages each. While transcribing tapes was very time-consuming, the listening and entry process greatly enriched my understanding of these educators. What I share in this document is but a small slice of what I learned from the interviews and subsequent communications with these educators.

I utilized the narratives to construct a three-part framework containing forty-two elements. This overview provides an initial perspective of the detailed, element-based structure. I introduce the three-part framework one category at a time, and focus within each upon the major element groupings, illustrating general categorical composition. The final segment of the overview conveys the real-world "motion-picture" nature of the elements, which the framework displays in static form.

Teaching Conditions

The overall teaching context which fosters student growth in environment-related outcomes is multi-dimensional, and incorporates elements both within and well beyond the classroom walls. Desirable conditions include varied forms of *support*, *resources*, *flexibility* and *climate*. Teachers can frequently exert substantial influence upon their circumstances - some seemingly inherit incredibly supportive conditions, while others are skilled at creating these conditions from a less-than-desirable initial setting. Narrative evidence suggests that each element in the framework beginning on page 74 enhances the likelihood of EE success in the classroom.

Teacher Competencies

Teacher competencies which support EE include varied elements, most notably breadth and depth

of relevant *knowledge and skills*. Successful EE demands a combination of environment-related content knowledge and skills, coupled with what could be called "generic" pedagogical skills. In addition, the last broad-ranging competency grouping, termed *integration-ability* in the framework which follows, appears very critical to enable the accomplishment of EE outcomes. Such competencies could be considered EE content-specific pedagogy (as per Shulman, 1986).

Teaching Practices

The practices category describes the *teaching methods and style* which were evident in the teacher narratives. Very conspicuously these environmental educators used a constructivist, student-directed experiential teaching orientation. Since EE is not a specific part of most state curricula, a teacher's *content orientation* played a significant role. The teachers usually either invested great effort in a very strong EE unit, or they were able to concentrate their teaching around environmental themes throughout the year. Both methods seemed to have their merit. The teachers often opted to avoid covering the curriculum, but instead emphasized engaging their students in meaningful learning experiences. Finally, seven teacher *personal behaviors* were identified as desirable of high-quality EE. As noted in the response by one teacher to a draft framework, "for the most powerful EE programs..., all of these are aspects of the teachers involved. I suppose if the teacher possesses any 6 of the 7 'behaviors,' we'd still see a very strong program" (Dixie - in review of survey draft).

Interaction Among the Elements and Categories

In actual practice, these categorized elements act synergistically to enable effective environmental education. Though the framework is divided into three categories, these divisions are not discrete, and show substantial overlap and interaction among them. Some teachers had exceptional resource

and administrative support, others creatively circumvented potential limitations, and some were constrained due to existing *conditions*. The specific *competencies* of individual teachers varied substantively, and their *practices* made evident these varying abilities. The balance between strengths and weaknesses enabled these diverse teachers to be effective under a wide range of teaching contexts. The nature of these interactions became more clear with the survey item-ratings and comments - as presented in the next chapter.

These grade three-to-eight practitioners' major EE efforts are to enhance student awareness and knowledge; which matches the EE goals in the draft-phase *Guidelines for Excellence* (NAAEE, 1997) for younger age levels. However, many of the teachers are also able to nurture student growth in affective domains, and help students acquire issue investigation and participation skills and action-taking with respect to local student-identified environmental issues. The teachers are - with their balance of conditions, competencies and practices - able to spark student creativity and stimulate student interest and personal investment in learning and action.

The **amount** of "success" these practitioners had - in fostering student growth in environment-related knowledge, attitudes, skills and responsible behaviors - is difficult to discern. The teachers were recommended to me by an EE professional who knew that practitioner through personal experience. And during the interviews, and at times during brief interactions with students or other teachers during the interviews, my subjective impression was that the teacher was indeed fostering student growth toward EE goals. Quantifying long-term "success" in education is challenging, as is discerning specific elements which are critical to these successes. Since the elements are extensively inter-dynamic, this study seeks only to identify the **major** factors, then take some effort to project the nature of their inter-dynamics.

Interview Participants

Due to the nature of interview-based research, and the importance of the knowing the participants to understand their stories, I want to "introduce" them to you briefly here before presenting the framework derived from their experiences. I personally interviewed eight teachers and "mail interviewed" another ten. While the eighteen teachers are not a representative sample, they embody diverse audiences - evident in the *Table 1* demographics and associated description in *Chapter 3*.

All of the teachers were recommended, by either other teachers or environmental education (EE) professionals, for having substantial EE experience and success. Several of the teachers have received national recognition for their EE efforts. Additional verification of their EE accomplishments was evident in the interviews. For instance: *Becky* developed an outdoor classroom with her seventh grade students, and took twelve students to present at a Japanese environmental conference. *Philippe* had his third grade students publish a book each year on an environmental topic in which they were immersed over an extended period of time. *Rita* has organized class trips to an environmental center for over twenty years, and is a well-respected teacher-educator in EE who frequently assists in teacher education programs at the environmental center. Each year, *John* and *Zelda* both spearhead week-long school-wide thematic Earth Week programs, during which all grade levels in their schools are involved. *Zelda* headed a teacher delegation to a Russian environmental educator exchange program in 1996. *Larry* completed his audio-tape interview in a plane on his way to Washington, D.C. to accept a Presidential Award in Science and Math teaching. The list of accolades for these educators could go on and on. For further insight into the lives of these educators, please read their brief "portraits" in the second part of *Appendix B*.

Narrative-Derived Framework:

Elements of Success in Environmental Education

As noted in the literature review, the three major categories defined by Bandura's social cognitive theory provide a reasonable lens to view education in action. The rich data yielded numerous elements of successful teaching, a credit to the merits of narrative inquiry. Yet framing these elements jeopardized their contextual integrity. The "fuzzy" boundaries - the dynamic interplay among the three categories - conditions, competencies and practices - became even more apparent. The teacher *practices* both formed and were adjusted to their *conditions*, and their *competencies* were skillfully applied as contextual *practices* - clearly blurring delineations between categories.

Yet, because the categories offer convenient handles to convey major components of the total teaching experience, they are used to present themes and elements derived from the narratives. They are interactive, as noted in the literature review - *Figures 1 and 2*, pages 25 and 26.

Due to narrative data bulk, the following presentation does not include **all** the supportive narrative evidence. Each element is supported by narrative excerpts, and where necessary, external research. Some elements have extensive narrative support, while others have less. For the sake of consistency, if there are three or more quotes presented with an element, plus one additional excerpt in *Appendix H*, the narratives alone will "speak" for the element. For elements with less narrative support, I will inform the reader of the rationale for the inclusion of that element. Again, for more extensive insight into the meaning and significance of each element, please see *Appendix H*, which furnishes one or more additional excerpts and narrative references.

The categories - and elements within each - are now listed in sequence, with brief supportive narrative quotes. **In this document, wherever narratives are quoted, references are made to the page and line numbers of the transcriptions (teacher pseudonym, page #:line number[s]).**

Teaching Conditions

With teaching conditions, sometimes the challenges in their absence are as telling as their supportive presence. Talented and dedicated environmental educators find ways to circumvent or surmount otherwise-barriers. Nevertheless, evidence of limiting barriers may be used to signify element importance.

SUPPORT

1) **Administrative support** - The administration may work collaboratively with teachers to advance EE experiences; and at the least does not set road blocks.

   I've either had very pro-principals who allowed me the flexibility to go where I wanted, or they couldn't care less. In which case I just went and did my own thing anyway..., and my principals have supported me. (Philippe, 8:3-4,10-11)

   ...our legislators and our supervisors and our principals, too, are really hung up on [state test] scores and ... you may not be familiar with that, but when my career and my reputation is at stake because of twenty multiple choice questions, hey, I'm sorry, but that's.... (Tim, 4:37-40)

   I mean if we DIDN'T get that kind of support - probably from the community first, you know we've had just such outstanding support from the community, and then ..., there's been..., one principal especially who was not very supportive, it was a constant hassle.... (John, 6:27-31).

2) **Adequate teacher planning time** - Teacher has sufficient time to access and evaluate resources (see #4-7), and to plan interdisciplinary, engaging, and culturally sensitive EE lessons on their own or with other teachers.

   We get together and team-plan for different possibilities..., and I say that I've found this, and I would like to teach this in science, but it's actually a math activity, rather than a science activity.... (Zelda, 11:30-33)

   Not just resources, but strongly connected to the resources is the needed time to access resources. (Dawn, 10/96 survey response)

   ... we'd spent the whole winter planning out where we were going to be each day.... (Tim, 2:36) - here, Tim chose to **make** the time with beyond-expected commitment, but he was rewarded with an extended outdoor experience with the students.

3) **Community support** - Media, businesses, agencies and organizations provide financial, organizational and educational support for teachers and EE programs.

The community has begun looking at our students as a resource of knowledge, which has been something that has been really wonderful. I'd never thought in teaching middle school that you would have local universities calling and saying "can your students that are doing these particular projects come and talk to our EE group at ..., can they put on an educational seminar for the elementary students?" (Dixie & Jenna, 4:23-28)

We also received some support from our PTO, from the fact that we looked to buy a computer for our publishing company, and a member of our PTO did write a grant that allowed us to purchase this new computer, and so we have a fine piece of technology in our publishing company now, which we use to publish our books. We print them out and they look very nice.

Let me add that we also received some support from the community when we were looking for donations for our publishing computer, members of the community came forth and made some donations..., businesses in town and individuals. And so we found that support encouraging, too, and exciting. (Dawn, 9:22-26; 38-40)

RESOURCES

4) **Access to out-of-classroom** - Teacher and students can participate in activities in the school surroundings, and in occasional extended off-site field-based experiences.

We're also very fortunate to be able to use a piece of property around a hundred acres that's owned by a local museum. It has pond, stream, chaparral and riparian-type communities right there on those acres. And we're able to take ***all*** *of our students there; we take our upper grade students there more often - all throughout the year to do these field studies.* (Bonnie, 3:4-8)

We try to get out of the classroom, and in these days of cutbacks in all areas of education, it's difficult sometimes, but we get out of the classroom and do field trips, whether it's in the community or walking around the school grounds, to the nature center or some of the sites where the students have an interest in what's going on. If they're talking about water pollution, we're going to try to schedule a field trip to the Metropolitan Sewer District or Water Company. And in accessing these resources, it's not just the teacher's responsibility, the students take some responsibility for this also. (Susan, 7:29-36)

...another teacher and I took 45 students out into the desert to do plant and animal research. We spent three 3-hour periods doing different activities in the desert, and then came back to the school.... (Larry, 2:28-30)

5) **Local environmental (bio-physical) resources** - Teacher and students have access to a diverse, quality environment, and sufficient financial, technological and other material resources.

I probably have the best teaching situation you can have. There's probably not another science room that has what I have. I have really created it, unbelievable...., we use it,

though. (Becky, 10:33-35)

Look at this storeroom..., this store room has all fifth grade resources in it, and then it has three or four other teachers stuff in here that's stored. (Rita, 17:32-34)

No matter where I was, I would find a way to do EE. I think [an] advantage is being in an area... where it's a small town.., a small school district, and we're close to just so many neat things..., the Mississippi going through, and the state park just a few miles away, and a National Wildlife Refuge right here, and the dam right here and.... (John - 7:29-34)

6) **Local human (socio-cultural) resources** - Parents and other community members are directly involved to facilitate/reinforce student growth, and to help generate connections between curriculum, students and the local culture.

Parents are a good resource..., one of our parents is a geologist. He doesn't actually do that any more, but his training is in geology; so he knows places to go. And you'll find out that a lot of people will have ideas on good field trips. We try to do as many field trips as possible, because you learn so much away, you know. (Zelda, 13:5-9)

And guests are so knowledgeable sometimes about things that I have a small amount of knowledge about. (Dawn, 4:1-2)

One additional piece that we've really learned in accessing these resources in the community is that it's wonderful to access but you don't want to suck the resource dry. And one way that we've managed to work around that is..., we've developed a partnership with the city of..., or other networks. (Dixie & Jenna, 9:3-6)

We do a lot of first-person interviews. When you live in a small community, often your best resources are your own family members and other members in your community. They're the ones that have some baseline knowledge, even though it may not be recorded by scientific standards. They are still the ones who really can give you interviews and baseline information on which to start a good investigation, whether it is about an environmental issue, a social issue, a historical perspective, or whatever. So, most all the resources I use are, I would say now off the Internet - and from that networking I have - built in the scientific community and first person in this community. (Vicki, 8:22-30)

7) **Non-local resources** - Resources beyond the community are available for major initiatives to expand educational opportunities, bring in diverse perspectives, and help students make connections with other persons and ecosystems around the world.

GREEN is one external resource that really opened this world - field experience - for us. They provide transportation for us, they provide in-service training for our teachers, they provide chemical kits, they re-fill the chemicals. They provide continued training on water quality testing..., so that's one area that has been real important.... We access and utilize their resources, but the students and the teachers also give back in ways.... The students organizing ..., those are the things that they actually give back as well.... (Dixie & Jenna, 7:38-41; 9:7-11)

Though support here appears limited, "non-local resources" was retained as an element

because of its critical importance to **some** educators - even though not consistently important in the interviews.

FLEXIBILITY

8) **Flexible curriculum** - Teacher has opportunity to use alternative instructional approaches, including interdisciplinary strategies and specific culturally-adaptive methodologies.

I don't believe in "coverage." I think you have to do it over and over and over again. Because it's perfect practice that makes perfect, and not just practice. (Sharon, 10:30-31)

I wouldn't discontinue a project at the expense of having to cover material when the students are excited about an in-depth environmental activity or project that we're doing in our classroom. I think that excitement and enthusiasm benefits the students in the long run so much more than just having to "cover" material. (Dawn, 5:45-48)

Resources are available but due to curriculum demands/requirements, there isn't enough time to utilize all of them. (Rita, 10/96 draft survey comment)

I think we're being ruled by the almighty [state test] scores, and that sort of dictates our curriculum to some extent. So right now, for me, what I'm doing, is I try to work in environmental lessons whenever I can..., and I try to work those things in-between major topics. (Tim, 3:17-21)

9) **Flexible schedules** - Teacher has flexibility to combine and integrate units, teach collaboratively, and engage in extended field experiences.

It would be very difficult to pull off our program without having the extended blocks - we have 101 minutes to work with when we take our students out into the field, and we have a flexible team that we do creative things with when we do take the students out into the field, and that again would be really difficult with a group that doesn't have the teaming or the extended periods..., to be willing to let go of a traditional day so that they can provide the students with the experience - outdoors. (Dixie & Jenna, 5:34-40; 13:43-49)

I believe school should be interdisciplinary. I don't have space for compartmentalization because it all fits together in so many different and phenomenal ways that when I have to break it apart it just frustrates me incredibly, and I don't want to have to teach in 45 minute sound bites - whatever that might come with.... I can't abide by the 45-50 minute periods and the bells ringing and kids just getting up and going when they're just finally getting engaged into something meaningful. (Vicki, 7:2-9)

...another teacher and I took 45 students out into the desert to do plant and animal research. We spent three 3-hour periods doing different activities in the desert, and then came back to school and spent an hour compiling the data and writing conclusions about the data that was collected. (Larry, 2:27-30)

As with any portion of the curriculum, flexibility in curriculum and schedules is critical. (Bill, 12/96 survey draft comment)

If you aren't allowed #8 & 9, the rest is moot. (Vicki, 12/96 survey draft comment)

CLIMATE - *heavily influenced by teacher*

10) **Collaborative learning environment** - Students recognize and support group goals, and are immersed in a safe learning environment, characterized by mutual respect and care.

As their communities, they always worked with a group of four in every thing they did for the six-week session.... and they basically lived, breathed, ate, slept as a community. (Philippe, 5:21-22)

I wander from group to group in my classroom, making sure the groups are working cooperatively. Before this activity, we review those skills that are important while we're working as a cooperative group. I think we spend a good deal of time developing atmosphere, and creating a classroom in which students can feel comfortable, sharing their opinions, taking risks, saying this with other students.... (Dawn, 8:5-10)

If they have an idea about something, my students feel (from my perspective) that they can just openly share the information or ask the question - it being that safe environment - giving them all those foundational pieces so that they're excited about learning, so that they want to continue learning on through high school and into their life after that.... (Dixie & Jenna, 6:16-21)

11) **Cooperative teaching** - Opportunities are provided to tag-teach, team-teach or in other ways provide diversity and complementarity in teaching styles.

Another thing that..., I couldn't do without, is having a team member to go through and plan and put all the pieces together and the flexibility that develops and the creativeness that develops out of this. I couldn't do without it. If I was absolutely forced to, that would be one thing, but at this point it's pretty much I couldn't do without a team member. [The next year, the team had to split up...] When we taught, we were one. (Dixie & Jenna, 5:19-23; 17:36)

This element is also evident in the quote from Larry noted with element #9, where he took students on a field trip with another teacher. Still, the evidence of support for this element is not extensive, but similar to the value of non-local resources, certain teachers find collaborative teaching to be extremely valuable.

12) **School/classroom models environmentally responsible behaviors** - Classroom and school operations are environmentally responsible, and include student participation.

I can take 50% of the credit, but I think that the other 50% needs to go to having a school philosophy that is "recycling, reusing...," the environment is important, the choices that you make are important. So, our whole school philosophy is that way, and it's included in

our mission statement. (Zelda, 15:37-40)

Students often learn what they "see." If a school environment doesn't model environmentally responsible behaviors they stand to lose their students through an innocent (or otherwise) hypocrisy. (Bill, 10/96 survey response)

An argument for this element is "actions speak louder than words." However, the "school-wide" nature of this element is not as evident with interviews where teachers shared their personal experiences.

13) **Students bear the consequences of their behaviors** - As part of normal classroom and school procedures, students experience the consequences of their behaviors.

They came into school one day and I threw out the garbage cans. Each group of four kids with the four tables was a continent, and the floor was the ocean. And I'd told the custodians not to come and vacuum the floor for the next week or two.... (Philippe, 3:47-4:1)

I can usually handle it in classroom by having the child go over there and see where their behavior... "where on that chart did your behavior fit in. What is it you did, can you see yourself in there?" So I'd let them think, rather than MY saying to them "you did this, you did that" - go over there and tell me what you did - which one of those rules over there did you have a problem with? And, what can you do about it? It says down there on the bottom..., it's important to use..., what happens to us when we forget? (Sharon, 6:26-31)

Teacher Competencies

KNOWLEDGE BASE

1) **Ecological knowledge base** - The teacher has a strong cognitive base which enables them to critically utilize their ecological knowledge with diverse and evolving complex environmental issues.

As a high school student, my sophomore year, I was taught a broad background in science, and the last quarter of the sophomore year in biology was EE. My teacher was a follower of Paul Ehrlich, who opened my eyes to the gist of the environmental problems on Earth and how that related to everything else that I'd learned. And I think that contributed a whole lot. He really opened my eyes and he made me aware. And that's what I want other students to find out. You have to understand what you're dealing with and what you're talking about.... And another way that is used is, that if I have to write a test or a lab or an activity, and somebody gives me an idea, I can use that little spark to develop something that's relevant ... to our community and a real life example that is known by me and

something that I would like to teach the students and give them a little more knowledge about their community. (Larry, 2:11-17; 5:8-12)

Many of the interviewees had apparent depth of both educational grounding as well as personal experience in varied outdoor settings or with environmental issues. Pointed narrative excerpts are not abundant. Nevertheless, the element receives extensive - perhaps excessive from the perspective of the practitioners? - support in the literature as critical to effective EE.

2) **Socio-political knowledge base** - The teacher understands the importance and nature of social and political operations and the roles these play in diverse and evolving complex environmental issues.

I now see it as a whole way of living. It's a lifestyle, learning about our environment and how to live lightly and sensitively and conscientiously within this environment is a whole lifestyle thing - it's big, it's global, it's economic, it's political, it's all the choices one makes - are tied under the larger umbrella of EE. So I feel now it's a whole process - it's a way of teaching, it's a way of getting kids into the field to experience their environment, and then getting them back into the classroom to learn about information that has to do with that environment. It's a way of getting them to reflect and think about what choices they make every day. It's how they treat other people.... They are on one hand wanting more independence, on the other hand still wanting more security. A lot of what their values are have to do with their experiences. And the more exposure they can have to the experience of being in the environment; contributing; planting a tree, making a difference, talking with an elderly person - all those experiences shape everything, shape their attitudes, shape their biases, shape who they vote for.... (Dixie & Jenna, 2:5-14; 11:27-28,40-44)

I found explicit excerpts here difficult to discern, and yet strangely clear. Teacher engagement with local potentially-controversial issues demands an understanding of cultural norms and political realities - where to tread or not tread. Multi-cultural environmental education research is making profoundly clear the shortcomings of limited socio-political grounding.

3) **Local cultural understanding** - The teacher understands students, local cultures and sub-cultures, and ways in which these human elements interact dynamically with environmental issues.

The racial make-up of my student population at both the middle school and the elementary school is probably about 85% African American, and of that 85%, the majority of the students were males. As research indicates, most children at this age level, and especially African Americans, are visual and auditory learners. So during my classroom instructions, I try to make sure or insure that ***all*** *the learning styles of* ***all*** *of my students are addressed at some part during the instructional process. Another element that is of importance to me is to recognize each students strengths and challenges....* (Susan, 6:10-18)

I think one of the reasons educationally we're in so much trouble nowadays is - strangely because of one of our strengths, which is cultural diversity, and the fact that we don't take the time to understand each others' cultures and the values that those generate, and then bring to the classroom. And, it causes kids to be in conflict when they don't understand why, and it causes teachers to be frustrated. And if we bring that community into the school and allow them to "own" that school, to have ownership, to have pride in that school, to be involved in that school, to be committed to that school - all that community-based management stuff - then I think that we have a better chance at turning around some of the really negative trends and childhood statistics around test scores and behavior and teen pregnancies and drug use and gang use.... (Vicki, 11:39-12:6)

In this past year I think my definition of EE has really broadened.... I see the scope as being much larger than just within the school system now. I see it as adults, community, policy makers, media members, and most certainly our school children. But while we're waiting for this generation of youngsters to grow up - hopefully with some better environmental ethics than our current adult community, we really need to broaden our definition of EE, even those of us that are traditional classroom teachers, so that when we offer courses, we're mindful not just of the students, but of their families, and the impact of the message that we deliver to them might have when they go into the community. (Vicki, 1:3-11)

It's interesting that, after a great deal of classtime discussion and study, the students do come up with many similar questions because, through discussion they find out - "oh, so and so shares a certain interest with me and we'd like to know more about that from our community..." Not always are the questions those that I feel might be most pertinent to our community, however, Martha and I certainly try to steer the students in the direction of our local interests and local issues..., (Dawn, 7:9-14)

4) **Teaching and learning theory** - The teacher is well-grounded in EE goals, and constructivist and other learning theories, to guide planning, implementation and evaluation phases of instruction.

It is important, and this is as indicated in the seven intelligences, to build upon students' strengths. The more you build upon those strengths, the more you decrease those challenges. By teaching EE, this is another way to provide me the opportunity to address the strengths and the challenges of my students. (Susan 6:20-24)

As mentioned in *Chapter 3*, this element was added subsequent to the initial framework draft. The literature review indicated strong support for this element, and personal reflection

and observation suggest that a grounding in research enables an educator to retain focus, and develop perspective and insight into attaining educational goals with students.

SKILLS BASE

5) **Listening/questioning skills** - The teacher has careful, active listening abilities to recognize nuances in perspective and meaning, and a wide repertoire of questioning strategies to nourish student understanding and guide students to form personal questions (see also #11).

> *As I assess the kids, I make sure that I value everybody's ideas - no matter how diverse they may be - because I want my students to feel very willing to take risks.... I use a variety of questioning skills so that the kids are answering their own questions - or looking to how they can answer their own questions instead of just answering questions. I make sure that all students are included in discussions and experiences - no one is omitted.* (Bonnie, 8:31-33,38-41)
>
> *[evidence of a caring listener] He said to me one morning when I was running to my classroom: "[Susan, Susan] guess what?" [urgency and excitement in voice]. And I would say [calm voice] "what, Tom." [Again excited] "Guess why they leave the water in the swimming pool?" Well, his face was just beaming. I stopped what I did, didn't even get into the classroom, and listened to what he said went on in that meeting.* (Susan, 4:12-17)
>
> *I've seen her out in the field. There were kids all over once not very busy at a project, and she looked at Matt and said, "now Matt, for next time, what could we have done differently?"* (Dixie & Jenna, 6:40-42)

6) **Computer proficiency** - The teacher can use computers for classroom applications, and make use of telecommunications to broaden cultural perspectives and enrich collective study and action.

> *I find myself using the Internet an awful lot, using e-mail to most of our scientists at the University.... And I have formed a real strong network with the scientific community that is willing to support students and student research. And by student research I don't mean college or high school, I mean clear down to sixth grade or below IF students come up with meaningful questions to be sent.... And so I've spent a lot of time trying to build that network for myself and my classroom. And most of our news stations also have e-mail addresses, so they can do a follow-up letter, or follow-up note on e-mail.* (Vicki, 8:10-17)

Again, as with non-local resources, certain educators find that their computer proficiency opens up a world of opportunities, linkages beyond the classroom and general access to resources and external research that complements educational efforts. For this reason,

complemented with the strong national support for computer literacy, this element was included in the framework.

7) **Diverse instructional strategies** - The teacher has strength in several highly engaging teaching strategies, complemented by facility with other methods for specific circumstances, topics and students.

> *[Among those mentioned...] Lecture, graphic organizers, hands-on activities, integrated instructions, cooperative learning, computer activities, small group and large group discussion and brainstorming... an individual or a group investigation... role playing....* (Susan, 8:30-46)
>
> *Another unit we do is forests..., so I share a day's worth of slides that I took..., and they learn quite a bit about rainfall and how it affects plants and animals that live in the forest. And we study food webs and food chains in the deserts and also in the forests. I like to use Project WILD activities to get the kids actively involved in the learning process. In map reading, I've taken them out on the bleachers, and we go up to the top of the football stadium bleachers and look at the surrounding..., and we use the maps to identify the compass directions and....* (Larry, 3:8-13; 4:44-5:3)

This element was evident in nearly **all** interviews, but most frequently dispersed throughout the narrative. The extent of support is evident in the list of references in *Appendix H.*

8) **Resourcefulness in accessing resources** - Teacher is a skilled life-long learner, can creatively access human, material and financial resources to capacitate desired EE strategies, and can evaluate resources to guard against bias in their use.

> *[for owl pellet activities] I've got places I can always go to..., and I even know what I'm going to find, because I've seen the owls, so I know if I go in one certain area I'm going to find barred owl pellets, and if I go into another area I'm going to find great horned owl pellets, and so we try, I try to keep them separated as much as possible so we can talk about different eating habits.* (John, 3:19-23)
>
> *We have made a deal with our local bus transportation company. We use busses that are already coming to our area - our kids are almost all bussed in. And so we leave at 9 o'clock with a bus that has already dropped our kids off, and then we have kindergarten busses that come back up right about 11:30, so they pick us up from that area on their way back up to our school site to pick up the kindergarten kids, and they don't charge us very much for that because they're just going slightly out of their way. We're using regular school buses.* (Bonnie, 10:1-7)
>
> *I do depend upon outside resources to a great extent (and I need to include this also). my students writing letters to companies that they are interested in, or who are involved in a particular issue and they write them and the companies send us tons of information.*

*And we have to **evaluate** that information because oftentimes it is biased, but that is another way that we're able to access information, and people....* (Susan, 8:2-8)

9) **Creative; knows how to do without** - The teacher can overcome limitations, induce student creativity, and cultivate adaptive solutions to real-world problems–which are also characterized by limited information and/or resources.

I just save everything..., you just try - if a lab calls for something, you just substitute in empty bottles for beakers or something..., you just try to make do with what you have. We were doing a lab on lung capacity [and it calls for excessive and expensive store-manufactured equipment]. For just that one activity they were expecting me to have $400 worth of equipment. So, we just made do with fishing tube and big buckets of water and 2-liter bottles, and we marked it off for the different dimensions at the .25, .5, .75, 1-liter mark, and we kept going up the bottle and that's how we did the lung capacity lab. (Jim, 7:11-17)

*So, you make do with whatever you can find, and if you can find an old sheet, and you're all excited because you have **something** that you can use in a strange way, and that helps me a lot. We had two classes outside and the only thing I had was a sheet. You just put it underneath a big tree limb and you just shake the ... tree, and then you take a look at what falls out. And the kids are fascinated by that because....* (Jim, 22-26).

I found it curious that I had a hard time pin-pointing quotes in support of creativity, when the adaptive/creative response to circumstances seemed so evident....

10) **Alternative assessment abilities** - The teacher has mastery in diverse learner-based assessment strategies which complement and integrate with diverse instructional processes, and exemplify EE objectives.

I have been using scoring rubrics for three years and keep increasing the frequency with which I use them. I like them because the students can set up the rubric for me. (Jim, 13:41-46)

*[in addition to assessment imbedded in her multiple instructional strategies...] [She included] report presentations, checklists, participation levels, self-assessment, and scoring rubrics are used in many of these areas.... I also allow my students to grade or assess each member in their group. And I have found that when they assess the members of their group - their grades come out almost the exact same as the letter grade that I would assign that particular student for their work. They're very honest about how each student performed in the group, and they're honest about **their** contributions to the group. And I've even found that when I allow the students to grade themselves and the other members in the group, they're often much harder on themselves than I would be. And I appreciate their honesty, and I share that with them.* (Susan, 9:11-40)

I usually have my students write essay questions and answers to tests.... Another way I

may assess students is just through informal talking with them and discussing things that may be going on, like asking for comments about current events that I may read out of a newspaper, and check their level of understanding or see what their questions are and maybe how they would attack a problem. (Larry, 6:31-38)

We kind of start backwards. We develop our assessment, and then we develop our curriculum, so that we are sure.... and that students are aware of that assessment at the beginning of a unit. They know EXACTLY what they will be assessed on. And we use a variety of assessment tools.... (Dixie & Jenna, 9:26-32)

I assess students on their projects. I measure them against themselves, I consider their social growth, I do very little in the form of testing. Although occasionally..., in prepping students for their standardized tests, we do a lot of test format, because they don't have a clue about it. And I'll also use portfolios in the classroom.... (Vicki, 8:43-9:7)

INTEGRATION-ABILITY

11) **Facilitation skills** - The teacher has skills in reflective dialogue with students, facility in guiding students to discover connections, and can relate to diverse perspectives to bring *balance* to classroom discussions (see also #5).

My greatest strength is providing really balanced curriculum for the kids - never trying to put my own personal beliefs in what we're attempting to learn. I don't tell them ***what*** *to think, I provide them with a balance of activities and ideas, I bring in people from all walks of life - from the outside resources so the kids can make their own decisions. And I think that is* ***so*** *important, because sometimes environmental educators tend to be environmentalists, and I don't think we're doing any service for our kids by doing that....* (Bonnie, 3:27-35)

Then I'll look in and there's Jenna. She's got the group leaders, and they're sitting around the table processing, trying to figure out the next move - who needs to do what..., she doesn't take it over - she guides them.... Jenna said to [student], what do you think could have been done differently, what things could we have done that might have changed that. How could we have made sure those kids had a little more ownership or was there a way we could have structured a re-planting to get the kids engaged a little more? And then [student] started throwing back his ideas. And it's that sort of dialogue where you don't jump in yourself all the time, but you back away and you let them - not only set it up, but also analyze it after it's been done. (Dixie & Jenna, 6:29-31; 15:19-25)

I loved it when I heard "a sage on the stage versus a guide on the side" - and I struggle with that continually; for it's so much fun to be on stage. (Vicki, 6:38-40)

This element is admittedly somewhat tangential to "integration-ability," but was placed here reflecting the demands of constructivist teaching. If teachers are to help students make connections, they need to be skilled facilitators, helping students to seek and find answers, explore meaning and make linkages with their integrated world. One can also draw linkages

here with *Practice #1* - student-centered learning.

12) **Ability to make connections** - The teacher can link cognitive and affective dimensions, making connections: (a) between students' daily life and the topic; (b) between cause and effect so as to foresee/anticipate consequences; and (c) between the real world, the topic at hand, and individual and/or cultural values.

> *You should always connect; we need to connect everything you can or it won't "stick."* (Becky: 10:10).
>
> *Everything that we study is related to how we use it in our environment. I'll say to them..., "how would you use this in where you live. Now, if you were out clear cutting in a national forest, how would you use it?" When we do measurement, we do the same thing, when we're dividing we do the same thing. We weigh, we measure.... everything is related to environmental education. Everything because they understand it. They don't understand going to college. We drew our hand on a piece of paper..., then I went around and drew a racoon track on top of it - so they could compare. See, that's a skill in fifth grade - compare and contrast.* (Rita, 5:28-34; 7:31-33)
>
> *One thing I can't teach without is information that doesn't apply to their lives. I don't how to motivate or turn on middle school students without* ***connecting*** *the knowledge they are learning with their everyday life. And for me, the environment provides that piece, so that when we teach atomic theory, when we teach chemistry, we also teach dissolved oxygen, we also go out and look at salmon and how that relates to dissolved oxygen and what we need to do to keep the dissolved oxygen at an optimal level. It's all webbed, it's all applied.* (Dixie & Jenna, 5:2-8)

13) **Understands local-to-global issue connections** - The teacher can connect environmental learning experiences to local culture, and link local issues to global and intergenerational concerns.

> *I've always concentrated on what's here. I think that if you look at my room, all of the animals that I've got, and the bird case with all the birds out in the school hall, it's all local things. I'm not going to bring in tropical animals and tropical birds and things, because they're not going to see those things anyway. I still teach that a lot, and I think that's important to make that connection, between how the tropics connect with us, and the rain forest is important and all that, but I try to concentrate on what we have here. ... stress the importance of how it all ties together, but again concentrate on the locals. More recently now, I've had an opportunity, in that I've been to the rainforest just a few years ago, and I was in Siberia this last summer, and I was in Alaska, and so I experienced the tundra, and so I'm kind of bringing from my first-hand knowledge.... And so I bring some of those things in. But my main knowledge, and I guess the main knowledge I want my kids to have is what is happening right here at home....* (John, 9:10-19)

14) **Ability to integrate curriculum** - Can infuse EE into diverse subjects, and/or integrate multiple disciplines into an integrated unit.

> *I would add to this the ability to integrate curriculum. The recent support for "thematic teaching" has been so exciting for me as an environmental educator (I am no longer a "closet thematic teacher!"). Studying EE issues w/my class, we cover all areas of the curriculum, and teachers need to have a command of their curriculum objectives in order to plan and foster learning within the environmental theme.* (Dawn, 10/96 draft survey)

This element was omitted from the initial draft of the framework. As pointed out in *Chapter 3*, this element was recommended by an interviewee during framework review. The capacity to integrate is more imbedded within teaching, not readily extracted from the narratives. The importance of this capacity is heavily supported in the literature (for instance, see Engleson and Yockers, 1994), as basic to effective EE.

Teaching Practices

TEACHING METHOD/STYLE

1) **Student-centered learning** - Students democratically participate in significant educational and classroom management decisions – co-selecting culturally-relevant, meaningful experiences.

> *[..., in planning a school nature trail] ...the experts came in and I would take my kids out and say, "the experts say this, this, and this" [brief foundation of ideas]. Then, I divide them into groups of six, gave them a great big piece of brown paper and magic markers, and say "well you all draw what you think should go outside." Then, I put their drawings up around the room, and I had students pick the best one from each class. Then I had all six put up, and then I had a kid who said he could take all those and draw them into one. And he did. (WOW). We have wonderful kids, absolutely wonderful. We have the whole spectrum here, from inner city to.... I just believe in kids, and really and truly that's my teaching philosophy, to empower kids to do it. They do far better, far more than you could ever think of doing with them. I expect kids to be capable of that....* (Becky, 7:13-20; 9:11-13)

> *I guess the thing that excites me most when I am teaching is when we can get into an activity that is more student-driven. Kids have such great ideas, and when given the chance and opportunity to put their energies into something that they've created and they've come up with, the projects become very exciting. And so I guess I enjoy teaching the most when I am facilitating the project that the children are helping to drive.* (Dawn, 3:14-18)

When my students become involved in environmental investigations, they begin to take ownership of that investigation or that issue. They become the experts in the classroom. they have a sense of empowerment and become responsible for that learning. (Susan, 2:15-17).

2) **Utilizes personal and student strengths/passions** - The teacher employs personal talents and passions, and capitalizes on students' strengths as avenues to enhanced interest and involvement.

The butterfly garden is something that I got going because of my great interest in gardening. And, at the time we were talking about endangered species in our classroom.... (Dawn, 8:39-40)

The neat thing about EE to me is that it blends and integrates with anything you want it to integrate with. Whatever your strength is, EE can fit right in. My strength happens to be in language arts, and so the childrens' literature is very important to me. Well, I approach EE, I do it through literature.... (Bonnie, 2:36-43)

I begin the teaching process with the students where they are, and then I build upon their strengths and their challenges to try to achieve my educational goals within the classroom. (Susan, 7:1-3)

3) **Experiential teaching orientation** - Students are engaged in hands-on, minds-on classroom experiences in which they explore cause and effect relationships, and/or are engaged in local environmental issues.

[You're not a "curriculum coverer?"] I don't like that word - hate it. Because anybody can cover..., but have they learned it, have they experienced it? (Sharon, 17:1-3)

I can't imagine teaching without the real world. We can sit in there and talk about aquatic habitats all day long..., we can show videos, and feel like the kids are getting it. But until you take them out to a pond or to a stream - some type of real habitat where they can observe first hand and touch first hand, and collect and see what's happening, I don't think they would get the same experience. (Bonnie, 2:44-3:2)

The field work and providing the students with the real hands-on experiences. That is something I couldn't do without at this point, because that is where, when the kids are actually experiencing it, that is where they are really making the connections, and then they can apply it when they get back to the classroom from the field or anything like that. (Dixie & Jenna, 5:15-19)

4) **Cooperative and inclusive learning** - Students and teacher immersed in interdependent and inclusive experiences, providing opportunities for collaboration with mutual respect and encouragement (see also ***Conditions***, #10).

[A group name] across the street..., every spring, along with the school..., we clean up our park. All the Cadets come out and help the kids clean up the park. So, the blind get out there, the deaf get out there, the community of disordered..., the BAD [in jest, sarcastic] kids get out there, you know..., everybody ..., teachers, janitors, everybody gets out there and cleans up the park. We have a garden out there, and we garden out there, and the homeless are out there, and they say "oh, how is the garden today" and we say "oh, fine." "Well, I took a little tomato..." "...well no problem" - and everybody takes a part in the community. (Delora, 2:22-26)

So, we try to work it as a team, me being the leader, but they are all team members, and I stress that when they are doing their cooperative work..., I say..., "you better make sure that this person over here knows it also, and have them to tell it back what you told them. Don't just tell them something and think that's learning it." (Sharon, 17:26-32)

I had my students working in groups of four or five, and the way they select the groups is because of an issue that they're concerned with. (Susan 4:3-4).

5) **Involves external resource persons** - Other persons are selectively included in the learning experiences, to present diverging perspectives and add depth/richness to student understanding.

..., he's able to come and take a couple of kids to the site that we might re-vegetate, for example..., help get it all set up before we bring 50 kids down there to do a re-vegetation project. And he's got the freedom and the flexibility in his job to organize behind the scenes at the request of students. And there are other people..., an expert on birds and some different things, and is able to work with small groups of students when we go down to the field. You know, we are classroom teachers in a huge district, with 32 kids in every class, with a turnover of 30%, with a huge population served by free and reduced lunch. It's an urban, difficult area..., we're in a new school and that's great, but our population is difficult and a large population, and the way we've managed to get it to the size we need to do these sorts of things is by pulling in tons of outside help to get the groups of students down to a workable size. And we couldn't do this, we couldn't do student-generated, student-facilitated projects with kids without a slew of additional resources, beyond our own two. (Dixie & Jenna, 8:29-41)

I make FULL use of community resources so it's not just me all the time that the kids are with. They have a variety of people and experts. (Bonnie, 8:42-44)

In teaching EE, I rely ***heavily*** *on outside resources. As you well know, new issues and solutions, and resolutions to those problems, are always changing. So to keep my students informed, we watch CNN newsroom programs, the students and I bring in articles from either the newspaper or magazines or leaflets and brochures. We invite experts into the classroom, and these can be people from the Conservation Department, the ... Zoo, residents in the community who are knowledgeable about certain aspects of an issue....* (Susan, 7:21-26)

6) **Reflection in planning and application** - The teacher: spends considerable time planning strategies - often with other practitioners - to expand student growth; pauses for personal reflection during class to address student challenges; and allows time for students to critically

reflect as part of the class.

Every unit that I do is different, and even though I rotate every two years through it, I'm always trying to re-write what I've done and decide what works and what doesn't. (Zelda, 6:35-37)

And many times students would ask "why do we have to do this?.... why do we have to know this?" And you know sometimes as a teacher, you have to stop and think about it yourself. I suppose some of the things I was teaching to them had no real connectedness to their world. So I was looking for ways to increase student motivation and learning in my classroom, and I noticed that once I began teaching EE, I got the students hooked. (Susan, 3:11-14)

The other thing she does really well is she remembers to reflect. And at the end of every project, she brings them in - every service project - and they stand up and talk about what went well, what could have been done differently.... I've seen her out in the field. There were kids all over once, not very busy at a project, and she looked at [student] and said, "now [student], for next time, what could we have done differently." ... And I am ***practicing*** *to be that way. It's not my natural. My natural is to kind of assert leadership in a little stronger way, and not to sit back and let those kids figure things out more for themselves.* (Dixie & Jenna, 6:34-7:5)

CONTENT ORIENTATION

7a) **Environmental focus of teaching** - Students dig deeply into a single major issue or project.

[I differentiated between these two options in content orientation because of personal acquaintance/familiarity with teachers who target an in-depth single-issue they consider highly relevant to their students. The differentiation was not very apparent in brief interview excerpts, but the two options were included in the survey to assess the two different approaches - and to see if there were differences associated with grade level.]

7b) **Environmental focus of teaching** - Students investigate numerous environmental issues, and discover connections with multiple issues on a local-to-global scale.

There was a story about coral reefs, and we talked about the coral reefs and destruction of the coral reefs, and so I got the environmental part into that - as it fit right into the story. Klondike Fever was in reference to the gold rush in Alaska, and I'd been to Alaska this summer, and so we worked that in also.... The Incredible Journey was one of the stories in our reading books we were reading, you know about the animals traveling, so.... as they were traveling and trying to get across the streams, we got off the subject a little bit and talked about water quality and some water things related to that, and so ..., if you're conscious about the environment, you can fit it in any place. (John, 3:40-4:7)

Sometimes it's rather difficult to separate EE from education because the two are so intertwined. I use EE as the means or as a tool to meet my instructional objectives, which have been set by our building or district or state standards. I teach it because our students enjoy what we do and what they learn through issue investigation. It provides

them the opportunity to use all the tools that we've given them - the tools to research, the tools to read, to write, to interview, to think critically, and now, using this issue investigation program that I use, they're able to use these skills. They begin to see the practicality of what we're doing in the classroom, and how everything that we do in the classroom is interconnected, or dependent on each other. (Susan, 11:17-25)

8) **Nurturing a sense of place** - The teacher builds student knowledge of and connectedness to local cultures, habitats and environmental issues, nurturing a deep sense of - and commitment to - place/community.

You can live in the concrete jungle and it's still your environment. It's still EE. I need to make sure that the area in which I live..., it's important to take ownership. (Delora, 1:26; 3:25-26)

I hope the students develop an awareness for the community that they live in, initially to understand how natural life processes take place in our city and in the surrounding countryside around where we are currently living. A lot of my students don't get out in the hills or in the mountains. A lot of my students don't get the chance, a lot of them have moved to this area from another part of the state or from another state and don't know too much about it. So I want them to understand where they live first. (Larry, 1:12-17)

I really want them to have some strong knowledge to some local ecosystems, to own those ecosystems emotionally, to know the difference between introduced and native species, endemic and indigenous, to understand our really unique geology and geographical concepts that shape our environment, and through those tools to understand just why it is so important to not only have that knowledge, but to do something with that knowledge positive, for future generations. (Vicki, 2:1-7)

PERSONAL BEHAVIORS

9) **Consistent "can-do" vision** - The teacher clearly asserts realistic hope for the future, and empowers students to be constructively engaged in bringing about brighter future scenarios.

