

**NON-FORMAL ENVIRONMENTAL EDUCATION IN TEXAS:
AN EXAMINATION OF OBJECTIVES AND EVALUATION**

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Ann F. Miller, B.A.

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SUPERVISING PROFESSOR: JAMES R. KIMMEL

Non-formal environmental education (EE) programs in Texas, programs not funded or evaluated by public school systems or the Texas Education Agency, play a very important role in providing environmental education to Texas children. This exploratory study analyzed results of a survey sent to 105 non-formal EE providers in Texas to determine the extent to which their programs operate with clearly defined instructional objectives and the extent to which the attainment of those objectives are evaluated. Survey results showed that over 70% of surveyed programs operate with clearly stated instructional objectives. Survey results were inconclusive concerning evaluation of instructional objectives because data collected in phone interviews of non-respondents was in significant variance with data from the written surveys. Further study is needed to clarify questions concerning evaluation and to determine the extent to which non-formal EE providers in Texas are interested in working together to establish common goals, support specialized training programs, and increase public recognition for their professionalism.

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INTRODUCTION

The purpose of this study was twofold. First, it surveyed non-formal environmental education (EE) program directors in Texas to obtain baseline information about their programs' stated learning objectives and about evaluation of those learning objectives. Second, survey results provided information used to formulate recommendations concerning further research needed to help strengthen non-formal environmental education programs in Texas.

This study defined non-formal environmental education programs as programs whose functions were not mandated or funded by the Texas legislature or by public school systems. Although many of the surveyed programs worked closely with schools on a voluntary basis, they were not subject to systematic evaluation by the schools or the Texas Education Agency. These non-formal sites generally offered many other programs to the public in addition to those offered to schools.

Some of the surveyed non-formal environmental education programs were supported by state agencies such as the Texas Parks and Wildlife Department (TPWD). Others were supported by city governments, private foundations, or semi-governmental agencies such as the Lower Colorado River Authority (LCRA). Some programs were at least partially supported by students paying tuition. Some programs targeted learners after school hours, on weekends, or during school vacations, while others offered their programs during regular school hours. Some programs trained teachers who generally attended the teacher workshops using their own funds and on their own time.

Research Questions

The following research questions examined the extent to which non-formal environmental education programs in Texas operate under well-defined learning objectives and the extent to which they are being evaluated.

1. What percent of non-formal EE programs operate with clearly stated instructional objectives?
2. What percent of non-formal EE programs use each of the following primary categories of EE instructional objectives: environmental attitudes, knowledge, and skills?
3. What percent of non-formal environmental education programs in Texas evaluate the attainment of established instructional objectives?
4. Of those non-formal EE programs that evaluate the attainment of instructional objectives, what percent assess changes in each of the primary categories: environmental attitudes, knowledge, and skills?
5. What do survey respondents report as being their primary obstacles to assessing the attainment of instructional objectives?
6. What methods are being used to assess the attainment of instructional objectives for non-formal EE programs?

The Importance of Non-formal Environmental Education Programs

It is important to investigate non-formal environmental education programs because much environmental education in Texas takes place in non-formal programs. The *Directory of Texas Environmental Education and Interpretive Facilities* (Chavez 1992) lists 156 sites not on school campuses where environmental education programs are offered. Additional programs may not be listed in this directory because they do not have an established site. In the Austin area, for example, the Colorado River Watch Network is supported by the LCRA. In this program, students and their teachers regularly visit sites along the Colorado River and its tributaries to do volunteer water quality monitoring. This program and other “hands-on” approaches to environmental education were included in this study of environmental education programs in Texas.

It is also important to recognize the limits to environmental education in the public school curriculum. At this time, environmental science is offered only as an elective course in some public high schools in Texas. In the “Recommended” graduation plan proposed by the Texas Education Agency (TEA), students are required to take three years of science; biology, chemistry, and physics. Environmental science cannot be substituted for any of these, subsequently few students will take environmental science in high school if it is offered as an elective course only.

Geography is a natural avenue for environmental studies and geographers have been interested in providing environmental education as it relates to the study of geography (Pemberton 1989, McKeown-Ice 1994, Padgett 1994, Klein 1995, Kimmel 1996). But depending upon the interests and knowledge of an individual teacher,

geography at the high school level often focuses more on cultural and regional geography; environmental concepts are taught on a marginal level or not at all.

A similar situation exists in science education in the public schools. Ecological concepts are just one component of some science courses. High school science teachers often feel ill prepared to teach ecology because college biology courses are taught primarily at the molecular and cellular level and do not focus on concepts dealing with ecosystems. Teacher certification requirements do not require ecology or natural history courses. Elementary teachers may also feel ill-prepared because Texas elementary teacher certification requires only one college science course (Sandra West, personal interview, 14 October, 1996). In Sewing's (Ham and Sewing 1988) research of elementary teachers in Washington and Idaho, she determined that over 50 percent of the surveyed teachers felt that their own lack of knowledge about EE was a most important or important barrier to their teaching environmental education.