You know, it's amazing. It blows my mind, just blows my mind. And there's nothing that a kid, no matter how low or how high, can't learn. And EE ***enables*** *them to do it.* (Delora, 6:34-36)

We did population activities from ZPG last year -- we talk about what individuals can do to resolve the issue. I refuse to use "scare tactics" to convince kids there is urgency. I personally find such tactics debilitating because they lead to a sense of futility. (Connie, 5:8-10)

[the student interrupting... sheepishly]. "Well, I don't know nothing about science" - "yes you do, what did you eat this morning? Did you wash your face this morning, did you take a bath? What do you take a bath in? Where do you think that came from? What did it taste like?..." and so forth and so on. (Sharon, 27:25-28).

10) **Infectious passion for EE, and for teaching in general** - Teacher exhibits zest for learning and reverence for life and the quality thereof, and invites/inspires students to share these loves.

> *They said, "you're always here - why?" - and I said "I love it here, I love it." It's like an infectious disease, you just..., say "this is it, I want it, give me everything you have." And that's what happened. And..., I love it, I love it, I love it, I love it to death. It's just fun. And, I guess because I love it, the kids love it.* (Delora, 2:2-5)
>
> *EE is **always** successful.... I'd say that my greatest strength in my teaching is simply my passion for it. I love what I do, I know it shows in my teaching, and I know that the kids pick up on it.* (Bonnie, 2:1; 3:25-26)
>
> *I just think that outdoor experience very much kind of stirred my soul in terms of being passionately in love with the environment.... I spent a great deal of time in Latin America with birds in Guatemala. And so I kind of think that I fell in love myself with being outdoors, with hiking, with climbing.... I am ... really in love with middle schools.* (Dixie & Jenna, 3:34-35; 17:26)

11) **Incorporates Humor into the Classroom** - The teacher uses lightness to balance the serious nature of environmental issues, and to foster longevity of responsible actions.

> *For instance, drawing and illustrating pictures or cartooning the functions of different types of energy resources that we use. And if I give them eight types of energy resources, they need to draw a picture and show maybe how they're being used and throw in a caption, so they have to do some writing along with the picture, and they have to write a caption that is either positive or negative about that energy source. And it's their choice. Another assignment that I have them do is to illustrate the function of the four components of blood that we have, and use humor as a requirement in that assignment, so they have to think of funny things for the characters in their cartoons to say to help others understand the meanings of the components of the blood and their functions.* (Larry, 4:35-43)

Evidence for this element came from the laughter during the interviews, the experience during the interview with John noted in *Appendix H*, as well as the excerpt from Larry's narrative above. These experiences suggested humor plays an important role in environmental education - and should be included.

12) **Invests self and personal resources** - The teacher invests abilities, time and finances in support of students, conveying trust, faith and commitment through these actions (balanced with #11).

> *I guess I have to use some of my own money; I think all teachers do. I get a lot of materials from different courses that I take, booklets from - I take a curriculum course and*

I get books from there, I get sheets from other teachers - a lot of sharing of materials. And again different groups I work with, I get a lot of freebies, and I can always use that in the classroom. (Jim, 6:37-41)

This week has been our spring break. On Wednesday, I took a group of sixth graders (almost all girls) for a morning hike along the.... trail.... It challenged them, they succeeded in braving the unknown, and they had a wonderful time. Me too! (Connie, 3:6-12)

The other thing is that there is a huge time commitment. Process goal is a goal of time. I think the best environmental educators have incredibly strong work ethics, because it's HOURS of time to move kids in this way. And I am - every minute - using my time the minute a decision is made, this is our project. I find a kid in a science class that's one of our facilitators, who can skip silent reading, and they're at the computer and they're typing a permission slip.... I mean we squeeze out of the day every piece of time that there is, and again that takes the leadership of teachers with quite a bit of commitment to this. (Dixie & Jenna, 14:41-47)

13) **Practices environmentally responsible behaviors** - Teacher models environmental responsibility, both within and beyond the classroom, teaching a powerful message through action/example.

I think that it is important to mention myself as a role model in the classroom.... an important part of my teaching. I don't expect students to live their lives like me, but I want to provide opportunities for them to see how I think things through and I don't hide my values from them. I share with them and give them explanations about my thinking. We'd like to provide those kinds of opportunities in our classroom for kids to talk about - where they get ideas and how they make their decisions. And so I think that's a real important part about my teaching and my classroom, too. (Dawn, 2:12-19)

And whatever is left-over, we take to the children's home, and we ***share*** *what we have - even though these kids come from that same level that they're sharing with. There's a family that lives nearby, and they have 9 or 10 kids, and they've got grandkids all living in that same house. And my husband and I buy wood for them for the winter, and I take all the stuff that's leftover from the party to them. They do it for Valentine's Day - everything that's leftover.* (Rita, 12:16-21)

This last quote from Rita shows how socially-linked environmental responsibility can be enacted through classroom experiences.

14) **Risk-taker** - The teacher is willing to "take the plunge" into well-planned educational risks which expand student opportunities beyond the "norm" or "expected."

They came into school one day and I threw out the garbage cans. Each group of four kids with the four tables was a continent, and the floor was the ocean. And I'd told the custodians not to come and vacuum the floor for the next week or two.... (Philippe, 3:47-

4:1)

I know this works, and I have the strength about me, through I guess the ten years knowing that it works and having an intuitive sense about what the children are excited about. But whether my ... scores go up or down I don't care. In fact the [state test] scores often don't reflect what the kids have learned, because they don't measure flexibility, they don't measure creativity, they don't measure research skills, they don't measure a lot of things that I think I'm teaching these students, that's not going to be shown on the .... (Philippe, 8:5-10)

This element, while not abundantly evident in the narratives, is conspicuous in its importance for EE. Since it is often relegated to the side, "not a part of the curriculum," and in some areas maligned by outsiders and insiders, many environmental educators have learned the importance of taking risks to advance opportunities.

15) **Recharges self** - The teacher makes time for personal, emotional, physical and intellectual experiences to maintain or rekindle the flame for EE and be revitalized for life in general.

I wasn't teaching EE - or that much of it - before I got real actively involved with [state-level EE organization], and was able to attend conferences and pick up bits and pieces.... 99% of what I do is stolen from somebody else. I didn't come up with the idea of dissecting a deer, or the wild foods or.... So, I've just kind of put it into kind of a year-long curriculum. (John, 8:22-27)

My husband and son are both salesmen for outdoor equipment.... My son is very involved in scouting, and we sea kayak and hike and mountain bike. So it just comes from the heart.... (Becky, 2:16-19)

I am very up on different ocean problems, I am a lover of scuba diving and snorkeling - do a lot of that - so I bring a lot of personal experiences into the classroom for my students. I was fortunate a few years ago to talk with Dr. Jane Goodall. And that was a real thrill in my life. I spend a lot of time when we do the rain forest talking to the students, and sharing a lot of her studies with my students as well, in trying to give them a broad range of things. (Sue, 2:24-29)

Again, please refer to *Appendix H* for an additional supportive narrative excerpt for each element, and note the abundance or dearth of supportive evidence as indicated by the number of references listed with each element.

Framework Analysis and Inter-dynamics

The preceding *Elements of Success in EE* framework contains the elements that were apparent in the practitioner interviews. There is notable variation in the extent to which each element had narrative support (*Appendix H*). The elements retained in the framework which had less narrative support usually had clear literature support - or at times the researcher's subjective judgment based upon past experience, literature review and dialogue with other educators - that extended beyond extractable excerpts.

The interviews also substantiated the high degree of the elements' inter-relatedness. During review of the narratives, it was clear that some of the teachers were not strong in certain elements of the evolving framework. They may have had low administrative support, limited resources, or were not particularly strong in their ecological knowledge base. Yet they conveyed how these "weaknesses" were overcome by complementary strengths, which enabled them to provide effective environmental education. In other instances, teachers showed strengths in complementary elements, which enabled them to greatly expand student opportunities and learning.

Figure 3 (the following page) illustrates these inter-dynamics. The figure displays how specific strengths in any of the three categories (identified by a "+" on one side of the middle column) work in dynamic with factors on the opposing side of the figure. While each example within the figure is not drawn directly from interview narratives, the sum of the interviewing experience left the researcher with this inter-dynamic image, from which these examples were inferred. The figure illustrates how, in some instances, strengths ("+" items) can be used to overcome limitations or weaknesses ("–" items), and yield still-effective EE. In other circumstances a teacher may exhibit strengths on both sides of the figure (elements from two different categories) - often the case with successful environmental educators - in which case synergy is likely to occur. Such dyads illustrate - in a simplistic way - the rich complexity of interactions among the forty-two framework elements. In reality, interactions appear to be evident both within and between categories.

Teaching Conditions	<«-»>	Teacher Competencies
Low administrative and/or community support	- +	Strong resourcefulness in accessing resources; creative
Access to out-of-classroom	+ +	Understands local-to-global issue connections
Exceptional local human (socio-cultural) resources	+ -	Somewhat weak in ecological & socio-political knowledge base
Limited flexibility in curriculum or school schedule	- +	Very rich and creative with diverse instructional strategies
Limited bio-physical and other resources	- +	Creative instructional strategies and ability to make connections
Teaching Conditions	**<«-»>**	**Teaching Practices**
School does NOT model environmentally responsible behaviors	- +	Teacher practices environmentally resp. behaviors
Limited access to out-of-classroom	- +	Involves external folks as resource persons
Flexibility in curriculum and scheduling	+ +	Continuous environmental focus of teaching
Exceptional administrative support and cooperative teaching environment	+ -	Has difficulty taking risks; new teacher to the community
Limited bio-physical and socio-cultural resources	- +	Consistent "can do" attitude, invests self & personal resources
Teacher Competencies	**<«-»>**	**Teaching Practices**
Strong local cultural understanding	+ +	Student-centered learning, utilizes student strengths/passions
Initially, a limited ecological knowledge base	- +	Experiential teaching orientation; reflection in planning/application
Ability to make connections	+ +	Nurtures a sense of place
Strong on EE and other learning theory	+ +	Infectious passion for EE, and for teaching in general
Has difficulty making connections	- +	Student-centered learning; risk-taker
Exceptional facilitation skills & ability to make connections	+ -	Not particularly passionate in teaching; chooses not to invest personal resources

Figure 3) Interaction Between Elements in Framework Categories

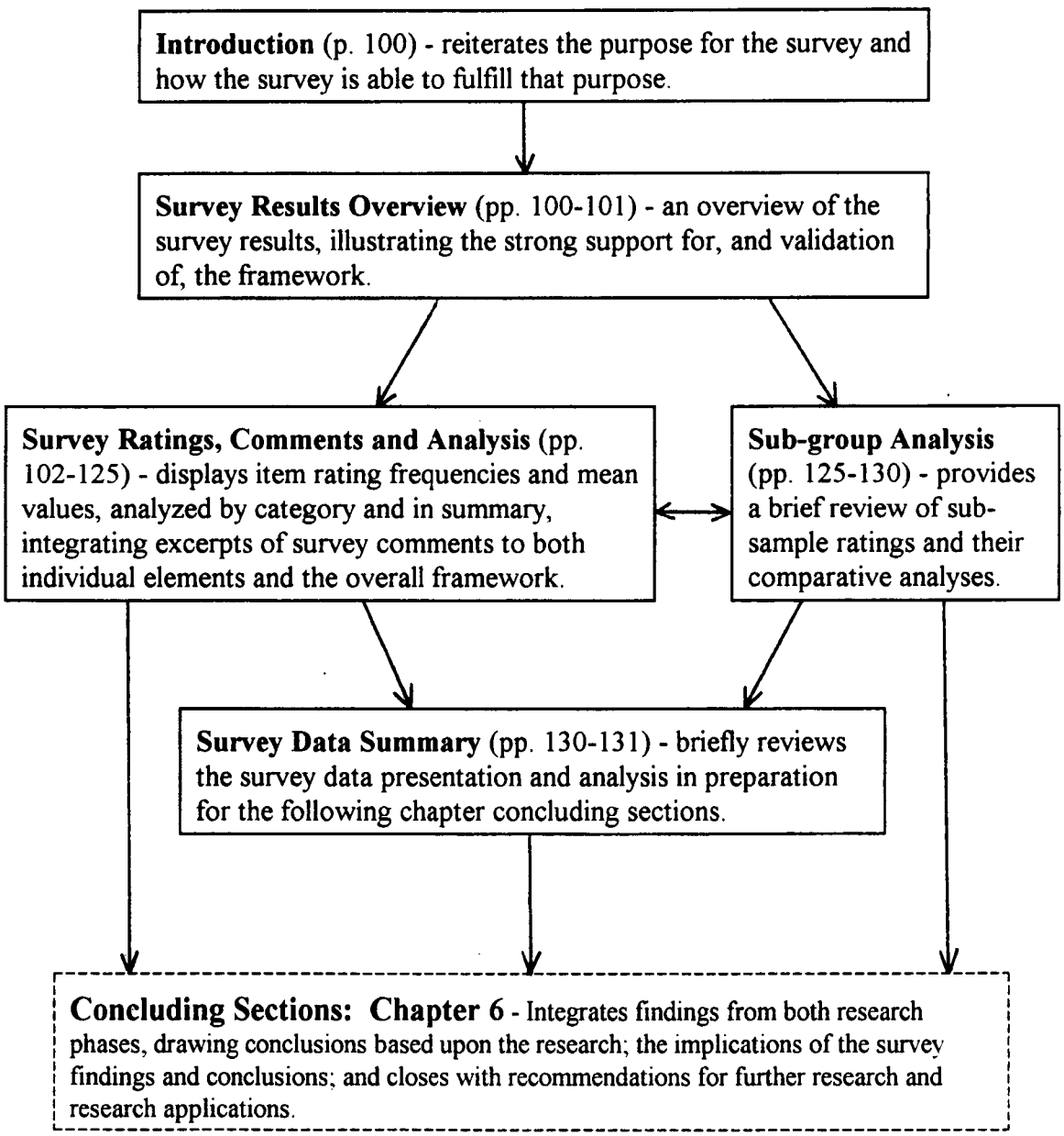
Linking Research Phases

The narrative research - with the infusion of the literature-review base - provided a wealth of narrative data which enabled the construction of a fairly wholistic *Elements of Success in EE* framework. The teacher stories confirmed that individual educators can indeed make substantial contributions to student growth in environment-related educational outcomes. Their stories also highlighted the tremendous influence *teaching conditions* have upon the daily and long-term efforts of educators across the country. The practitioner experiences substantiated the existence of three major divisions of elements which contribute to teacher efficacy: the student/teacher/school/ community context, the teacher's personal proficiencies, and how the teacher interacts with the students - both within and beyond the school walls. I remain deeply indebted to these fine educators who brought to light this lucid representation of the environmental educator's teaching world.

The interview-derived framework received consistent support - a measure of validity - from the interviewees themselves, as well as the researcher's colleagues and advisors. All forty-two elements were grounded in interview evidence, bolstered by the research literature or the author's subjective judgment where the evidence was limited, and then validated through interviewee reviews.

Complementary research methodologies can add integrity to a given research project. Again, I quote from Marcinkowski: "When focused upon the same issue, qualitative and quantitative studies can triangulate - that is, use differing methods to assess the robustness or stability of findings. Where studies using different methods have similar results, one can be more certain that the results are not influenced by the methodology" (1993, p. 65). The research intentions were to identify the major factors which foster student growth toward desired EE goals. The quantitative research element - the survey - provided opportunity to further validate - and assess the reliability of - the qualitative research-derived framework. A survey enabled framework appraisal by a broader national audience - evaluating framework validity/utility, and suggesting additional refinements.

Chapter 5
Research Phase II - The Survey: Data Presentation and Analysis



Introduction

The purpose of the survey was to provide broad-based practitioner evaluation of the *Elements of Success in EE* framework - to substantiate framework integrity and utility, and enable further refinements. While the interview-derived framework had validity and acceptance by the interviewed environmental educators, the survey brought opportunity to assess the framework validity, reliability, its relevancy to a broader educational audience, and across a variety of subgroups.

The national survey, sent to 500 educators in early 1997, enabled substantive input from **all** regions of the United States. A high response rate and consistently high evaluation from these educators gave substantial indication of the framework's content validity, reliability and relevance. Variations in element mean rating scores, coupled with insightful comments, brought further indications of relevance and a rich critique of the framework.

Survey Results - An Overview

The high response rate (65.6%) brought input from a broad spectrum of environmental educators across the United States, with a balanced representation of third-to-eighth grade public school teachers involved in EE (see "Survey Sample" in *Chapter 3*). The overall framework ratings and average mean scores for all categories and elements was between high and very high (details follow). The framework had coherence, confirmed by very high internal consistency - Cronbach's alpha - scores for entire framework (α=.94), and its three parts - teaching conditions (α=.88), teacher competencies (α=.89), and teaching practices (α=.90). Content validity and relevance was demonstrated by the consistent support from the broad audience, the clear relevance proclaimed by numerous comments, and the fact that fifty-three of the respondents expressly requested (not a "check-off" item on the survey) a copy of the research summary. Finally, the high response rate, the

strong representative nature of the sample, the consistent high ratings across sub-groups, and high internal consistency provides strong indication that the framework possesses a high level of "known group" (environmental educators) and construct validity.

The two overall framework evaluation items were each rated high-to-very-high respectively, at 4.15 and 4.11 on a 5-point scale for inclusiveness and ability to illustrate the complex of elements which enable a third-to-eighth grade teacher to foster student growth in desired EE outcomes (for exact wording on these and other elements, see the survey in *Appendix E*). This numerical support was augmented with extensive comments (*Appendix I*). The **categorical** evaluations were also each rated between high and very high: the *Conditions* category with a mean of 4.17, *Competencies* - 4.30, and *Practices* highest at 4.41.

The average mean rating for all forty-two elements was 4.15 (SD = .44). The three elements which received the strongest support were all in the *Practices* category - #13, *Practices environmentally responsible behaviors* (mean of 4.60); #10, *Infectious passion for EE and teaching in general* (4.59); and #3, *Experiential teaching orientation* (4.52). The three with the lowest rating were Condition #7, *Non-local resources* (3.40); Competency #6, *Computer proficiency* (3.46); and Condition #3, *Community support* (3.61).

Fully one-half (21) of the elements received ratings of 4.25 or greater **and** had standard deviations of .8 or lower - few responses differed substantially from the high rating. Elements with these combined qualities are considered "bedrock elements." Practitioners across the country consistently judged these elements to contribute very significantly to student growth in EE outcomes.

The high survey response rate was matched with quality. Of the 328 surveys returned and entered, only one survey page was not completed. While n-sizes for the items range from 308-328, the majority were at 326-328, exhibiting the teachers' careful responses. Over one-half of the survey respondents (174) included comments in some form - several attaching extra pages expressing their thoughtfulness, and illustrating the depth and richness of their experiences. Almost all expressed

strong support for the framework, with comments such as: "I was impressed at how well you captured the essence of the critical components of EE teaching in your questions. I made a copy of the survey to help me remember what is important in EE teaching" (#15 - all survey comment quotes are referenced by the source survey number; see *Appendix I* for the entire set of comments).

Survey Ratings, Comments and Analysis

The following data presentation begins with the general, then moves to the specific. The item-by-item numerical ratings provide strong support for the validity of the framework which identifies the major teaching elements which foster student growth in environment-related knowledge, attitudes, skills and responsible behaviors. The comments reinforce the support, and provide differing perspectives for the framework revisions presented in the concluding chapter and associated appendixes. Because of this, representative comments are presented concurrently with the ratings.

As noted in *Chapter 3*, where comparisons are made between ratings of two elements, if total sample mean differences are less than one-tenth point, the item means are considered essentially identical. Where differences are between one- and two-tenths, they are deemed worthy of reporting. But only those with greater than two-tenths are regarded as meaningful, and their significance is explored and reported, using a paired sample t-test at a five percent level of probability. Since the sample is not random, please remember that such estimates of statistical significance do not have rigorous statistical validity.

Overall Framework Evaluation

The survey contained two items requesting appraisal of the overall framework. The first of these items asked respondents to rate the extent to which the overall framework includes the major elements which enable third to eighth grade teachers to foster student growth in desirable EE

outcomes. The second item asked them to rate the framework for its ability to illustrate the complex of conditions, competencies and practices which enable similar student growth. These two items received high-to-very high mean respective ratings of 4.15 (SD=.75) and 4.11 (SD = .79; see *Table 4*). The results presented in *Table 4* suggest the respondents decisively concurred that the overall framework includes all major elements requisite to achieve the identified EE goals, and effectively illustrates the complexity of the three categories of component elements.

Another way to assess framework quality is by its internal consistency - how well its component elements adhere to one another. The full framework was found to be highly reliable (α=.94; a value over .7 is considered good). And, though alpha levels typically drop when there are fewer measurement items, reliability measures remained very high for all three categories: *Teaching Conditions* (α=.88), *Teacher Competencies* (α=.89), and *Teaching Practices* (α=.90), further confirming framework coherence.

In the following segments of this overall framework evaluation, excerpted comments are presented to show evidence of: framework quality; thought-provoking and inter-dynamic nature; viability with other disciplines; criticisms, insightful suggestions; and evidence of the few instances of self-rating.

Framework and Survey Quality

Most of the comments were positive. Some of the comments related to the survey instrument itself: *Nice instrument* (#35); *Wonderful survey* (#232); and *Good job on the survey* (#416). But

Table 4: Rating Percentages and Means for Overall Framework Evaluation

Item Description	very low significance - 1 «----» 5 - very high significance						
	1	2	3	4	5	Mean	N
1) **Inclusiveness of all major elements**	0	1.9	15.9	47.1	35.0	4.15	314
2) **Illustrates complexity**	0.3	2.6	16.6	46.6	33.9	4.11	313

most of the comments pertained to the high level of support and usefulness of the framework.

Representative comments and presented below.

Excellent choice of elements. These are, I believe, "what it takes" to facilitate learning in an effective manner and w/lasting rewards for students (#54).

You have really done a spectacular job in itemizing a list of ingredients in promoting EE successfully (#6).

The framework looks very promising! That qualities and strategies you have listed will benefit students if implemented (#334).

Your questions show your interest in the subject matter and the high degree of work you've put into this facet of education (#389).

Your questionnaire reflects great depth of understanding and 'feel' for EE. Good work! (#465).

Some comments conveyed explicit respondent interest in the framework school district utility:

Our school is currently developing a number of grant proposals which address many of the issues and concerns indicated in your survey. We feel strongly that the EE framework you are describing (conditions, competencies, and practices) needs to be supported & developed in our school in order for our students to have a clear understanding of local/universal environmental issues & their role in the community as environmental conservationists. I would be interested in seeing the results of your survey (#189).

And with respect to a state-level EE organization:

I would like a brief summary of the completed research. Our state EE organization may be able to use the information (#339).

Framework as Thought-Provoking

Then, on an individual level, a number of respondents found the process of survey completion thought-provoking.

I think that a survey such as this will help teachers realize the importance of EE (#190).

Your questionnaire and survey questions provoked some interesting self-analysis. The teachers you interviewed obviously gave you some cogent points (#57).

Reading these questions reminded me of the possibilities of education and teaching and all the things I believe in and made me excited about starting this career (#284).

I would appreciate receivir g a summary report of your research. I myself am looking toward entering into a doctoral program in the very near future. I found your framework engaging and thought-provoking (#28).

Framework Inter-dynamics

As noted in *Chapter 4* with the presentation of the interview-derived framework, the elements are not static or isolated, but work interactively to create the "whole" of effective EE. These teachers captured facets of those interactions:

I strongly feel that EE is dependent on students developing that sense of "connectedness" or ownership to a community/environment. The teacher's enthusiasm is infectious and needs to be reinforced by administrative recognition and praise. I see faculty becoming easily discouraged when not given opportunities to expand EE, either personally, through in-service courses, or professionally, through curriculum development (#79).

The answer is very simple. Your document stresses the things we all know are necessary and desirable, but it all boils down to dedication. Is the teacher willing to go the distance? It takes many extra hours and a great deal of "expeditional learning." Field trips are an absolute necessity. Risks must be taken. Roadblocks must be circumvented. Create. Constantly create. The process is at least as important as the product. Utilize resources. Network (#243).

Framework Viability with Other Disciplines

Some pointed out that the framework had utility with many other disciplines, or simply for education as a whole.

I felt that the teacher practices you are evaluating hold true for all areas of study and implementation (#206).

It should be noted that these questions/conditions fit perfectly with all teaching/learning (#311).

This survey is based on learning styles and present philosophical approaches to teaching. You could easily substitute EE for <u>any</u> subject (#458).

Framework Criticisms

The framework's broad potential applicability led a few respondents to criticize it as idealistic.

These elements are so inclusive that it's impossible to meet all of them by any teacher, school or school system. They are all very important not just for EE, but for almost any field of curriculum... (#17).

Conditions stated are all ideal and would certainly foster growth and awareness. However, I feel that they are too idealistic. By supporting all of these, I feel it would be discouraging to feel that I could make difference in a child's environmental understanding and awareness [*sic* - perhaps concern if teachers felt they had to have ALL of them?] (#349).

Other general criticisms show evidence of the different ways the research was received by participants. The more specific and constructive comments which suggest possible framework changes are presented with the "insightful suggestions" below.

Needs more focus on teachers interest and commitment to EE (#47).

The survey is good, but seems laden with jargon, especially in relation to cultural-relatedness. I don't see the need for team teaching or cooperative learning in EE as compared to regular ed. All education works well either way. They are desirable, but not necessary (#108).

I feel that this survey leans heavily toward constructivist theory. I agree with some of the philosophy, but EE was successful before constructivist philosophy came in vogue.... Again, I agree and practice many of what constructivists preach, but I also do what works. I would have liked to see a more balanced survey (#357).

This is a good questionnaire if it doesn't overly promote "super professionalism" at the expense of humanism (#420).

Some questions were extremely wordy for those of us who are out in the field working with kids (#440).

Insightful Suggestions

The following two excerpts convey some of the challenges faced in working with an educational framework - expressing the art and subtleties of EE in the field. Categorical or element-specific suggestions are included later in this presentation.

I'm concerned that most of recent EE has focused overwhelmingly on issues - even for young kids - recycling, greenhouse effect, rainforest destruction, etc., when I think we need to spend a lot more time on the purer subjects of ecology/natural history/biology/ call-it-what-you-like, especially w/elementary students. Ecologists, of all people, should know about the necessity of a secure base of the pyramid [illustrates a pyramid w/natural history at the base, issues at the apex]. Kids should know about trees & birds & bugs before they write letters to Congress about them! This is a big issue w/me, one that has turned me off to many environmental groups - too much gloom and doom.

On the other hand, kids can recycle paper and cans (etc.) w/scouts, family, church, school, and do other things that are "good practices" w/o getting into the issues too much - planting trees, cleaning up litter, stenciling storm drains, etc. They're seeing positive results w/o the gloom and doom, and perhaps learning something in the process. I do all of these things with my students (and several other things, most notably study birds in great detail) - and my goal is not the particular facts involved in the issues, but rather what your survey calls "personal behaviors." Kids are looking for role models, and they'll never forget a beach clean-up or planting dozens of native trees. For those going onto a field in environmental sciences, the facts in the issues will be well known to them, but most people will be "average" citizens, and they need to be exposed to such things, too.

For my money, the single best way to teach EE is this - mind you, I'm not holding my breath, nor is it the easiest: our social studies curriculum needs to be re-written so that the environment is explicitly front and center and indispensable to an understanding of history, from the flooding of the Nile, to the size of Africa being a deterrent to the East Indies, to Columbus following migratory birds, to Lewis & Clark, the Dust Bowl, etc. We've got to get the sanctimonious preaching ("Save the Whales") out of environmental ed (that's environmentalism, not ed). I now call it "environment ed" because I want those who can see the difference to see the difference (#108).

One must also consider children's emotional and physical development. Through my experience working with children in the age group identified in the framework of Elements of Success, I've discovered that 3rd, 4th and even 5th graders are more inclined and motivated to do EE activities than middle school age students (#113).

Evidence of Self-Rating in Responses

While the survey clearly requested teachers to "rate the significance of each item in fostering 3rd-to-8th grade student growth...," there is evidence that a few teachers completed the survey with self-rating scores, as evident in these two excerpted comments:

My scores may be higher than a regular teacher, because of my passion to improve the environment, and instill a sense of ownership for our world in students (#202).

Others may rate me a little higher in some areas, but I know how much more I have to learn. The kids and I do have fun (#379).

Framework Evaluation by Category

While the preceding section reviewed the big picture, this section examines the categories and each element therein. The categorical- or element-specific comments re-affirmed the importance of some elements, advised changes in element focus/descriptions for others, and identified possible new elements to round out the framework as a whole (for which, see *Chapter 6*). Because the comments

play an important role in this research, they are presented here at some length, excerpted from their full presentation in *Appendix I*. The wording of the survey (*Appendix E*) suggests that elements with higher mean ratings are elements believed to hold greater significance in fostering student growth in desired EE outcomes. Items with lower ratings were deemed of lesser significance in the educational process. Those with high-to-very high ratings **and** low standard deviations could be considered foundational or "bedrock elements"- consistently rated highly significant. In the following pages, the ratings are presented in table and figure form for each category. An analysis of the element ratings and comments follows their data presentation, with the concluding segment for each category discussing comments related to the category as a whole.

Teaching Conditions (Cronbach's α=.88)

Table 5 and *Figure 4* present the teacher ratings for the *Teaching Conditions* elements. Overall, the average mean score for the thirteen elements is 4.03 (SD = .59), somewhat lower than the item where respondents evaluated the teaching conditions category 4.17 (SD = .75), but slightly above "high." The three "bedrock conditions" - those with very high scores and low standard deviations - were *flexible curriculum* (#8), *collaborative learning environment* (#10), and *students bear consequences of behaviors* (#13).

SUPPORT (average mean rating: 3.98; SD = .79)

In the **support** sub-category, both administrative support and adequate teacher planning time were rated quite highly, though the standard deviation for teacher planning time was considerably higher (1.16 versus .83). The perceived benefits of administrative support (4.21) are greater than those from the community (3.61) (difference = .60; $p<.01$).

#1) **Administrative support** (mean rating: 4.21; SD = .83) - The importance of administrative support was articulated very clearly in the following two quotes.

Table 5) Percentages and Mean Ratings for Teaching Conditions

TEACHING CONDITION	very low signific. - 1 «---» 5 - very high signific.						
Subcategory or Element Title	1	2	3	4	5	Mean	N
SUPPORT						3.98	
1) **Administrative support**	0.6	2.8	14.4	39.1	43.1	4.21	327
2) **Adequate teacher planning time**	3.4	9.1	14.0	19.2	54.3	4.12	328
3) **Community support**	2.4	9.5	33.0	34.6	20.5	3.61	327
RESOURCES						3.81	
4) **Access to out-of-classroom**	0.9	4.6	12.8	29.9	51.8	4.27	328
5) **Local environmental (bio-physical) resources**	1.2	4.0	25.3	40.5	29.0	3.92	328
6) **Local human (socio-cultural) resources**	3.4	7.0	30.8	39.0	19.8	3.65	328
7) **Non-local resources**	1.5	10.4	44.5	33.7	9.8	3.40	326
FLEXIBILITY						4.31	
8) **Flexible curriculum**	0.3	2.5	9.8	34.3	54.1	4.40	327
9) **Flexible schedules**	1.8	6.1	11.9	29.7	50.5	4.21	327
CLIMATE - *heavily influenced by teacher*						4.14	
10) **Collaborative learning environment**	0	0.6	13.4	35.4	50.6	4.36	328
11) **Cooperative teaching**	2.5	10.1	30.4	33.7	23.3	3.65	326
12) **School/classrm models env. resp. bhvrs**	0.3	4.3	14.6	39.0	41.8	4.18	328
13) **Students bear consequences of behavrs**	0	1.8	11.4	33.8	52.9	4.38	325
14) **Categorical evaluation (*CONDITIONS*)**	0	2.1	14.0	48.7	35.1	4.17	308

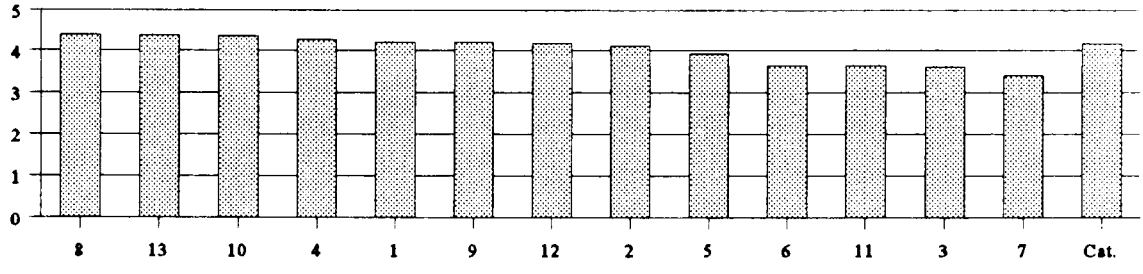


Figure 4) Teaching Conditions - Mean Rating Scores

As an EE teacher, my greatest drawback now is an administrator who will not allow or accept any more EE credits because it's not in "my area" (#308).

Support, resources and a willing teacher are the prime factors to initiate and foster an EE program in a school setting. A teacher may be very competent and implement highly successful teaching practices laced with personality plus. But if he/she is not supported by the administration, the EE program becomes a personal in-classroom event. Until EE is mandated as a subject to be implemented in all classrooms, few students are empowered and their learning is filled with factoids with no connection to the real world (#481).

Here is evidence of a teacher's ability to nurture/gain administrative support:

When I first started teaching 5 years ago, I had virtually no support from anyone for EE. My principal was discouraging, parents unsure, and even students tended to whine at times about EE-type activities. However, over the past few years, my drive has overcome the early obstacles. We have been featured on the cover of a magazine, in our local newspaper, and on a local gardening show. The superintendent showed us off to NSF when they were evaluating our system for continued funding. The administration is asking me to promote EE through workshops (#200).

Some respondents felt administrators need to work collaboratively, while others - in their comments - rated that segment of the element lower than the essential that they not set roadblocks. Finally, one comment pointed out that "staff support is as vital as administrator's support" (#374).

#2) **Adequate teacher planning time** (mean rating: 4.12; SD = 1.16) - Inadequate teaching time (the inverse of this condition) has been frequently cited in prior research as a major barrier to effecting EE (Hamm, 1988; and others). From such research one could surmise that *adequate teacher planning time* would be rated of very high significance in the *elements of success in EE* framework. In fact, 54.3 percent of teachers rated this element of very high significance - the highest of **all** the conditions. Yet it also had the highest standard deviation (1.16) of **any** element, showing somewhat less relative consistency in the support for this element. Nevertheless, the element's importance is well exemplified in the following quotes:

Basically the bottom line is that elementary teachers lack adequate time for preparation of extra curriculum which EE is slotted in most educational arenas (#162).

Although the range of interaction with the environment can vary from a few activities to an all year investigation, I think teacher planning time is the key component to the success of any endeavors into fostering environmental awareness of students (#6).

#3) **Community support** (mean rating: 3.61; SD = .99) - Whereas EE happens in and with the community, and student-directed learning is the desired approach, specific community support was not, on average, rated as highly as other elements. As noted by one teacher: *Good to have, but can manage without* (#368).

RESOURCES (average mean rating: 3.81; SD = .72)

With the four resource-related items, rated significance for being able to take students outdoors was highest (at 4.27), with somewhat less perceived value for the two local resource items and least in non-local resources - rated 3.40 (the two extremes differed by .67, $p<.05$).

#4) **Access to out-of-classroom** (mean rating: 4.27; SD = .92) - There were few explicit comments related to this highly-rated element. Some teachers have access to extensive outdoor experiences, others are more frustrated by their absence: *1 trip is allowed per year* (#64 - respondent self-rated this one - a "1").

#5) **Local environmental (bio-physical) resources** (mean rating: 3.92; SD = .90) - Some of the interviewed teachers expressed their view that they "couldn't teach" in a setting without some "natural" surroundings. Reinforced here: *Having access to local environmental resources is of utmost importance* (#230). The combination of quality environment and financial/technological/ material resources made its interpretation somewhat uncertain: *'re resources - what about resources such as books and lab materials* (#483).

#6) **Local human (socio-cultural) resources** (mean rating: 3.65; SD = .98) - Most pointedly, some respondents believed parental involvement was very significant:

> *Parents helping is a great idea.... We need parent support in the home, they need to reach respect for each other and adults and they need to teach their children to value education. If parents gave that support, we as teachers could get the information across* (#53).

> *Yes, we do have parental help. It is okay. We need more* (#202).

#7) **Non-local resources** (mean rating: 3.40; SD = .86) - The general tone of comments with this element was "nice but not necessary" (#423). Yet the item was rated highly by others as essential to the initiation of major program efforts., e.g.:

> *Outside resources were a wonderful help. These organizations and individuals provided us with unique experiences! I would have been lost without their knowledge and willingness to give us their time!* (#20)

FLEXIBILITY (average mean rating: 4.31; SD = .77)

Both **curriculum** (#8) and **schedule** (#9) flexibility were very highly rated. Here again the potential influence of self-rating plays a role. Research shows teachers feel limited by curriculum and scheduling in-flexibility. Self-rating teachers would presumably rate these elements lower, and yet they were two of the more highly rated elements on the survey (respective means of 4.40, SD = .75; and 4.21, SD = 1.00). This confirms that, while the self-raters may have somewhat lowered mean scores on some of the elements, their numbers are likely small enough to have had fairly minimal impact upon the overall mean scores. The two flexibility elements received few comments, but those few reinforced element importance (see *Appendix I*).

CLIMATE - *heavily influenced by teacher* (average mean rating: 4.14; SD = .64)

Three aspects of **climate** were rated highly significant, while one of the four elements - cooperative teaching - received a somewhat lower rating (3.65). However, considering the frequency of extant cooperative teaching, one might consider that rating to show its merit.

The support for a **collaborative learning environment** (#10 - mean rating: 4.36; SD = .73) was much higher than that for **cooperative teaching** (#11 - mean rating: 3.65; SD = 1.02). The difference (.71, $p<.05$) was perhaps indicative of the typical nature of the teaching environment, where there are individual teachers in a classroom with many students.

#12) **School/classroom models environmentally responsible behaviors** (mean rating: 4.18; SD = .86) - a fairly highly rated element. Interestingly enough, the parallel element in the *Practices* category (#13: "practices environmentally responsible behaviors") received the highest rating of **all** elements (4.60). This may suggest support for personal accountability, while nurturing this capacity on a school-wide basis may not be practical for some educators.

Finally, **students bear the consequences of their behaviors** (#13 - mean rating: 4.38; SD = .80) - received a number of extra "+" emphases in the survey side-margin. Students learn from their own consequences, part of the connection-building noted as competency #12.

Discussion - Conditions Category

One comment showed the simultaneous importance of several teaching conditions:

I see two factors in education as being major hurdles for EE. One is lack of money to provide materials or transportation for EE experiences. The second factor is a limiting curriculum that some principals and superintendents are unwilling to bend from (#407).

Extensive curriculum requirements can constrain teacher creativity and exploration of alternative strategies. In addition, classroom size and the nature of the student population itself - elements not specifically included in the framework - may constrain some EE efforts. These concerns are well-expressed in these quotes which close the *Conditions* review.

Although I may have the opportunity to use alternative instructional approaches, I feel restricted by other factors. The breadth of my current curriculum severely limits the degree to which I can implement the teaching practices described in this framework. I would really like to utilize more of the practices, but they are so time consumptive that there would be holes left in the students' knowledge base.

A factor that also seems to limit the experiences for the student is the classroom dynamics. With "inclusion" and the needs of the students sometimes, the "freedom" to explore and discover evolves into chaos. With the different learning styles, needs of students, methods of retention, it is a management process to help an outdoor classroom meet the needs of all students (#365).

There is one variable that is not considered in this survey. I work on a team of 4 teachers.

They are willing to assist minimally. Having team members join the force and take responsibility for environmental learning has been a difficult variable. Much more could be done if cooperation was a priority. Mutual responsibility for EE is a limiting factor (#374).

Doesn't mention student-teacher ratio, or student population (#380).

I don't see the student in this framework - readiness, ability, history, attitude, skills (#483).

Teacher Competencies (Cronbach's α=.89)

Table 6 and *Figure 5* illustrate the teacher ratings for the *Teacher Competencies* elements. Here again, the categorical evaluation (4.30; SD = .64) was higher than the average mean score for all elements within the category (4.19; SD = .47). Most elements within this category were highly rated. An interesting comment by one teacher points to the value of all the competencies: *"Bonus Pay" needed for all staff members who receive the knowledge base, skills and integration-ability training and practice their dynamics to foster EE growth* (#348). Another comment: *Don't think you could do much EE without these, regardless of other conditions* (#368).

With the exception of *computer proficiency* (#6), all competencies were rated at nearly 4.0 or above, with standard deviations of .80 or less. The "skills base" items were fairly close in average mean score with the knowledge base items, but the "integration-ability" items were higher than the other two sub-categories by more than 0.2 points ($p<.05$), with standard deviations of .71 or lower.

KNOWLEDGE BASE (average mean rating: 4.06; SD = .59)

The **knowledge base** elements received a high average mean rating of 4.06, though not as highly rated as the other *Competency* sub-categories. Teacher educators in EE have placed much emphasis upon helping teachers develop a strong knowledge base in ecology - and more recently socio-political sciences, yet these were rated not rated as highly as the elements under "skills" or "integration-ability." Ratings for all sub-category elements were approximately the same (3.99-4.10).

Table 6) Percentages and Mean Ratings for Teacher Competencies

TEACHER COMPETENCY	very low signif. - 1 «----» 5 - very high signif.						
Subcategory or Element Title	1	2	3	4	5	Mean	N
KNOWLEDGE BASE						4.06	
1) **Ecological knowledge base**	0	2.4	18.0	48.6	30.9	4.08	327
2) **Socio-political knowledge base**	0	2.1	23.3	48.8	25.8	3.99	326
3) **Local cultural understanding**	0	1.5	18.2	48.9	31.4	4.10	325
4) **Teaching and learning theory**	0.3	3.7	18.0	43.7	34.3	4.08	327
SKILLS BASE						4.15	
5) **Listening/questioning skills**	0	1.2	10.1	45.0	43.7	4.31	327
6) **Computer proficiency**	3.1	9.5	39.3	34.7	13.5	3.46	326
7) **Diverse instructional strategies**	0	1.2	12.5	46.5	39.8	4.25	327
8) **Resourcefulness in accessing resources**	0	1.5	11.3	35.8	51.4	4.37	327
9) **Creative; knows how to do without**	0	0.3	7.6	35.8	56.3	4.48	327
10) **Alternative assessment abilities**	0.3	2.8	19.9	46.2	30.9	4.05	327
INTEGRATION-ABILITY						4.37	
11) **Facilitation skills**	0	0.6	7.3	44.6	47.4	4.39	327
12) **Ability to make connections**	0	0.3	7.6	41.9	50.2	4.42	327
13) **Understands local-to-global issue connectns**	0	0.3	10.5	46.2	43.1	4.32	325
14) **Ability to integrate curriculum**	0	0.6	11.7	39.0	48.8	4.36	326
15) **Categorical evaluation (*Competencies*)**	0	0	10.0	50.3	39.7	4.30	310

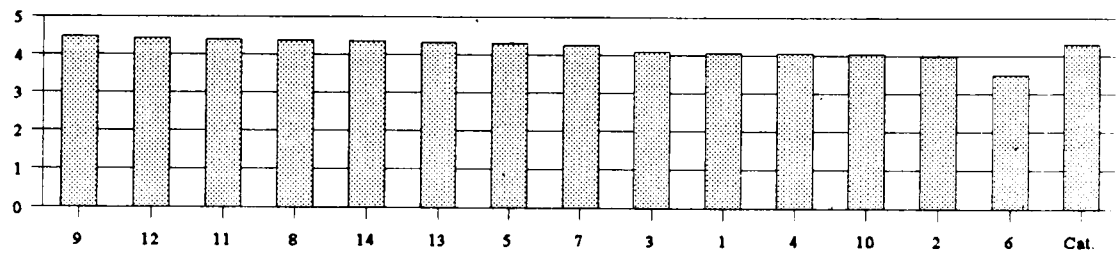


Figure 5) Teacher Competencies - Mean Rating Scores

#1) **Ecological knowledge base** (mean rating: 4.08; SD = .76) - The fairly consistent message - echoing "not as high as others" rating for this element - was that the *teacher must be willing to learn along w/students* (#46). It is *highly desirable but not necessary* (#108); *strong is best, but beginners can be very effective* (#368).