The Texas Essential Knowledge and Skills (TEKS) is a set of educational objectives in all curricula areas for grades K-12 that will guide Texas educators in selecting the skills and concepts to be taught in Texas public schools beginning in the fall of 1998. During the two-year process of developing the TEKS, members of several environmental education organizations were asked to suggest skills and concepts that should be included in the TEKS and to critique drafts of the TEKS. The resulting TEKS do contain important environmental concepts and skills. As might be expected, the primary curricula areas that contain concepts and skills pertaining to environmental education are science and social studies, but the question still remains whether teachers will be immediately prepared to incorporate environmental concepts and skills into their

curriculum. Unless the legislature changes teacher certification requirements, non-formal environmental educators may be the most qualified to perform that function.

It seems, then, that non-formal environmental education programs are a key component of environmental education in Texas. But are these programs effective in achieving environmental education objectives? Interviews of three non-formal environmental education program directors revealed that only one out of three was able to provide a readily available list of their program's objectives pertaining to participant learning of environmental concepts or skills. None of the program directors reported using evaluation tools to determine the extent to which their programs were effective in meeting instructional goals (Nancy Herron, Dr. Glen Longley, and Nora Mularky, personal interviews, 1996). These directors acknowledged the importance of using clearly stated learning objectives and of doing program evaluation. All three requested help in designing and conducting a program evaluation and were eager to participate in this study.

LITERATURE REVIEW

Studies published in the environmental education literature formed the basis for creating the research questions and subsequent survey for this study. The literature review consists of three parts. First, it introduces categories of objectives used in the survey and details the support of those objectives in the environmental education literature. These objectives are then divided into three groups to provide organizational structure for the second part of the literature review that examines published studies of the evaluation of environmental education programs. Third, citations in the literature establish the need for evaluation of non-formal environmental education programs.

Objectives of Environmental Education

This study based its survey concerning EE learning objectives and the evaluation of those objectives (See Figure 1) on the published work of several environmental educators and organizations. Although each source categorized its version of EE objectives a little differently, the survey reflected their commonalities as much as possible in the brief form necessitated by the survey. The researcher also took into consideration the nature of non-formal EE providers in that their programs generally provide a “hands-on” experience in the environment. Thus, although none of the research cited included field investigation skills in their listing of environmental objectives, knowledge of non-formal programs suggested their inclusion. The North American Association for Environmental Education (NAAEE) has a twenty-year history of promoting

environmental education. It is composed of environmental professionals, teachers, and students working throughout North America who recognize that clearly stated goals and objectives are necessary to help educators develop effective and comprehensive programs. With the support of NAAEE, a team of environmental education professionals, scientists, curriculum developers, teachers, and people with expertise in other areas has worked together for over two years to produce a set of common guidelines for environmental education. These guidelines, “Excellence in Environmental Education -- Guidelines for Learning (K-12)” (NAAEE, 1998) build upon the objectives as stated in the *Tbilisi Declaration* of 1977 (Tbilisi Intergovernmental Conference on Environmental Education 1978).

The *Tbilisi Declaration* detailed five primary objectives for EE: 1) to help social groups and individuals acquire an awareness and sensitivity to the environment and its problems; 2) to help social groups and individuals acquire knowledge about the environment and its associated problems; 3) to help social groups and individuals acquire a set of values, concern, and sense of responsibility for environmental improvement and protection; 4) to help social groups and individuals acquire the skills for identifying and solving environmental problems; and 5) to provide social groups and individuals with the opportunity to work toward resolution of environmental problems. Although the first category of objectives found in the *Tbilisi Declaration* (environmental awareness and sensitivity) is missing from the “Guidelines,” several studies found in the EE literature described evaluation of environmental attitudes. Subsequently this category of EE objectives was retained in the survey.