> *Teachers need not have an enormous wealth of environmental knowledge in order to foster EE goals in their students. They need only have the desire to learn, the knowledge of resources and the passion for EE. Learning with your students can be more powerful than being a fountain of information. I have learned about dissolved, oxygen, fecal coliform and nitrates along with my students. They are engaged and very passionate about what they are learning. They see my excitement, wonder and confusion and they feel validated* (#8).

#2) **Socio-political knowledge base** (mean rating: 3.99; SD = .76) - The explicit importance of a socio-political knowledge has received relatively recent recognition in EE, yet the element was rated at a level close to that for ecological knowledge. There was some suggestion that its importance *depends upon the grade level* (both #358 and #380). Its challenging influence upon local environmental issues was also subtly noted: *If you understand too much, you'll get cynical* (#368).

Local cultural understanding (#3 - mean rating: 4.10; SD = .74) and **teaching and learning theory** (#4 - mean rating: 4.08; SD = .83) received very similar ratings and few comments. Their importance are re-explored in the concluding sections and appendixes.

SKILLS BASE (average mean rating: 4.15; SD = .53)

With the exception of computer proficiency, all the **skills base** elements were highly rated. The average mean score for all these elements is 4.15, though this value would rise to 4.29 if computer proficiency were excluded. Clearly, practicing environmental educators highly rate the ability to resourcefully access (4.37) and creatively utilize (4.48) resources. They also consider having diverse instructional strategies of high importance (4.25), including their listening and questioning skills (4.31). Ability to conduct alternative assessments was not quite as highly rated (4.05).

#5) **Listening/questioning skills** (mean rating: 4.31; SD = .70) received no comments, and yet a fairly high rating. The item has similar qualities to those of element #11 -facilitation skills - for which the rating was quite similar (4.39).

#6) **Computer proficiency** (mean rating: 3.46; SD = .95) - The main message received from the somewhat lower rating for this element could be summed up in the *hands-on is more important* (#358) comment. A more in-depth understanding is apparent with the following:

> *Students in the 90s have or use computers. The computer is in the "library," in many classrooms, and in the home. The technology is moving quickly and we have CD ROMS, laser discs and all kinds of attachments to the computer. Students I teach love to "play" on the technology, but they don't "use" the technology. They use the computer as a quick encyclopedia to look information up for them, they have lost the skills of looking up information for themselves. They don't use primary sources or interviews as research information, they go to the computer. They flash pictures on a screen but they don't read the information that goes with it. Even when they play a "game" such as Amazon Trail, they find the creatures, but they don't go into the information to read about the animal. We use calculators in math, the skills of multiplying or adding and subtracting in their head are gone. We don't require cursive handwriting any longer because too many of them can't write neatly -- they type. The problem arises when there is no computer to take a test or the calculator shuts down. The student shuts down too. Don't get me wrong, I think technology is wonderful and I think it enhances both teaching and learning - I'm just very concerned that we have begun to expect less of our students, we've lowered our expectations, and it's because we've made life easier for them* (#53).

Diverse instructional strategies (#7 - mean rating: 4.25; SD = .72) and **resourcefulness in accessing resources** (#8 - mean rating: 4.37; SD = .74), both highly rated, also received several extra "+" ratings (see *Appendix J*). But the most "decorated" of elements pointed out that teachers must be **creative; know how to do without** (#9 - mean rating: 4.48; SD = .65), which received six extra "+," "*" or other such notations in the margins. Collectively, the rating these three elements received accents the benefits of the creative use of diverse resources and teaching strategies.

The final "skills base" element was **alternative assessment abilities** (#10 - mean rating: 4.05; SD

= .80), which are currently "in vogue" at state and national levels, and academia. Teachers rated this element highly, but not exceptionally so, though women rated it higher than men (4.14 relative to 3.79 - see section on sub-sample analyses).

INTEGRATION-ABILITY (average mean rating: 4.37; SD = .53)

The ability to integrate and make connections with students is considered very critical to effective EE. The various **integration-ability** elements received an average mean score of 4.37, with no single element standing out markedly. All are considered highly valuable capacities to help foster student growth in desired EE outcomes.

Facilitation skills (#11 - mean rating: 4.39; SD = .65), which include a diverse set of skills, including listening and questioning, sensitivity, on-going reflection and adjustment, were quite consistently highly rated.

#12) **Ability to make connections** (mean rating: 4.42; SD = .64) - Based upon the interviews, this element appeared as one of the most critical of all listed elements. This perspective is clearly echoed in the following comment which appeared adjacent to an "*" in the side-margin by the element: *I believe that this is the key to learning..., we must make connections or ask why are we teaching this!!* (#34). A richer illustration comes with this quote:

> *We have developed, and each year revise, a 6th-8th grade "Science" framework. We not only make connections to/with the other sciences, but we also spiral and revisit the concepts/ideas with the other disciplines within each grade level. We reinforce science concepts by making connections at each grade level. We also take the major topics or themes (often environmental) and "teach" the topic throughout the entire grade level (not only involving core classes, but also many of the non-core classes)* (#382).

The final two competency elements - **understands local-to-global issue connections** (#13 - mean rating: 4.32; SD = .67), and **ability to integrate curriculum** (#14 - mean rating: 4.36; SD = .71)

received quite high ratings, encouraging even greater educational linkages - from the local-to-global scale and between disciplines through integrated curriculum.

Teaching Practices (Cronbach's α=.90)

Table 7 and *Figure 6* present the teacher ratings for the *Teaching Practices* elements. Here again, the average mean score for all elements within the category (4.24; SD = .49) is lower than the categorical evaluation (4.41; SD = .65). This category contains the most highly-rated framework elements, with ten receiving mean ratings of 4.25 or over and standard deviations of .80 or less. Such importance is well articulated in this one comment excerpt:

> *Of the three areas being observed, I believe that the "teaching practices" section is the most important in fostering student growth in EE outcomes. Students tend to mirror the passions of the teacher. If the teacher uses humor and has a positive attitude in the classroom, the students will absorb the environmental information with excitement and curiosity. Using hands-on experiments and field trips will also foster a rich learning environment for the eager students* (#278).

TEACHING METHOD/STYLE (average mean rating: 4.14; SD = .57)

Under the **teaching method/style** grouping, the importance of an experiential teaching orientation clearly stands out, with a mean rating value of 4.52. Utilizing personal and student strengths and passions, and cooperative and inclusive learning were also very highly rated at 4.29 and 4.26. Reflection in planning and action - an increasing focus of teacher education programs - was next, rated at 4.09. The nature and extent of student-centeredness in teaching was more heavily debated, as noted in the comments presentation below. Nevertheless, both this and the involvement of external resource persons were still rated at 3.83, a reasonably high rating value.

#1) **Student-centered learning** (mean rating: 3.83; SD = .92) - Teacher survey respondents had but one of many definitions of "student-centered teaching" to which they reacted. The perceptions of some were based upon the assumption that *teachers may and should be aware of*

Table 7) Percentages and Mean Ratings for Teaching Practices

TEACHING PRACTICE	very low signific. - 1 «---» 5 - very high signific.						
Category or Element Title	1	2	3	4	5	Mean	N
TEACHING METHOD/STYLE						4.14	
1) **Student-centered learning**	0.6	6.1	29.8	36.5	27.0	3.83	326
2) **Utilizes prsnl/student strengths/passion**	0.3	1.2	11.3	43.3	43.9	4.29	328
3) **Experiential teaching orientation**	0.3	0.9	7.9	28.0	62.8	4.52	328
4) **Cooperative and inclusive learning**	0.3	0.6	13.4	44.2	41.5	4.26	328
5) **Involves external resource persons**	1.2	3.4	28.2	46.0	21.2	3.83	326
6) **Reflection in planning and application**	0	2.5	20.9	42.0	34.7	4.09	326
CONTENT ORIENTATION						3.97	
7a) **Environmntl tchng focus (single issue)**	0.9	7.3	37.0	35.8	19.0	3.65	327
7b) **Environmentl tchng focus (mult. issues**	0.9	3.7	24.5	40.2	30.7	3.96	326
8) **Nurturing a sense of place**	0.6	1.2	12.5	39.0	46.6	4.30	328
PERSONAL BEHAVIORS						4.44	
9) **Consistent "can-do" vision**	0.3	0.9	7.6	35.2	56.0	4.46	327
10) **Infectious passion for EE and for teaching in general**	0	0.9	4.3	30.2	64.6	4.59	328
11) **Incorporates humor into classroom**	0.3	1.5	10.1	36.3	51.8	4.38	328
12) **Invests self and personal resources**	0.6	4.0	12.2	41.9	41.3	4.19	327
13) **Practices environ. respons. behaviors**	0	0.3	7.0	25.6	67.1	4.60	328
14) **Risk-taker**	0	2.1	8.5	35.1	54.3	4.42	328
15) **Recharges self**	0.3	2.8	8.9	26.8	61.2	4.46	325
16) **Categorical evaluation (*Practices*)**	0.3	0.3	6.3	44.0	49.1	4.41	316

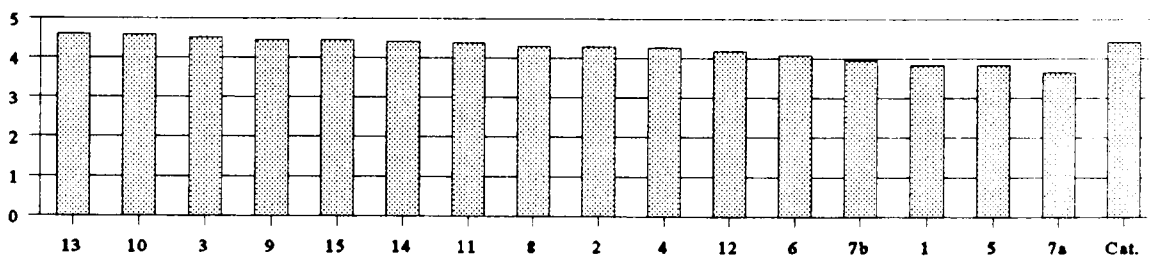


Figure 6) Teaching Practices - Mean Rating Scores

opportunities and experiences the students may not, and should, as a leader, have them gain exposure (#339). Student-centered learning occurs on a continuum, so while there is support for student-centered learning, the extent thereof is not specified through this research.

Some respondents felt the extent of student centeredness was dependent upon student age and ability: *depends upon the abilities and needs of children* (#380), and *I believe students need a strong foundation before this works (i.e., high school)* (#422). Yet, as noted in the following sub-sample analysis section, this element was actually somewhat more highly rated by elementary grade-levels than it was by those teaching in upper grade levels.

#2) **Utilizes personal and student strengths/passions** (mean rating: 4.29; SD = .74) - The "utilizes student..." segment of the second element readily succeeds the first, in that student-centered learning enables identification of student interests. And yet this element was rated substantially higher - nearly one-half point. This difference suggests the utility/value of teaching passions, coupled with an insightful recognition and work with student interests - at teacher's initiation.

Both **experiential teaching orientation** (#3 - mean rating: 4.52; SD = .71) and **cooperative and inclusive learning** (mean rating: 4.26; SD = .73) are strongly supported practices throughout education. The fact that experiential teaching is very highly rated on this survey comes as no surprise to EE, which has touted experiential practices since its inception.

Involving external resource persons (#5 - mean rating: 3.83; SD = .84) was more highly rated than the *conditions* to which it pertains. Conditions #3, 6, and 7 (community support and local/non-local human resources) were each rated lower than this (respective differences of .22, .18 and .43, $p<.05$ for each) - where external persons are involved in the class. The relatively high rating of this element elevates the value of these resources (*conditions*) in **practice**.

#6) **Reflection in planning and application** (mean rating: 4.09; SD = .81) is a widely-advanced practice throughout education (especially with reference to Schön, 1987), and is highly rated here. The following quotes, complemented by personal observations and dialogue with other practitioners, suggest the item description may benefit from some changes.

> *I object to the word "considerable" time in planning. To me that means a lot of hours. The truth is that a competent teacher, one that knows the material and strategies of teacher, doesn't need to spend "considerable" time -- they just need to spend ample time. Some lessons are easily taught with a game, some with art, and some need lecture - the planning goes with the activity. It also depends on whether or not the teacher can get "ready made" success lessons. By that I mean, I've used "Project WET" and "Project WILD" lessons very successfully, but I didn't spend a lot of time on the planning. Someone else did that for me. The lessons are well written, they're hands on, and they're proven successful with field tested groups* (#53).

> *This is very important, however, we only get a total of 180 minutes per week for planning. I take it on my own self to plan activities for school* (#202).

Its importance in the educational setting - and explicitly for EE - is still strong.

CONTENT ORIENTATION (average mean rating: 3.97; SD = .66)

The extent to which teachers believe it is important to maintain an environmental **content orientation** is not clearly deduced from survey results. The split-option - single issue or multiple issues - may have reduced the clarity of this element analysis. Certainly, teaching EE demands that some content embraces the environment. The more cleanly defined *nurturing a sense of place* received a high rating of 4.30.

The contrasting element options for **environmental teaching focus** - single major issue or project (#7a - mean rating: 3.65; SD = .90) and numerous environmental issues (#7b - mean rating: 3.96; SD = .89) suggest benefits from either approach, with some preference for including multiple environmental issues (difference = .31; $p<.05$). The comments also suggest that age-level may influence relative preference:

> *The age group is very important for "in depth" study. Grades 3-6 don't have very great*

tolerance levels for "in depth" work. They like to learn trivia, quick facts, and lots of little things. They still think "more is better." I think 7th and 8th grade students should start doing more "in depth" work (#53).

Rating varies according to grade level (#58). *Depends on age* (#407). *Depending on age* (#296). *Depends on grade level* (#380).

Grade-level variations based upon grade of respondent are reported in the sub-sample analysis section which follows. The survey, however, was not designed to assess this difference, since all teachers were asked to respond for the targeted grades three to eight.

#8) **Nurturing a sense of place** (mean rating: 4.30; SD = .78) - In spite of the *sense of place* terminology being relatively recent in common use, environmental educators seem to readily recognize its importance, thus the fairly high rating. One quote draws attention to its import:

The one difference with EE that <u>is</u> different is the component cited in content orientation, #8: "nurturing a sense of place." This is also one of the hardest things for a teacher to learn (#63).

PERSONAL BEHAVIORS (average mean rating: 4.44; SD = .52)

The **personal behaviors** sub-category received the highest overall average mean score of any categorical sub-group (4.44). These ratings included the two highest of the entire framework - modeling environmentally responsible behaviors both within and beyond in the classroom (rated at 4.60), and exhibiting an infectious passion for EE and teaching in general (rated at 4.59). The *invests self and personal resources* element received a number of pointed comments discussed later, as the inclusion of financial investment was a point of contention. Interestingly, the last framework element - *recharges self* - received a very high rating at 4.46.

In some respects, a **consistent "can-do" vision** (#9 - mean rating: 4.46; SD = .70) might be linked to teachers having an **infectious passion for EE, and for teaching in general** (#10 - mean rating: 4.59; SD = .62). To maintain an infectious passion, an individual must maintain at least a

modicum of optimism. The two together represent the heart and soul behind effective EE:

I know it's not statistically measurable, but it has to come from the soul - students can read the intangibles as well as the printed words (#115).

I think the passion is the most important element. Nothing else has to be "in place" to create an effective program. EE, like the environment itself, is never a static set of optimal conditions. It's changeability invites exploration! (#448).

#11) **Incorporates Humor into the Classroom** (mean rating: 4.38; SD = .75) - This element was not anticipated prior to the interviews, yet plainly received a very high rating by participants. This element may find linkage with element #15, as humor can serve as an ongoing form of recharging.

#12) **Invests self and personal resources** (mean rating: 4.19; SD = .85) - A number of teachers inferred from the survey wording that teachers were being expected to, or evaluated based upon, their financial investment in their teaching.

Please don't connect finances with faith and commitment. I know we do it, but don't evaluate on the expectation (#225).

Not clear to me. All teachers invest ability and time (and most of the ones I know invest money) to their classes. Do you want them to invest MORE? (#53)

Other such comments can be found in *Appendix J.* Two individuals highlighted the "finances" segment of the question and rated the element a "1." Clearly finances are a point of contention with this element. The fact that the element still received a rating of 4.19 indicates the value of teacher investment (certainly at least non-financial) in their teaching.

#13) **Practices environmentally responsible behaviors** (mean rating: 4.60; SD = .63) - The highest rated of all elements, environmental educators believe they are called upon to "practice what they preach" if their desired results are to be realized.

#14) **Risk-taker** (mean rating: 4.42; SD = .74) - The importance of this highly-rated element is

most clear when seen in the context of many others - especially any "otherwise" limiting *conditions* elements. Overcoming situational limitations - trying out new/different strategies and so forth - demands that risks be taken. This deduction is supported by survey responses.

#15) **Recharges self** (mean rating: 4.46; SD = .80) - Highly rated! A parallel assessment could be conducted regarding the degree to which environmental educators recharge themselves, contrasted with the extent they see it as valuable. Some certainly do a fine job with it - *Summer vacation* (#422) - and it keeps them going. One, however, responded *ideally! But rarely happens!* (#180).

Discussion - Practices Category

The following comment caused reflection as to the inclusion of **balance** in this framework.

> *The issue of balance is critical. I have very strong environmental convictions personally, but I must provide a forum for all sides of an issue. Also, environmental educators must be careful to find the balance with regard to emotion and its place* (#401).

The framework as a whole "hints" at the importance of balance - in *conditions #7*, where non-local resources are to "bring in diverse perspectives;" in *competence #11* it is explicitly stated; and with *practices #5*, the teacher involves external resource persons to "present diverging perspectives." Yet it may not be explicit enough in the *Practices* as a whole that the teacher **must** present a balanced perspective on issues. This comment underscores the importance of **balance** in EE.

Sub-group Analysis

The target population for this research was practicing U.S. teachers who conduct EE in traditional schools, grades three through eight. As noted in the earlier demographic presentation, the survey respondents represent a balanced, diverse cross-section of this target population. While the sample shows balance in representation, the researcher can not claim representivity - for the target

population can not be explicitly defined. Nevertheless, the results show consistent high ratings across demographic sub-samples, which elevates framework validity with respect to the environmental educator population as a whole.

The third research sub-question directed investigation to see if teacher sub-groups provided consistent support for the research-constructed framework. The ratings from the sub-groups identified by the regional sample distribution and the survey demographic items are now presented with a brief discussion. The sub-question is addressed by evaluating sub-group average mean element-ratings for the full framework and its three categories, and the specific survey items which rated the overall framework and its categories. After this discussion, several analyses are performed to assess sub-group associated differences in specific element ratings.

Full Framework and Category Ratings

Sub-groups were distinguished by the four major U.S. Census Bureau regions and the demographic questions on page five of the survey. An average mean rating for all elements within each category - and within the entire framework - was calculated for each sub-group. The results showed consistent high ranking by **all** sub-groups for the full framework (see *Appendix J*) and each of its three categories. The range for sub-group average mean scores were: 4.09 to 4.22 for all framework elements; 3.96 to 4.11 for *Conditions* elements; 4.13 to 4.23 for *Competencies* elements; and 4.16 to 4.33 for all *Practices* elements. The high average mean score and strong coherence across sub-groups suggests there is broad and consistent support for the framework elements.

The survey also had two overall framework and three categorical evaluation items. The mean score for each of these items also showed a high rating and degree of consistency (see *Appendix J*). The ranges for the mean scores were: 4.05 to 4.26 and 3.98 to 4.21 for the two overall framework evaluation items; 3.98 to 4.36 for the *Conditions* evaluation item; 4.22 to 4.36 for *Competencies*;

and 4.28 to 4.55 for the *Practices* evaluation item. This high mean rating and high level of coherence across subgroups suggests there is broad and consistent confirmation as to the inclusiveness of the overall framework and each component category. Such findings provide measures of framework content and construct validity.

Sub-group Differences Among Elements

During the interviews and review of survey comments, there were hints that some of the framework elements may be of greater or lesser significance with selected groups. In the following presentation, evidence concerning these conjectured differences is presented and discussed.

Regional and Demographic Sub-groups

To check for regional differences in perceived significance of any of the elements, a complete rank-order list of all rated items was printed for each of the nine United States Census Bureau sub-regions. Nearly all sub-regions had at least two of the lowest and two of the highest elements in common with the total sample. And while there were slight differences in individual element means, no significant differences were noted between the sub-regions.

The school and community sub-groups (large and small sizes - the cut-off sizes are indicated in *Appendix J*), were each found to generate very similar element ratings - as noted in the *Appendix J* tables for categorical ratings.

Teacher sub-groups based upon years of teaching generated very similar framework and categorical ratings (*Appendix J*). However, since computers are still relatively new to education, an effort was made to see if those newer to teaching would rate computer proficiency more highly. Computer proficiency had a moderate-to-high (3.46) overall mean rating - the second lowest of all elements for significance in fostering student growth in desired EE outcomes. Teachers who have

taught twenty and more years rated this element at 3.39. The rating was significantly higher - 3.67 (difference of .24, $p<.05$) by teachers with less than five years experience. Both sub-group ratings leave computer proficiency with a moderate-to-high rating for significance.

Teacher sub-groups by ethnicity, while not large enough to accurately evaluate differences, were found to generate nearly identical mean rating values for the categories of framework elements. Similarly, the average mean ratings given by those with bachelor's versus master's degrees were very similar - within five-hundredths of a point (see *Appendix J*). And finally, some exploration was completed to see if teachers holding advanced degrees attach a greater significance to knowledge base elements. Little mean rating difference was found for the four elements, with the greatest (.11) points regarding the importance of teaching and learning theory.

Overall, the above sub-groups showed very little meaningful differences between sub-groups of sufficient size to allow analysis. Such consistency suggests that, across these subgroups, the full framework and each of its constituent elements have fairly consistent perceived significance in fostering student growth in environment-related knowledge, attitudes, skills and behaviors.

Elementary and Secondary Teachers

Teachers were asked to rate items, categories, and the overall framework for significance related to fostering third-to-eighth grade student EE growth. They were **not** asked to rate the elements for their particular grade level. Nevertheless, because of personal grade-level familiarity, differing school experiences may incline upper- and lower-grade educators to respond differently.

Table 8 shows the average mean scores for respondents who taught in grades pre-K through 5 and for those teaching in grades 6 through 12. Interviewee and survey comments suggested there may be grade-level associated differences in *Competencies* #1, #2, #13, and #14; and *Practices* #1, #3, #7a and #7b. Of those eight, only those with differences greater than one-tenth point are presented in

Table 8) Mean Differences with Selected Elements by Teaching Grade Level

Framework Element (or title describing scale)	All N = 328	Pre-K-5 n = 116	6-12 n = 136	Diff.
Comp. 14) Ability to integrate curriculum	4.36	4.47	4.22	.25*
Prac. 1) Student-centered learning	3.83	3.89	3.78	.11
Prac. 3) Experiential teaching orientation	4.52	4.58	4.46	.12
Prac. 7a) Focus: Single environ.-issue in depth	3.65	3.68	3.53	.13

* $p < .05$

Table 8. Based upon this evidence, elementary educators may believe student-centered, experiential learning, and focusing on a single in-depth issue to be more important than secondary teachers. But the only element differing by more than two-tenths of a point was the ability to integrate curriculum (difference = .25, $p<.05$) - possibly reflecting the fact that elementary school teachers are more typically responsible for the full academic curriculum, facilitating consistent curriculum integration.

Gender

There were several notable differences in the gender-associated ratings of certain elements, as shown in *Table 9.* Female mean-ratings for twenty-one elements were greater than those given by males by over one-tenth of a point, and five elements had greater than two-tenths difference in their mean rating (*Table 9*). Differences of greater than two-tenths of a point appear in the following areas: perceived significance for EE of having flexible schedules and a collaborative learning environment, of being able to conduct alternative assessments, and of having student-centered learning to nurture a sense of place. Such findings deserve further investigation regarding their relevance to EE outcomes. In this study, the female teachers expressed greater support for student-centered and collaborative learning which nurtures a sense of place - and a need for flexible schedules and alternate assessment abilities to support these strategies. This could suggest that female teachers

Table 9) Mean Differences with Selected Elements by Gender

Element	All: N = 328	F: n = 236	M: n = 89	Diff.
Cond. 9) Flexible schedules	4.21	4.27	4.06	.21
Cond. 10) Collaborative learning env.	4.36	4.42	4.20	.22*
Comp. 10) Alt. assessment abilities	4.05	4.14	3.79	.35*
Prac 1) Student-centered learning	3.83	3.91	3.65	.26*
Prac 8) Nurturing a sense of place	4.30	4.36	4.12	.24*

* $p < .05$

are more willing to give students greater voice in their classrooms than men, and/or more familiar with new instructional innovations. These differences merit further exploration.

Survey Data Summary

The 328 responses (65.6% of the sample), with 60% or greater from each of the four U.S. Census Bureau regions, gave the overall framework an average mean rating between high and very high - 4.15 on a 5-point scale - which matched the overall mean rating for all its constituent elements. Cronbach's alpha measure of internal consistency was very high (α=.94). The three categories - conditions, competencies and practices - received average mean respective ratings of 4.17, 4.30 and 4.41. Ratings for all elements ranged from moderate-to-high (3.4) up to high-to-very high (4.6), with thirty-two of the elements rated at high (4.0) or higher. This substantial (over a 1.2-point spread) variation in individual element mean scores implies that practicing environmental educators perceive some elements to have greater significance in fostering student growth in desired EE outcomes.

As mentioned in the overview, elements which received mean ratings of high to very high and low standard deviations could be considered "bedrock elements" - elements for which teachers consistently express strong support. Twenty-one, or half of all elements received such ratings - of

4.25 or greater and standard deviations of 0.8 or less. Three of these elements were in the *Teaching Conditions* category: flexible curriculum; collaborative learning environment; and students bear consequences of their behaviors. Eight of these elements were in the *Teacher Competencies* category: listening/questioning skills; diverse instructional strategies; resourcefulness in accessing resources; creative, knows how to do without; facilitation skills; ability to make connections; understands local-to-global connections; and ability to integrate curriculum. And finally, ten of the *Teaching Practices* could be considered "bedrock": utilizes personal/student strengths/passions; experiential teaching orientation; cooperative and inclusive learning; nurtures as sense of place; consistent "can-do" vision; infectious passion for EE and for teaching in general; incorporates humor into the classroom; practices environmentally responsible behaviors; a risk taker; and recharges self.

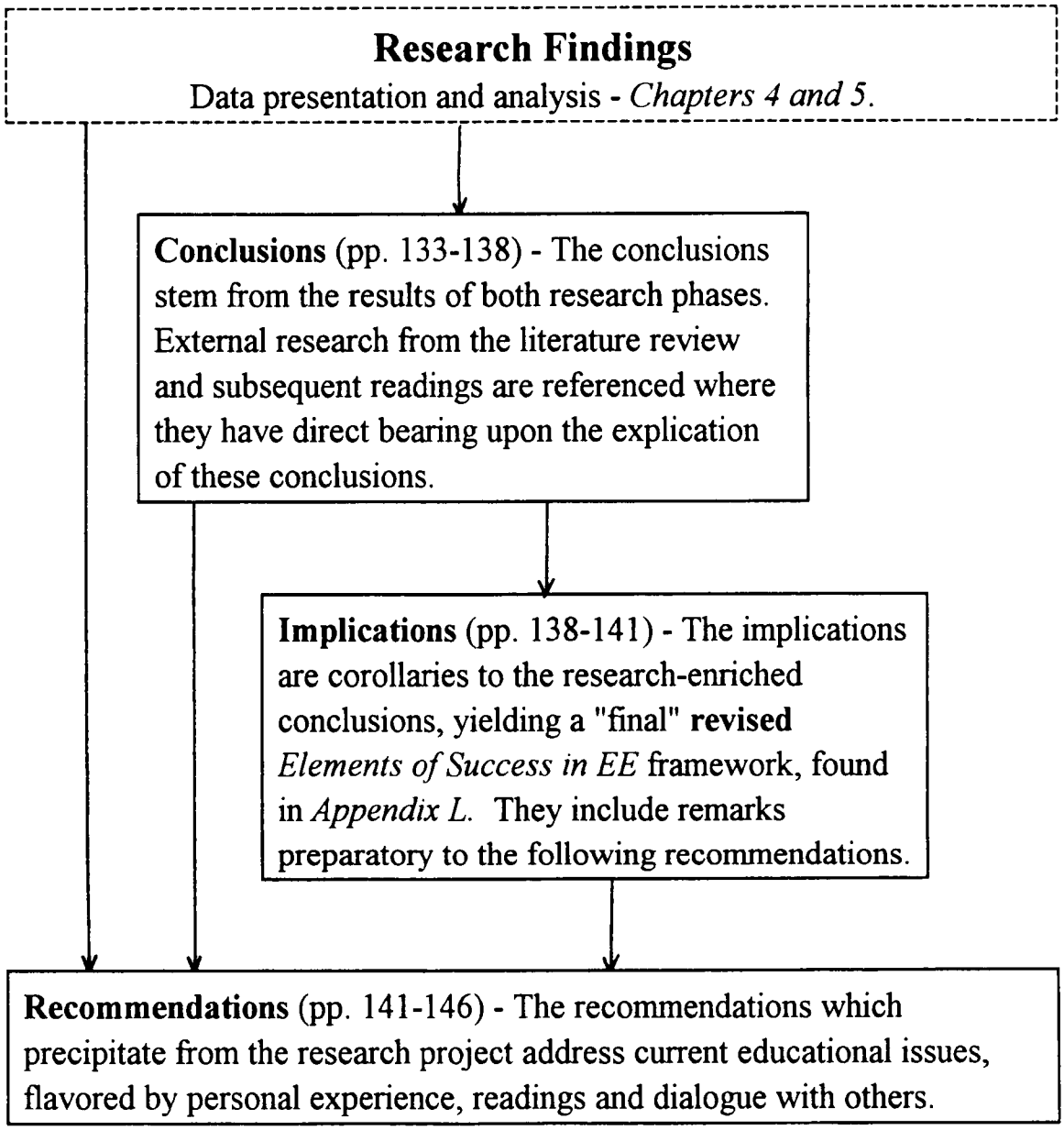
The survey was designed to support and complement the interviews - qualitative supported by quantitative research. Specifically, the survey provided opportunity to validate the 42-element *Elements of Success in EE* framework, and add breadth/perspective to assist in framework revisions to further enhance its utility. The inter-dynamics within and between the categorical elements - noted by the researcher in advance - were reinforced by survey respondents. The exploration of demographic sub-groups showed consistent support for the overall framework and its component parts. Several individual elements received significantly different mean rating values in association with gender or teaching grade-level - which may be of interest to teacher educators and to those who implement EE programs in schools.

The framework evaluated by the survey respondents identifies forty-two elements which teachers believe play a significant role in environmental education efficacy. In addition to strong acceptance of the framework by this audience, the survey yielded extensive rating and comment data which enable framework "fine-tuning," and offer opportunities for additional research. There is strong and consistent confirmation that educators across the country believe the framework provides a valid and useful representation of the elements which contribute to successful environmental education.

Chapter 6

Concluding Sections:

Conclusions, Implications & Recommendations



Conclusions

This section begins with a direct response to the research question, and follows with responses to the three sub-questions, which are related to: **Research Design and Implementation** - concerning the effectiveness of the research process and its significance upon the findings and other related research; **The *Elements of Success in EE* Framework** - evaluating the validity, reliability, relevance and utility of the framework; and **Framework Consistency Across Sub-groups** - regarding the exploratory research with sub-groups. In response to the second sub-question, the reader is referred to *Appendix K* for detail regarding framework refinements.

A direct response follows each sub-question (e.g., C1.1), then other responses which pertain to that question (e.g., C1.2, C1.3, etc.).

Research Question:

Where third to eighth grade teachers conduct environmental education, what are the major teacher-identified factors which foster student growth in environment-related knowledge, attitudes, skills and/or responsible behaviors?

The major factors are identified and presented with the forty-two element framework which received broad validation through a national survey of environmental educators. A more complete response to this question is evident in the responses to the three sub-questions which follow.

Research Sub-Question #1) Research Design and Implementation

*To what extent is practitioner-based research - consisting of interviews and a national survey - able to paint a wholistic picture of the **Elements of Success in Environmental Education**?*

C1.1) *The practitioner-based research - consisting of extensive literature review, in-depth interviews and surveys - proved to be an effective means to identify the major factors which foster student-growth in environment-related knowledge, attitudes, skills and responsible behaviors.*

The research design began with an extensive literature review which generated theoretical grounding in the three-part social cognitive framework which was used in the ensuing qualitative -» quantitative research. The literature review also provided an initial research-supported inventory of elements which contribute to successful environmental education (EE). Interviews furnished elements of successful EE by environmental educators who were considered highly effective, and verified the utility of the social cognitive framework into which the elements were placed. Finally, environmental educators across the country evaluated the practitioner-derived and literature-enriched framework for its validity and utility. The survey results demonstrated strong internal consistency, strong known-group validity, and a high level of utility among the practitioners.

The study demanded an open perspective to enable practitioners to speak for themselves. The survey confirmed the fact that the framework is practitioner-grounded, verified the interview- and literature-derived framework, and brought broader perspective to enable further refinements. Collectively, the three perspectives on elements of successful EE engender deeper understanding of how educational conditions, and teacher competencies and practices, work to foster growth in student EE outcomes.

C1.2) *The teacher interviews and surveys provided educational benefit to a number of the participants - and the researcher.*

While this conclusion does not directly pertain to the sub-question, it points out an important desirable element of educational research design and implementation. Educational research can be an intrusion OR a blessing for time-challenged teachers. Evidence that this research was constructive

showed in interview comments . . . "I want to thank you for the opportunity to kind of put together my thoughts about where I've been and where I'm going" (Vicki, 11:15-17). "This was an opportunity for me to reflect on issues which are my passion. I thank you, Ted, for the opportunity to do so. I don't often take the time to do this kind of thing since I am so focused on my deep passion . . . , my school" (Bill, draft survey review comments). Similar comments from survey respondents were mentioned in *Chapter 5*. Fifty-three survey respondents expressed at least some measure of sincere interest by specifically requesting a copy of the research summary. Finally, through the research process, the researcher acquired a much deeper understanding of EE, and greater empathy for the teachers - in the schools.

Research Sub-Question #2) The *Elements of Success in EE* Framework

*To what extent are the **Elements of Success in EE**, as generated through three forms of research - literature review, teacher interviews, and teacher surveys - congruent?*

The three research forms were complementary, as noted in the answer to the first research sub-question. However, prior research had shown lack of a consensus related to a framework for environmental educator standards (Simmons, 1995). In contrast, this research with practitioners yielded strong agreement on a framework of the major conditions, competencies and practices of successful environmental education.

C2.1) ***Elements of Success in EE** is a valid and reliable framework which encapsulates the mosaic of factors which contribute to effective environmental education in grades three to eight.*

The practitioner-based *Elements of Success in EE* framework was constructed with strong grounding in theory and research literature. Interviewed teachers expressed strong support for the framework

constructed from **their** narratives. Framework evaluation items contained in the survey received high to very high ratings (4.11 and 4.15 on two 5-point-scaled items), the average mean score for all framework elements was 4.15, and the survey had a high Cronbach's-α of .94. The survey also yielded extensive respondent **comments** which were generally very favorable, and the positive ratings were consistent throughout a wide range of sub-samples. Finally, reflecting back, the framework incorporates most major elements identified through previous research literature. All these factors contribute to framework validity and reliability.

C2.2) *All three major categories are important and inter-dynamic in their application to successful environmental education.*

The research makes clear that all three categories of elements - teaching conditions, teacher competencies and teaching practices - are important. Even in brief excerpts, interview narratives and survey comments frequently pointed out how several-to-many of the elements were interdependent. Thus, the framework must be understood to sustain categorical- and element-specific inter-dynamics. Illustrations of the inter-dynamics were presented with excerpts from the survey respondent comments in *Chapter 5*, and are further articulated in *Appendix N*.

C2.3) *EE practitioners believe that each of the forty-two elements provides support for third-to-eighth grade student growth in environment-related knowledge, attitudes, skills and/or responsible behaviors, with some variation in the nature and significance of this support.*

Extensive support for this statement can be found in *Appendix K*. In that appendix, survey results relating to each of the elements are reviewed in detail by sub-category, at times referring back to the literature review and other research findings.

C2.4) *Within the framework are certain "bedrock elements" which find consistent high to very high ratings by environmental educators.*

While the framework is adaptable to specific teaching environments, nearly all survey respondents deemed certain elements highly important for effective EE. These elements - identified in *Chapter 5* - were those which had high-to-very high ratings (at least 4.25 on the 5-point scale) and low standard deviations, which together suggest a convincing consensus. Fully one-half of the 42 elements found this measure of support. Three of these elements were in the *Teaching Conditions* category: flexible curriculum; collaborative learning environment; and students bear consequences of their behaviors. Eight elements were in the *Teacher Competencies* category: listening/questioning skills; diverse instructional strategies; resourcefulness in accessing resources; creative, knows how to do without; facilitation skills; ability to make connections; understands local-to-global connections; and ability to integrate curriculum. Finally, ten of the *Teaching Practices* received "bedrock element" ratings: utilizes personal/student strengths/passions; experiential teaching orientation; cooperative and inclusive learning; nurtures a sense of place; consistent "can-do" vision; infectious passion for EE and for teaching in general; incorporates humor into the classroom; practices environmentally responsible behaviors; a risk taker; and recharges self.

C2.5) *There is a consensus among EE practitioners in grades three-to-eight regarding a model for use in development of environmental educator performance standards.*

Simmons (1995), as quoted earlier (p. 9), pointed out that "no particular structure or model for the development of environmental educator performance standards is readily evident" (p. 88) in the various guidelines constructed with prior research. In contrast, the framework constructed and tested in this study received strong and consistent support from practitioners across the country.

Research Sub-Question #3) Framework Consistency Across Sub-groups

Will teacher sub-groups - defined by regional representation, grade level, years of teaching,

gender, or level of educational attainment - provide similar support for the framework constructed by this research?

C3.1) *The framework and its component categories received consistently high support by all identified demographic sub-groups.*

Each of the teacher sub-groups consistently rated the overall framework and the three categories highly. Comparisons made between the full sample and each of the sub-groups - for average mean ratings of the overall framework and each of the three categories - revealed that their ratings were within two-tenths of a point on the five-point survey scale. Similar coherence was found in average mean scores for all elements in the full framework and each category. Such consistency added significant validity to the findings.

C3.2) *Two demographic variables - gender and teaching grade-level - influence the rating of selected framework elements.*

Teachers at the lower grade levels find greater perceived significance in the ability to integrate curricula - teach across disciplinary lines - than do those at upper grade levels. Female environmental educators rate four elements significantly higher than did their male counterparts: collaborative learning environment, alternative assessment abilities, student-centered learning and nurturing a sense place.

Implications

Implications are placed under the titles relating to the first and second sub-questions, using "I" instead of "C" (e.g., I2.1, I2.2, etc.). In connection with the second subheading, a revised framework is presented in *Appendix L.*

1) Research Design and Implementation

I1.1) *Similarly constructed studies in other fields - complementing qualitative with quantitative research - can yield rich and useful information.*

This research experience confirms the statement quoted from Marcinkowski (1993) which contended that two complementary research forms tend to enhance validity. The interviews provided strong practitioner-grounding to the framework. The survey provided both quantitative framework verification and extensive/rich comments which contributed significantly to the verification of interviewee perceptions and refinement of the resulting research product - *Elements of Success in EE* framework. Comparable benefits could accrue from such an approach - carefully designed and implemented - in other research tasks.

2) The *Elements of Success in EE* Framework

I2.1) *The **Elements of Success in EE** framework may be applicable to other disciplines, and/or teacher education in general.*

Several survey respondents suggested framework utility for state-level EE organizations or for education as a whole. Teaching frameworks are increasingly recognized as a viable way to display the components of professional practice (Ambach, 1996; Danielson, 1996), and guide efforts toward their enhancement. This three-part framework may have broad potential utility, with the benefit of direct practitioner approval.

I2.2) *The research data and conclusions - coupled with external research findings - suggest changes in the framework that could further enhance its quality/utility.*

The survey framework received decided approval by teachers across the country. At the same time, as enumerated in *Appendix K*, the varied element ratings and external research provide substantive

evidence that the framework could be further enhanced. Using this broad-based input, the researcher constructed a **revised** framework which addresses concerns raised by the survey respondents without detracting from the integrity of the validated framework. A complete REVISED *Elements of Success in EE* framework is presented in *Appendix L*, composed from researcher perceptions based upon the entire research process. Alterations from the survey framework version are highlighted to facilitate understanding/rationale for the revisions. A succinct version of the revised framework also appears in the last three pages of *Appendix M*.

I2.3) *The framework seems to convey the entirety of the teaching experience, within which an individual teacher can adapt personality and style to capitalize on strengths and circumvent potential barriers/limitations to effective EE.*

An understanding of the inter-dynamics was evident in the interviews, as noted in *Figure 3* (in *Chapter 4*). The survey comments yielded additional insight into these inter-element relationships. An analogy to baking comes to mind. In teaching, one could say that there are multiple **recipes** to efficacy, where many of the same ingredients come into play. Changes in the relative quantity and quality of ingredients - and how they are processed - definitely flavor the final outcome. *Appendix N* presents three categorical tables which illustrate selected linkages between framework elements. The tables are simplified, for in reality *every element is connected to every other element*. The linkages displayed are those intimated or projected during this study.

I2.4) *Members of the school and surrounding community, working together, may be able to elevate environmental education achievements by improving teaching conditions.*

Several survey respondents expressed interest in the framework for their administration, and/or school board members (see *Chapter 5*; all comments can be found in *Appendix I*). This research experience - especially in the interviews and survey comments - recognizes the linkages effective

teachers make with their communities. The framework makes clear that the school and community collectively define the teaching conditions which support quality EE. School operations and norms, access and involvement of the community, and a supportive school climate all have a heavy influence on educational outcomes. Administrators and school board members can work with teachers, students and community members, and develop adaptive/creative strategies to capitalize on particular elements which can enhance student growth toward EE goals.

This approach also nurtures educator understanding of local cultures. Multi-cultural research emphasizes the critical value of: learning more about the students and their cultures; having adaptive strategies to reach diverse learners; and utilizing locally relevant environmental issues to attract and maintain student engagement with classroom content.

> When school staff are unable to reflect the life and needs of a child, the school loses its relevance as a valid source of knowledge. When teachers fail to connect with their students by tapping into their learning and cultural styles, then barriers between the schools goals and the children's innate abilities grow. . . . Misunderstandings between the two cultures [home and school] have been cited as a key roadblock to establishing desirable home-school relationships and academic focus among students (Woodruff, 1996, p. 279).

Recommendations

1) Research Design and Implementation

Recommendations under "research design and implementation" are based upon the valid results realized with this research strategy. In addition, research extensions can complement this study.

R1.1) *Similar research with EE practitioners at other grade levels (less than third grade and/or, greater than eighth) should be done to expand framework utility.*

While lower and upper grade level educators reviewed the framework, all were asked to assess its appropriateness for grades three to eight. Even with these guidelines, elementary school teachers

rated the ability to integrate curriculum higher than did secondary educators. Directed effort with more narrowly-defined grade levels - elementary, middle and secondary - could ascertain specific grade-level differences in relative importance of the various elements and perhaps different elements.