Evaluation of Non-formal Environmental Education Programs

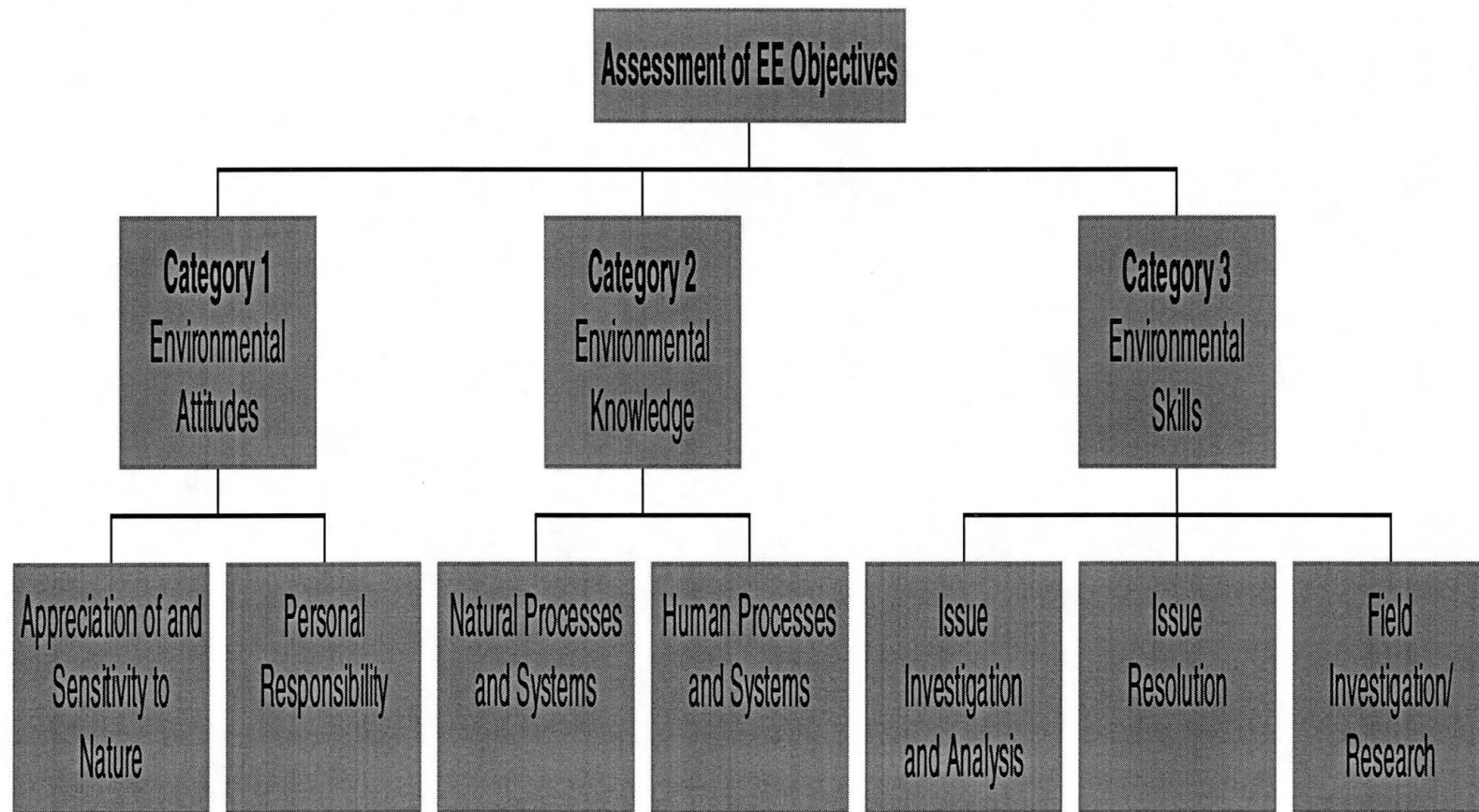


Figure 1

Roth (1992) divided EE learning objectives into four primary strands: 1) a knowledge strand (knowledge of natural and human processes and systems); 2) an affective strand (sensitivity and appreciation of both nature and society); 3) a skill strand (identifying and investigating environmental issues or problems); and 4) a behavior strand (action, responding and coping behaviors). In like manner, the Environmental Education Literacy Consortium (1994) identified the following categories of EE objectives:

1) affective dimensions (attitudes and sense of responsibility); 2) cognitive dimensions (knowledge and skills); and 3) behavior dimensions. The survey did not include behavior objectives because responsible environmental behaviors are themselves a product of an individual's attitudes, knowledge, and skills (Ramsey and Hungerford, 1989).

In summary, a review of environmental education literature suggested three primary categories of objectives for this study: 1) environmental attitudes; 2) environmental knowledge; and 3) environmental skills. These three categories form the structure for the remaining review of environmental education literature.

Studies that Report the Assessment of EE Programs

Assessment of Environmental Attitudes

Louis Iozzi (1989) examined the EE literature concerning the development of environmental attitudes. He found that only a few studies “. . . attempted to determine the effects of specific interventions or programs designed to improve, change, or alter existing attitudes...” (Iozzi 1989, 4). Among other findings, his research concluded that when programs were designed specifically to accomplish objectives dealing with

promoting positive environmental attitudes, those programs generally succeeded. He also found that the research supported the idea that outdoor education is an effective way to improve environmental attitudes.

Crompton and Seller (1981) reviewed the empirical quantitative literature concerning assessment of outdoor education experiences on participants' interests, attitudes, and moral and ethical values (the affective domain). They did not find a large body of literature in professional journals. Most studies remained unpublished as doctoral or master's theses. Of those studies, Crompton and Seller found that many of the studies lacked rigorous research methods and the reliability and validity of the instruments used to assess affective change were not established. Few assessments were longitudinal in scope.

Other notable studies have investigated the effects of non-formal environmental education programs on the environmental attitudes of participants. Shepard and Speelman (1985-1986) developed, piloted, and tested a Likert-type survey instrument for assessing environmental attitudes of resident campers aged nine to fourteen years old. They based their instrument on a number of instruments cited in the EE literature. They used an experimental group of 405 campers that chose environmental program options and a control group of 208 campers that did not. The results of their study showed that overall, the experimental treatment had little effect in developing positive environmental attitudes, but five-day programs had a greater effect than three-day programs. Shepard and Speelman suggested further research concerning optimum time frame for resident camp outdoor education programs.

Ryan (1991) investigated the effects of a conservation program at Beaver Creek Conservation Area near Saskatoon, Saskatchewan on the environmental attitudes of fifth graders. He used an experimental context that tested both a control group that did not attend the program and the experimental group that did. The survey tested rates of agreement/disagreement on scenarios relating to environmental issues at Beaver Creek. After one year, the results of the study showed that students who had attended the program displayed pro-conservationist attitude gains when asked specifically about Beaver Creek, but there was little difference between the participants and the control group for more abstract concepts not specific to Beaver Creek.

Kostka's (1976) study found that inner-city sixth grade students scored significantly lower on an environmental attitude pretest than did suburban pupils in the same program. A comparison of pretest scores to posttest scores indicated that the program had little impact on the environmental attitudes of the pupils. She also found that inner-city students, especially girls, seemed to need a different kind of environmental education than suburban students. She concluded her report with a recommendation that further research is needed in order to test the effectiveness of different program approaches.

Assessment of Environmental Knowledge

Keen's (1991) research assessed the increases in environmental knowledge of fifth and sixth grade students participating in the Sunship Earth environmental education

program at the Birrigai Outdoor Education Center in Australia. Keen found that after six months, participants displayed a significant increase in ecological knowledge.

Lisowski and Disinger (1991) developed and validated the Student Ecology Assessment instrument and administered it to students immediately before and after a seven-day field-based instructional program. Four weeks after the program, a retention test was administered. They concluded that the abstract concepts targeted in their study were effectively taught using field instruction techniques, but that more research was needed into the comparative effectiveness of other instructional strategies.

Assessment of Issue Investigation, Analysis, and Resolution Skills

To this researcher's knowledge, the only empirical research reported in the literature dealing with assessment of environmental skill development has to do with the assessment of formal EE programs (those that take place in schools). Ramsey, Hungerford, and Tomera (1981) investigated the effects of environmental action and case study instruction on the environmental problem solving abilities of eighth grade students. While increasing students' knowledge of environmental action skills, the researchers also found that students tended to demonstrate positive environmental behaviors more often than students who had not received the training. Ramsey and Hungerford (1989) also reported that ". . . instruction that promotes awareness and analysis of environmental issues, and practice in issue resolution . . . fostered seventh graders' knowledge of environmental action skills" (Ramsey and Hungerford 1989, 32). Knowledge of these skills tended to promote responsible environmental behaviors.

The Need for Evaluation

Evaluation has long been acknowledged as an integral part of assessing the effectiveness of educational programs (Gredler 1996). Bennett (1988) states, “. . . if we want to convince the educational community that environmental education can improve the curriculum and make it more relevant to students, we must evaluate our programs.” Bennett continues by listing four readily apparent benefits of evaluating a program: 1) Information gained will help improve the effectiveness and efficiency of teaching methods, the learning environment, and instructional resources; 2) Growth in student learning will more likely occur through better diagnosis of student needs; 3) It will be easier to assess the impact of the program on students’ environmental behaviors; and 4) Educators will be in a better position to gain support for their programs.

An examination of the environmental education literature revealed that non-formal environmental education programs have not been routinely evaluated unlike formal education programs which are subject to statewide evaluations such as the Texas Assessment of Academic Skills (TAAS). In her study, Kostka (1976) asked nature center directors in the Twin Cities area of Minnesota to identify their greatest need for research. She reported a unanimous vote for research in program evaluation.

In his comprehensive review of environmental education literature, Roth found that the programs “. . . provide specific objectives representing the cognitive, affective, and behavioral domains, but most fail to carry through with measurement of these objectives” (Roth 1980, 7). Likewise, in his review of the progress in environmental education in Australia, Linke made a case for the fact that the many contributions to

environmental education made by new field study centers may be minimized because of a lack of thorough evaluation. He states that, “. . . there seems to have been relatively little interest - at least very little effort made - in finding out how effectively particular activities or teaching approaches contribute to the development of conservationist attitudes. . .” (Linke 1981, 22).

An article by Jacobson concerning the use of a developing country’s park system for conservation education asserts that her study would help fill “. . . a scholarly need for research on the use of non-formal learning environments, such as parks, for conservation education and need for research on its evaluation” (Jacobson 1990, 20). Jacobson’s extensive program evaluation included a pretest/posttest format to evaluate environmental attitude and knowledge gains of students attending park programs. She also conducted an evaluation of a mobile unit program that presented both ecological and economic concepts important to understanding the park. Jacobson concludes her article by stating, “As evaluation becomes an inherent part of the development and implementation, as well as the assessment, of park programs, a better understanding of elements leading to effective programs should emerge. The results of evaluation - improvement and accountability - help to ensure that the role a national park plays in conservation education is as useful and successful as possible” (Jacobson 1990, 25).

Several recent publications point to the importance placed on evaluation by organizations whose members are involved in non-formal environmental education. The National Association for Interpretation published a report, “Evaluating the Effectiveness of Interpretation” that resulted from a 1990 workshop of the same title. “A Field Guide for Evaluating National Park Service Interpretation” was also published in 1990. The

National Wildlife Federation published *Teaching and Evaluating Outdoor Ethics Education Programs* in 1995 and in March of 1998 the National Conservation Training Center supported a four-day conference and publication titled “Education Program Evaluation.” One publication from the “EETAP” Resource Library (Environmental Education and Training Partnership, 1998) is titled, “Assessing Non-formal Environmental Education: Unobtrusive Data Collection.” This publication identifies some obstacles to assessment, then describes unobtrusive methods of evaluation that are both quantitative and qualitative.