R1.2) *Research with the REVISED Elements of Success in EE (Appendix L) should be completed to confirm its validity and utility.*

The revised framework presented with the implications is based upon the associated research evidence. However, the researcher cannot claim definitive validity of the revised framework due to the substantive changes made to the one validated by the survey. While the researcher is convinced the revised framework may have even greater validity, such confirmation awaits completion.

2) The *Elements of Success in EE* Framework

R2.1) *The framework should be translated into a rating instrument to enable its direct use.*

By changing the survey items from "extent of significance" to "extent currently existing" - or some other such wording - this framework could find immediate utility as a means to focus environmental educator professional growth and school facilitation of EE programs. Inspiration for this recommendation came directly from one survey respondent:

> *Your framework is good, & it covers many points. I think another survey asking what the teachers' experiences really are may be more revealing, however. Many teachers ideally know what should be done and what conditions they need to do a good job teaching EE. But, the reality is - many teachers are working under adverse conditions and cannot do what they want to do. Somehow that needs to be changed. Many public schools especially need to see the results of your study so they allow more autonomy to their teachers* (#77).

An assessment instrument of this sort may help a school district identify opportunities to enhance conditions or provide pointed teacher in-service education opportunities. It could also help individual teachers identify areas they need personally to target. This latter suggestion is reinforced here:

> *It seems to me that the question isn't which are significant since they all are, but which*

conditions do practicing teachers have available to them and which skills & practices do they have presently. This would indicate areas which need work (#380).

R2.2) *Applicability of the framework categories and elements should be tested with other disciplines and other forms of interdisciplinary education.*

Survey respondents suggested this research framework is applicable to other disciplines or broadly to education as a whole, but such intimations remain to be verified. There are many similarities between environmental education and other integrated fields such as whole language, integrated science, holistic education, and others. To what extent do the three categories - and the elements (excepting EE-specific ones) within each - retain their prominence? Identifying similarities and differences between disciplines and other educational "divisions" would be an asset to teacher education as a whole, and a step toward enhanced communications between these educational fields.

R2.3) *Additional research is necessary to develop* ***predictive validity*** *of the* ***Elements of Success in EE*** *framework.*

The *Elements of Success in EE* framework received substantive validation with this research effort. However, there is research that must be undertaken if the framework is to have predictive validity. Such validation would greatly enhance its utility in teacher education and assessment. Toward that end, it will be necessary to . . .

a) . . . *develop a coherent, agreed-upon set of desired student EE outcomes.* Progress is under way toward this end in the developing NAAEE "Guidelines for Excellence."

b) . . . *develop a valid measure for these outcomes.* Predictive validity requires a valid measure of student success, so a measurement "tool" of some sort must be devised.

c) . . . *identify relationships between elements of this framework and the desired student EE outcomes.* Finally, student outcomes must be associated with the framework elements to identify linkages and further enhance framework utility in teacher education.

R2.4) *A study of the framework inter-dynamics should be completed to guide framework use in teaching or teacher education.*

The inter-dynamic relationships among framework elements were clear to both the practitioners and the researcher. However, the nature and influence these inter-dynamics must have upon teacher education have yet to be discerned. A study investigating the "elements in action" with a focus upon interrelationships would help clarify the significance of these linkages in practice.

R2.5) *National environmental educator standards should be built upon this three-part structure.*

Because of the integral/pervasive influence of **conditions** to the overall framework, a set of standards based upon non-contextualized **competencies** alone would be misleading. While these *Elements of Success in EE* are not as comprehensive or detailed as standards may be, the framework - coupled with some of the additional depth found in *Appendix A* - offers a suitable substructure upon which to build comprehensive environmental educator standards. Further, this framework reflects the perspective of practitioners, a perspective that cannot be ignored in the development of any set of educator standards.

R2.6) *Teacher education programs could be strengthened to develop teacher capacities relating to the framework's "bedrock elements."*

One-half of the forty-two elements received consistent high-to-very high ratings by practitioners across the country. Such consensus demands that these elements be given space - priority - in teacher education. The teacher education process must help teachers select activities and design lessons to engage diverse students in locally and culturally relevant environmental education. Efforts are ongoing to establish a spectrum of EE strategies adapted to multi-cultural and urban audiences. Teacher education programs need to provide teachers with knowledge and skills essential to implement EE in any setting. Specifically, teacher education programs should:

a) . . . *bolster teacher abilities to* ***make connections*** *and to gain access and effectively utilize information/resources.* Making connections stood out prominently in the interviews as a "most essential" element for teacher EE efficacy. Making connections has fundamental importance to EE - and education as a whole. More explicit effort to build this capacity through teacher education programs may provide a substantive boost in the effectiveness of new teachers. Accessing and creatively using available resources is a valuable tool in this process.

b) . . . *strengthen student-centered teaching strategies.* Student-centered experiential learning which utilizes student strengths and passions is an educational approach supported by this research. As noted in Implications 2.4, its importance with multi-cultural audiences is also very evident.

c) . . . *make more clear the importance of* ***affective*** *elements in education.* Affective elements - from beliefs to ethics (behavior congruent with belief patterns) - received consistently high-to-very high survey ratings by teachers. These included maintaining a consistent "can-do" vision, exhibiting an infectious passion for teaching and using student passions, and showing congruence between professed environmental care and associated ethics. Pre-service and practicing teachers may benefit from understanding how they can most effectively use their existing passions - attitudes-in-action - and cultivate those having greatest potential for advancing EE outcomes.

d) . . . *conduct additional research at local levels (needs assessment) to ascertain priority elements for pre-service teachers.* By using this framework in a revised rating form (see Recommendation 2.1), teacher education and in-service programs can more effectively match educational efforts to local needs.

3) Framework Consistency Across Sub-groups

R3.1) *The extent of grade-level and gender-associated rating differences with selected elements*

indicates that further investigation should be made into these relationships and their potential significance.

While this research only revealed differences in **perceived** importance of selected elements, further research is necessary to reveal if there are actually differing levels of need associated with gender and/or grade level.

The value/integrity of alternative forms of assessment is well-substantiated in research literature. Yet the female environmental educators in this sample rated it significantly higher than did the male teachers. Gender-linked differences in the item ratings were greater than any of the other demographic associations evaluated. Further research into these differences is recommended.

Concluding Thoughts

The framework constructed with this research succinctly illustrates the major elements of effective teaching in the interdisciplinary field of environmental education as perceived by teachers in grades three-to-eight. Some people consider teaching an art, with each educator having - in a sense - a favored medium. A teacher begins by sharing personal passions and strengths, then exploring outward **with** students, constantly building knowledge and skills. Teacher growth occurs from a starting point, wherever it may be. This framework provides an inventory of the conditions, competencies and practices that can help teachers - and teacher educators - chart personal and collective paths to greater efficacy in environmental education teaching and learning.

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Appendix A

Literature-Derived

Elements of Success in EE

The following framework is derived from extensive environmental education and other educational research. Constructing the framework was a subjective process, further modified from personal experiences. The outline provides a summary of the major elements of success in EE which are reasonably well-defined in the research literature.

Desirable EE Teaching Conditions

These elements and their organization draw heavily from Ruskey and Wilke (1994), Simmons (1995b), and also Ham (1988), ELAC (1995), Samuel (1993) and Johnson (1980).

1) **Supportive Climate for EE** - An environment where the school administration: (a) has a statement of support for K-12 EE and a K-12 EE curriculum plan; (b) provides regular time for teachers to plan for collaborative EE programming; © offers flexible time schedules and other support for collaborative teaching; and ideally (d) full-school participation in the EE program.

2) **Community Access and Involvement** - An environment where: (a) community and agency personnel participate in investigations of local significant environmental issues; (b) the school district allows and supports direct student involvement in the community; © teachers and students have access to adequate transportation to and from environmental study areas or locations where environmental issues can be investigated; and (d) time and financial support are available to support at least one overnight experience for the students in a location where environmental investigations can be realized with adequate instructional support.

3) **Adequacy of Resources** - A school where: (a) interruptions are minimized to avoid drain on opportunities for time focused on EE tasks; (b) a pool of appropriate materials and equipment is available for use by school teachers (*environmental ethics suggest a preference for shared resources, thus the resource pool must be adequate for shared needs*); © annual budget allowances enable maintenance and upgrade of all resources at a level which sustains quality and availability to match intended use; and (d) computers and related telecommunications resources are maintained and upgraded on a regular basis, with instructional support staff to enable their effective and timely use in collaborative educational programming - both within the school and the world beyond.

Desirable EE Teacher Competencies

The competencies are based largely on Simmons (1995b), Engleson and Yockers (1994), and Wilke et al. (1994), and modified in line with the research presented in the Literature Review. With all competencies, an ability to **apply** the competencies is implicit with their listing.

1) **Content Knowledge**
   A) **Affect** - *An effective environmental educator is able to*: (a) role model environmental sensitivity/appreciation; (b) provide supportive rationale for caring about environmental issues; © recognize and respect the differing value perspectives associated with environmental problems and issues; (d) demonstrate motivation to actively participate in

maintaining or improving environmental quality, and the awareness that a healthy environment is dependent upon responsible human actions; (e) articulate personal principles with respect to environmental issues and demonstrate effort to live in congruence with these principles; and (f) recognize value differentials with respect to personal lifestyle and environmental activism, and consciously work to resolve value conflicts.

B) **Ecological knowledge** - *An effective environmental educator is able to*: (a) demonstrate a thorough understanding of the four laws of ecology in application to a variety of environmental problems and issues; (b) demonstrate an ability to apply major ecological concepts (including individuals, species (and diversity), populations, communities, ecosystems, biogeochemical cycles, energy production and transfer, renewable and non-renewable energy sources, interdependence, niche, adaptations, succession, homeostasis and people as integral components of ecosystems) to environmental issues; © explain ecosystem processes, including the various ways in which human social systems interface with their environs; and (d) articulate and apply concepts of change and limiting factors (the dynamic "balance of nature," human population dynamics, biotic and abiotic limits, relationships between populations, relation of human lifestyles to ecosystem impact) to environmental issues.

C) **Social-political-cultural-geographic-economic knowledge** - *An effective environmental educator is able to*: (a) demonstrate at least a basic level of understanding of local, regional, national and global geography; (b) explain the basic components (structure and scale) and patterns of change in societal and cultural systems; © anticipate inter-influential interactions between ecological, economic, cultural, social and political components of environmental issues; (d) communicate the conflicts that can arise between divergent beliefs, political structures, environmental values and cultural lifestyles with respect to environmental issues; and (e) articulate the conflicts between technological advances and associated environmental and ethical issues.

D) **Knowledge of environmental issues** - *An effective environmental educator is able to*: (a) provide a rationale for concern about the major recognized environmental issues, including human population and quality of life, air quality (ozone, global warming, acid deposition and general pollution), water quality/quantity, soil quantity/quantity, land use/misuse, resource availability and loss (waste issues), energy, biodiversity, etc; (b) defend a personal priority of concern with respect to environmental issues; and © articulate the positive trends and opportunities for enhancing the quality of life with respect to the various environmental issues.

E) **Skills** - *An effective environmental educator is able to*: (a) generate a list of environmental problems (cause and effect) and issues (conflicting perspectives) at local, regional, national and global levels; (b) demonstrate ability to analyze, synthesize and evaluate environmental problems/issues using primary and secondary sources, then evaluate that problem or issue on the basis of evidence obtained and personal values; © identify and use criteria to select appropriate action strategies to influence the outcome of an environmental problem/issue, and be able to create, evaluate and implement the action plan; (d) conduct a basic risk

analysis for a given issue/situation; and (e) demonstrate capacity to engage in long-term, holistic processing - think in systems, forecast, think ahead, plan, etc.

F) **Determinants of environmentally responsible behavior** - *An effective environmental educator is able to*: (a) provide evidence of at least a modicum of internal locus of control with respect to environmental issues; (b) demonstrate a willingness to accept responsibility for personal influence of everyday behaviors upon the environment; and © demonstrate a willingness to help correct negative environmental impacts and work to resolve environmental problems and issues.

2) **Educational Foundations and Instructional Methodologies**

There are multiple integrated aspects of effective EE, which include a thorough grounding in educational and psychological foundations and familiarity with diverse instructional strategies. Included are at least some foundation with: (1) educational philosophy, (2) theories of moral reasoning and valuing processes, (3) theories of relationships between knowledge, attitudes and behaviors, (4) learning theory (constructivism, behaviorism, etc.), (5) transfer of learning theory, (6) physical and intellectual development of people and associated learning readiness, (7) learning and group dynamics, and (8) diverse instructional strategies/methodologies (especially experimentation, issue investigations, case studies, simulation games, discussion and debates, cooperative learning, instruction exhibiting wise use of computers and telecommunications resources, affective educational methods, outdoor education methods, action planning and evaluation).

Using such a foundation, these competencies-in-action must be adequate to enable the educator to select, develop and implement curricular programs and instructional strategies:

A) to organize and implement instruction to achieve desired EE cognitive and affective outcomes using strategies which have proven effective and appropriate, with diverse learners in a variety of educational settings;

B) to support learner development of diverse EE conceptual understandings;

C) to foster student reflection about the importance of value perspectives in environmental issues and their own related values;

D) which foster learner ability to evaluate, clarify and revise personal value positions to reflect new understandings;

E) to develop learner skills needed to identify (and define), investigate (with local and telecommunications resources), evaluate and analyze (including values perspectives) environmental problems and issues;

F) which directly involve students in investigating the world around them and their relationship to it–at an appropriate level of challenge;

G) which help students learn to appreciate how different individual lifestyles and cultural patterns impact the environment;

H) which foster constructive educational experiences with controversial issues;

I) which stimulate students to assess and evaluate an issue in terms of its local, regional and global implications, from ecological and socio-cultural perspectives;

J) which help learners recognize the need for environmental issue investigation and evaluation as a prerequisite to sound decision-making;
K) which stimulate and foster creativity and critical thinking, to help students think of alternative solutions to environmental problems and issues resulting from their investigations;
L) which involve students in research, discussions and debates to work toward win-win resolutions with complex environmental issues;
M) which familiarize students with diverse action strategies which can be used to resolve environmental problems and issues;
N) which provide opportunity for students to become directly involved in taking responsible individual or group action with respect to environmental issues; and
O) which enhance the likelihood that learned knowledge, attitudes and cognitive skills are transferred to lifestyle decision-making by learners.

3) **EE Foundations**

The literature also suggests merits with an underlying familiarity with the whys and wherefors of EE. As such, *an effective environmental educator is able to* (1) demonstrate an understanding of the history, philosophy and theory-base of EE; (2) infuse EE curricula into other disciplines where appropriate; and (3) use EE content as a vehicle for accomplishing other basic general education outcomes.

4) **Assessment**

Following the emphasis placed upon assessment in the general education competencies, there is similar emphasis in EE, with an often-overlooked capacity to use diverse assessment strategies. *An effective environmental educator is able to*: (1) engage in ongoing assessments of learning and teaching with respect to learner achievement in cognitive, affective and behavioral dimensions; (2) effectively implement a variety of nonformal and formal, personal and classroom assessment strategies; (3) develop and equitably employ a set of sound criteria, based on stated goals, objectives or performance outcomes, to use in analysis of student work; (4) demonstrate the ability and willingness to modify selection of instructional materials and/or strategies based upon the results of classroom evaluations and assessments; and (5) blend in the assessment process as a teaching strategy to achieve a variety of desired EE outcomes.

Desirable EE Teaching Practices

These framework components are more loosely derived, but draw fairly heavily from research beyond the EE literature.

1) *Generic* **Desirable Teaching Practices**

A) **Planning** - The teacher develops a framework of yearlong and short-term goals for students.

and adopts strategies that nurture student understanding in a collaborative learning environment.

B) **Guide and facilitator** - The teacher encourages students to take responsibility for their own learning, to pursue their own ideas individually and in groups; guides students in the skills and uses of self-assessment; and opportunity for presentation of work accomplished.

C) **Constantly learning** - The teacher integrates personal growth from external sources (experiences, colleagues, conferences, readings, etc.) to teaching practices.

D) **Collaborative learning** - The teacher directly facilitates collaborative group work, encourages students to take responsibility for the learning of all members of the class, and structures and facilitates ongoing formal and informal discussions to seek deeper understandings and applications of shared discoveries.

E) **Collaborative teaching** - The teacher (a) regularly invites contributions from other teachers and community members as integral portions of learner experiences; (b) regularly assists colleagues in areas of personal expertise and/or interest; and © enriches learning experiences by facilitating communications with others in the community and beyond through practical applications of computer technology.

2) **Teaching Adapted to the Nature of EE**

A) **Planning** - The teacher plans with other teachers and community members to collaboratively implement integrated EE learning experiences for the students.

B) **Diverse perspectives** - A teacher (a) strives rigorously to provide balanced insight into the many perspectives that come into play with environmental issues; (b) recognizes the typical environmental inequities between social groups, and seeks support for more equitable treatment;

C) **Integrated** - The teacher seeks to integrate EE across the entire range of their responsible discipline(s); and seeks wholistic experiences that enable the lived experience to build the knowledge and skills of students in meaningful ways.

3) **Teaching Adapted to the Specific School Culture**

A) **Teacher research** - The teacher systematically gathers and analyzes data from students and their development and uses results to guide teaching.

B) **Planning** - The teacher adapts the selection and implementation of curricula to the interests, knowledge, skills and experiences of their students.

C) **Responsive** - The teacher is responsive to student environmental interests/concerns that do not match their own, and supportive of efforts to investigate these issues.

4) **Teaching adapted to a post-modern world**

A) **Computer infusion** - Teachers integrate various forms of electronic communications into their instructional practices as a form of research and communication.

B) **Global education** - Global or trans-national elements of environmental issues are a consistent and integral component of instructional efforts.

C) **Multi-cultural education** - Students are made fully aware of the different ways of seeing environmental issues from diverse cultural perspectives, and are willing to learn from other cultures.

5) **Teacher Qualities**

A) **Positive Attitude** - Teachers adopt a "can do" approach with their students and exhibit a faith in their students' abilities.

B) **Respect** - The teacher actively displays and demands mutual respect among students and involves each student at their level of social, intellectual and developmental ability.

C) **Model** - The teacher promotes and models curiosity, excitement, wonder and imaginations as habits of mind; and exhibits environmentally responsible behaviors: (a) takes initiative to learn more about their personal and collective influence on the environment and actively seeks out strategies to avoid or reduce impacts, or restore environmental quality; (b) lives in an environmentally responsible manner with respect to consumer purchases and other economic decisions, applying knowledge and principles to actions taken; © works directly as an individual to help maintain or restore environmental quality - seeking to persuade others to adopt environmentally sound practices, ecomanagement, and taking political and legal action where appropriate; and (d) works collaboratively with others to effect the same changes identified in points a-c here.

D) **Integrity** - The teacher has an obligation to honesty, but not transparency; states environmental convictions, yet is honest where unable to uphold those convictions.

E) **Compassion/Fairness** - The teacher seeks to get all students in the classroom involved in ways that provide opportunity for meaningful experiences and construction of knowledge, and promotes fairness and equity in intra-class relations.

F) **Nurturant** - The teacher (a) allows students to experience some frustration, but also recognizes when limits are reached and greater benefits can be derived by providing assistance; (b) seeks to enhance student capacity for persistence, and shows similar persistence and resilience in their educational efforts; and © reflectively seeks a deeper understanding of issues, and does not push specific action on issues. Sometimes conditions suggest the wisest course may be one of inaction.

4) **Teacher Practices to Create Desired Conditions**

A) **Creativity** - The teacher makes creative use of available time and resources to enhance the quality of learner experiences.

B) **Self-initiative** - Where time and resources are limiting, the teacher builds requisite resource levels and time flexibility to enhance educational opportunities.

Appendix B

Researcher Autobiography

and

Participant Portraits

The following pages contain a personal autobiography. Any extended interview research is colored by the perspective of the researcher - in this case myself. In addition, I have included a brief biography of each interviewed teacher to convey the breadth and depth of the teachers who contributed their narratives to this research.

Researcher Autobiography

I spent my younger days in a Detroit suburb, the youngest of six children. We did a lot together as a family, and often my play-time world was the outdoors and the games we invented. We didn't have a lot of toys, and material things never meant much to me - and still don't. My mother had six children in seven years (!!!), which meant I had five older siblings keeping me in line. As a result, I developed a strong desire to direct my own life. A few years back my mother explained how she came to realize she couldn't tell me **how** to do something. I was determined to figure it out myself; to put a little of myself into it. I loved discovering things for myself - subconsciously rebelling from having five older siblings always seeming to know. Regardless, the bonds of youth live on, and my family remains an important part of me.

While young, we took nearly annual trips out to California, camping at national parks on the way out and back, and surfing while visiting relatives on the west coast. Those were grand times. And though they ended when I was ten years old, they left fond memories, and likely served as a foundation for my love of nature and life. With an inbred *joi de vivre*, I have difficulty understanding a spectator approach to life - the TV, sports, videos and other ways of living life from the couch. I want to get involved, and I have an intense passion for a **quality** life, filled with healthy air, water and food, people and other forms of life, and opportunities to explore and discover the world around me.

Humans, now at 5.8 billion and growing, are an increasingly common component of our environment. Where can I find peace and quiet - time for reflection, star gazing and listening to silent stillness? Such opportunities at the time of this dissertation were at a lower level than I find desirable. I feel trapped in a fast-paced world - comparable to a tired child who runs around endlessly, excited and giggling, until she tires, collapses, and falls to sleep. Yet where are sleep and recuperation possible for our tired humanity and world?

My faith in God provides me with hope in our common future, in spite of how humans have mishandled responsibilities as stewards of the creation. We foul the earth and displace many complex and interacting ecosystems with a built environment devoted to the support of a single - human - species. Can we discover a *reverence for life* - as suggested by Albert Schweitzer - and move beyond such an anthropocentric mind-set?

Some people may consider me to be an "intense" person. Yet I learn from my own shortcomings and foibles that I live and view life from my own perspective. I am sincerely interested in the way others see the world, and realize that others may wish to live their own lives as **they** best see fit. Others see things differently, and can help broaden my perspective. I believe in the synergy of collaborative efforts, and wish to open communication lines which enable synergy to take place.

In my work with students and teachers, I want to know the stories that lie behind them, but I also have a passionate desire to help them see the world around them from other perspectives - including a more bio- or eco-centric one instead of anthropocentric. I am strongly motivated to nurture social responsibility in those with whom I interact. With 5.8 billion of us, it is no longer solely a question of what we as individuals can afford, but what the whole biosphere can afford. How can we help our neighbors - human and other living beings - around the world have lives of greater quality, both now and for future generations?

There is more..., my intense love for my 4-year old daughter; my 6-year relationship with my

wife, growing stronger after a rocky first several years; my wilderness experiences; my low social self-confidence; my ever-changing and growing faith; my introverted self; my willingness to risk; my desire for peace and slowing down in my own life, coupled with my determination to make a difference - to be a responsible steward of the many blessings I have....

I think I will always retain a certain amount of bias in my perspective of the world. But at the same time I am a multi-perspective person with 25+ jobs in my history. I am learning to see things through other eyes, and even beginning to understand others, and the implications of that understanding. I am working on it....

Participant Portraits

Becky is a seventh grade life sciences teacher in a suburban school district. She has been teaching at the same school for 25 years, and has what she terms as the "best science classroom in the county." She feels virtually no barriers to her environmental education (EE) teaching efforts other than personal time limitations.

Becky has two grown children, and does lots of hiking, camping and the like with her family; continuing with extensive diverse explorations today. These experiences may have inclined her in the environmental direction, but she is still a relative newcomer to EE. She was inspired in that direction following attendance at an EE workshop at Tremont in Townsend, Tennessee. She has spent the past ten years as an inspired environmental educator. She and twelve of her students were involved in a 1990 exchange trip to Japan, where they presented a four hour workshop to other educators there. Currently balancing her environmental enthusiasm with other aspects of science education, she still devotes at least one full day each week to environmental issues.

Bonnie is a "born and raised" local of the urban California community in which she teaches today. She received both her B.A. there, as well as her masters degree in environmental education. She now serves as grades K-6 environmental resource teacher for an environmental magnet school. She provides weekly pull-out programs for students in grades K-3, and 3-4 week collaborative EE units with grades 4-6. She enjoys the challenge of the diverse student groups, coupled with collaborative teaching opportunities.

Bonnie changed careers from marketing to education, inspired by her children's enthusiasm for school! The enthusiasm came from the very school where she teaches today; she was turned onto EE from what she saw in her own children to be the results of the EE process/experience. Today she is broadly involved in EE, and her classroom energy conservation program was highlighted in a national educational video produced by Silver-Burdett.

Connie taught initially in the elementary school, but was drawn toward middle school early in her career. Teaching in middle Arizona, she developed a one-semester EE/ecology course for sixth graders and became active in the state-wide EE organization, AALE. She initiated the AALE Natural History Weekend, bringing teachers and resource professionals together around a topical environmental study. In her school she gained access to school property to build an outdoor classroom, and with assistance from the state game and fish department, built and stocked a pool

with the now-endangered desert pupfish. Her classes replaced/added numerous plants, put in a weather station and erected a shade ramada.

For two years after Connie married an Australian bloke she lived and traveled around the world before returning to rural Arizona. Her travels brought her teaching experiences in a Greek/Asian ethnic urban area of Sidney, and in diverse segments of small-town Arizona, where she currently teaches in a brand new bi-lingual/bi-cultural rural middle school. Surrounded by desert and mountains, she lives most contentedly in a river valley, teaching integrated math/science to sixth graders, and taking interest in community affairs relating to children and education.

Dawn taught initially in Wisconsin, then Texas for three years and back home to Wisconsin where she obtained her M.S. For one year she served as K-8 EE specialist in one district, then married and moved again. She has now been teaching third grade in northwestern Wisconsin for the past seven years. She is known for her interest and love for nature, has started and worked with her students in planting a small butterfly garden on the school site. She has recently set up a publishing company at the school to publish single copies of children's books.

Dawn sees her teaching role as a facilitator or guide for student-driven projects. She supports her students in their community activities, including community surveys and other ways of involving her students in the community. Her love for nature spills over into her love for watching-and nurturing-the natural growth of her students - and her children.

Delora London ("everything has a use" Delora) has a "sneaker garden," and has been teaching for 15 years, the last five of those as a science specialist in a downtown urban community. Her creative, energetic, "can do" attitude effervesces - both in dialogue and with her students. Her gravitation toward science came part way through her career, when she "discovered" how clearly science was connected with all aspects of her students' lives. She is captivated by connections, and when starting as science specialist, immediately enlarged her teaching environment to incorporate the surrounding community. She teaches her students to look outwardly to the community, while simultaneously brings the community into her classroom.

Delora grew up on the New York Bronx, and moved to this large Midwestern city right after college. She starting teaching in high school, but discovered that was not her niche, and returned to school to re-certify in elementary education. Her first ten years as a *resource teacher* contributed to her extensive familiarity with a diversity of materials for use in her teaching. She has alternately wanted to be a singer, actress and nurse, and has talents in all three areas which enrich her teaching. She is strongly dedicated to a helping profession, and is determined to lift her students up to higher aspirations for their future.

Dixie and **Jenna** provided a dynamic, interactive team approach to teaching 7th and 8th grade in a "very dynamic school" in the northwest. They teach a service-oriented integrated science class and an elective environmental awareness/action course. The team was unfortunately broken up part way through this research, as Jenna was called off to teach high school in the district. She was the ONE district person who could fill the shoes required in a new grant-supported program. Dixie chose to stay at the middle school because she loves teaching at that level! Her students will be feeding into the classes Jenna now teaches.

Dixie came to love the world around her through inspirational teachers. As she came to spend more time outdoors, hiking, climbing and other outdoor camp experiences, she developed a passionate love for the environment, which she now shares with her family. The contagion spills over into her teaching, where she retains her enthusiasm with highly-energetic middle-schoolers, trying to channel their energies constructively to be life-long learners of the environment.

Jenna also became interested in environmental education through teachers, starting in middle school trash pick-ups, and continuing through extensive field experiences in college. She has a talent for helping the middle school students take ownership in their projects, fostering self-reflection and self-initiative on behalf of youthful/energetic care and love for the environment. She inspires this through her sincere care and love for the students - and her belief in their abilities to solve their own problems.

Jim developed his love for the environment through a variety of formal and nonformal experiences in New York state. Majoring in biology, he focused on environmental matters. He currently teaches seventh grade in an eastern urban school. His long-standing love and respect for life extends from insects to humans. He believes "there's a science to liking nature..., things to be learned and things that you can teach other people." He retains his excitement and enthusiasm even through summer with his involvement as a camp nature director. He finds creative uses for all sorts of resources in helping his students see things differently and take responsibility for their own learning and discovery.

To Jim, environmental education is an ongoing process where students can discover their place in the world, and that their actions, no matter how large or how small, have impact beyond their home, backyard, car, or school. He seeks to enlarge the student's world and their sense of responsibility for their actions.

John, a fifth-grade teacher for 21 years, is known alternately (and affectionately) as *snake man*, *can man* or *bird man* for the reputation he has teaching his fifth graders about environmental matters. He immerses his students experientially, maximizes outdoor settings, develops thoughtful, responsible behaviors in his students.

John has spent most of his life in the same Midwestern area, but broadens his perspective with extensive travels that include Alaska and Russia in recent years. He uses his personal experiences to bring a global perspective to his teachings, while remaining thoroughly rooted in the local environment for first-hand experiences with his students. He has received a number of state awards for his environmental education teaching efforts, and one national award as well.

Larry has a strong background in field research, and a masters in teaching biology. While he has taught Earth and life sciences, and chemistry, his main focus now is a *thematic science* course which emphasizes wildlife management, astronomy and energy resource investigations. He takes frequent workshops in areas connected to environmental sciences to maintain the quality and integrity of his class presentations, and learn new skills or perspectives to share with his students.

He travels extensively in the summer throughout western and central United States, and into Mexico. His trips are both personal therapy and opportunities to investigate and acquire more information and/or materials with which to teach. His immersion in the environment has earned him

the nickname by his wife of the "little Euell Gibbons." He recently won the Presidential Award in Math and Science in Arizona.

Penny is a librarian for a 1st-5th grade elementary school in the Rocky Mountain region. She has served as a substitute teacher for 19 years, and in her present role she designs programs directly supportive of curriculum goals at the various grade levels in the school. She has lived in seven states, providing diverse experiences and constantly revising strategies for her different teaching opportunities.

Penny has worked as a nature center interpreter and park ranger, and is an active facilitator for the *Project WILD* and *Project Learning Tree* programs both in her school and far beyond. She develops educational units to take into classrooms, as well as thematic library exhibits which support educational programs such as National Wildlife Week or Earth Day.

Philippe is an inspiring, creative teacher who strongly believes students need both freedom and responsibility to develop self-care and environmental stewardship skills. He is currently working on a doctorate in education, seeking to expand opportunities to influence others and upgrade the quality of education for all children. Philippe has taught pre-Kindergarten, and first through fifth grades - mostly at suburban schools. His greatest experience has been at the third-grade level. His teaching units call for his students to "publish a book" on the topic at hand.

Philippe spent his early years in England, a single child raised largely by his father, who was attending school and working at the same time. He was in Ontario, Canada for college and initial teaching experiences, which provided him with a strong base in experiential education.

His first extended experiences with the less human-centered world was hitch-hiking across Canada. It was in this experience where the seeds were planted for his love for the earth. This experience was complemented with survival-type experiential education, including extensive canoeing. His first degree was in urban planning and psychology; but he later switched to elementary education at the last minute following a visit to a school classroom.

Rita ("what more can I say" Rita) is an energetic and inspired woman who teaches fifth grade in a Title I school in a rural community which borders a sizable urban population. Her classroom is a revolving picture of immersion-education, filled with artwork and projects in varying stages of development, surrounding the often-environmental themes which extend from several weeks to a month in time.

Rita comes from a strongly education-oriented family, with strong roots in rural living. She practiced seven years in Orlando before landing her present position in the Appalachian region–her first home–where she has remained the past twenty years. She and her husband have one daughter who is doing well in college in New York. Rita continues to be deeply committed to her students, their families, and their surrounding environment.

Sharon ("that's science" Sharon) overflows with energy and compassion - finding connections in all parts of her students' daily life–eating, brushing teeth, plants or even breathing–with the subject matter close to her heart - science. While she terms it "science" - her clear focus is with environmental matters. She exhibits a no-holds-barred determination to help enrich her students life.

demonstrating her enthusiasm by her lifestyle. She loves ***stuff*** in her classroom, using every opportunity she can to get her students to manipulate "things" and learn from that interaction.

Sharon was born on a plantation in Mississippi, moved to California, then to a large Midwestern city when in seventh grade. Her first occupation was sewing, where she learned how things were made by taking things apart and putting them back together again. She takes the same approach to teaching, helping students learn how things are made, and helps them put things back together. This skill applies to teaching subject matter, and yet spills over (more of a focus perhaps?) as she helps them build their own lives. She is thoroughly dedicated to her students, and has taken them to professional basketball games, purchased teaching supplies and many other resources with her own money.

Sue teaches in a rural school district on the west coast. All throughout her 21 years of teaching, her love has been nature and environmental sciences. With her recent master's degree in EE, she has been able to increasingly focus her efforts in that field. She has been able to develop a whole new framework at her school - based on EE. She loves revising and re-creating new projects, including curricular organization. While somewhat of a self-described workaholic, she loves to have fun, and deeply enjoys teaching and..., life.

Susan has taught elementary through high school in physical education and health, team-teaching middle school language arts and science, and now a sixth grade self-contained classroom with a strong emphasis in environmental education. Her diverse experiences, coupled with her sincere efforts to stay abreast of new teaching styles and new strategies, provide her with extensive breadth and depth which enables substantive recognition for her teachings.

Susan believes "that each child is an intelligent and a unique individual that has the potential for making a positive contribution to our society." And it is her "responsibility to insure that each student is provided with a quality education so that they can become the person that they want to be...." Consequently, she has been recognized for her interdisciplinary teaching skills in environmental education, but also for her contributions to multi-cultural awareness in the schools where she has taught.

Susan has invested herself extensively in the school community, providing substantive support to achieve academic and behavioral expectations in her students, but has also developed strong 2-way communication with parents, and exhibits professional commitment to her colleagues. She even volunteers her own time to help other teachers with events. Her sense of fairness and straight-forward attitude are appreciated by students, parents, and teachers alike."

Tim has had a long-standing interest in and love for the outdoors. He has taught science for twenty-six years in the same suburban school. He recently switched from the eighth to sixth grade, where the curriculum allows more teaching focus on his environmental interests.

His most extensive experience came with twelve years of taking kids on the road for two weeks early in the summer, camping and exploring in different parts of eastern United States. He was impressed by the changes this program brought to student lives. Parents reported that their children were volunteering to take more responsibility for daily tasks at home.

Currently, Tim feels restricted by the curriculum and expectations for standardized-test

achievement; and the limitations of liability concerns, which deters his continued involvement in extended camping experiences. He is more an opportunity-seeker as of late - looking for opportunities to infuse environmental content and stewardship into his current course content - making connections between the youth and their larger environment.

Vicki worked initially in speech therapy, then taught three years in Hawaii, then Georgia. She then took twelve years off from teaching before returning in 1989. Her diverse experiences - including coaching competitive swimming, starting a kite/wind sock business and extensive travels - furnished her with a more global perspective and enhanced her abilities to make connections between students and school content. She now teaches middle school science in Hawaii, and has a strong emphasis on making cultural connections.

Vicki bases her EE approach upon a respect for local cultures, building upon the "strong, powerful and positive connections between cultural values and environmental education." She is a risk-taker with strong principles. She has returned money instead of getting books she feels would narrow exploration of curricular connections to the community. She takes risks in teaching, and supports student investigation and constructive community actions.

Zelda is a *very* enthusiastic educator, who returned to teaching as a volunteer at the public schools with her children. She became more interested in teaching with these experiences, and started larger-scale education in a Montessori school to see if she "wanted to return to spending 50 hours a week working with large groups of children."

The experience spurred her to continue as a Montessori school teacher, where the environment more holistically fosters respect for other students, and for their surrounding environment. At this school, Zelda has substantial freedom and can teach in congruence with her strongly-held *responsible living* principles. She recently had the opportunity to travel to Russia on an environmental educator exchange program through the National Park Service, and had a tremendous experience there. She will be able to follow-up with that experience by taking her students there in 1996.

Appendix C

Elements of Success in EE:

INTERVIEW GUIDE

This Interview Guide was used to guide the in-person questioning of practitioners during the first phase of the research. The questions asked each time were not exactly the same - as they were adapted to the teacher and to the setting where the interview took place.

Elements of Success in Environmental Education, Through the Eyes of Practitioners

INTERVIEW GUIDE

Setting:

The interviews will take approximately one to two hours, and will be conducted in a quiet meeting place where interruptions can be minimized. The interviewer will make certain that any desired snack and beverage are provided and, in general, a comfortable atmosphere is maintained. The interviewer will have paper and pens, and a tape recorder with several additional tapes that will last the duration of the interview.

Consent form:

Hand the individual the consent form and give them time to read it over. Respond to any questions they may have, and patiently await their agreement and signature prior to moving forward with the interview.

From here below the "official" interview starts; *tape recorder is turned on.*

Introduction:

I am conducting a series of interviews with practicing teachers. The interviews are designed to help understand the nature of successful environmental education experiences.

1) *You have been recommended to me as one who has experienced some measure of success in environmental education. Please tell me what led up to your involvement with environmental education.*

2) [after they have led into some of their more recent experiences] *Please tell me about some of your most memorable of your successes (or all, depending upon extent of their experience) with environmental education.*

3) [if not offered directly] *If there were times you wished you could do more in environmental education, I would like to hear about those, too.*

4) *Do you have any other comments or illustrations of your experiences in environmental education that you would like to share?* [if yes, then *please share that/those with me.*]

5) [Perhaps] *If, during any of your environmental education efforts you have had any problematic experiences, please share how you dealt with the situation.*

6) [After close?] *I would like to include a short biography of all those I interview in the final project report. Would this be okay with you?* [await their answer - then, if yes...] *Is there anything you would like to add to our previous discussion that you would like me to include in this biography?* [again, await their answer] *Please share that with me - I will construct the biography and send it to you for your proof and approval.*

Appendix D

The Mail "Interview" Process

The following pages provide examples of the items used in the mail "interview" process.

Cover Letter

This letter shows the typical composition of the letters sent to mail "interview" participants. Each letter was adjusted based upon the preceding pattern of communication. The contents were, nevertheless, fairly similar.

Consent Form

Some slight modifications were made in this form to adapt to the differing circumstances of the "interview."

Interview Guide

The *Interview Guide* used with these interviewees was consistent for all mail interviews. The page includes an explanation at the top, followed by a series of questions. Some of the instructions found in the cover letter are also briefly mentioned on this sheet to ensure their completion as requested.

Follow-up Letter

Since the mail "interview" process eliminated opportunity for direct probing questions, I sent a follow-up letter which included probing responses for more detail with respect to their initial responses to the interview questions. This letter is a sample which includes the general content, but quite obviously the content varied significantly with each teacher.

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KNOXVILLE

College of Education
Education in the Sciences, Mathematics, Research and Technology
402 Claxton Addition
Knoxville, Tennessee 37996-3400
(423) 974-5037

{addressee name and address}

[date]

Dear M. _____:

Thank you for your interest and contributions to environmental education (EE), and most explicitly for offering to participate in my current research project: *Elements of Success in Environmental Education through the Eyes of Practitioners*. As I continue with my round of "mail interviews" I enjoy the opportunities to "meet" people conducting EE in many diverse ways.

I appreciate **your** experiences, time and thoughtfulness. I hope you find the process acceptable and interesting. I will do what I can to make it "easy" and hope further correspondence you receive from me may contribute to your personal growth and can be applied in your present work environment.

Since we discussed the general nature of this "interview" on the phone, I can keep this letter to minimal length. Below, I describe the enclosures which are identified in *italics*. On the other side of this sheet, I explain the full "interview" process I intend to follow.

1) *Consent Form* - Please read this form so you are fully aware of the nature of the study. The University requires that I have a **signed** copy. If you agree to participate, please sign the form and return it with your completed tape.

2) *Interview Guide* and *Audio Tape* - Please read the instructions at the top of the *Interview Guide*, and, using a tape recorder (and microphone if you have one, to obtain a clear recording) for the audiotape, respond to the questions listed.

3) *Addressed, Stamped Envelop* - Upon completion, please place the signed consent form and audio tape in the envelop and return to me. If possible, *please return by April 30*. If for some reason you will not be able to finish by this time, please let me know.

Please re-wrap the cassette tape in the bubble-protection material and tape closed before placing it in the return envelop.

- over, please -

Upon receipt of the consent form and audio tape, my plans are as follows:

1) I will transcribe the entire recording, review and reflect upon your responses, and formulate follow-up questions. These questions will replace the usual "probing" questions that are part of the personal interviews.

2) I will send you the complete transcription, follow-up questions, another blank audio tape and return envelop. You may review the transcription of the interview for accuracy to ascertain that the contents are an accurate reflection of your intended communication. I will ask you to record (in writing or on the tape) any corrections, amendments or additional thoughts to original questions, along with your responses to the follow-up questions. *This will probably take place in the summer months.*

3) You can then return any corrections and your responses to me in a return envelop. If I have any further questions following this round, I will try to address those over the phone or e-mail.

If you have any other questions, please call me either here at the office or at home. Thank you again for your interest and assistance. My phone numbers and e-mail address appear below.

Thank you again for your interest and willingness to participate in this research project.

Sincerely,

Ted May, UT-Knoxville Doctoral Student

{included office and work phone number and e-mail address}

Enclosures, described on page 1.

Elements of Success in Environmental Education, Through the Eyes of Practitioners

CONSENT FORM

The objective of this project is to identify the major factors that foster student growth in environment-related knowledge, attitudes, skills and responsible behaviors, with teachers of third through eighth grade students.

You are asked to respond to a series of questions that may take from 30 minutes to an hour or more. Your identity will be kept confidential through the use of pseudonyms, and only I will have access to the consent form, tape(s) and transcript. The tapes and all items from which your identity could be linked, including this consent form, will be stored in a locked cabinet in an office at the College of Education, University of Tennessee, Knoxville.

There are no anticipated risks involved in your participation with this project. Participation will provide you with the opportunity to reflect on your own experience and will provide me, as the principal investigator, the opportunity to understand and describe those elements which contribute to reaching desired outcomes through environmental education. You and other educators may benefit from the articulation of these elements of success for environmental educators, as guidelines for further personal growth.

Your participation is entirely voluntary and you may refuse to participate, refuse to answer any specific questions, or withdraw at any time without penalty. Please feel free to contact me if you have further questions or concerns about the project or your participation in it.

Principal Investigator: Ted May, Graduate Assistant
EdSMRT Unit, College of Education
402 Claxton Addition
University of Tennessee, Knoxville
Knoxville, TN 37996-3400
423-974-7394

****

I fully understand the explanation of the project and I agree to participate.

_____
Name

_____ _____
Signature Date

Elements of Success in Environmental Education, Through the Eyes of Practitioners

INTERVIEW GUIDE

Nature of the "Interview":

I am conducting a series of interviews with practicing teachers, designed to help understand the nature of successful environmental education experiences. Your response to these questions will take from 30 minutes to an hour or more. Please respond to the questions clearly on a blank audio-tape, recorded in a room with minimal background noise. Your candid and informal response will be most appreciated. No "prepared" structure to your response is expected - feel free to interrupt yourself at any time☺.

Instructions:

Please *read each question in sequence*, and respond in full to that question. All questions are listed below. [*The comments in italics are instructive, and need not be verbalized.*] If you find you have answered one of the latter questions in response to a previous question, please still read the question and say so. If you choose to respond in greater length than the tape allows, please use an additional tape. I will be happy to send blank tapes as replacements.

Question Sequence:

1) You have been identified as an accomplished environmental educator. Please describe what "environmental education" means to you.

2) What do you hope to accomplish with your students through their environmental education experiences with you as their teacher?

3) How did you get started with environmental education?