RESEARCH METHODS

Before beginning this study, the survey group, non-formal EE programs in Texas, was defined as programs whose functions were not mandated or funded by the Texas legislature or by public schools themselves. Using this definition, data from the Houston I.S.D. Outdoor Education Center could not be used although this program provided feedback on the preliminary survey.

In order to answer the research questions, the Non-formal Environmental Education Program Survey was developed, mailed to the study group, and results analyzed according to the steps outlined below.

1. A preliminary survey instrument was sent to six non-formal EE program directors for comments and recommendations.
2. Revisions were made to the survey instrument.
3. The final survey instrument (See Appendix) was mailed to 105 non-formal environmental education program directors in Texas.
4. Follow-up phone calls were used to solicit responses from non-respondents.
5. Descriptive statistics were used to evaluate the returned surveys in terms of simple percents of responses for:
 - a. programs that identify instructional objectives and those that do not
 - b. categories of instructional objectives
 - c. programs that evaluate instructional objectives and those that do not
 - d. categories of instructional objectives that are evaluated

- e. obstacles to evaluating instructional objectives (for those that do evaluate)
 - f. reasons for not evaluating instructional objectives
 - g. types of evaluation tools used
6. A content analysis was performed on the respondents' answers to the following portions of the questionnaire where respondents chose "other" and explained:
- a. categories of instructional objectives other than the suggested categories
 - b. categories of instructional objectives evaluated other than the suggested categories
 - c. types of evaluation tools used other than the suggested types
 - d. obstacles in trying to evaluate learning objectives other than the obstacles suggested
 - e. reasons for not evaluating attainment of instructional objectives other than the reasons suggested

SURVEY RESULTS AND DISCUSSION

Of the 105 surveys mailed, five were undeliverable due to changes in address or, in one case, dissolution of the program. Of the 100 surveys delivered, 57 were returned although only 54 of the surveys were fully completed and could be used for this study. The three respondents who did not complete the survey indicated that their programs were not fully functioning at that time, but would be functioning in the future. All respondents indicated that they would like access to survey results.

Table 1. Responses to Surveys

Number of delivered surveys	100
Number of respondents	57
Number of usable surveys	54
Response rate	54 %

Because the survey was mailed to a select group of possible respondents (people in charge of non-formal environmental education programs in Texas), a high response rate was expected. However, the 54 percent of usable survey responses was not as high a response rate as expected. To determine if the percent of non-respondents who do operate with clearly stated learning objectives or who do evaluate the attainment of those objectives differs greatly from the percent of survey respondents, the researcher made telephone calls to ten non-respondents. The ten non-respondents were asked only the two primary questions of the survey: 1) Does your program operate with clearly stated learning objectives? and 2) Do you evaluate the attainment of those learning objectives?

Responses to the first question bolstered confidence in the survey responses, but responses to the second question were in variance with data collected from the survey and will be discussed under the heading, “Discussion of Survey Results Related to Evaluation.”

Survey Results Related to Learning Objectives

Of 54 completed surveys, 40 respondents indicated that their programs did operate with clearly stated instructional objectives (Table 2). This response rate of 74 percent was higher than expected from the interviews with three program directors that initiated this study. In the phone interviews of non-respondents, seven out of ten (70 percent) said that their programs operated with clearly stated learning objectives. The closeness of the response rate between those interviewed by phone and those who returned the survey supports the survey results.

It is interesting to note, however, that although fourteen respondents indicated that they did not operate with clearly stated instructional objectives, all respondents answered the question regarding categories of learning objectives that applied to their environmental education program. It appears that although the objectives of the program might not be clearly stated or stated in terms of instructional objectives, all respondents can identify categories of learning objectives that apply to their EE programs.

Table 2. Responses Related to Objectives and Evaluation

	Number of “Yes” Responses	Percent of “Yes” Responses	Number of “No” Responses	Percent of “No” Responses
Programs that operate with clearly stated objectives	40	74	14	26
Programs that evaluate the attainment of stated objectives	38	70	16	30

The survey listed six categories of environmental learning objectives. These six categories were combined into three primary categories: environmental attitudes, knowledge of natural and human systems, and environmental skills. (Fig. 1) The response rate in each of the three primary categories was calculated by averaging the response rate for each of its subcategories. As illustrated in Table 3, for the category of environmental attitudes with two subcategories, the average of the response rate for the two subcategories was 93 percent. Responses indicated that knowledge objectives were utilized most often (96 percent), while environmental skills objectives were utilized least (50 percent).

The “other” category received 26 percent of the response (Table 3). The wide range of responses indicated the variety of roles the surveyed programs assume. These “other” responses indicated programs are involved in teacher training, team building, multi-cultural education, career exploration, developing communication skills, safety education, and developing critical thinking skills.

Table 3. Responses Related to Categories of Stated Learning Objectives

Subcategories of Learning Objectives	Number of Responses (n=54)	Response Rate %
Appreciation of and sensitivity to nature	53	98
Sense of personal responsibility	47	87
Knowledge of natural and human systems	52	96
Issue investigation and analysis skills	24	44
Issue resolution skills	18	33
Field investigation/research skills	40	74
Other	14	26
Primary Categories of Learning Objectives		
Environmental Attitudes		93*
Knowledge of Natural and Human Systems		96*
Environmental Skills		50*

* Response rate calculated by averaging the percents of the subcategories

Discussion of Survey Results Related to Program Objectives

The Introduction of *Excellence in Environmental Education--Guidelines for Learning (K-12)* states, “Environmental literacy depends on a personal commitment to apply both skills and knowledge to help ensure environmental quality and quality of life. For most learners, that personal commitment begins with an awareness of what is around them in their local environment and community.” Later, it continues by saying, “Instructors should provide learners with early and continuing opportunities to explore their environment,...” (NAAEE 1998, 5). On the survey, 98 percent of non-formal EE

programs in Texas, most of which are housed in parks, zoos, nature centers, and museums, operate with the objective of teaching an appreciation and sensitivity to nature. Obviously, non-formal EE programs are uniquely equipped and dedicated to providing learners with important experiences in the out-of-doors that schools often do not provide. The *Project WILD Activity Guide* (1992) which has a ten-year reputation as a respected EE publication, states, “It seems increasingly important, in this urbanized age where much information comes to us vicariously and abstractly, to make sure that students have meaningful, first-hand experiences with the living world ” (WREEC 1992, 344). Although some schools are taking advantage of programs such as the “Wildscape” program supported by TPWD that encourages gardening for wildlife on the school grounds, a majority of schools do not have convenient places for students to observe wildlife and plants, experiment with nutrient and energy cycles, or discover cause and effect in the natural world. Additionally, *The Project WILD Activity Guide* states that, “In the urgency for teachers to teach more and faster, there is a growing assumption that the building classroom is the only place where legitimate learning can take place. The result of this tendency is increasingly to abandon the out-of-doors. In our view, this is a mistake” (WREEC 1992, 344). Clearly, non-formal EE programs are accepting this important role.

The prioritizing of the categories of objectives by the non-formal programs surveyed follows closely the organization of the *Project WILD Activity Guide* which introduces awareness and appreciation activities first, followed by knowledge of natural and human processes and systems, issue investigation, and finally, responsible human actions.

Although the average response rate for the skills category of objectives (50 percent) was significantly lower than the knowledge and attitude categories (Table 3), it is important to note that responses were higher in the skills category for field investigation/research skills (74 percent). This again emphasizes the experiential role that non-formal environmental education programs play, but leaves a question about why non-formal EE programs place a much lower priority on issue investigation and issue resolution skills. One program director voiced the opinion that the length of most of their programs does not allow for the development of issue investigation and issue resolution skills. Perhaps program directors feel that those skills are best left to the formal education system which has considerably more time with the students. If the formal education system does embrace those objectives, then perhaps this important category of EE objectives will be taught to Texas students. Otherwise, it is an important issue for non-formal EE providers in Texas to address.

Survey Results Related to Evaluation

As illustrated in Table 3, for the three primary categories of environmental education objectives, the category that was evaluated most often was knowledge of natural and human systems (76 percent). The category next most often evaluated was environmental attitudes (54 percent) while evaluation of environmental skills had a combined total of only 36 percent.

Reflecting the diversity of instructional objectives, ten respondents indicated “other” on the survey concerning categories of objectives that are evaluated. These

“other” responses included team building, teaching techniques, scientific method, and multi-cultural objectives. Three respondents listed “program format” or “enjoyment of program” as other instructional objectives that they evaluated.

Table 4. Responses Related to Categories of Objectives that are Evaluated

Subcategories of Learning Objectives	Number of Responses (n=38)	Response Rate %
Appreciation of and sensitivity to nature	22	58
Sense of personal responsibility	19	50
Knowledge of natural and human processes and systems	29	76
Issue investigation and analysis	17	45
Issue resolution	8	21
Field investigation/research	16	42
Other	10	26
Primary Categories of Learning Objectives		
Environmental Attitudes		54*
Knowledge of Natural and Human Processes and Systems		76
Environmental Skills		36*

* Response rate for the primary category calculated by averaging the percents in its subcategories.

Discussion of Survey Results Related to Evaluation

Although the survey responses indicated that 70 percent (Table 2) of the non-formal EE programs evaluate the attainment of instructional objectives, the results from the phone survey of non-respondents puts this number in question. Of the ten non-respondents surveyed, only three (30 percent) said they evaluate the attainment of their

programs' instructional objectives. This 40 percent gap in response rate indicates that the survey did not sufficiently answer the research question concerning evaluation of learning objectives.

Another response concerning assessment of learning objectives that should be noted, however, is the listing by three respondents of "program format" and "enjoyment of program" as other instructional objectives that they evaluate. These responses indicate either that the respondents did not read the survey carefully or that they did not fully understand the term, "instructional objective." "Program format" and "enjoyment of program" might be important program factors to evaluate, but they are not "learning objectives." If the respondents did not fully understand that the survey was asking specifically about the assessment of learning objectives, then perhaps other respondents also did not understand, and the survey results concerning this question are not valid. Perhaps this survey's 70 percent response rate was inflated.