4) Please share a teaching experience where you felt most successful in accomplishing... [..., *whatever you stated in response to #2 above. Please share as many experiences as necessary to clearly illustrate the "guts" of your EE teaching strategies.*]

5) Please describe an element of your teaching you "couldn't teach without" and illustrate this with an example from your teaching.

- over, please -

6) Please describe your "philosophy of teaching" and share a teaching experience which clearly indicates your teaching "style." [*This may be redundant with #4. If so, please omit.*]

7) Please describe your "greatest strength" in teaching by using an example of that strength- in-action.

8) Please explain to what extent do you rely on external resources, and how you access these resources for use in your classroom.

9) Please describe how you assess your students to determine their growth toward... [*...whatever you stated in response to #2 above*]..., or other forms of evaluation you use in your classroom.

10) As part of my final report, I will include a **brief** (2-3 paragraph) biography of all interviewed teachers, using a pseudonym. Toward that end: (a) do you have any pseudonym you prefer - a first name is all I need; (b) please briefly describe your educational and teaching history leading up to your present role and any particular quality of your teaching today for which you are known.

11) If you have other comments you wish to make, feel free to do so.

End of "Interview." Again, please return the completed tape in the return envelop provided, along with the signed Consent Form.

I will be transcribing this interview and sending the transcription and a draft biography to you for your review and approval, along with my follow-up questions.

Thank you very much for your time.

Ted May

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{name and address of responding teacher}

[date]

Dear M . _____:

Thank you for your taped responses to the mail interview questions regarding my research project: *Elements of Success in Environmental Education through the Eyes of Practitioners*. As per my initial letter, I have completed the transcription of your taped responses, and am sending you follow-up questions at this time. I have enclosed the tape you used for the first questions, with it positioned at the end of your earlier comments. Please continue your comments on this tape.

If you could, please first review the transcription to see if you wish to make any changes or corrections in your initial responses. You may make any minor changes right on the transcription - if you return it to me. Please place longer comments or changes on a separate piece of paper, or record them on the enclosed audio tape.

For the follow-up questions, I have placed sequential red-ink numerals in the right-hand margins of the transcription which match the numbers of the questions printed below. To reply on the audio tape, please follow the same procedure as for the first round of questions, reading each question, then following with your response.

1) Please explain how .... Did you initiate the ...? And how did you gain your students attention so that they become involved?

2) To what extent, and how...?

3) Could you explain how...?

4) I'm not sure I understand ....

...

12) **Brief Biography** - what follows is an abbreviated *draft* biography based upon your responses. Please review the draft, and make corrections as you wish.

Thank you again for your time and willingness to share your experiences and professional insights. If you have any other questions before completing your responses, please feel free to call me.

Sincerely,

Ted May, etc.

Enclosures: Complete transcription; Audio tape; and addressed, stamped envelope

Appendix E

Elements of Success in Environmental Education

Through the Eyes of Practitioners:

SURVEY and Associated Material

The following pages consist of the following:

* The initial cover letter which accompanied each survey.
* The final survey - reduced in size to allow adequate margins for the dissertation (I apologize for the resulting lower quality of the title page). Surveys were printed on two-sides of one 25½"x11" sheet, two-folded down to 8½"x11" size, then folded again to be placed in a business-sized envelope, including a #9 addressed, stamped return envelope. All were mailed in a #10 envelope with standard (32¢) postage.
* The reminder postcard, which was mailed one week after the initial survey mailing.
* The follow-up letter used with second mailings of the survey, 22 days after the initial mailing.

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{Name and address of recipient}

January 23, 1997

Dear M.

Greetings, my name is Ted May, a doctoral student in education. I am writing to request your assistance in defining the *Elements of Success in Environmental Education, Through the Eyes of Practitioners*. **XXXXXXXXXX** suggested you may be interested in my research because of your personal experiences with environmental education (EE).

Last year I interviewed 18 teachers from 11 states regarding their EE experiences. I used the interview narratives to construct the enclosed survey: *Elements of Success in EE*. Now I invite your participation in the research. You are one of 500 educators being asked to rate the significance of the items which foster student growth in desired environmental education objectives.

The *Elements of Success* framework has three categories (*conditions, competencies* and *practices*), described in the survey. Your contributions will help provide a clearer target for teachers and teacher educators to:

* create or construct the *conditions* which facilitate desired EE outcomes;
* develop the teacher *competencies* that are necessary for efficacy in EE; and
* encourage contextual *practices* that work to attain desired EE outcomes.

Toward this end, I will appreciate your completed survey. Your responses will not be associated with any survey data entries, and research results will contain no identifying information that could be linked to individual respondents. I will maintain complete confidentiality.

Please return the completed survey in the enclosed postage-paid envelope. If you have questions about the survey, please feel free to contact me. If you would like to receive a *brief* summary report of the completed research, please so indicate with your comments on page 6 of the survey.

Thank you again for your assistance.

Sincerely,

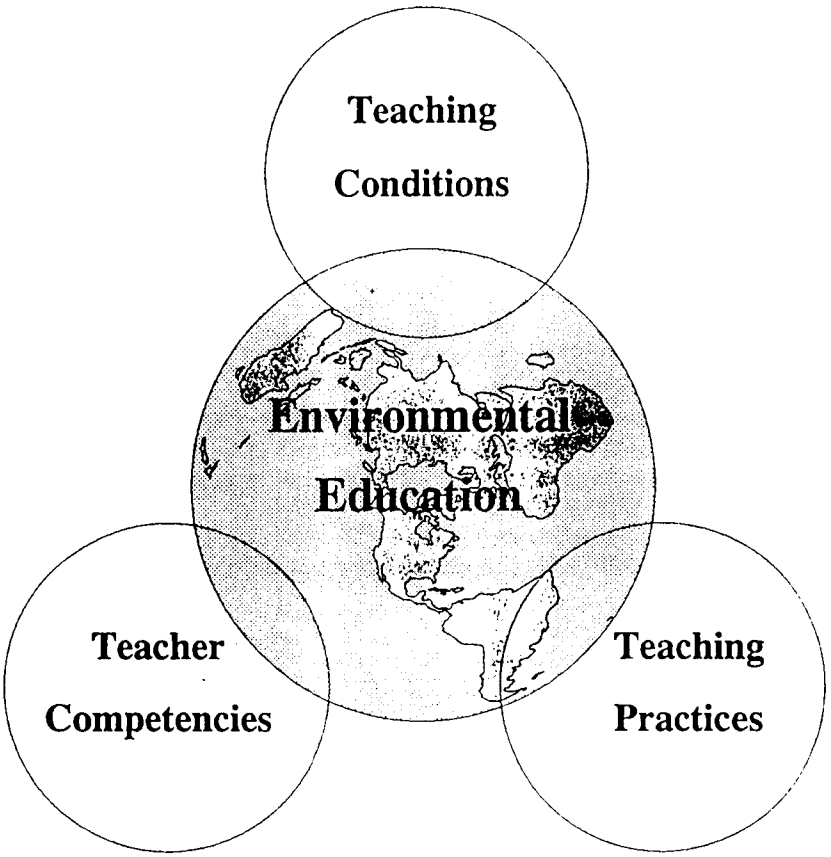
Ted May, doctoral candidate

{address, phone number, FAX and e-mail address included}

Enclosed: *Elements of Success in EE* survey; and addressed, stamped return envelope

Elements of Success in Environmental Education

Through the Eyes of Practioners



Your contribution to this survey will provide educators with a clearer picture of the elements that will foster growth in environmental education.

TEACHING CONDITIONS

Teaching conditions encompass the complete school context, plus other environmental influences upon students' lives. The *elements of success* consist of support from other people, the school physical/social structure and climate, resource availability, and flexibility of time and curriculum. In short, the conditions are those factors which help create a constructive teaching/learning environment.

Please rate the significance of each item in fostering 3rd-to-8th grade student growth in environment-related knowledge, attitudes, skills and/or responsible behaviors.

Please use the following scale, and circle the number that *best* fits your view on each element.

The significance of the item in fostering student growth in desired EE outcomes is...

1	2	3	4	5
very low	low	moderate	high	very high

	Rating
SUPPORT	
1) **Administrative support** - The administration may work collaboratively with teachers to advance EE experiences; and at the least does not set road blocks.	1 - 2 - 3 - 4 - 5
2) **Adequate teacher planning time** - Teacher has sufficient time to access and evaluate resources (see #4-7), and to plan interdisciplinary, engaging, and culturally sensitive EE lessons on their own or with other teachers.	1 - 2 - 3 - 4 - 5
3) **Community support** - Media, businesses, agencies and organizations provide financial, organizational and educational support for teachers and EE programs.	1 - 2 - 3 - 4 - 5
RESOURCES	
4) **Access to out-of-classroom** - Teacher and students can participate in activities in the school surroundings, and in occasional extended off-site field-based experiences.	1 - 2 - 3 - 4 - 5
5) **Local environmental (bio-physical) resources** - Teacher and students have access to a diverse, quality environment, and sufficient financial, technological and other material resources.	1 - 2 - 3 - 4 - 5
6) **Local human (socio-cultural) resources** - Parents and other community members are directly involved to facilitate/reinforce student growth, and to help generate connections between curriculum, students and the local culture.	1 - 2 - 3 - 4 - 5
7) **Non-local resources** - Resources beyond the community are available for major initiatives to expand educational opportunities, bring in diverse perspectives, and help students make connections with persons, cultures and ecosystems around the world.	1 - 2 - 3 - 4 - 5
FLEXIBILITY	
8) **Flexible curriculum** - Teacher has opportunity to use alternative instructional approaches, including interdisciplinary strategies and specific culturally-adaptive methodologies.	1 - 2 - 3 - 4 - 5
9) **Flexible schedules** - Teacher has flexibility to combine and integrate units, teach collaboratively, and engage in extended field experiences.	1 - 2 - 3 - 4 - 5
CLIMATE - *heavily influenced by teacher*	
10) **Collaborative learning environment** - Students recognize and support group goals, and are immersed in a safe learning environment, characterized by mutual respect and care.	1 - 2 - 3 - 4 - 5
11) **Cooperative teaching** - Opportunities are provided to tag-teach, team-teach or in other ways provide diversity and complementarity in teaching styles.	1 - 2 - 3 - 4 - 5
12) **School/classroom models environmentally responsible behaviors** - Classroom and school operations are environmentally responsible, and include student participation.	1 - 2 - 3 - 4 - 5
13) **Students bear the consequences of their behaviors** - As part of normal classroom and school procedures, students experience the consequences of their behaviors.	1 - 2 - 3 - 4 - 5
14) **Categorical Evaluation** - Please rate the extent to which the above items include the major *Teaching Conditions* which enable a third to eighth grade teacher to foster student growth in desirable EE outcomes.	1 - 2 - 3 - 4 - 5

TEACHER COMPETENCIES

Competencies are often described as what a person knows and is able to do. Major competency elements for EE teachers include a cognitive base in the bio-physical and socio-cultural aspects of environmental issues; teaching abilities in planning, communications, assessment and other teaching strategies adapted to students' needs; and the ability to establish connections through constructive learning experiences. *The Elements of Success in EE framework is contingent upon teachers applying their competencies in their teaching.*

The significance of the item in fostering student growth in desired EE outcomes is...

1	2	3	4	5
very low	low	moderate	high	very high

KNOWLEDGE BASE	Rating
1) **Ecological knowledge base** - The teacher has a strong cognitive base which enables them to critically utilize their ecological knowledge with diverse and evolving complex environmental issues.	1 - 2 - 3 - 4 - 5
2) **Socio-political knowledge base** - The teacher understands the importance and nature of social and political operations and the roles these play in diverse and evolving complex environmental issues.	1 - 2 - 3 - 4 - 5
3) **Local cultural understanding** - The teacher understands students, local cultures and sub-cultures, and ways in which these human elements interact dynamically with environmental issues.	1 - 2 - 3 - 4 - 5
4) **Teaching and learning theory** - The teacher is well-grounded in EE goals, and constructivist and other learning theories, to guide planning, implementation and evaluation phases of instruction.	1 - 2 - 3 - 4 - 5
SKILLS BASE	
5) **Listening/questioning skills** - The teacher has careful, active listening abilities to recognize nuances in perspective and meaning, and a wide repertoire of questioning strategies to nourish student understanding and guide students to form personal questions (see also #11).	1 - 2 - 3 - 4 - 5
6) **Computer proficiency** - The teacher can use computers for classroom applications, and make use of telecommunications to broaden cultural perspectives and enrich collective study and action.	1 - 2 - 3 - 4 - 5
7) **Diverse instructional strategies** - The teacher has strength in several highly engaging teaching strategies, complemented by facility with other instructional methods for specific circumstances, topics and students.	1 - 2 - 3 - 4 - 5
8) **Resourcefulness in accessing resources** - Teacher is a skilled life-long learner, can creatively access human, material and financial resources to capacitate desired EE strategies, and can evaluate resources to guard against bias in their use.	1 - 2 - 3 - 4 - 5
9) **Creative; knows how to do without** - The teacher can overcome limitations, induce student creativity, and cultivate adaptive solutions to real-world problems—which are also characterized by limited information and/or resources.	1 - 2 - 3 - 4 - 5
10) **Alternative assessment abilities** - The teacher has mastery in diverse learner-based assessment strategies which complement and integrate with diverse instructional processes, and exemplify EE objectives.	1 - 2 - 3 - 4 - 5
INTEGRATION-ABILITY	
11) **Facilitation skills** - The teacher has skills in reflective dialogue with students, facility in guiding students to discover connections, and can relate to diverse perspectives - bringing *balance* to classroom discussions (see also #5).	1 - 2 - 3 - 4 - 5
12) **Ability to make connections** - The teacher can help students build bridges between feelings. understandings and experiences: (a) connecting students' daily life with classroom topics; (b) linking causes with associated effects to help students foresee/anticipate consequences; and (c) relating the topic at hand to individual and/or cultural values and experiences.	1 - 2 - 3 - 4 - 5
13) **Understands local-to-global issue connections** - The teacher can connect environmental learning experiences to the local culture, and link local issues to global and intergenerational concerns.	1 - 2 - 3 - 4 - 5
14) **Ability to integrate curriculum** - Can bring EE into different subjects, and/or integrate multiple disciplines into an integrated unit.	1 - 2 - 3 - 4 - 5
15) **Categorical Evaluation** - Please rate the extent to which the above items include the major components a 3rd to 8th grade teacher must *know and be able to do* to help them foster student growth in desirable EE outcomes.	1 - 2 - 3 - 4 - 5

TEACHING PRACTICES

The practices describe the teacher's methods and "style," or the implementation of competencies in context. The *elements of success* include what happens within and beyond the classroom — the focal content and nature of the classroom experiences, and the patterns of teacher behavior such as clarity, passion, humor, communications and role modeling among students and colleagues. Teaching practices are revealed in the entire planning-through-evaluation process that surrounds student-teacher interactions.

The significance of the item in fostering student growth in desired EE outcomes is...

1	2	3	4	5
very low	low	moderate	high	very high

TEACHING METHOD/STYLE	Rating
1) **Student-centered learning** - Students democratically participate in significant educational and classroom management decisions — co-selecting culturally-relevant, meaningful experiences.	1 - 2 - 3 - 4 - 5
2) **Utilizes personal and student strengths/passions** - The teacher employs personal talents and passions, and capitalizes on students' strengths as avenues to enhanced interest and involvement.	1 - 2 - 3 - 4 - 5
3) **Experiential teaching orientation** - Students are engaged in hands-on, minds-on classroom experiences in which they explore cause and effect relationships, and/or are engaged in local environmental issues.	1 - 2 - 3 - 4 - 5
4) **Cooperative and inclusive learning** - Students and teacher are immersed in interdependent and inclusive experiences, providing opportunities for collaboration with mutual respect and encouragement (see also ***Conditions***, #10).	1 - 2 - 3 - 4 - 5
5) **Involves external resource persons** - Other persons are selectively included in the learning experiences to present diverging perspectives and add depth/richness to student understanding.	1 - 2 - 3 - 4 - 5
6) **Reflection in planning and application** - The teacher: spends considerable time planning strategies—often with other practitioners—to expand student growth; pauses for personal reflection during class to address student challenges; and allows time for students to critically reflect as part of the class.	1 - 2 - 3 - 4 - 5
CONTENT ORIENTATION	
7a) **Environmental focus of teaching** - Students dig deeply into a single major issue or project.	1 - 2 - 3 - 4 - 5
7b) **Environmental focus of teaching** - Students investigate numerous environmental issues, and discover connections with multiple issues on a local-to-global scale.	1 - 2 - 3 - 4 - 5
8) **Nurturing a sense of place** - The teacher builds student knowledge of—and connectedness to—local cultures, habitats and environmental issues, thus nurturing a deep sense of—and commitment to—place/community.	1 - 2 - 3 - 4 - 5
PERSONAL BEHAVIORS	
9) **Consistent "can-do" vision** - The teacher clearly asserts realistic hope for the future, and empowers students to be constructively engaged in bringing about brighter future scenarios.	1 - 2 - 3 - 4 - 5
10) **Infectious passion for EE, and for teaching in general** - Teacher exhibits zest for learning and reverence for life and the quality thereof, and invites/inspires students to share these loves.	1 - 2 - 3 - 4 - 5
11) **Incorporates Humor into the Classroom** - The teacher uses lightness to balance the serious nature of environmental issues, and to enhance student interest and enthusiasm.	1 - 2 - 3 - 4 - 5
12) **Invests self and personal resources** - The teacher invests abilities, time and finances in support of students, conveying trust, faith and commitment through these actions (balanced with #11).	1 - 2 - 3 - 4 - 5
13) **Practices environmentally responsible behaviors** - Teacher models environmental responsibility, both within and beyond the classroom, teaching a powerful message through action/example.	1 - 2 - 3 - 4 - 5
14) **Risk-taker** - The teacher is willing to "take the plunge" into well-planned educational risks which expand student opportunities beyond the "norm" or "expected."	1 - 2 - 3 - 4 - 5
15) **Recharges self** - The teacher makes time for personal, emotional, physical and intellectual experiences to maintain or rekindle the flame for EE and be revitalized for life in general.	1 - 2 - 3 - 4 - 5
16) **Categorical Evaluation** - Please rate the extent to which the above items include the primary strategies and behaviors a 3rd-8th grade teacher must exhibit to foster student growth in desirable EE outcomes.	1 - 2 - 3 - 4 - 5

Overall Framework Evaluation

The **Elements of Success in EE** - *a framework based upon practitioner experiences* - is designed to embody the **major teaching-associated elements** which foster grade 3-8 student growth environment-related knowledge, attitudes, skills and responsible behaviors. Please evaluate the overall framework using the following scale:

1	2	3	4	5
to no extent	to a slight extent	to a moderate extent	to a considerable extent	to a great extent

OVERALL FRAMEWORK EVALUATION **Rating**

1) The extent to which the *overall framework* includes the major elements which enable third to eighth grade teachers to foster student growth in desirable EE outcomes. 1 - 2 - 3 - 4 - 5

2) The extent to which the *overall framework* illustrates the complex of conditions, competencies and practices that enable a 3rd-to-8th grade teacher to excel with environmental education in the schools. 1 - 2 - 3 - 4 - 5

Comments:

About Yourself - Finally, we would like some information about yourself to help with statistical analyses.

1) Grade level(s) you currently teach:
   - ___ grades 2-4
   - ___ grades 3-5
   - ___ grades 6-8
   - ___ multi-grade specialist
   - ___ other (*please specify*): _____

2) Size of school in which you teach:
   - ___ under 199
   - ___ 200-499
   - ___ 500-1000
   - ___ over 1000

3) Type/size of community in which school is located:
   - ___ Rural, or city/village under 2,500
   - ___ City of 2,500 to 49,999
   - ___ Suburban to an urban area over 50,000
   - ___ Urban - 50,000-499,999
   - ___ Urban - 500,000 and over

4) Number of years you have taught: ____ yrs

5) Gender: ___ female ___ male

6) Ethnicity:
   - ___ African American
   - ___ Asian American or Pacific Islander
   - ___ Hispanic American
   - ___ Native American (Am. Indian, Eskimo or Aleut)
   - ___ White American
   - ___ other (*please specify*): _____

7) Your highest level of educational attainment:
   - ___ high school diploma or GED
   - ___ two-year college degree
   - ___ bachelor's degree
   - ___ master's degree
   - ___ doctorate

Please turn to the back page for additional comments.

Additional Comments

Thank you for taking the time to complete this survey booklet. Teaching is a very demanding occupation, and your dedication is evident in your willingness to participate in this research. Your assistance will contribute to the validity and utility of the findings. Please use the space below and/or additional paper to comment upon the framework or any of its element or categories.

Please return the survey booklet in the postage-paid envelope, and direct any questions to:

Ted May, doctoral candidate
EdSMRT Unit, College of Education
UT-Knoxville, 402 Claxton Addition
Knoxville, TN 37996-3400
423-974-7394/5037; FAX: 423-974-0135; e-mail: *tmay@utkux.utcc.utk.edu*

Reminder Postcard

January 30, 1997

Dear Environmental Education survey research participant:

Last week, I mailed you a survey seeking your reaction to an *elements of success in environmental education* framework. If you have already completed and returned the survey to me, please accept my sincere thanks for your prompt response. If not, please do so today.

I am especially grateful for your assistance because I believe the collective wisdom of teachers such as yourself can notably enhance the quality of education in our nation's schools.

If you did not receive a survey, or if it was misplaced, please contact me at the number or e-mail address below, and I will send you another one right away.

Sincerely,

Ted May, doctoral candidate at the University of Tennessee-Knoxville
office: phone number and e-mail address listed

THE UNIVERSITY OF TENNESSEE
KNOXVILLE

College of Education
Education in the Sciences, Mathematics, Research and Technology
402 Claxton Addition
Knoxville, Tennessee 37996-3400
(423) 974-5037

February 14, 1997

Dear M

About three weeks ago, I wrote to request your assistance in defining the *Elements of Success in Environmental Education, Through the Eyes of Practitioners*. As of today, I have not received your completed survey. I realize that you may not have had time to complete it. However, I would genuinely appreciate your help on this project.

Your response will assist this effort to construct a clear picture of the elements that foster student growth in environment-related educational outcomes. The study's usefulness depends upon receiving a completed survey back from each teacher who received one. You were identified by others as one who could have meaningful input into this project. You may also find that completing the survey helps you clarify your own vision of effective environmental education.

In the event that your survey has been misplaced, a replacement is enclosed, along with a postage-paid envelope. Again, I would be happy to answer any questions you may have about the research - feel free to contact me.

Thank you in advance for your assistance.

Sincerely,

Ted May, doctoral candidate
(please note address on letterhead)

{included direct phone number, FAX and e-mail address}

Enclosed: *Elements of Success in EE* survey; and addressed, stamped return envelope

If you returned your first survey:

*In the event that this letter crosses in the mail with your returning survey, please accept my thanks for your assistance. If so, you may give this survey to another environmental educator. If you do this, please write "**different respondent**" on the front of that survey.*

[NO responses were received in response to this note.]

Appendix F

Survey Sample Demographics

The regional populations used for the survey sample are taken from the U.S. Census Bureau regions and sub-regions - with the region-assoicated states noted. This is followed by an explanation of the sampling process and recommendations to future researchers. **Table F-1** includes the sample size for the various regions, and comparisons to ascertain proportionality of the sample. Subsequent tables (F-2-»F-6) presents all demographic details obtained from the survey respondents that are not included in the data presentation in **Chapter 5**. The appendix is presented in the same order as that found on the survey (see **Appendix E**), including "other" fill-ins as well as any comments/changes other than a one-item check-off from the options presented with the survey.

Survey Sample Population: Regional Representation

Regions and associated states: (U.S. Bureau of the Census. (1995). Statistical abstract of the United States: 1995 (115th ed.). DC: Author.)

Northeast: *New England* - ME, VT, NH, MA, CT, RI
Mid-Atlantic - NY, PA, NJ

South: *South Atlantic* - DE, MD, DC, VA, WV, NC, SC, GA, FL;
East South Atlantic - KY, TN, AL, MS
West South Atlantic - AR, LA, TX, OK

Midwest: *East North Central* - OH, MI, IN, IL, WI
West North Central - MN, KS, NE, IA, MO, SD, ND

West: *Mountain* - CO, MT, ID, UT, WY, AZ, NM, NV
Pacific - WA, OR, CA, HI, AK

Explanation:

The table on the following page presents numbers and percentages of four quantities for each of the nine regions: (1) the United States estimated population; (2) the estimated population of persons under age eighteen (used to estimate relative populations of school-age children and their associated numbers of teachers); (3) estimates of the teacher population by region [These figures were discovered **after** the survey samples were selected and the survey completed. They are included here should other researchers wish to use this sampling method.]; (4) the actual sample used with this survey; and (5) the survey responses received.

In *Chapter 5*, results are presented by region instead of sub-region. This collapsed-presentation was done to overcome a mistake discovered after the survey had been completed. When transcribing numbers and percentages from the statistical reference to the table, the researcher wrote the middle five sub-regions down in a different order than they appear in the reference. Thus the Mid-Atlantic region received East North Central numbers and percentages, West North Central figures were entered into the East South Atlantic row, then the southern sub-regional figures were entered for the next three sub-regions. This explains why the sample proportions did not correspond to the actual figures. Future researchers could the teacher population and percentages.

Population and Sample: The table gives the estimated 1995 population (in millions) for persons under age 18, and the total population of each Census sub-region. Percentages of each follow. The number under the "sample" column is the number of teachers in that region who were sent a survey.

Table F-1) U.S. Census Bureau Regions: Sampling and Survey Returns

U.S Census Bureau		United States Population*				Sample		US Tchrs.+		Returns	
Region	**Sub-Region**	**Ttl Pop.**	**%**	**<18 yrs**	**%**	**n-size**	**%**	**#**	**%**	**#**	**%**
Northeast	*New England*	13.2	5.0	3.2	4.6	23	4.6	141.0	5.5	15	4.6
	Mid-Atlantic	38.2	14.5	9.4	13.6	68	13.6	370.6	14.5	40	12.2
South	*South Atlantic*	47.0	17.8	11.6	16.8	83	16.6	452.6	17.7	54	16.5
	East South Atlantic	16.0	6.1	4.2	6.1	35	7.0	157.9	6.2	22	6.7
	West South Atlantic	28.7	10.9	3.1	11.7	84	16.8	347.4	13.6	51	15.5
Midwest	*East North Central*	43.6	16.6	11.5	16.7	31	6.2	410.0	16.1	24	7.3
	West North Central	18.4	7.0	4.9	7.1	58	11.6	203.6	8.0	46	14.0
West	*Mountain*	15.4	5.9	4.4	6.4	32	6.4	154.3	6.0	24	7.3
	Pacific	42.9	16.3	11.8	17.1	86	17.2	315.0	12.3	52	15.9
Totals for U.S.		263.4	100.1	69.0	100.1	500	100.0	2552.2	99.9	328	100.0

* U.S. Bureau of the Census. (1995). Statistical abstract of the United States: 1995 (115th ed.). DC: Author.

\+ Figures are in thousands, taken from U.S. Department of Education. (1996). Digest of educational statistics: 1996. DC: Author. Table 65, page 76.

Table F-2) Demographic Data from Survey - first three items only

"About Yourself" Demographic Data	Frequency	Percent	N-size
1) Grade Level(s) You Currently Teach *(re-coded from survey responses)*			328
grades pre-K-1	9	2.7	
grades 2-4	**40**	**12.2**	
grades 3-5	**67**	**20.4**	
grades 6-8	**123**	**37.5**	
grades 9-12 (*details below*)	13	4.0	
multi-grade specialist (*details below*)	44	13.4	
other mix of grades (*details below*)	15	4.6	
administration (*details below*)	7	2.1	
multiple responses (*details below*)	10	3.0	
2) Size of School			328
under 199	19	5.8	
200-499	114	34.8	
500-1000	124	37.8	
over 1000	61	18.6	
other or non-response (*details below*)	10	3.0	
3) Type/Size of School Community			328
rural, or city/village under 2,500	76	23.2	
city of 2,500 to 49,999	85	25.9	
suburban to urban area over 50,000	82	25.0	
urban - 50,000-499,999	41	12.5	
urban - 500,000 and over	36	11.0	
other or non-response (*details below*)	8	2.4	

Table F-3) Grade Level(s) You Currently Teach:

#	# entered	What they indicated on survey
487	2	Grades 3-5; and noted in blank at bottom "bilingual"
399	3	Noted art and dance teacher for grades 7 & 8
24	4	Grades 6-8, multi-grade specialist - media specialist
29		Science specialist - Kindergarten, first and second grades
93		K-5, speech-language pathologist
242		K-12 Science Coordinator
248		Magnet Coordinator, for Elementary Environ. Sci. Program
258		Gifted & Talented, 1-4
331		Homeschool, K-12
336		grades 2-4; and other: el. ed. math/sci. methods
363		Gifted education, grades K-6
435		grades 3-5 and 6-8 (indicated 3-6) multi-grade specialist)
455		grades 2-4, 3-5, 6-8 - multi-grade specialist
458		grades 3-5, multi-grade specialist
489		Science resource teacher (& indicated previously taught grades 3-5)
12	5	grade 1, plus grades 6-8
42		grades K, 1, 2, & 4
54		I team w/all level classes from pre-K thru high school.
95		grades 2-4 and 3-5
140		7th-9th
191*	(x 7) »»	grades 3-5 and grades 6-8; **others**: #'s 213,369,370,478,488,493
326		grades 2-4; 3-5 and 6-8
425		5-12, all subjects
480		7-12
302	6	9-12; taught grade 7 EE 5 years prior
174	7	Currently teaching K/1st grade trainable mentally handicapped
108	9	grades 3-5 and other: Teacher In-service, science/EE
112		grades 2-4, 3-5 and other: "Workshop for Educators"
249		Nearly all checked or indicated - as K-8 Nature Ed. Coordinator
289		grades 3-5, 6-8 and other: sp. ed. behavior
298		grades 6-8 & multi-grade - 50% gifted & talented
316		grades 2-4, 3-5, and multi-grade specialist
423		grades 3-5 and multi-grade specialist - job-sharing grade 4-5, and math-science specialist for grades K-5
432		grades 6-8, multi-grade specialist and grades 9-12
477		grades 2-4,3-5,6-8 - K-8 Multi-age classroom
483		grades 6-8 and other: Post graduate

Table F-4) Size of School in Which You Teach:

#	# entered	What they indicated on survey
47	none	"School district 14,500; 21 buildings"
339	9	500-100 and over 1000
483	9	teaches M.S. at 500-1000 size; and post-graduate at over 1000 size

Table F-5) Type/size of Community Where School Is Located:

#	# entered	What they indicated on survey
181	6	Suburban to an urban area under 50,000
283	9	Rural, and city of 2,500-49,999 both checked off
347	9	City of 2500-49,999 and Urban, 50,000-499,999

Table F-6) Ethnicity:

#(s)	# entered	What they indicated on survey
94	6	Nothing entered in blank
129	6	Black (non American)
132	5	(White American) "naturalized"
148 & 292	9 (x2)	African American, Hispanic American and White American
174	3	Mexican American (written in to the side of Hispanic American)
191,476,479	9 (x3)	Native American and White American
341	6	Immigrant Asian
371	9	White American and American Indian
403	6	Sicilian/English
410	9	Hispanic American and White American
472	6	Part-Hawaiin
475	6	Cosmopolitan

Table F-7) Your Highest Level of Educational Attainment:

Many also wrote # of additional hours they had over bachelor's or master's degrees.

#	# entered	What they indicated on survey
166	6	CAS - Certificate of Advanced Study
171	6	Specialist degree
205	6	Rank I (written in just above doctorate - ???)

Appendix G

Data Management

Receiving, maintaining consistent records, accuracy in data entry and other data management processes are critical to valid research, and research that can be used again for further study and follow-up. These processes for data management and record-keeping are briefly described in this appendix.

Maintaining Records of Returned Surveys

As noted in the *Methodology* chapter, all surveys sent out had numbers written upon their front which were associated with specific teacher names. For the first survey mailing I used blue ink, the second I used black, in case there were any reason to differentiate between responses to the first versus the second mailing.

As surveys were received, the date was written on the bottom front, and any enclosures or envelope addresses were marked with the survey number in case of need for further use. Using the master list of addresses, a copy of that used for post card labels, each name was lightly crossed off the list as it was received. To prepare for the second mailing, these names were deleted from a copy of this address file, to reduce the number who would receive the second mailing. On the date designated (see cover letter at the end of *Appendix E*), these persons were sent another copy of the survey.

Any envelopes or postcards returned to sender were replaced with another teacher from the region where it was sent, and this was mailed out immediately. These persons did **not** receive the initial second mailing until a later period to allow them approximately the same time interval between mailings. They also did not receive a postcard reminder.

Table G-1 (the following page) shows the date and number of surveys received over the duration which surveys were received and used. I have not included here the number and dates surveys were received *return to sender*, though such records were maintained (for approximately 35 returns to sender).

Survey Data Entry

Two forms of data were obtained from the surveys. Numeric entries were made for the demographic data and the ratings of the framework elements, categorical and overall framework evaluations. The other data were the comments and notations made on the surveys, and in some cases on pages attached to the surveys. Numeric data were entered in an SPSS for Windows file, and written comments were entered in WordPerfect files. The process for these data entries is noted here, following the order in which the data were taken from the surveys.

Survey Number Identification

First, each survey was given a code number which corresponded to the number on the front of the survey. This provided not only a convenient way of telling who had or hadn't returned the survey, but also allowed me to re-locate any survey to check data entry accuracy. This was entered in the first column of the data file.

Table G-1 - Log of Completed Surveys Returned - all 1997

Date	# Received	# to date	Date	# Received	# to Date	% Return
1/30	2	2	2/28	4	271	
1/31	3	5	3/3	19	290	
2/3	42	47	3/4	2	292	
2/4	26	73	3/5	2	294	
2/5	6	79	3/6	8	302	**>60%**
2/6	18	97	3/7	5	307	
2/7	18	115	3/11	5	312	
2/10	41	156	3/12	1	313	
2/11	10	166	3/13	2	315	
2/12	9	175	3/14	2	317	
2/13	11	185	3/17	2	319	
2/14	14	200	3/18	4	323	
2/17	4	204	3/19	2	325	**65%**
2/18	9	215	3/20	1	326	
2/19	6	229	3/21	1	327	
2/20	8	227	3/24	1	328	
2/21	3	230	**Total Surveys Analyzed**		328	65.6%
2/24	18	248	These surveys were NOT entered or used in analysis.			
2/25	14	262 (50%)	4/8	1	329	
2/26	3	265	4/14	2	331	[66.2%]

Survey Respondent Demographics

The demographic data were taken from page 5 of the survey - the "About Yourself" section. Numerical entries for the responses were as follows:

1) Grade level(s) you currently teach
(***these were re-coded!***)
1 grades 2-4
2 grades 3-5
3 grades 6-8
4 multi-grade specialist
5 other mix of grades
6 grades 9-12
7 grades pre-K-1
8 administration (principal or other)
9 multiple responses (noted w/comments)
blank = no response

2) Size of school in which you teach:
1 under 199
2 200-499
3 500-1000
4 over 1000
9 multiple responses (noted w/comments)
blank = no response

3) Type/size of community in which school is located:
1 Rural, or city/village under 2,500
2 City of 2,500 to 49,999
3 Suburban to an urban area over 50,000
4 Urban - 50,000-499,999
5 Urban - 500,000 and over
6 alternate response (noted w/comments)
9 multiple responses (noted w/comments)
blank = no response

4) Number of years you have taught: # yrs
blank = illegible or no response

5) Gender: 1 female 2 male
blank = no response

6) Ethnicity:
1 African American
2 Asian American or Pacific Islander
3 Hispanic American
4 Native American (Am. Indian, Eskimo or Aleut)
5 White American
6 other (response noted w/comments)
9 multiple responses (noted w/comments)
blank = no response

7) Your highest level of educational attainment:
1 high school diploma or GED
2 two-year college degree
3 bachelor's degree
4 master's degree
5 doctorate
6 alternate response (noted w/comments)
9 multiple responses (noted w/comments)
blank = no response

Element, Categorical and Overall Framework Evaluation Ratings

Each item was rated on a Likert scale, with values ranging "1" to "5." Values were entered which corresponded to the number the respondent circled. For special circumstances:

* If the person circled a space between two numbers, the lower number was entered.
* If the person left an item blank, the file databox is left blank.

In addition, if notations or comments were made anywhere on the survey, or attachments were enclosed with the survey, a data field labeled "comments" was started, and if comments are made, I entered "yes" in the "Comments?" column. Finally, if they specifically requested a brief summary of the research results, I entered a "yes" under a final column, titled "Summary?"

Appendix H

Narrative Support for the

Elements of Success in EE Framework

I included selected excerpts for the framework elements within the body of Chapter 4 because I believe the depth contained therein is critical to understanding the nature of the framework itself. This appendix provides a few more supportive quotes and a reference to the additional evidence contained within the 235 pages of narrative transcriptions. The purpose is to show the near universality of support for some of the elements, and more sparse support for others. The quotes and transcription references are those ***in addition*** *to supportive quotes used in Chapter 4 of the text.* ***References are by teacher pseudonym, page and line numbers of the transcription.***

Table H-1) TEACHING CONDITIONS - Narrative Support

Element Title	Supportive Quotes and Transcription References
SUPPORT	
1) **Administrative support**	*I have never been said no to. I have this wonderful principal, who would say..., she trusts me - which is really nice.* (Becky, 8:8-9)
	Dixie & Jenna - 16:27-33; Philippe - 9:16; Zelda - 7:46-48; 14:29-36
2) **Adequate teacher planning time**	*Actually I think it was the extended contract that allowed me to do that..., it was a big push.* (Becky, 5:35-36)
	Becky - 3:27-29; Rita - once/month at EE teacher education programs
3) **Community support**	[when non-supportive principal took over...] ..., *the community already saw the value of what was happening, and* [principal's] *main problem was he didn't see value in taking kids out of the classroom. And I'd been doing field trips for a number of years, so the parents really backed it. So when he tried to put the clamps on things, some parents spoke up and said "my older son did this and we think it's great; I want my younger daughter or son to get involved too." So they kind of fought it, so as a result, I was at least able to keep in the things I'd already done, and then when he disappeared I was able to add some other things....* (John - 6:36-45)
	Becky - 5:13-17; Dawn - 9:27-37 (actively acquired); Rita - 3:6; 18:36;
RESOURCES	
4) **Access to out-of-classroom**	*I don't know if by now I couldn't teach without taking kids into the field. That's been - since we've been at ... - that's become a part of what we had to get grants for is just to get buses to get kids out and to be outside and, kind of back and forth. And I'm not sure I would ever want to go into a teaching situation any more where that wasn't as much a part of what happened as what goes on in the classroom.* (Dixie & Jenna, 5:10-14)
	Bonnie - 4:38-41; 9:40-10:8; Dawn - 1:26-30; Jim - 4:30-36; 11:22-26; John - 3:24-30; Larry - 2:37-3:2-3; Penny - 2:36-3:11; Vicki - 5:18-31; Zelda - 12:28-32
5) **Local environmental (bio-physical) resources**	..., *what I couldn't teach without is being able take the kids outdoors. I have a lot of friends who are also teachers, and their property is just basically blacktop or gravel..., and for me that would just be horrendous. We have a large lot in the back - a grassy area; we do have a lot of blacktop area; we have gardens planted; we have a lot of trees up along the side..., so we kind of have a handle on a lot of different ecosystems where we can study the life in the natural settings..., fairly natural settings. Without that, I don't think I could have done that.* (Jim, 4:14-18) {While specific quotes are hard to pull out, those in urban areas were usually adamant about taking students out into their local community - planning gardens, using local museums, etc.}

Table H-1) TEACHING CONDITIONS - Narrative Support

Element Title	Supportive Quotes and Transcription References
	Becky - 3:32-33; Bonnie - 3:5-6; Philippe - 3:40; 8:20-23; Rita - 9:2-4; Sue - 2:41-43; 3:28-31; Tim - 5:21-23; 6:25
6) **Local human (socio-cultural) resources**	*I used to keep extra scarves and things that I had, and sweaters..., but I don't need to do that now. They have it themselves. When I tell them to dress warmly because we're going to be outside, we're going to walk to the library, we're going to walk half way downtown..., they come dressed for it.... But the entire 2nd & 3rd grade in the school were going to this business opportunity that was going on that day for Chicago-land schools.... I usually don't get any negative feedback from the parents about taking children....* (Sharon, 18:28-19:9)
	Bonnie - 3:38-4:12,29-32; 10:9-14; Dawn - 9:3-10; Dixie & Jenna - 8:5-18; Susan - 7:24-43; Zelda - 12:28-32; 14:40-44; 15:17-22
7) **Non-local resources**	*Our main town has about 3,000 people. Our library is quite small.... I have formed a real strong network with the scientific community that is willing to support students and student research. And by student research I don't mean college or high school, I mean clear down to sixth grade or below IF students come up with meaningful questions. Scientists are busy people and they don't want to be answering small sound-bite-type question. They are real willing to help students with serious research, whatever age they are; so I've spent a lot of time trying to build that network for myself & my classroom.*(Vicki, 8:5-17)
	Dixie & Jenna - 8:5-24; 15:38-39 & 16:25-26; Vicki - 17:27-33
FLEXIBILITY	
8) **Flexible curriculum**	*...in this geology unit that I am doing right now, all it says as far as my responsibilities go is "geology." And I can present it* ***any way I want****. I can include as many field trips, no field trips.., just however I want to teach that.* (Zelda, 12:8-11)
	Dixie & Jenna - 5:41-6:2; 9:33-44; Jim - 12:48-52; 13:2-6; Penny - 4:28-37; Philippe - 8:3-4; Sharon - 17:1-15; Sue - 2:2-3
9) **Flexible schedules**	John's quote shows the blending of flexibilities - curriculum and schedule: *I have..., flexibility. If I get into a math assignment, and something comes up about some environmental issue..., I'm off and on it. I'll get back to the specific math class later, but I'm not going to pass up an opportunity to go with something like that. So, I think the flexibility of not staying on a tight schedule, of not saying "well I've got to be done with this by such and such a date or else...." You know, if I get done with it three days after that such and such a date - well then, fine - if those three days led to a good discussion or an activity whether it's related to EE or politics, so be it. There are things that I know fifth graders have to learn, I know the things they've got to get in math before the end of the year, and I know the skills that they have to get in language, and reading and science and social studies.... They'll get those skills by the end of the year, but they may not get those skills in the exact same way that if I'd have just plowed on straight-way through the books.* (John, 10:13-26)

Table H-1) TEACHING CONDITIONS - Narrative Support

Element Title	Supportive Quotes and Transcription References
CLIMATE - *heavily influenced by teacher*	
10) **Collaborative learning environment**	*Every single kid has a neighbor. And the neighbor is responsible for making certain that their neighbor has everything done when they're supposed to have it done. ..., and this is in every subject area. And, the way I have them grouped is - high and low. But, nobody in here knows* ***who*** *are the lows.* (Rita - 14:3-6)
	Becky - 6:13-14; Bonnie - 8:33-34; Dawn - 7:35-46; Philippe - 9:42-10:3; Rita - 6:15-17; Sharon - 10:41-46; 11:1-17; Susan - 4:33-49; Tim - 2:31-34
11) **Cooperative teaching**	*I job-share my classroom with another teacher, and this year we've identified two issues that we're exploring with our students. [She] and I both teach part time and so we are teaching when the other person is not there. Although we have a fairly integrated curriculum and run a fairly integrated classroom, we still keep ... responsibilities pretty separate in terms of planning and grading, assessment, and things like that. And, pretty much following through activities in those curricular areas...,. even though we are not teaching together most of the time, we do set down at the beginning of the year and set long-range goals together, and then at the start of each theme or unit we plan which concepts we'll be covering and the activities that we'll be doing. We share resources - it's a pretty exciting time, planning time together.* (Dawn, 1:30-32; 5:5-20)
	Dixie & Jenna - 5:24-33
12) **School/classroom models environmentally responsible behaviors**	*I felt real good about it because the kids were totally empowered. It was* ***their*** *project; they totally took it on, ... felt that it was their project..., that they made a difference. And by the end of the year, just money-wise - which was not my goal, but kind of a nice way to measure it sometimes - we saved almost $6000 for the school. So, that was something really tangible that the kids could say that they did. They saved $6000 just by turning off the lights. And one of the neatest things... one of the students came back and shared that her mother started an energy patrol at her job in the Post Office....* (Bonnie, 2:22-29)
	Zelda - 5:42-45; 7:21-23; 16:27-31
13) **Students bear consequences of their behaviors**	*Look at that sign. [points to one on the wall -* ***You are responsible for your own behavior****] And when one of them like ... wants to be the class clown - just wants to cut up all the time, and I'll say ..., "what does that sign say? ..., you are responsible for your own actions and ..." ..., and that's all I have to say - it's over.* (Rita, 13:28-33)
	Delora - 7:33-36; Vicki - 3:43-45