Responses Related to Obstacles to Evaluation and Reasons for Not Evaluating

As shown in Tables 5 and 6, constraints on time are important for the respondents who do evaluate the attainment of learning objectives (63 percent) and even more for those who do not evaluate (87 percent).

Another important response concerning obstacles to doing program evaluation was the lack of training in program evaluation (37 percent for those that evaluate and 33 percent for those that do not evaluate). Two respondents who circled "other" in the survey concerning obstacles to evaluating their programs, explained their situation. One

said, “Since our programs are based on the needs of the public and these needs are constantly changing, then our programs constantly change, therefore, it is difficult to standardize evaluation criteria.” Another said, “ Our programs are flexible and each may cover different topics, issues, techniques. We lack the time to develop evaluations of each program.” Several respondents who do not evaluate echoed these sentiments by indicating that the large numbers of students and lack of personnel created obstacles.

Table 5. Responses Related to Obstacles to Evaluation

Obstacle to Evaluation	Number of Responses (n=38)	Response Rate (%)
Lack of Funds	3	8
Lack of Training	14	37
Lack of Time	24	63
Lack of Interest	8	21
Other	9	24

Table 6. Responses Related to Reasons for Not Evaluating

Reason for not Evaluating	Number of Responses (n=16)	Response Rate (%)
Lack of Time	14	87
Lack of Training	6	33
Lack of Money	7	33
Lack of Clearly Stated Objectives	3	11
Other	8	44

Discussion of Survey Results Related to Obstacles to Evaluation and Reasons for Not Evaluating

The results of this survey clearly demonstrate that the heavy demands on time and staff have a direct effect on the ability of respondents to evaluate their programs' instructional objectives. In an article titled, "Four Steps to Evaluating Environmental Education Learning Experiences," Bennett (1988) echoed the survey results by listing "time" as the biggest obstacle to overcome for doing program evaluation. Bennett stated, "The secret to overcoming this constraint is to treat evaluation as an integral part of the total planning and teaching process,..." (Bennett 1988, 15). The rest of his article detailed steps for building evaluation into that process so that the time taken to create and do the evaluation is minimized while benefits are maximized.

Bennet also suggested other obstacles to evaluation of non-formal EE programs that were not addressed in this study. First, he suggested that fear of being judged and held accountable sometimes creates a reluctance to evaluate. Anyone who has been in a Texas school during TAAS testing can attest to the anxiety among teachers that their teaching abilities will be judged according to the performances of their students on TAAS. Perhaps respondents to this survey were reluctant to respond that they do not evaluate their programs (The survey was not anonymous).

Second, Bennet suggested some people may think that evaluation is too complex and difficult to understand. Certainly people who have no training or experience in evaluation may have that perception. Survey responses (Table 5 and Table 6) indicate

that approximately one-third (37 percent and 33 percent) of the respondents consider lack of training to be an obstacle to evaluation.

Finally, Bennett suggested that some people may think that it is expensive to administer a good evaluation. Survey results support this suggestion, too, because 33 percent of the respondents who do not evaluate their programs' instructional objectives indicated that a lack of money was a factor (Table 6).

Survey Results Related to Methods Used to Evaluate Attainment of Learning Objectives

According to survey results, questionnaires were the most used type of evaluation tool (63 percent), while learner products (50 percent), and interviews (45 percent), were the only other tools used by close to half of the respondents. The least used types of evaluation were objective tests and Likert-type scaled evaluations. Respondents who circled "other" used a variety of evaluation methods. Three respondents indicated that they used teacher interviews, while letters from former students, peer review, written evaluations, and observations were also listed.

Table 7. Responses Related to Methods Used to Evaluate Attainment of Learning Objectives

Method Used	Number of Responses (n=38)	Response Rate (%)
Objective Tests	11	29
Likert-type Scales	6	16
Group Discussions	15	39
Questionnaires	24	63
Learner Products	19	50
Interviews	17	45
Other	7	18

Discussion of Survey Results Related to Methods of Evaluation

Because the survey did not ask for details concerning methods of evaluation, the results do not indicate if the most widely used methods of evaluation (questionnaires, group discussion, interviews, and learner products) were used qualitatively or quantitatively or both ways. Did programs obtain data from the evaluations? One respondent described their evaluation as, “. . .sensing the reaction of the kids - if they laugh, talk, crowd around, get excited - then we have succeeded.” This gives the presenter important feedback, but without documentation, the report of the children’s learning remains anecdotal, nothing that the teacher can use as proof of the lesson’s effectiveness in the attainment of learning objectives. The advantage of using well-

designed quantitative evaluations in addition to qualitative evaluations is that the objectivity of the tools helps bolster any conclusions drawn from the evaluations. Bennett (1988, 19) says that, “By using multiple measures, an evaluator can obtain a much broader data base for making judgments about outcomes in which he or she will have greater confidence.”