Table H-2) TEACHER COMPETENCIES - Narrative Support

Element Title	Supportive Quotes and Transcription References
KNOWLEDGE BASE	
1) **Ecological knowledge base**	*I've increased my knowledge base to the point where now I can walk through the woods and identify a lot of the plants that I see, and the animals and signs of animals, trees, flowers and birds to the point where I've got a pretty good knowledge base to always come back to. If a question comes up in the classroom about something, I can usually come up with the answer - often right from my head - but at least I know where they can get it.... But, you know that didn't come overnight, that came over a lot of years....* (John, 8:33-39)
	Becky - life science teacher for years; camping, etc.; Dixie & Jenna - 3:35-37; John - 3:19-23; 8:22-23; Philippe - 16:20-21
2) **Socio-political knowledge base**	In a long narrative, *Dawn* explained how she involved her students in the wolf issue in Wisconsin - where she **had** to know how to guide her students - fully cognizant of the potential political and cultural ramifications - if she was to be "successful" (which she was) with such a teaching venture.
	Connie - 2:17-24; Vicki - 11:33-41; no direct quote, but international experience
3) **Local cultural understanding**	*I mean you can live in the concrete jungle and it's still your environment.... Use what they know. They know the violence, they know everybody is going to get killed or something blown up, but there's a reason for that, and there's a moral at the end of the story....* (Delora, 1:26; 12:44-13:2)
	Becky - 9:11-14; Jim - 6:17-19; John - 11:2-14; 12:33-34; Philippe - 12:6-12; Rita - 7:11-17; 8:43-44; 9:11-12; 12:39-40; 14:26-15:4; Sharon - 11:37-43; Tim - 1:20; 6:33-36; 8:14-15; Vicki - 2:25-32; 13:35-39; Zelda - 5:23-28
4) **Teaching and learning theory**	*At first I just noticed that things went better, then I wondered why. Now, I know that the constructivist model of learning puts exploration and discovery as the first step in structured learning. [and] lots of kids learn by manipulating objects. And this style is kind of social, which is relaxing and helps kids feel comfortable -- all of which make learning more successful.* (Connie, 2:4-9)
SKILLS BASE	
5) **Listening/ questioning skills**	*I couldn't teach without questions, lots of questions.... I don't want a textbook. I want to generate as many questions and as much curiosity as possible in students. I want to develop even better skills in helping students develop good questions and asking good questions myself. And then in helping students to look at those questions, to poke and prod at them, to see what other questions they lead to, to see, to understand that all questions aren't meant to be answered, but that's okay. And that most questions, when you do get an answer, you get more questions along with it....* (Vicki, 6:24-32)
	Dawn - 3:34-35; 7:1-5; Dixie & Jenna - 12:42-46; Susan - 7:6-18

Table H-2) TEACHER COMPETENCIES - Narrative Support	
Element Title	**Supportive Quotes and Transcription References**
6) **Computer proficiency**	*Our science framework wants 40% hands-on - I probably to more like 60% hands-on, but bear in mind I teach one subject - EE. I use a lot of technology..., we have probably one of the largest libraries in our district of laser disk, CD-ROM, and video-tape, so that's available....* (Bonnie, 8:34-38)
	Becky - 11:4-6; Tim - 6:17-20,28-31
7) **Diverse instructional strategies**	*We role play exactly what it is they're supposed to do; so they feel comfortable in the role of questioning or interviewing others.... Report presentations..., we use rubrics in our district, and we have a rubric for oral presentations which can become an artifact in the student's portfolio....* (Susan, 9:1-23)
	Becky - 2:2; 4:21-29; 6:9-10; Bonnie - 8:33; Connie - 5:46-6:3; Dawn - 2:38-47; Dixie/Jenna - 4:33-38; John- 3:29-30;8:27-33; Larry- 4:26-30; Penny- 2:39-3:7; Philippe - 6:39-40; 16:15-16; Rita - 4:32; 7:38-46; 9:15; 13:2-10; 17:7-9; Tim - 3:18-20; Vicki - 2:18-33;16:27-40; Zelda - 3:22-24,38-40;5:5-8;7:37-38
8) **Resourcefulness in accessing resources**	*And so I would do a conference with individual groups and give them a little bit more direction. So, then off they would go, and I would go into the library myself, the Knoxville library, and the school library and I would generate all these books, and so each unit would have a set of books that would be specific to their unit. So there's like five research tables going all at once, I would provide the materials for them - to a degree. And then they'd have to make phone calls, I had them interview people, call up the local library, go to the Science Museum, we'd have guest speakers come in. In fact they organized guest speakers to come in....* (Philippe, 6:7-12)
	Becky - 2:2-3; 8:19; Dawn - 3:41-43; 9:5-6,30-41; Delora - 7:37-41; Dixie & Jenna - 8:12-20; 16:16-33; Jim - 6:42-7:3; John - 10:1-7; Larry - 6:1-22; Penny - 4:17-20; Rita - 4:38-43; 12:27-29; 18:10; Sharon - 22:6-13; Sue - 4:1-8; Susan - 7:21-43; Tim - 1:23-25; Vicki - 3:37-38; 8:4-17; Zelda - 2:14-16; 7:23-26; 17:27-31
9) **Creative; knows how to do without**	*I had experts come in on every plan period before school and until I said "Whewww." I said I can't take in all that, I'm just going to do what I can do. So, it's like the amphitheater and all these plans, I thought "well, why couldn't just dig two holes and put a board across and have it like this" [gesturing with hands]. That made sense to me. That's what we did.* (Becky, 5:7-11)
	Delora, 2:13-18; Jim, 9:19-35; Rita - 16:7, etc.; Sharon - 20:25-32
10) **Alternative assessment abilities**	{student self-directed assessment...}*It takes the majority of kids 2 quarters before they... realize they have to* ***do*** *something... to master the objectives. By the 3rd quarter, the majority are focusing on what they have already mastered and what skills they need to work on. By May, I have lots of students who have achieved mastery of the whole lot, and are feeling incredibly confident and proud of themselves. They got over what seemed like an insurmountable hurdle and they have a clear sense that it was their effort that got them there.* (Connie, 2:31-38)
	Dawn - 4:7-25; Delora - 16:1-5; Jim - 7:30-46; 8:16-25 - mastery learning; Sue - 4:12-34; Susan - 8:14-30

Table H-2) TEACHER COMPETENCIES - Narrative Support	
Element Title	**Supportive Quotes and Transcription References**
INTEGRATION-ABILITY	
11) **Facilitation skills**	Here Sharon allows students to make sense of content (see also *Practice #1*), not relegating them to isolated meanings.... *You see that blue sign up there - "telling is not teaching" - telling is not teaching. You hear teachers saying a lot, "well I TOLD him this and I TOLD them that..." - telling is not teaching - is NOT. And I find out that with science, I don't WANT to tell them. I want THEM to find out - find their own words for it... "Find the words to say..."* (Sharon, 17:33-37)
	Bonnie - 7:5-15; Dawn - 2:40-47; 3:33-35; Delora - 8:19-27; Dixie & Jenna - 4:33-41; 13:23-34; 14:5-9, 19-24; Jim - 2:24-29; 5:30-33; John - 11:30-41; Larry - 2:28-36,40-43; Sharon - 8:37-39; Vicki - 3:43-45
12) **Ability to make connections**	*The teaching of EE can be an interdisciplinary approach to learning..., it shows the connectedness of all things in our environment. In math we learn how to construct and read graphs and charts, collect data, and report out using percentages. In social studies we construct or label maps and grids of the areas the students are investigating, and students also have an opportunity to talk to other students, parents and citizens to find out their attitudes about certain environmental issues. In science, you know you must have the facts so you can understand the implications of the issues you are investigating. And in language arts, students learn how to present in both written & oral form.* (Susan, 2:22-29)
	Becky - 4:16-17; Delora - 8:14-16; Jim - 10:11-20;13:18-22; Larry - 4:44-5:3; 5:31-40; Philippe - 3:43-44; 4:38-44; Rita - 6:43-44; 7:1-5; Sharon - 1:20-36; 21:40 - and much more; Susan - 3:12-16; Tim - 4:4-7; Vicki - 1:33-2:7; 11:38-45; 16:9-24; Zelda - 4:36-39; 5:5-19; 7:29-31
13) **Understands local-to-global issue connections**	*..., the Hawaiian population is endangered..., the estimates really vary up and down the scale as to what the population was before Cook. I don't want to take a guess, that's a big cultural fight right there. But we know today there are probably less than 20,000 pure Hawaiians in the world, although the part-Hawaiian population is growing. And I think that in Hawaii, the pure Hawaiian population, once it was only 2000, way less than 20,000 worldwide. Whatever it is, it's just a very small amount. So, our kids relate to being an endangered, indigenous people; it's one of the ways we help them start to understand why it's important to protect plants and animals that are indigenous.* (Vicki, 16:9-23)
	Larry - 5:17-40; Vicki - 1:33-2:5
14) **Ability to integrate curriculum**	*In the various areas that they are studying in social studies in the seventh grade curriculum, we have tried to go and study that particular biome in the language arts. For instance, when they study Islam and Arabia, we do the desert biome. And we tie it all in, and we talk about the ecological problems and solutions of the desert, as well as going into the life sciences and physical sciences and Earth sciences, and then we go ahead and when they study China and Japan, we do the ocean and wetland biomes. And do the same things. I bring out various ecological problems with the oceans.* (Sue, 2:16-23)

Table H-3) TEACHING PRACTICES - Narrative Support	
Element Title	**Supportive Quotes and Transcription References**
TEACHING METHOD/STYLE	
1) **Student-centered learning**	*..., well, a lot of times the students grade their own work - they grade each others work. I try to do as little grading as possible.... They feel grades are unfair, they are very arbitrary..., they're harder on themselves, on each other, than I am with them. We just had project presentations, we were presenting at the ... Zoo last week..., they took up different stations in front of specific animal exhibits - like the lion, the penguins, the Diana monkey, zebra, flamingos..., they had to make their presentations to the class, and I told the class, "pretend like you are second graders...." And while the kids really got into the parts, and were making sure the presenters knew their stuff. And some of the presenters DIDN'T, ... they had to work overtime in order to make sure that they weren't going to be embarrassed on the day of the trip. And the day of the trip, I had kids who would really not work for me almost all year turn around and because they were the experts in their field, that outshined MY expectations of what I thought they were accomplishing.* (Jim, 5:34-6:16)
	Becky - 3:3-4; 6:32-33; 7:28-30; Connie - 2:33-38 - student self-directed assessment; Dawn - 2:30-3:11; 7:10-14; Delora - 5:31-40; 6:34-36; Dixie & Jenna - 4:6-15,34-38; 6:8-11,39-42; 13:2-5,32-34; Penny - 3:28-29; Philippe - 9:17-21; Rita - 13:1-10; Sharon - 1:3-5,9-14; 17:26-32; Susan - 4:33-34;5:36-6:7; Vicki - 3:37-45;15:10-39; Zelda - 7:33-35;9:7-10;10:17-18
2) **Utilizes personal and student strengths/ passions**	*Another unit we do is forests..., so I share a day's worth of slides that I took when I did some black bear research with the Arizona Game and Fish Department, and they learn quite a bit about rainfall and how it affects plants and animals that live in the forest. And we study food webs and food chains in the deserts and also in the forests.... I took an endangered species class from him. So that is first-hand knowledge that I bring to the classroom that makes science real to my students.* (Larry, 3:8-12; 4:20-21)
	Becky - makes excellent use of student strengths; Dixie & Jenna - 6:24; 7:6-8,35 (each other); 12:8-14; Penny - 4:6-7; Sharon - 2:14-26; 21:39-40 (sewing); Susan - 4:15-17; 5:8-10
3) **Experiential teaching orientation**	*We studied the river, we went out to the river and did water testing and.... I think that if you can get the teachers in the experiential theme-situation, I think they've got to feel it first. I can't imagine teaching it without that. There's another teacher that has all this stuff that hasn't even - his kids haven't even touched it yet.... He's always looking for barriers, reasons to NOT. It just frustrates me that he does that. I ask him what labs do your kids do, and he says "my kids don't do labs - I won't let them out of their seats because they can't behave." [she, as if talking to him] "How do you teach without that!!!"* (Becky, 4:27; 10:1-2; 11:23-25)

Table H-3) TEACHING PRACTICES - Narrative Support

Element Title	Supportive Quotes and Transcription References
	Bonnie - 8:34-36; Connie - 2:3-10; Delora - 2:22-29; 6:38-39; Dixie & Jenna - 11:39-44; Jim - 11:41-12:2; John - 5:14-25; 6:2-9; Larry - 2:27-36; 4:24-39; Penny - 3:14,18-33; Philippe - 3:32-33; 4:10-11,22-23,33-35; Rita - 4:34-35; 8:24-28; 9:31-35; 15:7; Sharon - 17:33-37; Susan - 2:4-6; Tim - 1:25-29; Vicki - 5:18-21; 17:17-23 -- includes experience w/people of other cultures; Zelda - 2:12-13; 3:25-29; 6:1-3; 9:41-47
4) **Cooperative and inclusive learning**	*Another scenario, and I'll call this student, John. John was kind of a loaner in the classroom, kept to himself.... He just didn't want to be bothered with anyone in the classroom, and he just didn't want to do the work. He would come in, sit down, that was it.... Well, John was assigned to a group, and again I told you my groups were usually about 4 or 5 students in a group working together.... The first couple of days after John was assigned to this group, his chair did not fit into the circle with the other students.... The students tried to encourage him to join the group, "come on John, come on up here..., we need you to help us, you are in our group and you have to help us." He refused, he continued to refuse them.... So about the 3rd or 4th day, I noticed that his group was really busy, I mean they were working and they were involved in discussion and they were planning on who was going to do what and who was going to use the telephone and who was going to write the letters and what else they needed to do. John's chair had moved closer to the group. By the end of the week, John had included himself with the other group members, was in the group, and trying to convince them how they should go about doing the investigation because what they wanted to do was wrong, and they should really try it his way. Sounds like peer pressure, and sounds like someone getting a little bit involved and becoming responsible for their learning. He became an* ***active*** *member of the group, and his assignment within the group was, since he was so vocal after he became a member of the group - he and one other student developed the instrument or the questionnaire that the group members used in their issue investigation.* (Susan, 4:33-5:4)
	Delora - 9:16-19; Philippe - 11:3-4; 14:4-6; Susan - 4:3-4,10-25
TEACHING METHOD/STYLE	
5) **Involves external resource persons**	*Again, of the "important-type" people, we don't have a whole lot ..., I want my kids to mix with those type of folks, so that they can see that they breathe and have all the other normal bodily functions that we do, you know that we don't need to be intimidated just because this person has a Ph.D. after their name, and that these are attainable positions, attainable..., they can get there if they want to.* (Vicki, 17:17-21)
	Bonnie - 3:38-43; 8:42-44; Dawn - 3:43-4:3; Dixie & Jenna - 8:5-8; Larry - 5:43-6:6; Susan - 7:24-27

Table H-3) TEACHING PRACTICES - Narrative Support

Element Title	Supportive Quotes and Transcription References
6) **Reflection in planning and application**	In the following quote, Delora illustrates the importance not only of teacher reflection, but of nurtuting student reflection - time and guidance for thinking. *I give them problems to solve - such as..., here you have a beautiful park, you have MCI moving down the street, or maybe Con Ed, or some other big power plant moving down the street, and they need some place to put their transformers or something like that. And what is the logical place, but the beautiful park. Now, what's going to happen, what are you going to do? "I don't want it there." I say "why, it's going to create jobs, that means the population of the town is going to really GROW, and that's going to bring more money into the community, into the pockets of people." "No, no,..., I don't want...." I say "research it" - yes, no, what? And then I give them maybe five different questions or problems that they have to solve, and then hopefully they'll reach back in their mind, or to what we've learned in previous years and say "oh, oh, maybe that's not a good idea, because I remember that there's a lot of waste from the hospital down the street..." I might even give them a map with the hospital, a Con Ed. plant, a nuclear plant, beautiful park, great town, lots of people, kids, old folks home, a forest, and have them map it out, what could they do, it's going to be there no matter what. Throw a wrench in it..., I want them to THINK.* (Delora, 12:7-22)
	Delora - 5:26-28; Dixie & Jenna - 6:15-21; John - 10:13-21; Larry - 2:30-36; Philippe - 16:3-5,27-29; Rita - 10:45-11:2; Sharon - 15:1-7; 17:1-15; 19:11-46; Sue - 2:2-3; 3:10-15; Susan - 4:16-17; 5:8-10; 6:25-30; Tim - 2:36
CONTENT ORIENTATION	
7a) **Envirnmntal focus of teaching** - single major issue	*It seems to me that if you really want to teach a topic, you're not going to get it out of a textbook. You need to get in the environment, and once you go to these places, like the ... Steam Plant, the most logical thing is you bring that plant back inside the classroom, so I would have kids using garbage make ... the steam plant; or the ... Dam - using recycled products. So then we'd have a whole 2-3 day session on developing this big huge model. Publishing the books seemed like a natural way to get the kids actively engaged in their learning.* (Philippe, 6:34-40)
7b) **Envirnmntal focus of teaching** - multiple issues	*And everything that we study is related to how we use it in our environment. I'll say to them, like when we're doing multiplication, how would you use this in where you live. Now, if you were out clearcutting in a national forest, how would you use it? When we do measurement, we do the same thing, when we're dividing we do the same thing. We weigh, we measure..., everything is related to environmental education. Everything because they understand it. They don't understand going to college.* (Rita, 5:28-34)
	Becky - 1:19-24; 4:33; Bonnie - 2:7-22; Connie - 5:39; 6:38-40; Dawn - 1:33-2:19 (wolves in WI); Dixie & Jenna - 2:3-14; Delora - 5:31-36; Jim - 4:13-19; John - 4:32-35; Larry - 2:37-43; Philippe - 3:47-4:8; -- published books as a class on topics; Sharon - 10:3-11; Tim - 3:27-34; 4:7-8; Vicki - 1:7-11; Zelda - 5:16-19; 8:32-33

Table H-3) TEACHING PRACTICES - Narrative Support

Element Title	Supportive Quotes and Transcription References
8) **Nurturing a sense of place**	*I think most of these kids aren't ever going to see a rain forest, they're not going to see the tropics or the arctic, and some of those animals. But, they're going to see what's around here all the time. And so I've always concentrated on what's here. I think that if you look at my room, all of the animals that I've got, and the bird case with all the birds [out in the school hall, filled with birds complements of money from the aluminum can drive], it's all local things. I'm not going to bring in tropical animals and tropical birds and things, because they're not going to see those things anyway. I still teach that a lot, and I think that's important to make that connection, between how the tropics connect with us, and the rain forest is important and all that, but I try to concentrate on what we have here. And so I have always taught mainly local animals and mainly local kinds of environment, and then stressed the importance of how it all ties together, but again concentrate on the locals.* (John, 9:3-14)
	Connie - 5:38-40; Delora - 3:18-22; 12:7-32; Dixie & Jenna - 4:23-24; Jim - 1:6-8 - philosophy; 3:11-29 - focuses in on local issues; John - 3:26-34; Larry - 2:35-36; 3:1-7; Sharon - 19:11-20:40; Vicki - 1:10-11,24-32; 11:38-45; 12:29-43; 16:17-24
PERSONAL BEHAVIORS	
9) **Consistent "can-do" vision**	*I have a motto each day - of something to learn, or to put forth the effort..., let's see, what is it today... today is "to be a better listener." I may do that three or four times a year. Just to be able to listen to the kids - I mean really seriously listen. You can hear them a lot, but to* ***listen to them - what they say****, that's important. It's like a "to thine own self be true" - just something, nothing religious, but just something..., even if I do it with just one kid, that's okay. And, that's how I go through my day. It helps me focus on something. I just like doing what I do. I am blessed to be where I am. I like the people I work with....* (Delora, 14:35-15:5)
	Dixie & Jenna, 7:8-15; Sharon - 27:25-37; Susan - 7:6-18 (implied)
10) **Infectious passion for EE, and for teaching in general**	*My element of teaching I really can't do without is all my personal experiences. I get to do weekend workshops and summer classes that teach me about the natural world that I share with my students. And that's a bit value for my kids because I'm always out there learning new things and sharing with resource professionals. And there are only two other people in my department that do that. With seven people in my science department, you know, 3 out of 7, that's great, but the four other teachers are teaching what they learn from a book. And I live science, and that's the biggest thing. And I'd get really bored if I didn't get to learn more and expand my knowledge of the natural world in Arizona.* (Larry, 3:25-32)
	Becky - 2:18-19,22; 11:19-22; Dawn - 3:35-36; Delora - 1:25-29; Jim - 2:5-8; Philippe - 13:23-24 (passion throughout!); Rita - 4:19; 21:4-5 (passion throughout!); Vicki - 1:18-23;11:3-5; 18:35-37

Table H-3) TEACHING PRACTICES - Narrative Support

Element Title	Supportive Quotes and Transcription References
11) **Incorporates Humor into the Classroom**	[In the midst of my interview, John was pulled out of the room and taken elsewhere for a special song in response to the Christmas program he had put together. The program included the songs, with his and his class name as author of many. Lots of laughter throughout!!☺☺☺ The originality of John's words was great fun, and prompted these fine witticisms by other staff, including the principal.] (John, 2:9-14)
	Bonnie - 7:1; Dawn - 2:12; Sharon - 4:15-16 - a certain lightness of touch; Zelda - 3:43-46
12) **Invests self and personal resources**	*I have to take my kids in the spring because these kids can not afford it. And I go out and beg scholarships from* ***everybody*** *- and I don't let any child go free except the most severe cases, and I usually ask [the facility] for* ***one*** *scholarship that will pay for one child. And then, my husband and I pay for one or two, and, I've got a couple of other people that will pay for one child. So, I usually have about twenty scholarships, which pays for 40 kids, because I make them pay 50% of it. If they have to bring in 50 cents a week, they do.* (Rita, 4:37-43)
	Larry - 6:18-26; & many more; Sharon - 3:19-21; 4:21-38; 22:18-44
13) **Practices envir. resp. behaviors**	*We talk about composting and recycling and how to do that; I encourage them to do that. We have a recycling project here at school..., an environmental club that does that.* (Becky, 3:14-19)
	Delora - 2:14; 3:4-8; Rita - 8:31-34,38-40; 11:4-11
14) **Risk-taker**	*And Jonah's idea about writing to George was to jot off a pencil and scratch note that I could barely decipher, and being a teacher that firmly believes that students should reap some consequences I guess, I cringed, but I could read it, so I stuffed it in an envelope and sent it off for Jonah. And strangely enough about three days later, Jonah gets a package back from George with the same identical types of scribbling, only it was in pen instead of pencil across the cover of a report George had done, saying "I hope this helps you, Jonah, and would you mind giving me a call, I think I need to talk to you...." Well, this changed Jonah's life forever, basically.* (Vicki, 3:42-4:1)
	Connie - 1:29-34; 3:9-12; Delora - 1:13-15; Sharon - 19:11-46
15) **Recharges self**	*[Based upon her own extensive travels..., discussing her efforts to communicate with other teachers.] It's a real struggle.... It's one of the things I'd like to try to make a difference..., maybe modeling and just being there and practicing, and hoping people see there's an alternative to a more traditional setting, and talking to teachers about how important it is to travel and to do other things, and to have other experiences and to take sabbaticals, and get out and how that strengthens your ability in the classroom.* (Vicki, 18:14-23)
	Dixie & Jenna - 5:24-33; Jim - 9:19-22; John - 9:15-19; Larry - 3:25-4:21; Philippe - 1:9-11; 8:3-5; Rita - 4:8,11; 15:7; Sharon - 23:1-2; 26:40-46; Tim - 1:5-8; 7:22,29-31

Appendix I

Survey Comments

The following comments - entered directly from the surveys [unless noted in brackets]. There were 174 survey respondents who had comments in some form; and 53 persons who specifically requested a summary of the results. The volume of comments was extensive, as noted in the following pages. The only comments deleted from this presentation are those which had personal bearing or were confusing. The comments are reproduce in categories to assist in their interpretation; with the survey number on the side for reference.

1) **General comments (criticisms and praise) about the survey/research**.
2) **Sharing the nature of the teacher's personal experiences w/EE**.
3) **Other general or personal comments**.
4) **Comments on specific Categories and/or Elements - organized by category and element**.

#	I-1) General Comments (Criticisms/Praise) about the Survey/Research
1	I would love a brief summary report of your completed research.
6	You have really done a spectacular job in itemizing a list of ingredients in promoting EE successfully.
15	I was impressed at how well you captured the essence of the critical components of EE teaching in your questions. I made a copy of the survey to help me remember what is important in EE teaching. Thanks. E-mail me at..., Visit our school Web Page at...
17	These elements are so inclusive that it's impossible to meet all of them by any teacher, school or school system. They are all very important not just for EE, but for almost any field of curriculum - with some changes in wording for areas like resources. What is the ultimate purpose of the study?
19	For EE, I think that the teacher's personal interest and commitment is of utmost importance. With enthusiasm for EE, a reverence for the environment, and a love of teaching almost anything is possible. Secondly, administrative support is also important to allow a teacher to take risks, leave the school grounds, and use community resources effectively. I think that the teacher needs to have knowledge of issues/techniques in EE, but she/he does not have to be an expert or even a science major. There are many people in a community who can share their expertise and a teacher can learn right along with the students. I would enjoy reading a brief summary. Thanks. Good luck!
20	In reading your survey you have been very thorough in stating the elements of a perfect educational setting. I received an environmental grant a couple of years ago and I recall some of the major issues/aspects of this project.... Thank you!
34	The EE model resembles "Education By Design: Critical Skills" Program that I have been trained in and believe works well. I know that that model was adapted from outdoor education models, so the similarities are not surprising.
35	Nice instrument.
47	Needs more focus on teachers interest and commitment to EE.
53	Many of the questions really talk about "good teaching" in general, not just EE. If you want to focus on EE, it needs to be more specific.
54	Excellent choice of elements. These are, I believe, "what it takes" to facilitate learning in an effective manner and w/lasting rewards for students. Best of luck with this survey and in conveying the importance of these elements to others. A summary would be appreciated.
57	Thank you for the opportunity to take part in your research. My ventures into EE were late in my career. Your questionnaire and survey questions provoked some interesting self-analysis. The teachers you interviewed obviously gave you some cogent points. I would appreciate further information regarding your research; and good luck!
61	The major problem is money. Bds. of Ed. want it, but can't pay for it. Most finances are going into technology of which science/EE are a part. Basic hands-on is what teacher supplies from their personal finances or creative talents of getting it free.
62	Since I found all items in each category very important, it was hard to assign a significance to them. This is a list which we all strive for, it's hard to say one is more or less important than another.

#	I-1) General Comments (Criticisms/Praise) about the Survey/Research
63	Any framework for EE needs to encompass all conditions and methodologies needed for <u>any</u> successful course. The one difference with EE that <u>is</u> different is the component cited in content orientation, #8: "nurturing a sense of place." This is also one of the hardest things for a teacher to learn.
70	To be able to get the full impact of what goes on in classroom education, time should be spent observing. Thank you for the opportunity to respond to your survey.
75	This survey is difficult to fill out as it is the <u>dream</u> of what you wish, as opposed to the reality of what one must actually deal with. I have very strong opinions about "teaching" EE..., I also have many real life experiences in the field with students. Keep on dreaming - but always remember those of us in the trenches -- it doesn't always turn out the way you plan it to.
77	Your framework is good, & it covers many points. I think another survey asking what the teachers experiences really are may be more revealing, however. Many teachers ideally know what should be done and what conditions they need to do a good job teaching EE. But, the reality is - many teachers are working under adverse conditions and cannot do what they want to do. Somehow that needs to be changed. Many public schools especially need to see the results of your study so they allow more autonomy to their teachers. Good luck w/your project. I would like to see your results if you have time.
79	Very thorough and comprehensive! I strongly feel that EE is dependent on students developing that sense of "connectedness" or ownership to a community/environment. The teacher's enthusiasm is infectious and needs to be reinforced by administrative recognition and praise. I see faculty becoming easily discouraged when not given opportunities to expand EE, either personally, through in-service courses, or professionally, through curriculum development. Good luck, and thanks for this opportunity.
95	Your framework is thorough and corresponds to my own belief of the importance of EE. Providing relevance through community connections is so necessary for younger students. They must observe first-hand through a local commitment, their place in a global environment. I would like to receive a summary of your findings.
101	The framework provides students with a solid environmental foundation, however, the county does not yet incorporate it as a science to be taught in its entirety. It is taught regardless.
108	The survey is good, but seems laden with jargon, especially in relation to culturally-relatedness. I don't see the need for team teaching or cooperative learning in EE as compared to regular ed. All education works well either way. They are <u>desirable</u>, but not necessary. I'm concerned that most of recent EE has focused overwhelmingly on <u>issues</u> - even for young kids - recycling, greenhouse effect, rainforest destruction, etc., when <u>I</u> think we need to spend a lot more time on the purer subjects of ecology/natural history/biology/ call-it-what-you-like, especially w/elementary students. Ecologists, of all people, should know about the necessity of a secure base of the pyramid {pyramid w/natural history at the base, issues at the apex}. Kids should know about trees & birds & bugs before they write letters to congress about them! This is a big issue w/me, one that has turned me off to many environmental groups - too much gloom and doom. On the other hand, kids <u>can</u> recycle paper and cans (etc.) w/scouts, family, church, school, and do other things that are "good practices" w/o getting into the issues too much - planting trees, cleaning up litter, stenciling storm drains, etc. They're seeing positive results w/o the gloom and doom, and perhaps learning something in the process. I do all of these things with my students (and several other things, most notably study birds in great detail) - and my goal is not the particular facts *(108 - continued on next page)*

#	I-1) General Comments (Criticisms/Praise) about the Survey/Research
108	*(108 - continued)* involved in the issues, but rather what your survey calls "personal behaviors." Kids are looking for role models, and they'll never forget a beach clean-up or planting dozens of native trees. For those going onto a field in environmental sciences, the facts in the issues will be well known to them, but most people will be "average" citizens, and they need to be exposed to such things, too. For my money, the single best way to teach EE is this - mind you, I'm not holding my breath, nor is it the easiest: our social studies curriculum needs to be re-written so that the environment is explicitly front and center and indispensable to an understanding of history, from the flooding of the Nile, to the size of Africa being a deterrent to the East Indies, to Columbus following migratory birds, to Lewis & Clark, the Dust Bowl, etc. We've got to get the sanctimonious preaching ("Save the Whales") out of environmental ed (that's environmentalism, not ed). I now call it "environment ed" because I want those who can see the difference to see the difference. This of course will (or should) require a re-directing of teacher training as well, and after 17 years, I can tell you I'm not seeing much movement on this front at all. And if you don't train 'em right, you spend the rest of your life catching them up. Having taught EE exclusively at an NSTA-award-winning program in NY for 10 years, I can tell you that a background in EE topics or ecology is, again, desirable, but clearly not necessary. I don't think I saw any relation between a teacher's knowledge and the effectiveness of the EE. It all had to do w/teaching and enthusiasm and commitment, and then content. "No one wants to know what you know, until they know you care." And remember The Sense of Wonder.
113	One must also consider children's emotional and physical development. Through my experience working with children in the age group identified in the framework of Elements of Success, I've discovered that 3rd, 4th and even 5th graders are more inclined and motivated to do EE activities than middle school age students.
115	I think your questions were properly focused. I particularly think that administrative support, flexibility of scheduling, teacher competence and enthusiasm are essential for successful EE. It's nice to be located in a good natural environment for study, but teacher creativity can turn any environment into a basis for ecological study. I don't think effective EE is possible w/self-limited, text-book dependent, and environmental neutral teachers. I know it's not statistically measurable, but it has to come from the soul - students can read the intangibles as well as the printed words.
129	Just one hint, if you want significant response, don't make your survey this long!
132	I'm not sure I understand your educator-ese!
140	Questions are very broad and high level. They aren't as relevant to the actual classroom experiences as they are to the brain and ideals of the teacher. The survey is well done for college level, but not close to reality for a junior high special ed. teacher. I am not trying to "slam" your survey, but you have been out of the classroom for a while (if ever in the classroom) and missed some of the road blocks and realities of the experience of teaching EE. I do commend you on your interest and efforts. I wish you the very best.
142	Teachers are pressured to teach state framework. EE needs to be linked with these frameworks to justify classroom time. Many questions describe "ideal" situations. I think "some" is better than "none" - so any EE is important. The more support a teacher receives from colleagues, administration, parents, etc., the higher the attainment.

#	I-1) General Comments (Criticisms/Praise) about the Survey/Research
162	I feel teachers can utilize EE with a minimum amount of science background. They just need the resources to boost their knowledge base. I know my use of PLT and Project WILD training is what gave me the starting knowledge to acquaint my students with EE activities even in the 1980s. Basically the bottom line is that elementary teachers lack adequate time for preparation of extra curriculum which EE is slotted in most educational arenas.
166	Having taught under various administrations, I think administrative support and encouragement is essential if the typical teacher is going to become a risk-taker. I also find many teachers in grades 3-8 feel they must know all the "facts" in science if they are to involve their students in in-depth science - and since they don't know all the "facts," many teachers in these grades shy away from teaching in-depth in these areas. However, I have observed in most recent years, in my school at least, more teachers involving students in the use of hands-on, minds-on science experiments - especially among the experienced teachers (10 years +). I am impressed with the obvious enthusiasm of both teachers and students.
190	I think that a survey such as this will help teachers realize the importance of EE. There needs to be more administrators and educators taking an active roll in protecting our environment. This area of learning becomes more and more needed each day and is mandatory if our world is to survive and its inhabitants are to live happy and productive lives. EE should be an integral part of the curriculum.
202	Right now, I believe national standards should be set. The state dept. of education is not working co-operatively with the state initiative, for what reasons I do not know. Therefore, goals need to be set to help teachers instead of sending one more item to put on the agenda. Textbook writers should also co-operate with the nation to produce truthful information on EE. If we say we have to work with collaboration, then as educators, we need to practice what we preach! We are one with the Earth and related. Please send me your goals for producing the survey form - and the findings. I was not clear on your objectives. My view is totally different than reality in teaching EE. My scores may be higher than a regular teacher, because of my passion to improve the environment, and instill a sense of ownership for our world in students. Sorry if I made comments throughout the form.
206	Overall framework includes all elements to foster growth. My discovery is that teachers can effectively operate, fostering growth, with few elements in place if necessary. The increased number of elements directed toward EE provide from an excellerated (sic), enhanced program. I felt that the teacher practices you are evaluating hold true for all areas of study and implementation. In rating their importance, I am strongly reminded of the methods taught while completing my MAT at the University of Louisville. It is very reassuring to read the components of your framework and respond.
211	Students in the lower grades will probably be more motivated to experiences that they have had. During 6th through 8th, the trend should be, and seems to motivate these students, toward activities they can impact on a community scale. It seems these students have difficulty actually getting feedback that their activities have a global impact. To properly integrate a total environmental program, access to diverse environments is a must. The city in which the school is located can usually offer various habitats to use as a study area. If zoos or museums are in the area and close proximity, they sometimes help facilitate construction of mini-habitats or walking trails in association with their goals and facilities. Expertise is also provided when these groups become involved with school activities. In lieu of any of the above, a very small area of 20'x20' can be created to exemplify most any habitat on most any campus.

#	I-1) General Comments (Criticisms/Praise) about the Survey/Research
225	The categories are fine; they address numerous topics. I would suggest elaborating on the administrative support item. Specify principals as well as curriculum coordinators. If teachers can include environmental objectives in district curriculum guides, then the path for individual teachers is smoother - justifies the environmental activities. I hope to see successful EE programs, not just success for the exemplary "renegade" teacher. For any outdoor classroom on campus such as gardens, nature trails, etc., maintenance becomes a prime issue. You must have administrative support to continue maintenance of a facility. For safety reasons, there are jobs that children may not tackle. For example in Texas we have severe problems with fire ants. Poison control codes require a trained certified individual to treat the fire ant mounds.
232	Wonderful survey!!
235	It is extremely important that with these EEs, students understand that these are life-long changes and volunteer work which drives many "grass-root" community-based efforts are EXTREMELY IMPORTANT and the basis for all environmental work!
243	You must have a passion for EE. You must be a constant learner, and a co-learner with your students. Do real research. Get dirty - even muddy. Manipulate the environment by developing a nature center or outdoor classroom. The answer is very simple. Your document stresses the things we all know are necessary and desirable, but it all boils down to dedication. Is the teacher willing to go the distance? It takes many extra hours and a great deal of "expeditional learning." Field trips are an absolute necessity. Risks must be taken. Roadblocks must be circumvented. Create. Constantly create. The process is at least as important as the product. Utilize resources. Network. Technological evolution provides incredible opportunities to gather information, but students can generate significant data and share it with others around the globe. Dr. Jane Goodall's "Roots and Shoots" program for young naturalists is a good vehicle for worldwide connections.
282	I feel that in any "teaching framework" you need to be energetic, knowledgeable, and organized. When the community is supportive and the students are socially capable, learning is easy and interesting. EE can really be integrated into a social learning and a social-skills based curriculum. Thanks for letting me partake in this survey.
283	Children pick up on what they see and feel around them. Building a respectful relationship throughout your class, and encouraging open communication will allow you the freedom to do the special projects that are integrated and meaningful.
284	Reading these questions reminded me of the possibilities of education and teaching and all the things I believe in and made me excited about starting this career. This is the halfway point of my first year and the focus and stress of the TAAS {?} has placed seemingly unmovable shackles around my vision of creativity.
306	The basic framework is okay - some issues not tended are the resources available to classrooms, schools or students. Our school and students is very economically depressed. Many ideas and trips as well as teaching strategies I am familiar with are not available to me or my students.
307	A well though out survey. Very thorough. Thank you for including me in your research. Please send a brief summary report....
311	It should be noted that these questions/conditions fit perfectly with all teaching/learning.

#	I-1) General Comments (Criticisms/Praise) about the Survey/Research
320	This is a well-developed instrument. Many of the components of this instrument, Harold Hungerford has instilled in his students for many years. He is a true leader in the field of EE. The skill-base question about computer proficiency is difficult to answer. I believe that my computer skills are good (I train other teachers), but I do not believe that it is an essential element for success. I would like to see a brief summary.
326	A lot of hard work has been put into this Elements of Success in EE framework! I would appreciate receiving a brief summary report of the completed research! Thank you.
327	The most important factor in implementing any program is TIME. Time to incorporate technology, new programs, workshops, etc. If education is to change, it must change at all levels - college, secondary, elementary and administration. EE should be recognized K-12 and be practical. {rated current situation - w/time only receiving a "2"}
334	I would like to know what you are doing with this data you have collected. The framework looks very promising! That qualities and strategies you have listed will benefit students if implemented. If I can be of further assistance, please let me know. Good luck!
336	It seems like teachers have to just plunge in - have an interest or follow a student lead and develop these competencies as they go. If we were to wait for these (very important) competencies, we'd always be stuck at the beginning.
342	The teacher must care about environmental issues and must understand why it needs to be taught. The teacher must have first hand experience in working with the environment such as work camps or field trips to the rain forest. This means money and time. Also most teachers need to take these classes or training sessions for college credit. To make sure the environment is maintained for tomorrow, the students of today must have positive experiences in the field. I would especially recommend camps and outings at least 3 days long. Good luck and best wishes.
346	I appreciate being included in this study. I am a person with a passion about the great need for environmental teaching and learning. If we get it out to the children, hopefully the adults will follow their example and realize the importance.
347	Additional planning during school time would be welcomed. A separate hands-on lab just for experiments and exploration would enhance the enjoyment of hands-on activities.
348	"Bonus Pay" needed for all staff members who receives the knowledge base, skills and integration-ability training and practices their dynamics to foster EE growth.
349	Conditions stated are all ideal and would certainly foster growth and awareness. However, I feel that they are too idealistic. By supporting all of these, I feel it would be discouraging to feel that I could make difference in a child's environmental understanding and awareness. I believe a well-developed model - by Hungerford at Southern Illinois - is a very effective approach to getting students involved and fostering their growth. I have used it for a number of years and know it to be effective from feedback I have received. I'm sure you are aware of his work. Good luck with your research.
351	Affiliation with a community-based EE group or facility is very desirable. Gives teacher support, on-going training and research resources.

#	I-1) General Comments (Criticisms/Praise) about the Survey/Research
357	I feel that this survey leans heavily toward constructivist theory. I agree with some of the philosophy, but EE was successful before constructivist philosophy came in vogue. Again I agree and practice many of what constructivists preach, but I also do what works. I resent the constructivist slant - I would prefer a more objective point of view. When I'm with my kids, I use the techniques that will get the ideas across to my kids. I don't care what you call it, as long as it works. The "constructivist only" teacher is not better than the "read and answer questions" teacher. It takes a balanced approach. I would have liked to see a more balanced survey.
365	Although I may have the opportunity to use alternative instructional approaches, I feel restricted by other factors. The breadth of my current curriculum severely limits the degree to which I can implement the teaching practices described in this framework. I would really like to utilize more of the practices, but they are so time consumptive that there would be holes left in the students' knowledge base. A factor that also seems to limit the experiences for the student is the classroom dynamics. With "inclusion" and the needs of the students sometimes, the "freedom" to explore and discover evolves into chaos. With the different learning styles, needs of students, methods of retention, it is a management process to help an outdoor classroom meet the needs of all students.
369	Broad scope and integrated approach to EE is critical! Investigation of environmental issues and decision making must be emphasized!
371	Framework very well stated. The best statements were: Teaching Conditions: 1, 4, 8, 10. Teacher Competencies: 4, 9*, 14. Teaching Practices: 6, 8, 9.
374	There is one variable that is not considered in this survey. I work on a team of 4 teachers. They are willing to assist minimally. Having team members join the force and take responsibility for environmental learning has been a difficult variable. Much more could be done if cooperation was a priority. Mutual responsibility for EE is a limiting factor.
377	I believe flexibility has to be a key for EE. I am fortunate to teach in a small school with a family-type caring staff so we can adapt to any situation and run with it if we so choose. For example, our prairie planting involved K-6, multi-age grouping, peer teaching, community support, faith, hope and lots of luck. Like any teacher I do not have enough planning time, but I care enough to feel that EE is the key to successful teaching. If a student can be brought to awareness and appreciation, this will lead to responsible action. Awareness and appreciation come through meaningful hands-on activities involving the entire curriculum and staff. I make many mistakes, but keep trying, studying, learning and doing. A sense of humor helps, plus family support can be a real key.
380	In the best of all worlds, all of the described conditions should be provided and the teacher should have all of the skills and practices described in order to foster student growth according to the EE goals. My guess is that most teachers will circle 4 or 5 on most of the items. It seems to me that the question isn't which are significant since they all are, but which conditions do practicing teachers have available to them and which skills & practices do they have presently. This would indicate areas which need work. Good luck with your study. Please send me a copy of a brief summary of the results.
386	Wow! Well though out!! What will you do with this information? Yes, I am interested in a brief summary report. Is this survey for the purpose of classroom instruction or outdoor schools? In the classroom EE needs to be a part of the regular content area curriculum or it will not be taught - no time to meet standards "added to" traditional subject areas, only if an integral part. (*386 - continued next page*)

#	I-1) General Comments (Criticisms/Praise) about the Survey/Research
386	(*386 - continued*) Outdoor schools often hire the least qualified and experienced teachers to work in the field with students. They should actually be the most qualified, enthusiastic, and supported monetarily. Not just any college student makes a good environmental educator, and people need to make a living doing what they do well.
389	Planning/Set-up time and availability of materials are essential in any hands-on/minds-on science program. Your questions show your interest in the subject matter and the high degree of work you've put into this facet of education. I believe EE should be part of all state standards. Good luck to you!
400	If EE were the only issues, we could all teach like this. A teacher's style is his/her best method of conveying info., whether we agree with their method or not, info. will be learned.
401	The issue of balance is critical. I have very strong environmental convictions personally, but I must provide a forum for all sides of an issue. Also, environmental educators must be careful to find the balance with regard to emotion and its place. I'm very emotional about the environment, and I try to instill this as the "sense of wonder" I mentioned before. But I have been in teacher EE workshops where the participants were actually led into worship of a tree. This violated (I feel) the Barrier Between church and state and gave EE a very black eye in local churches and eventually to the "Religious Right" political wing. We are dealing with these negative attitudes in our area. I feel EE needs to be taken into this religious arena to help repair the damage.
403	I could have just as easily circled #5 for all of the items {she circled "4"} - they are all very important - and extremely difficult for any one teacher to achieve. In our school system (Denver Public Schools), these is so much emphasis on literacy (just getting students to read on grade level) that teachers are overwhelmed and have no energy/time to get the info. to teach EE. Sad but true.
404	Great survey! I believe the most important aspects are support from administration, parents (especially in an Ag, mining area), and available workshops on EE for educators. Our Project WILD, Project WET and PLT are extremely important to our EE program.
406	Just talking about knowledge, attitude, skills & behaviors seems the norm for most educational frameworks - it doesn't address the "complex of conditions," etc., that one does meet in trying to put together and evaluate an EE program (curriculum or lesson). Getting all these things accomplished while having a life is a superhuman feat - OR - I'm not quite understanding what you're asking. Most of what you have written in this survey about conditions, competencies and practices is all very necessary for any educational success. But attaining all of these all the time is a superhuman feat. It is an ideal - something to shoot for certainly, but these type of goals and/or wishes are for the back of my mind. What I've learned is that simple practical, active, positive involvement on a day-to-day basis is what is necessary (not to mention flexibility). Today's youth is very busy in extracurricular activities or is a product of some type of "special circumstance." These are the "complex of conditions" that I don't feel are addressed in the survey.
407	I see two factors in education as being major hurdles for EE. One is lack of money to provide materials or transportation for EE experiences. The second factor is a limiting curriculum that some principals and superintendents are unwilling to bend from. (This, however, is improving.)
411	You've thought of very perceptive things to question us about. Good luck on your doctoral research.

#	I-1) General Comments (Criticisms/Praise) about the Survey/Research
416	Good job on the survey.
420	Many of these "superlative" goals should be reached indirectly without over-kill. Students have the ability to internalize objectives with gentle guidance. The teacher could/should be a learner along with the students. The teacher's personality including enthusiasm & fairness tremendously outweigh technical knowledge. Learning can happen with no resources and little previous knowledge. You can sit in a big empty dirt hole with your students and learn a lot together. This is a good questionnaire if it doesn't overly promote "super professionalism" at the expense of humanism. Good luck to you, Ted!
422	When a person loses "the edge" and fails to see the importance of items on survey, they need to get out of education. I support teacher pay by merit. These kids are our future, the only way to make the world a better place is to teach them good skills and manners as well as teach curriculum. The first two used to be taught at home but aren't anymore.
423	It's difficult to separate reality from ideal - in my case even tho I have not acquired some of the high level of skills acknowledged as important or necessary in fostering or excelling in EE goals, I am still able to accomplish alot (e.g., teaching abilities are developing). As a relatively young-in-experience teacher who is developing teaching skills, I feel somewhat overwhelmed with the long list of important aspects of teaching conditions, skills, and practices that I strive to attain. However, desire or passion in EE overall importance, I believe overcomes alot of inadequacies - one could always do better than at present, and skill is always relative to other variables. But these limitations don't have to limit a teacher's attempt to pursue EE goals. As with much of our ecological understanding, we are in process of learning and arriving at the "ideal" situation and ability. Teaching, in spite of inadequacies, helps model life long learning skills as well as relaying how complex the world is, full of change, surprises, and hope, in spite of our failures. All of the top level of teaching assistance, skills, etc., would be nice, but not necessarily. I'm not sure how this fits into your survey, but it is somehow important to say for myself.
424	It's okay to learn with the kids. Interesting survey. It almost reads as a checklist for any successful program.
425	Some environmental issues are universal -- pollution, clean water..., but some are only regionally important. For example, teaching water conservation and clean air issues here is a lost cause. There is no running water in the village and everyone (but the school) burns wood for heat and trash is burned then dumped on the other side of the airport. Keeping these things in mind is also important. Thanx.
440	Some questions were extremely wordy for those of us who are out in the field working with kids.
445	I always find it difficult to fill out a questionnaire without being able to explain or discuss conditions. I filled this out thinking about the most optimum conditions, but I realize that this is not always possible and teaching EE should not be limited to people who have this knowledge and these conditions because it must be taught. Not all teachers have access to these conditions.
446	Most teachers that I know have very little training in EE. Although the knowledge in exploring EE issues is much better than 10 years ago, there is still much need for improvement.

#	I-1) General Comments (Criticisms/Praise) about the Survey/Research
448	I would not be able to term any of these criteria as "unimportant." However, when I began teaching EE in my elementary classroom 12 years ago, I had only a passion to teach it, eager students with supportive parents, and the knowledge that local resources were available. Conditions, competencies and practices have grown over time and are still not what I would call a "5." I think the passion is the most important element. Nothing else has to be "in place" to create an effective program. EE, like the environment itself, is never a static set of optimal conditions. It's changeability invites exploration!
453	Individual teachers can have success even if the overall framework for a school program are not in place and to a lesser degree even if his/her own program misses some elements.
458	This survey is based on learning styles and present philosophical approaches to teaching. You could easily substitute EE for any subject.
465	Your questionnaire reflects great depth of understanding and 'feel' for EE. Good work! Good luck w/your project. I would like a summary report of your research. Thanks.
466	Thank you for soliciting my opinion. EE issues become more critical each day. Time and energy bolstered with materials and support will do a lot to raise the awareness and involvement of the students and their parents.
477	EE is an amazing approach to teaching real-life problem-solving and fostering in-depth questioning in young students!
481	Support, resources and a willing teacher are the prime factors to initiate and foster an EE program in a school setting. A teacher may be very competent and implement highly successful teaching practices laced with personality plus. But if he/she is not supported by the administration, the EE program becomes a personal in-classroom event. Until EE is mandated as a subject to be implemented in all classrooms, few students are empowered and their learning is filled with factoids with no connection to the real world. As an EE teacher, my style of teaching is viewed as being strange and different at my school site. Having a garden, compost box and using the outdoors as a classroom, has earned me these labels. My third grade students and I have tremendous respect for each other and commitment to understand the Earth and make it a better place. I would appreciate a summary report of your research project. Good luck.
483	I don't see the student in this framework - readiness, ability, history, attitude, skills.
485	Your survey is full of the current education "buzz" words to the point of being skewed. You should have included elements opposite to these already questioned. How could a person not be supportive of all these conditions? It would appear this survey was written to support your pre-existing beliefs. I do commend you for your vision. EE is an ideal vehicle through which other subjects can be taught in an integrated curriculum.

#	I-2) Sharing the Nature of the Teacher's Personal Experiences w/EE
Many comments from this section are not included in this Appendix because of the personal nature of them - some of these possibly enabling identification of the survey respondent. Some are included to get a taste of what sorts of comments were made, or especially if they are significant for survey analysis.	
1	I have always enjoyed involving my classes in all types of outdoor environmental education. The past few years have caused a decline in my time/ability to schedule outdoor ed. projects as inclusion takes up so much of my time....
11	I feel I am a fantastic teacher who has maintained a positive and flexible attitude. This has enabled my team and students to access many aspects of environmental education.
44	By bridging between schools, team teaching, interdisciplinary units, cooperative as well as collaborative teaching styles and strategies are helping to foster EE education in my school district.
66	Although EE is not mandated, many teachers integrate EE into existing curricula in many disciplines. Through state & federal monies in the county provides a variety of programs and grant money for EE projects. The Bd. of Ed. provides partial funding for 7th & 8th grade students to attend a 2½-day outdoor EE experience. Since many cultural programs are brought into the school, many teachers choose EE field trips at state and county nature centers. Development of EE outdoor teaching site is in the works in a small courtyard. Composting, greenhouse & pond & weather station are included.
72	I teach an environmental science course to 8th graders (2 sections -≈ 45 students out of ≈250 in grade). It is an elective. Students are required to take earth Science as science for grade level. We go on two field experiences (one - 5-days; one 3-days) to other areas in the state). Course includes ecology, water-sources, pollution, contamination, forestry, current issues. Please feel free to contact me if you need more info.
102	The most important factor is for the children to feel they are making a difference - it makes it meaningful and real world for them. Nature mapping is such a project....
108	Perhaps the most hopeful improvement of recent years has been the increasing influence of "Geography Themes." That probably comes the closest to what I mean by "environment ed" - start all you do in social studies and science (and a lot of literature, too) with the environment.
112	I am a lifelong teacher with no degree other than life experiences. I believe in and use the whole language method of teaching. I consistently have seen educationally challenged students benefit greatly from hands-on involvement in EE projects.
115	Good luck. My colleagues and I love the beach environment and we can model behavior and attitudes in such a way to really excite our kids. That's why our program works.
132	Teaching is a creative process. Never more so than in a framework like that provided by Issue Investigation and Evaluation. It is unpredictable, influenced day to day by student input and world events. The teacher has to have <u>plenty</u> of time and resources to provide the structure of grades & evaluation demanded by traditional education. They also have to be self-confident enough to let that go and flow with whatever input comes out of the blue. Another though, there is very little guidance on <u>what</u> to teach on ecology or environmental studies from state or county guidelines. So you have to make it up as you go.

#	I-2) Sharing the Nature of the Teacher's Personal Experiences w/EE
138	What has worked most successfully with my students is concentrating on local issues and discussing and implementing realistic action plans that are possible for young students to act upon.
165	I had not training in EE, but have always loved the "Great Outdoors." I sought out training on my own, and with the support of my principal, I have become a facilitator of state EE programs in .... I have also sought out grants, and have brought in approximately $50,000 of grant monies to my school I continue to strive for more hands-on science, with a very strong emphasis on current and local Environmental issues. I wish you much success, and look forward to hearing from you again.
169	I was a general science teacher in middle school (gr. 6-7-8) for the past 10 years. I took many graduate courses with .... I am a proponent of EE and I try to foster an interest in the environment with all students. Two months ago I accepted a position as an elementary school assistant principal. As such, I hope you can still use my survey. I am presently writing a grant proposal, seeking funds to develop an environmental trail on 2.5 acres of wooded land my school has recently purchased.
180	It took a 3-day weekend with NO kids (students) at the farm for me to play catch-up! Sorry this is so late. Hope it's useful. It was certainly thought-provoking. For the record, I teach in a K-12 urban school and engage in EE activities primarily with my 5-year-olds, but also with "olders" in various multi-age groupings - sometimes by teacher request; sometimes by parent request.
184	I teach at a [school which] fosters a broad, international understanding of our world and environment.
189	Our school is currently developing a number of grant proposals which address many of the issues and concerns indicated in your survey. We feel strongly that the EE framework you are describing (conditions, competencies, and practices) need to be supported & developed in our school in order for our students to have a clear understanding of local/universal environmental issues & their role in the community as environmental conservationists. I would be interested in seeing the results of your survey.
191	Thank you for asking for my assistance. Teaching science is very rewarding, challenging, and satisfying. I love hearing "what are we going to do today!" and "I love science!" I love it when parents say science is all their child talks about. Science touches all of our lives every day, and our young people need to feel comfortable with its concepts and vocabulary. Educators must realize its major role in educating our children for the future. Those of us that truly teach it consider ourselves lucky indeed to be an important aspect of the education of our future.
200	I look at teaching EE at a couple of levels, at least. On the 1st level, one can address EE within a "regular" classroom with little more than a few things salvaged from a dumpster. One can do EE outside on an unmodified schoolyard with enough drive to do so. Little support is required. On another level, there's EE as I do now. I've developed an outdoor classroom for the school which includes a nature trail, gardens, a pond & a small wetland - all created and maintained by students and me. When I first started teaching 5 years ago, I had virtually no support from anyone for EE. My principal was discouraging, parents unsure, and even students tended to whine at times about EE-type activities. However, over the past few years, my drive has overcome the early obstacles. We have been featured on the cover of a magazine, in our local newspaper, and on a local gardening show. The superintendent showed us off to NSF when they were evaluating our system for continued funding. The administration is asking me to promote EE through workshops. Bottom line: while the importance of other components may change with time - teacher tenacity is always required for EE. Thanks for the opportunity to participate.

#	I-2) Sharing the Nature of the Teacher's Personal Experiences w/EE
206	I am very interested to participate in research concentrating on EE. As an inner-city teacher, I am directly involved in a situation where kids need hands-on environmental knowledge and awareness. I currently take a group of 30 students to a Nature Preserve ≈ 30 miles outside of our city every Friday. There, they discover/experience what was not possible in their home surroundings. It is also critical to be culturally sensitive to the diversity of the student population.
210	This is based on my experiences with fellow teachers, not myself. I am very involved in EE; this is not the case with fellow teachers. EX: when studying any organism, students are encouraged to collect, kill & discard specimens. Nothing is conserved or recycled.
217	{Sent an article from local paper w/students and he highlighted.}
242	After 20 years of taking students into the field for study, we have seen improved attitudes, grades, maturity, and attendance. First hand experiences are best versus textbook learning. Funds are always limited or non-existent. Time is precious and often not allowed enough time during class for outdoor excursions. The dedicated teachers will commit to many personal after-school and weekend hours with students and special EE groups or projects. We need more grant money available for special projects and teacher training.
244	I believe that the students of today must get involved with taking care of their environment. If they don't, who will? EE is where it's at in science. All of us must become aware of our environment and what is happening to it. We must foster in children a similar feeling for they are the caretakers of our Earth in the future.
248	This is my 28th year with .... I may retire in May, '97. Please keep in contact with me. I've served as pres. of [state EE association, part of NAAEE]. We meet ... twice a year..., also pay for one member/spouse to attend national meeting. {& sent old program brochure.}
268	Every building does not have an outdoor classroom to complete EE with the hands-on approach {person self-rated all elements}.
321	I hope you sent this survey to some teachers who actually teach 3-8 grade! I have taught at that level, but it has been at least 15 years!
323	The program has been very successful for my students, community, and me. My classes have earned reputations as "environmental watchdogs." Our community now recycles and the program has spread to smaller towns in our county. Parents often request me as their student's teacher just because of the program. The issue investigations that we conduct have made me a better teacher. My students have been enabled to become leaders. Empowerment is a powerful motivator. With this program, students become active learners, community members, and teachers.
339	At this time, I am not in the classroom. I am currently coordinating recycling, recycling education, energy management/conservation and energy education for the school district and have been for 4 years. I would like a brief summary of the completed research. Our state EE organization may be able to use the information.
341	Many curricular mandates and more subjects added to curriculum (i.e., character education, defined learner outcomes, etc.), EE not a priority. Money is a problem. There are a lot of available resources within the community, but it takes money to bus students to and from these places. Our school is coming out of being $8 million in the hole.
364	{Sent a couple newspaper clippings of her class in action!}

#	I-2) Sharing the Nature of the Teacher's Personal Experiences w/EE
379	I help take 8th graders for an overnight outdoor experience as well. Others may rate me a little higher in some areas [*another self-rating survey here*], but I know how much more I have to learn. The kids and I do have fun. Our county used to have a EE director but due to money her position was cut. I miss her. It was nice for the kids to hear someone else's voice, opinions, and knowledge. Our school budget is very limited. We have written and received grants to help. One of them is helping us build an outdoor education area on our school grounds (over 3 years). So far, we've planted 39 trees and bushes. Next is prairie grasses and flowers. Finally we'll make a small wetland area. Sorry this is in pencil. It was handy when I felt like doing this. We are watching another snowstorm come in. Not sure about school tomorrow - 8-10" expected. We'll be going in June again.
382	We have developed, and each year revise, a 6th-8th grade "Science" framework. We not only make connections to/with the other sciences, but we also spiral and revisit the concepts/ideas with the other disciplines within each grade level. We reinforce science concepts by making connections at each grade level. We also take the major topics or themes (often environmental) and "teach" the topic throughout the entire grade level (not only involving core classes, but also many of the non-core classes).
401	I am trying to instill within my 7th grade students a "sense of wonder" coming from knowledge of local plants, animals and ecosystems. I keep things local and seasonal so the students have a change to see the very subject we were studying.
470	Our school's involvement with the Model Links program has given us the time for our teachers to renew their commitment to EE as we incorporated themes in our local environmental habitats with state educational goals in reading, writing, science, art and music. Math also become everyday hands-on use of equipment and skills (sic).
492	Our state is only working on our EE framework. It is included in our science framework as an addendum.
498	For your information, Hawaii's legislature has passed resolution adopting Keala Hoku's benchmarking 21st Century. Over 10,000 students in Hawaii addressed the indicators needed - e.g., safe environment.

#	I-3) Other General or Personal Comments
1	I'm sorry a death in my family delayed my response to your survey. Good luck!
28	Mr. May, I would appreciate receiving a summary report of your research. I myself am looking toward entering into a doctoral program in the very near future. I found your framework engaging and thought-provoking. I do hope that all goes well for you.
53	Good luck with your project. As my friends know, you can't ask my opinion unless you really want an answer. I do feel free to speak my mind when asked. If you have further questions or want to know anything else, feel free to contact me.
63	Good luck with your final study. I would be very interested in receiving the summarized version. If I can be of any further assistance, please feel free to contact me.
64	Good luck!!

#	I-3) Other General or Personal Comments
80	I hope I helped you in a small way. Check out River of Words, poetry & poster contest about watersheds. [address given]
102	Thank you for the opportunity to participate with this project. Yes, I would like to receive a summary report of your research.
103	{Enclosed a short personal note of some relatives in Knoxville.}
107	I would like to take this opportunity to say thank you to Dr. Marcinkowski. He is an outstanding educator and professional, extremely knowledgeable and aware of people's needs. There is no way that this program can be forgotten, thought his teachings has made an impact in my life.
108	I think I've said enough. Sorry I rambled, and sorry for the few mistakes. Hope I caught them all! Be in touch if need be and good luck. Yours truly.
113	I hope the information I provided is helpful. I am interested in receiving a summary of your completed report. Feel free to contact me.
138	I apologize for taking so long to return this. I hope you can still use it.
141	Normally I comment, but this comes at a bad time..., grades are due tomorrow. If I can be of further service, let me know.
150	Thank you for allowing me to participate in your research. If I can be of further service, please contact me.
154	I hope that this will help with your research. I would be interested in learning more about your findings. Education is constantly changing. What remains the same is that children do take or reject our values. It is important that teachers give them the tools they will need to survive.
156	I too have some unfinished business regarding research in the effects of EE on students. Please send me a brief summary of your results.
161	I am very interested in the results of your survey. Keep me in mind when you are finishing up your research.
165	I appreciate the opportunity to participate in your survey. I would very much like to see your final survey results and your interpretation of the 500 surveys. I hope that the results of your survey, study, and doctorate will in some way bring a change in some of the curriculum requirements at the college level.
166	I find this to be a most interesting research and would appreciate receiving a brief summary report of the completed research. [Also enclosed a self-addressed, stamped envelope; On envelope: "even your stamps show your enthusiasm for your research. I'm impressed!]
193	[flyer of gardening w/children program enclosed]
228	I am not sure how valuable my input is. I am not too familiar with this program.
253	Make it fun!! Good luck.
273	I visited the Panama Rainforest for 2 weeks with Pam. Not enough time to cover everything.
296	A brief summary report of completed research would be great. I'd find it interesting and helpful. {Also included personal note.}

#	I-3) Other General or Personal Comments
332	You were right, I misplaced the first questionnaire. I'm sorry. I hope things go well with the survey.
336	This was hard for me to complete! So much of what I teach is who I am, it does not get much reflection. Thanks for the opportunity!
358	I'm sorry about the delay in returning the survey. I was called out of town for a family emergency and missed two weeks of school and had much to catch up.
362	I apologize for my delayed answer to this survey. Frankly, it had gotten misplaced after I . completed only about half of it. I hope these answers are helpful, although I admit to being slightly mistrustful of data received in this format. Good luck!
369	Thanks for including me in this survey! We must assume more of a leadership role in EE if we are to impact positive outcomes. Leadership not only in the classroom but in the community, county, state, nation and perhaps even internationally. Major responsibility of pre-service teacher education programs - to develop a sound EE emphasis!
377	I would appreciate a summary report. Having just attended the State Education and Environment Roundtable in Ft. Myers, FL, I am amazed at the interest and the ideas that are found all across the U.S. EE has changed my life and my teaching style. I would appreciate any new materials or contacts that would help my students. Good luck to you.
394	I only want to apologize for my belatedness. I was filling out the first survey when your "reminder" arrived. Best wishes and good luck on your efforts. [also enclosed a 32¢ stamp since he had received two return envelopes!]
401	Good luck with your project!
403	Good luck. I admire your effort. I'd love to receive the brief summary.
410	Keep it up! I've been involved in the field myself for a period of time. Are you familiar with .... These groups all seem to have useful information or classes. They have all been a help to me professionally. See ya in the field.
421	Sorry about coffee stains.
455	Please provide the summary upon completion of the survey. You've done a very thorough job. [sent along a 32¢ stamp also!]
468	Ted - Good luck with your research. Sorry it took so long to get this to you. Thanks.
469	Not a 3rd-8th grade teacher! [several H.S. teachers were purposefully included in sample]
479	[enclosed note]: I'm really sorry this is late, but other endeavors take precident!
488	Ted, I tried to understand each one. If I didn't on some, I apologize. Thanks for the involvement. Very thorough.
492	Thank you for considering me for your survey. Since I live in the desert of Southern California, I see few environmentalists but many people with dollar signs blurring their vision. I life to hear from those who feel the same as I do. Keep up the good work!
493	Thanks - keep up the good work!

I-4) Specific Comments on the Categories and/or Elements

#	TEACHING CONDITIONS -- Comments
	GENERAL CATEGORICAL COMMENTS
191	The elements of success conditions are very important, but also creativity, freedom to explore, and child oriented environments are a must. The teacher must be willing to grow and learn from all experiences (positive and negative).
	Support - General
20	Being different than the other teachers at your grade level is very difficult. You are either encouraged to include the other classes in your project and yet the teachers are not committed to the subject. The other situation is that you are discouraged from "that field trip" because parents from other classes will complain. It's a dilemma...
	1) Administrative Support
202	Needs to work collaboratively.
308	As an EE teacher, my greatest drawback now is an administrator who will not allow or accept any more EE credits because it's not in "my area."
339	the "does not set roadblocks" rated at "5", the other part a "4."
374	Staff support is as vital as administrator's support.
	2) Adequate Teacher Planning Time
6	Although the range of interaction with the environment can vary from a few activities to an all year investigation, I think teacher planning time is the key component to the success of any endeavors into fostering environmental awareness of students.
202	We do not have time, we make time after/before school.
230	Adequate teacher planning time is crucial for successful learning.
266	Elementary [a situation-rated "2" - implying elementary esp. short on this]
339	Will only help if teacher has developed appropriate level of competency.
364	Do we ever have enough time? Not me. [rated "3"]
389	[Placed an "*" beside a "5" rating.]
499	We never have enough time.... [obviously a self-rating of "2"].
	3) Community Support
53	This suggests that business is very important. It's nice when they support us, but it's not necessary for a sound program.
200	I changed [from "4" to a "5"] because it seemed the only place to consider training programs such as WILD & PLT which show teachers that EE material does not supplant other material but supplements and is integrated into the typical curricular materials. Without such training, many newcomers to EE would baulk.

#	TEACHING CONDITIONS -- Comments
202	Yes, we need support. However, support is mediocre.
217	[Placed a "+" beside a "5" rating.]
343	HA! [an obviously situation-rating of "2"]
368	Good to have, but can manage without (rated a "3").
483	're climate [comment made at end, but pertains here..., though consider implications or interactions with the phrase "climate" in subsection below]: Politics - will administration, other teachers, parents, community support? e.g., in a resource use based economy (logging, mining, recreation, etc.) - support unpopular environmental ideas?
	4) Access To Out-of-Classroom
64	1 trip is allowed per year [respondent self-rated this one - a "1"]
202	Yes, one field trip per year. We need more.
	5) Local Bio-Physical Resources
202	No, we do not - however, it is very important.
230	Having access to local environmental resources is of utmost importance.
266	Getting better [a self-rating of "3"]
368	Good to have, but can do with whatever is available.
389	[Placed an "*" beside a "5" rating.]
481	Nice, but not a must to implement [rated a "3"].
483	're resources - what about resources such as books and lab materials.
499	[underlined "financial" and rated response as "2" - continued self-rating used]
	6) Local Human (Socio-Cultural) Resources
53	Parents helping is a great idea. The reality is that most parents work and those that are willing to come "help" really want to check out other students, their student, or the teacher. We need parent support in the home, they need to reach respect for each other and adults and they need to teach their children to value education. If parents gave that support, we as teachers could get the information across.
202	Yes, we do have parental help. It is okay. We need more.
	7) Non-Local Resources
20	Outside resources were a wonderful help. These organizations and individuals provided us with unique experiences! I would have been lost without their knowledge and willingness to give us their time!
53	I'm not sure what the outreach resources refers to. If it is computers I have a real problem with that. I'll add that on later, if it is something like connecting with the Peace Corps in their World Wise School Program, that's great. I'm not clear on what this one means.

#	TEACHING CONDITIONS -- Comments
202	Yes, we are trying to link our school to the internet in all classrooms. However, it is mediocre right now.
323	[Wrote "Internet" by the rating response of "5"]
339	Act locally, think globally.
368	Good if available.
407	They are available at a price [statement made, with rating of "3"].
423	Nice but not necessary [rated a "3"].
	8) Flexible Curriculum
188	Has opportunity, but often doesn't choose to use!
202	We are supposed to follow our guides. [Flexibility] is important to me.
239	More of a practice than a condition??
389	[Placed an "*" beside a "5" rating.]
	9) Flexible Schedules
202	No, we do not have this at all - we need it!
239	More of a practice than a condition??
343	NOT! [written beside an underlined phrase "extended field experiences" - and not rated]
	10) Collaborative Learning Environment
188	Differs with each teacher.
202	Very important.
339	the "mutual respect and care" rated at "5", the other a "4"
	11) Cooperative Teaching
202	Very important.
	12) School/Classroom Models Environmentally Responsible Behaviors
202	Our students are environmentally conscious.
339	Practice what you preach.
428	[Placed a "+" beside a "5" rating.]
481	Ideal, but not if you're the Lone Ranger! [rated a "5"]
	13) Students Bear The Consequences of Their Behaviors
202	Yes, important.
235	[Placed a "+" beside a "5" rating] -- ***(as did #422 and #428)***

#	TEACHING CONDITIONS -- Comments
249	Always good, but not specifically related to EE.
339	???? I hope you're not pushing the assertive discipline model.
	14) CONDITIONS: Categorical Evaluation
202	Now it is fairly low. However, our school has made great strides. For most schools I speak at it is very low.
368	This stuff is all wonderful, helpful, but you can do a lot alone in a classroom, with kids. Everyone of these things added makes EE better and more effective.
380	Doesn't mention student-teacher ratio or type of student population {rated "3"}

#	TEACHER COMPETENCIES -- Comments
	GENERAL CATEGORICAL COMMENTS
8	Teachers need not have an enormous wealth of environmental knowledge in order to foster EE goals in their students. They need only have the desire to learn, the knowledge of resources and the passion for EE. Learning <u>with</u> your students can be more powerful than being a fountain of information. I have learned about dissolved, oxygen, fecal coliform and nitrates along with my students. They are engaged and very passionate about what they are learning. They see my excitement, wonder and confusion and they feel validated.
58	Teacher training and professional development should be given more consideration.
258	What I <u>do</u>, not other teachers. My teaching is much more flexible than a regular classroom teacher. I'm in a "pullout" program. [obviously self-rated, not general]
	1) Ecological Knowledge Base
46	Teacher must be willing to learn along w/students.
108	Highly desirable but not necessary.
202	Based on how I view it today! [rated "4"]
368	Of course, strong is best, but beginners can be very effective.
	2) Socio-political Knowledge Base
202	Yes, very important [a "5"].
358	Depends upon the grade level.
368	If you understand too much, you'll get cynical.
380	Depends on grade level being taught [rated a "4"].
	3) Local Cultural Understanding
202	Very important.

#	TEACHER COMPETENCIES -- Comments
434	I marked this [a "2"] for this community. Overall would be "3."
	4) Teaching and Learning Theory
202	Very important. Sorry to say, but most teachers have little access to learning theories post-college unless staff development is implemented. We are trying at our school.
	5) Listening/Questioning Skills --*No specific separate comments associated with this element.*
	6) Computer Proficiency
53	Students in the 90s have or use computers. The computer is in the "library," in many classrooms, and in the home. The technology is moving quickly and we have CD ROMS, laser discs and all kinds of attachments to the computer. Students I teach love to "play" on the technology, but they don't "use" the technology. They use the computer as a quick encyclopedia to look information up for them, they have lost the skills of looking up information for themselves. They don't use primary sources or interviews as research information, they go to the computer. They flash pictures on a screen but they don't read the information that goes with it. Even when they play a "game" such as Amazon Trail, they find the creatures, but they don't go into the information to read about the animal. We use calculators in math, the skills of multiplying or adding and subtracting in their head are gone. We don't require cursive handwriting any longer because too many of them can't write neatly -- they type. The problem arises when there is no computer to take a test or the calculator shuts down. The student shuts down too. Don't get me wrong, I think technology is wonderful and I think it enhances both teaching and learning -- I'm just very concerned that we have begun to expect less of our students, we've lowered our expectations, and it's because we've made life easier for them.
202	Very important, but right now our school is very low.
230	No computer in room yet [apparently self-rated a "1"].
306	Teacher does not have computers for students use.
358	Hands-on is more important.
368	Again, nice if you have - not crucial.
422	I'm the strong computer person for our team. [rated a "4"]
	7) Diverse Instructional Strategies
235	[Placed a "+" beside a "5" rating]
422	Not afraid to try new things [rated a "5"]
	8) Resourcefulness In Accessing Resources
235	[Placed a "+" beside a "5" rating] -- ***(as did #422)***
	9) Creative, Knows How To Do Without
20	The ability to be a critical and creative teacher and to celebrate this in your students is a must to be a problem solver. It rates very high for me! The success of a project does not depend on materials and the amount of resources. If you want to work on a project, attitude and enthusiasm and a creative approach can do wonders!

#	TEACHER COMPETENCIES -- Comments
202	Yes, we all have to do this.
235	[Placed a "+" beside a "5" rating] -- ***(so did #368 and #422)***
401	[Placed a "!!" beside a "5" rating.]
420	[Placed a "*" beside a "5" rating.]
486	Very, very high! [rated this "5"]
	10) Alternative Assessment Abilities
202	Very important for inclusion students.
235	[Placed a "+" beside a "5" rating]
	11) Facilitation Skills
422	[Placed a "+" beside a "5" rating]
	12) Ability To Make Connections
34	Put an "*" by this, then in comments: "I believe that this is the key to learning..., we must make connections or ask why are we teaching this!!
339	circled "feelings" - and put "buzz word" beside the phrase.
422	[Placed a "+" beside a "5" rating]
	13) Understands local-to-global issue connections
202	Very important to look at global connections.
	14) Ability to Integrate Curriculum
343	[Highlighting done of their "5" rating.]
422	Life is a mixture of items, not categorized. [Also placed a "+" beside a "5" rating]
	15) COMPETENCIES - Categorical Evaluation
202	All are important to be a well-rounded teacher.
235	"Very" [noted to the side of a "5" rating.]
249	Teacher is a genius [e.g., strong in all 14 elements☺]
368	Don't think you could do much EE without these, regardless of other conditions.
380	Doesn't mention behavior management skills or ability to work w/co-workers {rated "4"}.
497	More important in 8th grade than 3rd grade [rated a "4"].

#	TEACHING PRACTICES -- Comments
	1) GENERAL CATEGORICAL RESPONSES
278	Of the three areas being observed, I believe that the "teaching practices" section is the most important in fostering student growth in EE outcomes. Students tend to mirror the passions of the teacher. If the teacher uses humor and has a positive attitude in the classroom, the students will absorb the environmental information with excitement and curiosity. Using hands-on experiments and field trips will also foster a rich learning environment for the eager students.
434	Please note: I marked my teaching practices based on how I'm teaching now. I have an 11-month old and my teaching style has changed dramatically as I have no time beyond the school day.
	1) Student-Centered Learning
339	Teachers may and should be aware of opportunities and experiences the students may not, and should, as a leader, have them gain exposure.
368	[laced a "+" beside a "5" rating.]
380	Depends upon the abilities and needs of children [ated a "3"].
422	[same as w/#2] I do 6th grade. I believe students need a strong foundation before this works (i.e., high school). [rated this a "2"]
	2) Utilizes Personal and Student Strengths/Passions
115	Very important!
235	[laced "++" beside a "5" rating]
422	[ame as w/#1] I do 6th grade. I believe students need a strong foundation before this works (i.e., high school). [rated this a "2"]
	3) Experiential Teaching Orientation
75	I strongly feel it is inappropriate to involve students in local controversies..., issues okay as long as students are looking at all aspects of the issue.
221	[put an "*" beside a "5" rating for this element.] -- ***(as did #389)***
230	Students engaged in hands-on/minds-on learning experiences produces the greatest results.
235	[Placed "++" beside a "5" rating]
368	[Placed a "+" beside a "5" rating.]
	4) Cooperative and Inclusive Learning
339	Not all experiences have to be team/collaborative. Self exploration of issues is also viable.
	5) Involves External Resource Persons -- *No specific comments to this one.*
	6) Reflection In Planning and Application

#	TEACHING PRACTICES -- Comments
53	I object to the word "considerable" time in planning. To me that means a lot of hours. The truth is that a competent teacher, one that knows the material and strategies of teacher, doesn't need to spend "considerable" time -- they just need to spend ample time. Some lessons are easily taught with a game, some with art, and some need lecture - the planning goes with the activity. It also depends on whether or not the teacher can get "ready made" success lessons. By that I mean, I've used "Project WET" and "Project WILD" lessons very successfully, but I didn't spend a lot of time on the planning. Someone else did that for me. The lessons are well written, they're hands on, and they're proven successful with field tested groups.
202	This is very important, however, we only get a total of 180 minutes per week for planning. I take it on my own self to plan activities for school
296	Important - need changes in public schools for this "Hurried Child Syndrome."
420	[Placed a "*" beside a "5" rating.]
481	Break up into 2 different questions [noting the "and allows time for students..."]
	7) Environmental Focus of Teaching - both "a" and "b"
53	The age group is very important for "in depth" study. Grades 3-6 don't have very long tolerance levels for "in depth" work. They like to learn trivia, quick facts, and lots of little things. They still think "more is better." I think 7th and 8th grade students should start doing more "in depth" work.
58	Rating varies according to grade level.
117	Content orientation - this depends to some degree on the age of the student as well as their interests. I feel that even if one topic is chosen, it should be given a global view (relationships/impact).
169	Can do both [rated both a "5"].
339	The constant battle of how much vs. how deep....
370	These depend on the kids.
407	Depends on age [both rated at "4"].
497	Depends on benchmarks [rated both a "4"].
	7a) Environmental Focus of Teaching -- Single and Deep
135	Some choose this - issue investigation [rated a "4"].
296	[rated "4"] Depending on age.
380	Depends on grade level [rated a "4"].
420	Not always necessary.
422	Our job is to teach them how to research and question many different ways.
	7b) Environmental Focus of Teaching - Multiple Issues
380	Depends on grade level [rated a "4"].

#	TEACHING PRACTICES -- Comments
	8) Nurturing a Sense of Place
235	[Placed "+" beside a "5" rating.]
422	My community is changing.
	9) Consistent "Can-Do" Vision
142	[Wrote "+++" to side of this element and circled "5"] - then "Extremely important"
448	[Inserted "present and" before the word "future" in statement for element.]
	10) Infectious Passion for EE, and for Teaching in General
331	This has a strong influence on a successful EE based classroom.
	11) Incorporates Humor Into The Classroom
420	[Placed a "*" beside a "5" rating.] -- ***(as did #468)***
422	Students that enjoy the class do better. [also placed a "+" beside a "5" rating]
	12) Invests Self and Personal Resources
53	Not clear to me. All teachers invest ability and time (and most of the ones I know invest money) to their classes. Do you want them to invest MORE? I know that even when I go on vacation I bring back things "for the classroom." Many teachers I know do the same thing, how much more time and energy should be invested? I know of a teacher that "invests" every Saturday to take students on day trips. She takes them on whale watches, hiking, birding, etc. I personally don't think that is healthy. Teachers need a personal life or they become stale. Giving up a Saturday once in awhile is fine, every week is not. So, my answer depends on the intent of your question. [rated it a "3"]
161	The only frameworks (sic) I have a problem with is #12 under personal behaviors. Yes, I have spent an exorbitant amount of money in my classroom. I feel there are plenty of chances to write grants to finance activities in the classroom without going broke. The amount of money given to us in our classroom to make our activities interesting and worthwhile is by far on the low end. Yes there are grants to write for, but by the time the teacher plans her curriculum, goes out into the field to investigate hands-on opportunities for the students to enjoy, and integrate the activities into the daily routine there isn't any energy left to go look for the money. I guess this will always be the problem for the teachers of our era. It really is a shame that a teacher is tied down because of the lack of funds.
202	Poor question. We should <u>not</u> have to invest money of our own. I believe in investing self [a "5"], not money [a "1"]. Teachers invest themselves in the students learning. However, they should not have to spend $1000 to support their students. I do put a lot of money into my teaching because I feel it is my mission to have students acquire all the "special" touches in their learning environment.
225	Please don't connect <u>finances</u> with faith and commitment. I know we do it, but don't evaluate on the expectation.
339	No - finances are the responsibility of the educational institution.
422	I work ≥60 hours/week [rated this "5"].

#	TEACHING PRACTICES -- Comments
458	[circled the word "finances," and thus drew a line to rating of "1"]
497	[circled the word "finances," and then noted rating of "1"]
	13) Practices Environmentally Responsible Behaviors
8	Placed an "*" beside this one.
202	Practice what you preach.
368	[Placed a "+" beside a "5" rating.]
420	[Placed a "*" beside a "5" rating.]
422	Teacher must be a positive role model. [Placed a "+" beside a "5" rating.]
	14) Risk-Taker
150	Placed a "+" beside the element, also circling the "5."
202	You have to take risks - some not so productive.
339	Balanced with their district policies.
368	[Placed a "+" beside a "5" rating.]
420	Shake up the system.
448	[Crossed out the words "well-planned."]
	15) Recharges Self
180	Ideally! But rarely happens!
368	[Placed a "+" beside a "5" rating.]
420	[Placed a "*" beside a "5" rating.]
422	Summer vacation. I hope to work @ local Ag. exp. station this summer. [rated "5"]
448	[Placed a "10!" beside a "5" rating.]
	16) PRACTICES -- Categorical Evaluation
368	These things are also critical for effectively teaching EE.
497	This is so grade dependent; less important in 3rd (not as complex) than when dealing with middle schoolers.

#	OVERALL FRAMEWORK EVALUATION -- Comments
	GENERAL EVALUATION OF OVERALL FRAMEWORK
	Many of the comments made in this section were actually place in above sections. This was an oversight, and somewhat from convenience - as this was so far down in this long file. The context of the remark appears as a "general comments" - and since this is with the "general evaluation" of the framework, it should be okay.
53	I'm not sure of what you're asking. It looks like the "framework" is the inf. taught and you're basis is teacher experience. If that's so, teachers would never try new things. Teachers need knowledge and background, but student experiences are usually different than adult experiences, and can vary from group to group. The grade level and curriculum needs to be followed or we could have large gaps in learning. We can't always teach our interests and hobbies. This has me very confused. The very top of this section states it is "a framework based upon practitioner experiences." Does this include first hand as well as learned experiences? I feel like the word experiences is too broad, it doesn't pin point any specific area. Everything in life is an experience, to that extent, of course it will influence students. It looks like you're asking: What is a "good" teacher and can a "good" teacher foster student growth? Who would answer no to that? One last point on this. You begin by asking me to circle the number that best fits my view on the element. But you end up asking if the overall framework includes the elements needed for student development. These are two different things. Yes, you have asked many questions that would be good elements to allow students to learn, but no I don't agree with them all.
76	This seems to be more dependent on an individual teacher's initiative. [???]
137	I don't really follow what was meant..."major teaching - associated elements" - give example? I don't feel I can rate overall framework when I don't understand exactly what you mean [did NOT rate the overall framework].
154	This is a mindset. It is dependent on the vision of the educator.
298	This is difficult to understand [wording for general framework evaluation].
315	I think the elements described are accurate and important.
362	I do not understand your meaning here. Therefore, I left these questions blank.
370	I wasn't really sure of what you were asking here [rated "3"].
380	Doesn't mention student-teacher ratio, or student population. Doesn't mention behavior management skills or ability to work with co-workers and parents. Some answers vary depending on grade level [rated both at "4"].
428	I have an internalized framework - created over years of thought and environmental activities. But I don't think I'm familiar with this particular one [referring to the "elements of success in EE" title - apparently didn't realize it was this survey.]
433	I'm confused by what you mean in this section.
448	Could use more emphasis on the importance of attitude, available resources and exploration. Also, less educational jargon would be nice!
458	[I do not know which framework you are referring to (no rating given)]

Appendix J

Average Mean Ratings

by Sub-group:

Full Framework and Categories

This appendix provides a complete list of the demographic sub-sample average mean element ratings for the three categories and the full framework. These ratings convey the consistently high ratings across sub-groups for the categories as well as the overall framework.

Table J-1) Sub-group Average Mean Ratings for the Elements in Each Category and for All Framework Elements

Sub-group Descriptive Title	n	Conditions Elements	Competencies Elements	Practices Elements	All Elements
Northeast	55	4.01	4.15	4.18	4.11
South	126	4.00	4.19	4.23	4.14
Midwest	70	4.02	4.18	4.20	4.13
West	76	4.09	4.22	4.33	4.21
Grades K-5	115	4.11	4.23	4.32	4.22
Grades 6-12	136	3.96	4.17	4.16	4.10
School size <500	133	4.05	4.17	4.22	4.15
School size >=500	186	4.01	4.20	4.25	4.15
Community size <50,000	161	4.04	4.17	4.24	4.15
Community size >=50,000	161	4.02	4.21	4.25	4.16
<10 years teaching	82	4.05	4.21	4.25	4.17
10-20 years teaching	139	4.02	4.19	4.27	4.16
>20 years teaching	105	4.01	4.16	4.19	4.12
Female	236	4.05	4.21	4.27	4.18
Male	89	3.98	4.13	4.15	4.09
American of color	28	4.04	4.17	4.18	4.13
White American	284	4.05	4.20	4.26	4.17
Bachelor's degree	120	4.05	4.21	4.26	4.17
Master's degree	200	4.02	4.18	4.22	4.14
TOTALS	328	4.03	4.19	4.24	4.15

Table J-2) Sub-group Mean Ratings for Each Category and the Two Full Framework Rating Items

Sub-group Descriptive Title	n	Cond's Categ.	Comp's Categ.	Prac's Categ.	Overall #1	Overall #2
Northeast	51	4.02	4.20	4.30	4.06	4.02
South	118	4.10	4.30	4.35	4.11	4.14
Midwest	64	4.19	4.32	4.44	4.19	4.06
West	69	4.36	4.35	4.55	4.26	4.19
Grades K-5	105	4.23	4.33	4.41	4.22	4.21
Grades 6-12	127	4.10	4.25	4.32	4.05	3.98
School size <500	120	4.12	4.27	4.39	4.15	4.09
School size >=500	179	4.19	4.31	4.42	4.14	4.12
Community size <50,000	150	4.15	4.28	4.45	4.18	4.17
Community size >=50,000	152	4.19	4.32	4.38	4.13	4.06
<10 years teaching	76	4.20	4.30	4.43	4.13	4.09
10-20 years teaching	129	4.13	4.33	4.43	4.24	4.19
>20 years teaching	97	4.18	4.26	4.36	4.05	4.03
Female	219	4.24	4.33	4.46	4.18	4.13
Male	86	3.99	4.22	4.28	4.10	4.07
American of color	27	4.25	4.36	4.50	4.19	4.18
White American	266	4.18	4.30	4.42	4.17	4.13
Bachelor's degree	112	4.15	4.28	4.42	4.20	4.12
Master's degree	185	4.16	4.30	4.39	4.11	4.09
TOTALS	307	4.17	4.30	4.41	4.15	4.11

Appendix K

Support for Conclusion 2.3

This appendix presents a thorough review of the framework elements and sub-categories providing specific comment on these framework components.

Teaching Conditions

Support (average mean score: 3.98)

Direct administrative support and provision for adequate teacher planning time can significantly enhance teacher EE efficacy. The need for such support was abundantly evident in the literature review, intertwined with the other three sub-categories: resource adequacy, flexibility and climate (see *Appendix A*). Research continues to highlight the importance of teacher planning time, **especially** with interdisciplinary curricula (Barab and Landa, 1997).

The importance of **community support** was not as clearly substantiated by the survey (*Condition* #3, with a 3.61 mean). Another form of community support, **local human resources**, also received relatively low ratings at 3.65. Yet by its very nature (see *Chapter 2*), involvement in and with the community is critical to achieving basic EE goals - engaging in locally-relevant environmental issues. With this consideration, the element description may have stressed **support**, whereas community orientation or **involvement** is of greater significance.

Resources (average mean score: 3.81)

Survey elements dealing with adequacy of resources were rated highly, but of lesser significance than anticipated when compared to their level of importance apparent in the literature review and during the interviews. **Access** to resources, such as the out-of-doors, was rated highly at 4.27, whereas all other *resource* elements were rated below 4.0. The two forms of local resources (rated at 3.92/3.65) are of greater importance than non-local (rated at 3.40). One could surmise that, since *competencies* #8 and #9 - resourcefulness in accessing resources and creative ability to do without - were so highly rated (4.37 and 4.48), such skills may typically be utilized to overcome otherwise potentially limiting resources. In other words, resource adequacy is essential, but it is through creatively "multiplying" the available resources that their educational utility is realized.

Flexibility (average mean score: 4.31)

Flexible curricula and schedules are critical support features for success in EE. Their absence can be potentially debilitating: "If you aren't allowed #8 and #9, the rest is moot" (Vicki, draft survey comment). The critical importance of flexibility - **especially** for all forms of interdisciplinary education - is widely supported in the research literature. Barab and Landa (1997) express concerns relating to the wide acceptance of Jerome Bruner's "structure of the disciplines" in schools across the country. Careful scope and sequencing efforts with integrated units demand a "loosening up" in disciplinary structure. Interdisciplinary instruction requires "that the school set aside one or two periods each week for the seminars" (Barab and Landa, 1997, p. 55). While there are various ways flexibility may be realized in an individual school, some form of it is important.

Climate (average mean score: 4.14)

A constructive school climate enables EE benefits to be reinforced repeatedly throughout a semester and over the years. Student collaboration (#10 - mean of 4.36) was more highly rated than that between teachers (#11 - mean of 3.65), perhaps more indicative of present school realities than a "most desirable" rating. Collaborative opportunities provide opportunity for teachers to share ideas, and learn with one another, as well as with students (Beasley, et al., 1996; Johnston, et al., 1996).

The climate sub-section, critically appraised by survey respondents, could be revised to enhance its utility. Under *climate*, one might incorporate the importance of smaller classroom sizes, pointed out by one survey respondent and repeatedly highlighted in research (Goldberg, 1996; Meier, 1996; Sizer, 1992). Personal dialogue with practicing teachers also reinforces the importance of smaller class sizes. And, while *safe learning environment* is mentioned within element #10, its visibility in the framework may not be adequate for all districts, a point also made evident in survey comments - as well as in other research (Glasser, 1993; and other).

Teacher Competencies

Knowledge Base (average mean score: 4.06)

The four knowledge-base elements received fairly high and uniform numerical rating. Some teachers felt that other elements - teacher passion, an infusion of external resources and so forth - could enable them to overcome non-strengths here. Nevertheless, the high rating substantiates their value, including knowledge of EE goals and teaching/learning theory, which guides planning, implementation and evaluation phases of instruction. "People who try to copy successful schools without understanding the theory behind their success will fail..." (Glasser, 1993, p. *xii*).

Understanding - and adjusting to - local/individual cultures (element #3) is consistently viewed as "most critical" in multi-cultural education programs and associated research. "A crucial step in developing an appropriate definition of environment in a multi-cultural environmental setting is to adopt a definition that includes the life experience and sphere of reference of the students being taught" (Taylor, 1996, p. 5; see also Atwater, et al., 1994; Lee, 1996). While approximately one-fourth of survey returns were from urban areas of 50,000 or over, nearly 87% of the respondents regarded themselves as "White American." The importance of *knowing the audience*, and more importantly working with culturally/locally-relevant EE issues reinforce that this element is highly significant to efficacy with EE on a national scale.

Skills Base (average mean score: 4.15)

Survey results indicate that creatively accessing and utilizing available resources with diverse instructional strategies, including listening/questioning skills, are valuable skills which promote effective EE. Facility with a broad-base of instructional strategies - most consistently highlighted in educational research (e.g., Danielson, 1996) - is particularly germane to EE. Since EE is ill-defined in most school districts, it must frequently be infused in creative ways, using diverse strategies.

Computer use is growing in schools across the country. In EE, computers can be useful for

broadening cultural perspectives and facilitating some educational experiences. Where technology can consistently be used to augment student connections with hands-on activities, it can be of substantive utilitarian value to environmental educators.

Practicing teachers struggle to adopt new assessments which reinforce instructional strategies. The research literature suggests that assessment become a more integral part of instructional strategies, and encourage higher-order thinking, critical thinking and problem-solving skills. Their importance is recognized by environmental educators participating in this research as well. Acquiring alternative assessment skills was more highly rated by female than by male teachers, with respective values of 4.14 and 3.79. The reason for - and implication of - this difference demands further investigation.

Integration-Ability (average mean score: 4.37)

All facets of the integration-ability sub-category were rated high to very highly significant. External research also **strongly** supports these elements, especially that of making connections with students (as per Caine & Caine, 1994). During the interviews, achievement of this competency appeared to be derived from applications of several elements working in concert: the teachers knew their students/cultures well, had facility with a wide range of - often experiential - strategies, and could access their community/information sources and assist their students in doing the same. The importance of making connections can be embellished with perspective from multi-cultural education. "Many students reject schools because they fail to deal with the issues relevant to the places where they live, work, and play" (Lee, 1996, p. 7; see also Taylor, 1996). Finally, relating to one other *integration-ability* element, Gardner and Stern highlighted the importance of understanding local-to-global connections. Many environmental issues are highly complex, with a wide separation of symptoms and causes (1996); so teachers' facilitating abilities may be enhanced with greater understanding of these connections.

Teaching Practices

Teaching Method/Style (average mean score: 4.14)

The research literature gives evidence that experiential learning has great value in advancing student growth, which continues to find support in subsequent research (e.g., Stohr-Hunt, 1996). Survey respondents in this research strongly support this, with a 4.52 rating for experiential learning. Other elements in this sub-category complement such an approach, suggesting the effective environmental educator uses personal and student strengths/passions in cooperative and inclusive learning experiences, complementing student/teacher perspectives with external resource persons.

The bulky wording of the **reflection in planning and application** element (#6 - mean rating of 4.09) may have diminished its rated value. The element description included student **and** teacher reflection - a practice supported by practitioners **and** teacher educators but perhaps hard to grasp in a long item description. A segment of the element description which drew direct criticism was that "considerable time" be spent planning. As respondent #53 suggested, more accurate is the need for "ample time."

The remaining method/style element to be discussed is student-centered learning (#1). The importance of this element is reinforced by the multi-cultural education field. "Environmental education should be taught by starting with the students' experiences, interests and the cultural and environmental references they have around them, then later investigating other types of environments and experiences" (Taylor, 1996, p. 3). The specific definition of *student-centered learning* may likely influence an educator's rating, depending upon circumstances. The practice is still relatively foreign to many existing schools, which makes expanding the level of student-input into classroom practices a challenge for many teachers. Nevertheless the practice itself may be considered very desirable (reinforced by Kohn, 1993, the multi cultural education field, and constructivist teaching in general).

Content Orientation (average mean score: 3.97)

As noted in the results-presentation, the jury is still out as to the merits of "type" of environmental teaching focus - single or multiple issues. The decision likely rests with the individual teacher circumstances, but the difference does not appear to be of great import. Of considerable value, and minimally apparent in teacher education, is *nurturing a sense of place*. Highly rated, it is still one of the "hardest things for a teacher to learn" (survey respondent #63) how to teach.

Personal Behaviors (average mean score: 4.44)

The highest rated of all sub-categories, a teacher's personal behaviors include vision, passion, humor, investment in students, responsible lifestyle, risk-taking, and making time for recharging. No matter what the conditions or personal competencies, a teacher's day-to-day actions play a major role in their overall impacts as environmental educators. In fact, this sub-category would likely have been even more highly rated if the *investing self and personal resources* element did not include the word "financial." Clearly, these teaching elements have indispensable educational influence.

Overall, the framework might best be utilized by teachers to identify a starting point, then direct their personal growth at a responsible rate - the same as with students. The following quote supports this conclusion.

> *As a relatively young-in-experience teacher who is developing teaching skills, I feel somewhat overwhelmed with the long list of important aspects of teaching conditions, skills, and practices that I strive to attain. However, desire or passion in EE... overcomes a lot of inadequacies..., and skill is always relative to other variables. But these limitations don't have to limit a teacher's attempt to pursue EE goals. As with much of our ecological understanding, we are in process of learning and arriving at the "ideal" situation and ability. Teaching, in spite of inadequacies, helps model life long learning skills as well as relaying how complex the world is, full of change, surprises, and hope, in spite of our failures* (#423).

Teacher education processes must be similar to environmental education with youth - and avoid overwhelming students with enormous and complex problems or "gloom and doom" approaches. Similar to *teaching practices #1 and #2* - student-centered learning and utilizing personal passions - teachers must commence with their strengths, and grow from there.

Appendix L

Support for Implication 2.2:

A REVISED

Elements of Success in EE Framework

This appendix presents the REVISED framework which is supported by the evidence found in Appendix K. An abbreviated version of this revised framework can be found in Appendix M.

Teaching Conditions

The Conditions category is substantially re-structured; ending up surprisingly similar to segments of the literature-derived elements of success in EE conditions category (Appendix A). Changes to the survey version: all categorical titles are changed, several elements are combined, most are re-arranged, and one new element is added.

1) **SUPPORTIVE CLIMATE FOR EE** (prior average mean score for "Support": 3.98)

This category was changed in title and content to reflect its facilitating role in EE, extending beyond "support" per se.

1a) **Administrative support** - Administrative and other school personnel facilitate - or collaborate with teachers to advance - quality environmental education experiences.

This element (prior rating 4.21) now includes other school personnel, and shows the administration more explicitly in a facilitating role, furthering EE.

1b) **Adequate teacher planning time** - Teachers have sufficient time to access and evaluate resources, and to plan interdisciplinary and engaging EE lessons on their own or with other teachers.

The only change in this element (rated 4.12) was to drop the parenthetical reference to elements #4-7 in the old list.

1c) **Flexible curriculum** - Teachers have latitude to re-organize curriculum structure, and use interdisciplinary and culturally-adaptive instructional strategies.

This element (rated 4.40) was re-positioned from a "flexibility" sub-category to unite with other school support-climate related elements, and slightly re-worded.

1d) **Multiple teachers involved with EE** - EE is a visible element throughout the school, and opportunities are provided to tag-teach, team-teach or in other ways provide diversity and complementarity in teaching.

A change from the "cooperative teaching" element (which was rated at only 3.65), though it retains components from that previous title. This newly-worded element conveys the importance of school-wide teacher influence upon the climate.

2) COMMUNITY ACCESS AND INVOLVEMENT

This new sub-category brings together elements of community-linkage, which is so fundamental to EE.

2a) **Flexible schedules** - School schedules enable combined and integrated units, collaborative teaching, and regular field experiences.

This other "flexibility" item (rated 4.21) found a home under community access, for it is scheduling flexibility which often facilitates or inhibits alternative programs and community involvement.

2b) **Access to out-of-classroom** - Teachers and students can participate in activities in the school surroundings, and in occasional extended off-site, field-based experiences.

Minimal change (rated 4.27), but placed under this category instead of "resources," and adjacent to flexible schedules - with directly facilitate out-of-classroom activities.

2c) **Community involvement** - Parental - and other community member and agency personnel - involvement enables/reinforces student growth, and helps generate connections between school activities, the students, and their local cultures.

This new element blends aspects of two which were not as highly rated in isolation (community support and local human resources - 3.61 and 3.65), and takes on a desirable EE quality - stated by the element title.

3) SCHOOL OPERATIONS/NORMS

In many respects this sub-category now represents elements of "school culture."

3a) **Acceptable student/teacher ratio** - The quantity and quality of teaching staff and volunteers must be congruent with student numbers, diversity and special needs.

This new element was constructed to address concerns regarding both classroom size and student "readiness to learn."

3b) **Safe and collaborative learning environment** - Classrooms are safe learning environments, characterized by mutual respect and care, where students recognize and support group goals.

This is a slightly-reworded element (previously rated 4.36), is altered to give more prominence to the necessary "safe" component of the classroom environment.

3c) **Adequate pool of resources** - Teacher and students have access to a diverse, quality environment, and an adequate pool of financial, technological and other material resources to meet shared needs in a timely fashion.

This element changed in location from "resources" to the present one, and re-worded to convey the shared nature of available resources (old element rated 3.92) - appropriate to modeling responsibility as per the succeeding element.

3d) **Environmentally responsible school norms** - School operations are environmentally responsible and include student participation.

This element was slightly changed to avoid duplication with teaching practices - placing emphasis upon overall school practices (old rating 4.18).

3e) **Students bear the consequences of their behaviors** - As part of normal classroom and school procedures, students experience the consequences of their behaviors.

This very highly-rated element (4.38) was left unchanged.

Teacher Competencies

This category saw less change than the previous one; maintaining categorical titles, but finding some shifting in element position, sequence, and/or wording.

1) **KNOWLEDGE BASE** (prior average mean score: 4.06)

Elements in this sub-category were shifted around to suggest a knowledge-foundation be based upon local cultural understanding and teaching/learning theory.

1a) **Local cultural understanding** - The teacher understands students, local cultures and sub-cultures, and ways in which these human elements interact dynamically with internal and external environmental issues.

A critical aspect of this slightly re-worded element (rated 4.10) is that ***it be used*** *to direct the teacher's instructional and assessment strategies, and personal behaviors.*

1b) **Teaching and learning theory** - The teacher is well-grounded in EE goals, and constructivist and other learning theories, to guide planning, implementation and evaluation phases of instruction.

Teachers must make connections with students - adapting teaching to individual students and local cultural understanding (no change - rated 4.08).

1c) **Ecological knowledge base** - The teacher has a strong cognitive base which enables them to critically utilize their ecological knowledge with diverse and evolving complex environmental issues.

No change except in position (rated 4.08).

1d) **Socio-political knowledge base** - The teacher understands the importance and nature of social and political operations and the roles these play in diverse and evolving complex environmental issues.

No change except in position (rated 3.99).

2) **SKILLS BASE** (prior average mean score: 4.15)

Most of the elements in this sub-category were simply re-ordered to add meaning to the sequence/priority.

2a) **Skilled with diverse instructional strategies** - The teacher has strength in several highly engaging teaching strategies, complemented by facility with other methods for specific circumstances, topics and students.

No change in this highly-rated (4.25) element, but re-positioned to emphasize priority status within the skills base items.

2b) **Resourceful in accessing resources** - Teacher is a skilled life-long learner, can creatively access human, material and financial resources to capacitate desired EE strategies, and can evaluate resources to guard against bias in their use.

No change in this highly-rated element (4.37), except in position.

2c) **Creative; knows how to do without** - The teacher can overcome limitations, induce student creativity, and cultivate adaptive solutions to real-world problems - which are also characterized by limited information and/or resources.

No change in this highly-rated element (4.48), except in position.

2d) **Adept with alternative assessments** - The teacher has mastery in diverse learner-based assessment strategies which complement and integrate with diverse instructional processes, and exemplify EE objectives.

No change here except in position (rated 4.05).

2e) **Proficient with computers** - The teacher can use computers for classroom applications, and make use of telecommunications to broaden cultural perspectives and enrich collective study and action.

While this element did not receive high significance rating (3.46), its value for networking alone - especially for selected circumstances - necessitates its retention. The wording is left unchanged.

3) INTEGRATION-ABILITY (prior average mean score: 4.37)

The listening/questioning element was brought into this subcategory as a viable component of integrating. Both 3a and 3b could be placed under the skills sub-category, but are placed here to recognize their importance in helping students make connections - so vital to EE.

3a) **Listening/questioning skills** - The teacher has careful, active listening abilities to recognize nuances in perspective and meaning, and a wide repertoire of questioning strategies to nourish student understanding and guide students to form personal questions.

Highly rated (4.31), with no change here except shifted from "skills" to be adjacent to its close complement - facilitation skills.

3b) **Facilitation skills** - The teacher has facility to guide students in discovering connections, and can identify and articulate diverse perspectives to bring ***balance*** to classroom discussions or investigations.

*No change here; though the importance of "balance" in this element (rated 4.39) received additional highlighting (now bold **and** italic). Balance is critical when making connections in that a teacher must avoid pressing her/his own views upon the students.*

3c) **Ability to make connections** - The teacher can link cognitive and affective dimensions, making connections: (a) between students' daily life and the topic; (b) between cause and effect so as to foresee/anticipate consequences; and (c) between the real world, the topic at hand, and individual and/or cultural values.

No change in this very highly important element (rated 4.42). It comes after 3a and 3b because of their enabling role in helping to make connections.

3d) **Understands local-to-global issue connections** - The teacher can connect environmental learning experiences to the local culture, and link local issues to global and intergenerational concerns.

No change (rated 4.32).

3e) **Ability to integrate curriculum** - The teacher can infuse EE into diverse subjects, and/or integrate multiple disciplines into an integrated unit.

No change (rated 4.36).

Teaching Practices

This highest-rated category as a whole (4.41; element average mean score: 4.24) saw the least change, though some re-organizing and wording changes were made to highlight important aspects of these elements.

1) **TEACHING METHOD/STYLE** (prior mean of means rating: 4.14)

1a) **Student-centered learning** - Students' prior experiences, interests, and the cultural and environmental references around them, are used to identify culturally-relevant, meaningful classroom experiences.

Some word-changing here to more explicitly state how students play an essential role in the classroom design and experiences (prior rating 3.83).

1b) **Utilizes personal and student strengths/passions** - The teacher employs personal talents and passions, and capitalizes on students' strengths as avenues to enhanced interest and involvement.

No change in this highly-rated (4.29) element. It is implicit that teachers utilize a student-centered learning approach (element #1) to facilitate identity and use of student strengths.

1c) **Experiential teaching orientation** - Students engage in either hands-on, minds-on classroom experiences in which they explore cause and effect relationships, or they are occupied with local environmental issues.

Some slight grammatical re-wording of this highly-rated (4.52) element.

1d) **Cooperative and inclusive learning** - Students and teacher are immersed in interdependent and inclusive experiences, providing opportunities for collaboration with mutual respect and encouragement.

No change here (rated 4.26).

1e) **Involvement of external resource persons** - Teacher selectively includes other persons in learning experiences to present diverging perspectives and add depth/richness to student understanding.

Some change in wording to clarify meaning (rated 3.83).

1f) **Reflection in planning and application** - The teacher spends sufficient time planning strategies to expand student growth, pauses for personal reflection during class to address student challenges, and allows time for students to critically reflect during class.

Some rewording of this element (rated 4.09) to enhance readability. This complex element is of great value to effective teaching.

2) **CONTENT ORIENTATION** (prior mean of means rating: 3.97)

2a) **Environmental teaching focus** - Students either dig deeply into a single major issue or project, or investigate numerous environmental issues to discover local-to-global linkages between them.

This element had been split (ratings were 3.65 and 3.96) to offer single issue or multiple issue alternative approaches. Placed in the framework within one element, a teacher has flexibility in application due to their circumstances.

2b) **Nurturing of a sense of place** - The teacher builds student knowledge of - and connectedness to - local cultures, habitats and environmental issues, nurturing a deep sense of - and commitment to - place/community.

No change in this high-rated (4.30) element.

3) PERSONAL BEHAVIORS (mean of means rating: 4.44)

3a) **Maintains consistent "can-do" vision** - The teacher clearly asserts realistic hope for the future, and empowers students to be constructively engaged in bringing about brighter future scenarios.

No change here (rated 4.46).

3b) **Exhibits infectious passion for EE, and for teaching in general** - Teacher exhibits zest for learning and reverence for life and the quality thereof, and invites/inspires students to share these loves.

No change in this very highly rated (4.59) element.

3c) **Invests self** - The teacher devotes abilities, time and energy - consistently supporting students, and cultivating their trust, faith and commitment - by their actions.

Changed to eliminate specific mention of teacher financial investment (previously rated at 4.19).

3d) **Incorporates humor into the classroom** - The teacher uses lightness to balance the serious nature of environmental issues, and to foster longevity of personal and collective responsible actions.

No change here (rated 4.38).

3e) **Practices environmentally responsible behaviors** - Teacher models environmental responsibility both within and beyond the classroom, teaching a powerful message through action/example.

No change in this most highly rated (4.60) element.

3f) **Takes risks** - The teacher is willing to "take the plunge" into well-planned educational risks which expand student opportunities beyond the "norm" or "expected."

No change here (rated 4.42).

3g) **Recharges self** - The teacher makes time for personal, emotional, physical and intellectual experiences to maintain or rekindle the flame for EE and be revitalized for life in general.

No change here (rated 4.46).

Appendix M

Research Summary Letter

The research summary letter was sent to 105 people. Fifty-three of these were upon request by those who completed the surveys. The others were people who had helped out in various capacities along the way - Advisory Panelists and others who provided teacher names and addresses for the survey, and of course the interviewees.

THE UNIVERSITY OF TENNESSEE
KNOXVILLE

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Education in the Sciences, Mathematics, Research and Technology
402 Claxton Addition
Knoxville, Tennessee 37996-3400
(423) 974-5037

{Name and address of recipient}

June 24, 1997

Dear....

Greetings again from Ted May (please note on page 3 - I have moved☺). This is a brief research summary of my recently-completed research project: *Elements of Success in Environmental Education, Through Practitioner Eyes*. I am sending this to the 18 teachers I interviewed, the persons who provided names of teachers who were sent surveys, the 53 survey respondents who explicitly requested a summary report, and my initial EE advisory panel. I thank you **ALL** for your assistance; the experience has been meaningful far beyond my initial expectations.

The interview process cultivated my developing interest, and deepened my respect and admiration for the many fine teachers we have in this country. As I listened to their words, and reflected on their similarities and differences, I began to sense how individual teachers can excel in widely diverse teaching environments. The three-part nature of the whole teaching experience - a dynamic blend of conditions, competencies and practices - became clear.

I constructed the framework from these interviews, tempered by my personal experiences in formal and non-formal education, and colored by reflections on my extensive literature review and dialogue with other educators. My greatest pain in placing the framework in static form was that it appeared static - deathly still. An "on paper" framework belied the inter-dynamic nature and rich colors of reality, and I feared those receiving the survey would "mis-read" it. Yet my desire for reasonable survey return rates demanded simplicity.

The results? I received over 65% returns, with at least 59% from every region (nine U.S. Census Bureau regions) of the country. The overall framework evaluations were rated at 4.15 and 4.11 on the 5-point scale for inclusiveness and ability to illustrate the complex of elements which enable a third-to-eighth grade teacher to foster student growth in desired EE outcomes. The **categorical** evaluations were all rated between high and very high: the *Conditions* category rated a mean of 4.17, *Competencies* at 4.30, and the *Practices* at 4.41.

The mean rating for all 42 elements was 4.15, and the full framework had very high internal consistency (Cronbach's α=.94). The three elements which received the strongest support were all in the *Practices* category - #13, *Practices environmentally responsible behaviors* (mean of 4.60); #10, *Infectious passion for EE and teaching in general* (4.59); and #3, *Experiential teaching orientation* (4.52). The three with the lowest rating were Condition #7, *Non-local resources* (3.40); Competency #6, *Computer proficiency* (3.46); and Condition #3, *Community support* (3.61).

- continued on back -

The ratings suggest the framework as a whole has integrity - and that some elements are of greater significance than others in fostering student growth. The rich comments - over ½ of the 328 returned surveys included comments - provided more insight to deepen my understanding of reality-based EE, leading to some further framework modifications. **The last three pages of this research summary contain the framework in modified form.** Let me provide a few key quotes from the comments. The number at the end of each quote is the survey number - some of you receiving this may recognize your words. These first three point to the personal- and potential broader-value of the framework.

I was impressed at how well you captured the essence of the critical components of EE teaching in your questions. I made a copy of the survey to help me remember what is important in EE teaching (#15).

The framework looks very promising! That qualities and strategies you have listed will benefit students if implemented (#334).

Our school is currently developing a number of grant proposals which address many of the issues and concerns indicated in your survey. We feel strongly that the EE framework you are describing (conditions, competencies, and practices) need to be supported & developed in our school in order for our students to have a clear understanding of local/universal environmental issues & their role in the community as environmental conservationists. I would be interested in seeing the results of your survey (#189).

Your questionnaire and survey questions provoked some interesting self-analysis. The teachers you interviewed obviously gave you some cogent points (#57).

Reading these question reminded me of the possibilities of education and teaching and all the things I believe in and made me excited about starting this career (#284).

I felt that the teacher practices you are evaluating hold true for all areas of study and implementation (#206).

One concern was the overwhelming nature of the framework. A review of any teaching "standards" will reveal much greater complexity and detail. While it may be admittedly impractical to attain "exceptional" measures on all 42 elements, there are examples of teachers who find their successes either promoted or restricted in relation to one or more of the elements. Yet I'll admit, the inter-dynamics are not clearly visible in the framework. How does this sound:

I strongly feel that EE is dependent on students developing that sense of "connectedness" or ownership to a community/environment. The teacher's enthusiasm is infectious and needs to be reinforced by administrative recognition and praise. I see faculty becoming easily discouraged when not given opportunities to expand EE, either personally, through in-service courses, or professionally, through curriculum development (#79).

- continued -

There were several other teachers who had equally eloquent statements of the inter-dynamic relationships within the framework. A teacher may start with strengths in a few elements, then gradually expand through their experiences with students. One starts with passion for the environment, for teaching, or for building connections, then the other "pieces" can be built along the way.

One way of putting it.... We (teachers) seek to utilize and/or nurture optimal teaching conditions - a **supportive climate**, **community access and involvement**, and overall constructive **operations/norms** of the school and classroom - to the extent possible. We enter into this climate with a continuously evolving **knowledge and skills base**, and **integration-ability** that facilitates our efficacy during interactions with the students. We then seek to *practice* our *competencies* in the context of the *conditions* (physical, students, etc.) we encounter - using our **teaching method/style**, our **content orientation**, and explicitly our **personal behaviors**. We then either "make EE happen" or are circumvented from successes initially; but we eventually find other avenues to foster student growth.

Teaching can be considered an art, with each teacher having a favorite medium. We start by sharing our passions and strengths, exploring outward **with** our students as we build supportive knowledge and skills. Wherever we start, we grow from there. I see this framework not as an overwhelming checklist, but as a survey of conditions, competencies and practices that can help us chart our individual and collective paths to greater efficacy.

Thank you again - each of you - for your contributions to this research project. The many people I have met - directly and indirectly - sustain my faith in the transformative potential of caring educators. Best wishes and prayers in your continuing personal and collective efforts.

Sincerely,

Ted May - new address:
Teacher Education, 155 EML Hall
North Dakota State University
Fargo, ND 58105-5057
701-231-7101; FAX: 701-231-7416
e-mail address: *nolson@plains.nodak.edu* (will be forwarded to me until I get one)

Attached as the following three pages - revised *Elements of Success in EE* framework

The REVISED *Elements of Success in EE* Framework

My initial intention was to present the revised framework, identifying any changes in the framework by *italics*. However, there are too many changes to enable that to be the case in a concise presentation as here. In my dissertation, I also accompany the framework with an appendix which illustrates the inter-dynamics between the elements. This, too - though extremely important - is omitted from this research summary. This framework is not "finished," and I will always cherish any suggestions you may have to further enhance its utility.

Teaching Conditions (prior average mean scores in sub-categories not given due to major changes)

1) SUPPORTIVE CLIMATE FOR EE

1a) **Administrative support** - Administrative and other school personnel facilitate - or collaborate with teachers to advance - quality environmental education experiences.

1b) **Adequate teacher planning time** - Teachers have sufficient time to access and evaluate resources, and to plan interdisciplinary and engaging EE lessons on their own or with other teachers.

1c) **Flexible curriculum** - Teachers have latitude to re-organize curriculum structure, and use interdisciplinary and culturally-adaptive instructional strategies.

1d) **Multiple teachers involved with EE** - EE is a visible element throughout the school, and opportunities are provided to tag-teach, team-teach or in other ways provide diversity and complementarity in teaching.

2) COMMUNITY ACCESS AND INVOLVEMENT

2a) **Flexible schedules** - School schedules enable combined and integrated units, collaborative teaching, and regular field experiences.

2b) **Access to out-of-classroom** - Teachers and students can participate in activities in the school surroundings, and in occasional extended off-site, field-based experiences.

2c) **Community involvement** - Parental - and other community member and agency personnel - involvement enables/reinforces student growth, and helps generate connections between school activities, the students, and their local cultures.

3) SCHOOL OPERATIONS/NORMS

3a) **Acceptable student/teacher ratio** - The quantity and quality of teaching staff and volunteers must be congruent with student numbers, diversity and special needs.

3b) **Safe and collaborative learning environment** - Classrooms are safe learning environments, characterized by mutual respect and care, where students recognize and support group goals.

3c) **Adequate pool of resources** - Teacher and students have access to a diverse, quality environment, and an adequate pool of financial, technological and other material resources to meet shared needs in a timely fashion.

3d) **Environmentally responsible school norms** - School operations are environmentally responsible and include student participation.

3e) **Students bear the consequences of their behaviors** - As part of normal classroom and school procedures, students experience the consequences of their behaviors.

Teacher Competencies

1) **KNOWLEDGE BASE** (prior average mean score: 4.06)

1a) **Local cultural understanding** - The teacher understands students, local cultures and sub-cultures, and ways in which these human elements interact dynamically with internal and external environmental issues.

1b) **Teaching and learning theory** - The teacher is well-grounded in EE goals, and constructivist and other learning theories, to guide planning, implementation and evaluation phases of instruction.

1c) **Ecological knowledge base** - The teacher has a strong cognitive base which enables them to critically utilize their ecological knowledge with diverse and evolving complex environmental issues.

1d) **Socio-political knowledge base** - The teacher understands the importance and nature of social and political operations and the roles these play in diverse and evolving complex environmental issues.

2) **SKILLS BASE** (prior average mean score: 4.15)

2a) **Skilled with diverse instructional strategies** - The teacher has strength in several highly engaging teaching strategies, complemented by facility with other methods for specific circumstances, topics and students.

2b) **Resourceful in accessing resources** - Teacher is a skilled life-long learner, can creatively access human, material and financial resources to capacitate desired EE strategies, and can evaluate resources to guard against bias in their use.

2c) **Creative; knows how to do without** - The teacher can overcome limitations, induce student creativity, and cultivate adaptive solutions to real-world problems - which are also characterized by limited information and/or resources.

2d) **Adept with alternative assessments** - The teacher has mastery in diverse learner-based assessment strategies which complement and integrate with diverse instructional processes, and exemplify EE objectives.

2e) **Proficient with computers** - The teacher can use computers for classroom applications, and make use of telecommunications to broaden cultural perspectives and enrich collective study and action.

3) **INTEGRATION-ABILITY** (prior average mean score: 4.37)

3a) **Listening/questioning skills** - The teacher has careful, active listening abilities to recognize nuances in perspective and meaning, and a wide repertoire of questioning strategies to nourish student understanding and guide students to form personal questions.

3b) **Facilitation skills** - The teacher has facility to guide students in discovering connections, and can identify and articulate diverse perspectives to bring ***balance*** to classroom discussions or investigations.

3c) **Ability to make connections** - The teacher can link cognitive and affective dimensions, making connections: (a) between students' daily life and the topic; (b) between cause and effect so as to foresee/anticipate consequences; and (c) between the real world, the topic at hand, and individual and/or cultural values.

3d) **Understands local-to-global issue connections** - The teacher can connect environmental learning experiences to the local culture, and link local issues to global and intergenerational concerns.

3e) **Ability to integrate curriculum** - The teacher can infuse EE into diverse subjects, and/or integrate multiple disciplines into an integrated unit.

Teaching Practices

1) **TEACHING METHOD/STYLE** (prior mean of means rating: 4.14)

1a) **Student-centered learning** - Students' prior experiences, interests, and the cultural and environmental references around them, are used to identify culturally-relevant, meaningful classroom experiences.

1b) **Utilizes personal and student strengths/passions** - The teacher employs personal talents and passions, and capitalizes on students' strengths as avenues to enhanced interest and involvement.

1c) **Experiential teaching orientation** - Students engage in either hands-on, minds-on classroom experiences in which they explore cause and effect relationships, or they are occupied with local environmental issues.

1d) **Cooperative and inclusive learning** - Students and teacher are immersed in interdependent and inclusive experiences, providing opportunities for collaboration with mutual respect and encouragement.

1e) **Involvement of external resource persons** - Teacher selectively includes other persons in learning experiences to present diverging perspectives and add depth/richness to student understanding.

1f) **Reflection in planning and application** - The teacher spends sufficient time planning strategies to expand student growth, pauses for personal reflection during class to address student challenges, and allows time for students to critically reflect during class.

2) **CONTENT ORIENTATION** (prior mean of means rating: 3.97)

2a) **Environmental focus of teaching** - Students either dig deeply into a single major issue or project, or investigate numerous environmental issues to discover local-to-global linkages between them.

2b) **Nurturing of a sense of place** - The teacher builds student knowledge of - and connectedness to - local cultures, habitats and environmental issues, nurturing a deep sense of - and commitment to - place/community.

3) **PERSONAL BEHAVIORS** (mean of means rating: 4.44)

3a) **Maintains consistent "can-do" vision** - The teacher clearly asserts realistic hope for the future, and empowers students to be constructively engaged in bringing about brighter future scenarios.

3b) **Exhibits infectious passion for EE, and for teaching in general** - Teacher exhibits zest for learning and reverence for life and the quality thereof, and invites/inspires students to share these loves.

3c) **Invests self** - The teacher devotes abilities, time and energy - consistently supporting students, and cultivating trust, faith and commitment through their actions.

3d) **Incorporates humor into the classroom** - The teacher uses lightness to balance the serious nature of environmental issues, and to foster longevity of personal and collective responsible actions.

3e) **Practices environmentally responsible behaviors** - Teacher models environmental responsibility both within and beyond the classroom, teaching a powerful message through action/example.

3f) **Takes risks** - The teacher is willing to "take the plunge" into well-planned educational risks which expand student opportunities beyond the "norm" or "expected."

3g) **Recharges self** - The teacher makes time for personal, emotional, physical and intellectual experiences to maintain or rekindle the flame for EE and be revitalized for life in general.

Appendix N

Inter-Dynamics Between Elements in the REVISED *Elements of Success in EE* Framework

When we try to isolate any single element from the framework, we find it hitched to the others.

(apologies to John Muir for this altered-context quote)

This appendix presents the entire REVISED Elements of Success in EE framework - element-title only - highlighting relationships between elements. Some examples are drawn from the interviews and survey comments, others are conjecture. The tables are not intended to be comprehensive, but to illustrate the inter-dynamic nature of the framework in action.

Table N-1: Inter-Dynamics of the Teaching Conditions

Element Title	Enables...	Enabled by...	Complements...
1) SUPPORTIVE CLIMATE FOR EE			
1a) **Administrative support**	*Practice 3f*	*Condition 2c*	all other elements
1b) **Adequate teacher planning time**		*Condition 1a*; creativity and external funding	
1c) **Flexible curriculum**		*Condition 1a*; *Practices 3a-3g*	
1d) **Multiple teachers involved with EE**	*Condition 3d*	*Condition 1a*; *Practices 3a-3g*	
2)COMMUNITY ACCESS AND INVOLVEMENT			
2a) **Flexible schedules**	creativity/collaboration	*Competencies 2a*, and others	
2b) **Access to out-of-classroom**	*Practices 1c, 2a&b*	*Practices 3a-3g*	
2c) **Community involvement**	*Competency 3c*	addresses limitations in *Conditions 1a*	
3) SCHOOL OPERATIONS/NORMS			
3a) **Acceptable student/teacher ratio**	*Practices 1a-1d*		
3b) **Safe and collaborative learning environment**	*Competencies 3a & 3b*		*Practices 1d & 1f*
3c) **Adequate pool of resources**	*Competency 2a, 2e* and others	*Competencies 2b & 2c*	
3d) **Environmentally responsible school norms**	overall EE goals by role-model; stimulates growth in *Competencies 1c & 1d*; supports *Competencies 3c & 3e*, and *Practices 3e*		
3e) **Students bear consequences of their behaviors**	supports overall EE goals by role-model; nourishes *Conditions 3d* and *Practices 3e*		

Table N-2) Inter-Dynamics of the Teacher Competencies

Element Title	Enables...	Enabled by...	Complements...
1) KNOWLEDGE BASE			
1a) **Local cultural understanding**	*Competency 3c, Practices 1a & 1b*		
1b) **Teaching and learning theory**	*Competency 2d*		
1c) **Ecological knowledge base**	*Competency 3c & Practices 3e*		*Practices 2a*
1d) **Socio-political knowledge base**	*Condition 2c; Competency 3c*		
2) SKILLS BASE			
2a) **Skilled with diverse instructional strategies**	utilize *Competency 1a* and *Practices 1a & 1b*		*Condition 2c*
2b) **Resourceful in accessing resources**	*Conditions 3c*		
2c) **Creative; knows how to do without**	*Conditions 3e & Practices 3a*		
2d) **Adept with alternative assessments**			*Competencies 1b & 2a*
2e) **Proficient with computers**			*Competencies 3c & 3d; Practice 1e*
3) INTEGRATION-ABILITY			
3a) **Listening/questioning skills**	*Practice 1a*		*Competencies 1a & 3b*
3b) **Facilitation skills**	*Competency 3c*	built upon *Competency 1a* and *Practices 1a*	
3c) **Ability to make connections**		*Competencies 1a-1d...*, all elements	
3d) **Understands local-to-global issue connections**	*Competency 3c*	*Competencies 1c & 1d*	
3e) **Ability to integrate curriculum**		*Competencies 1b & 2a*	

Table N-3) Inter-Dynamics of the Teaching Practices

Element Title	Enables...	Enabled by...	Complements...
1) TEACHING METHOD/STYLE			
1a) **Student-centered learning**	*Practices 1b-1d & 2b*		
1b) **Utilizes personal and student strengths/passions**	a form of *Practice 3g*	*Competency 1a*	*Competency 2c*
1c) **Experiential teaching orientation**	*Competency 3c*	*Competency 2a*	
1d) **Cooperative and inclusive learning**		*Condition 3a & 3b*	
1e) **Involvement of external resource persons**	*Condition 2c & Competency 3c*		
1f) **Reflection in planning and application**	*Competency 3c*		*Practices 1a-1d*
2) CONTENT ORIENTATION			
2a) **Environmental focus of teaching**		*Condition 3d & Practice 3e*	*Practice 2b*
2b) **Nurturing of a sense of place**		*Competence 1a & Practices 1a-1f*	
3) PERSONAL BEHAVIORS			
3a) **Maintains consistent "can-do" vision**	stimulates most others, and can often build *Condition 1a*		
3b) **Exhibits infectious passion for EE; teaching in general**	complements most others, notably *Practice 1b*		
3c) **Invests self**	balanced with *Practice 3d*		
3d) **Incorporates humor into the classroom**	*Competencies 3b & 3c*	*Practice 3g*	
3e) **Practices environmentally responsible behaviors**	*Competency 3c*	*Competencies 1a,c & d*	*Condition 3d*
3f) **Takes risks**	*Conditions & Competencies*		*Practice 1b*
3g) **Recharges self**	enables *Practice 1f*	allows long-term survival and freshness ☺☺	

Vita - Theodore S. May

I spent my younger days in a Detroit suburb, the youngest of six children. We did a lot together as a family, and often my play-time world was the outdoors and the games we invented. While young, we took nearly annual trips out to California, camping at National Parks on the way out and back, and surfing while visiting relatives on the west coast. Those were grand times, though they ended when I was ten years old. Fond memories which likely served as a foundation for my love of nature and general *joi de vivre*.

My life's journey has taken me many places. After finishing high school - where I participated in the first Earth Day celebration and related environmental efforts, I was off to the University of Michigan, where I attained my first bachelor's degree in Natural Resources. It took five years, for I paused after three years to spend time with the National Outdoor Leadership School (NOLS) in Wyoming, nurturing a love for wilderness explorations - inspired by the life of John Muir.

After finishing there, and short employment as naturalist with the Michigan School for the Blind camp, I moved to Wisconsin, where I managed an outdoor specialty store for three years. I enjoyed the teaching opportunities there so much - cross-country skiing, orienteering, etc. - that I returned to school at the University of Wisconsin-Madison and obtained teacher certification. I subsequently taught high school for three years in central Wisconsin, terminating my experience to run for state assembly, dreaming I would work to make school conditions more conducive to quality education.

After this failed effort - an exceptional learning experience, I returned to school again, this time to achieve a master's degree in environmental education from the University of Wisconsin-Stevens Point (UW-SP). This was a fine experience, meeting some excellent professors who remain friends and colleagues to this day. The degree led me into a position with the University of Wisconsin-Extension as a county 4-H and Youth Development Agent for five years in a beautiful western Wisconsin county. Toward the end of that chapter of my life, I was able to finish work on the 4-H

Adventure Projects I authored in draft version with my master's thesis. It was a joy to see them actually published for use throughout the state.

During this period, I met and married my wife, Cyndi, bringing a new dimension into my life. Three years later, we had our daughter, Sarah. Those of you who love and are dedicated to your family must realize the tremendous changes this brought into my life. I must admit that I can "relate" to many things I have not experienced, but **nothing** can enable someone to relate to the experience of having a child of your own - without having a child. What a love, a joy, and shared experience with a beautiful gift of a daughter.

After completing my employment with the UW-Extension, and while conducting a presentation at a state environmental education conference, I was offered a position at UW-SP - teaching half-time and engaging in a national research project with faculty from four other universities the other half. Wow, this was a pleasure; great folks to work with and a return to an environment where I could teach! What a pleasure..., but without a doctorate, the opportunities for this in my future were limited. Encouraged by the professors involved in the research project, I decided to return to school - leading to this dissertation venture.

My experience at the University of Tennessee in Knoxville has been intense, and incredible in many ways - some of which I shared in the Acknowledgments. At this stage, our family moves to Fargo, North Dakota, where I am excited about the opportunity to work with other faculty, settle down with my family and become a part of a community. I believe I have very important - and fun - roles as a husband, dad, and participating member of the community and church. At the same time, I hope to share my professional interests and abilities with others - at NDSU, the surrounding community, and through networks with others across the country and around the world - and support education which helps growing persons become responsible participants of their local community and global environment.