Objective tests (used most often to test knowledge objectives) and Likert-type scaled evaluations (often used to assess attitudes) were the least used types of evaluation. Both provide quantitative data. Perhaps, because many programs take place outside, program directors feel that the situation is not conducive to paper-and-pen assessments. Also, non-formal program directors may not want students to think they have to “take another test.” They want the learning experience to be enjoyable and unlike regular school. Of course, proper planning of evaluation methods could counter these obstacles and provide the “broader data base” championed by Bennett.

CONCLUSIONS

Even though the response rate to the written survey was not as high as expected, a subsequent phone survey of ten non-respondents supported survey results that approximately 70 percent of non-formal EE programs in Texas operate with clearly stated instructional objectives. A discrepancy (40 percent) between the responses to the written survey and the phone survey concerning evaluation of instructional objectives prohibits drawing conclusions concerning evaluation. Written responses to “other” instructional objectives that are evaluated continued to throw doubt on the 70 percent response rate for programs that evaluate instructional objectives. The “other” objectives listed as being evaluated, “program format” and “enjoyment of program,” are not instructional objectives. The question remains, did respondents not read the survey carefully or did they not understand the term, “instructional objectives?”

Survey responses indicated that over 90 percent of non-formal EE programs in Texas operate with instructional objectives in the two primary categories, “environmental attitude” and “knowledge of natural and human systems.” Fifty percent of the surveyed programs operate with learning objectives in the “environmental skills” primary category. Although the percent in the “environmental skills” category of objectives was considerably less than the other two primary categories, the “field investigation/research skills” subcategory had a higher response rate (74%). Many non-formal programs have apparently taken the role of offering students the “hands-on” opportunities to study nature that their facilities can provide. Once again, questions remain concerning how students will develop skills relating to environmental issue investigation and issue resolution.

Should non-formal EE providers teach those skills or should they leave that category of objectives to formal educators?

Although the percents of respondents who indicated that they evaluate learning objectives in each of the categories was much lower, “knowledge” objectives were evaluated more often (76 percent), with “attitude” objectives next at 54 percent and “skills” objectives last at 36 percent. This hierarchy of objectives that are evaluated correlates with the hierarchy of stated learning objectives, lending support to the accuracy of the data.

Both those who do evaluate instructional objectives (63 percent) and those who do not evaluate instructional objectives (87 percent) chose “lack of time” as the most significant obstacle to evaluation while “lack of training” was listed as the second most significant obstacle for both groups. Responses to the survey concerning methods of evaluation do not indicate whether the most used methods (questionnaires, learner products, and interviews) were used quantitatively or qualitatively and whether or not data is collected from the evaluations. Because these questions still remain, this study could form the basis for further discussion and research among non-formal EE providers in Texas.

Implications for Further Study of Non-formal EE in Texas

To this researcher’s knowledge, no other published studies have dealt with issues regarding non-formal environmental education in Texas. The exploratory nature of this study provided baseline data. Further research would be required to answer the basic question of this study concerning the percent of non-formal EE providers in Texas who

do evaluate instructional objectives. Careful construction of written or phone surveys would be necessary to alleviate any confusion among respondents about the types of evaluation of interest to the research. Further study could also address questions concerning the types of qualitative versus quantitative evaluation tools being used. Is data from the evaluations being gathered, analyzed, and used to strengthen non-formal EE programs?

Survey results also indicate that non-formal EE providers might benefit from research about specific pedagogical questions such as: 1) What types of evaluation tools are most effective when used with different age groups? 2) What types of evaluation tools work best in different outdoor settings, during different time frames, and with various numbers of participants?

Second, research is needed to address questions concerning the perceptions of non-formal EE providers. Do non-formal EE providers in Texas feel that they would benefit from training in pedagogical techniques such as formulating instructional objectives and evaluating attainment of those objectives? Do they feel that they would benefit from joining with other non-formal EE providers to discover common goals and to support specialized training programs? If so, what forms of communication and what type of organization would be most efficient and effective in accomplishing those goals?

Implications for Non-formal EE Providers in Texas

One survey respondent wrote, “This survey has opened my eyes to our program’s lack of evaluation.” An important benefit of this study then, is that the survey itself

called attention to learning objectives and evaluation of learning objectives as core ingredients of effective EE programs. Survey participants who obtain and review the results of this survey, will have access to new data concerning objectives, evaluation, and evaluation tools that are being used by other non-formal EE programs. The study will provide readers with background information from the EE literature concerning learning objectives and evaluation about which they might not have had previous access.

This increased awareness of learning objectives and evaluation could encourage program leaders to take action to strengthen their non-formal environmental education programs on an individual basis. Further, this study might encourage discussion among non-formal EE providers in Texas concerning common issues and result in cooperative efforts to address common goals.

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APPENDIX

November, 1997

Dear Environmental Educator:

Your environmental education program is a vital conduit of environmental education for Texans. As you know, public and private schools are often not equipped with facilities, expertise, and a mandate to create effective environmental education programs. As a professional educator and director of a non-formal environmental education program, your input is needed to help provide background information that can be of great benefit to everyone interested in environmental education in Texas.

By completing the enclosed survey, you and other program directors can help build a data base that can be used to strengthen non-formal environmental education in Texas. The survey will be used to acquire data that will answer research questions for a thesis concerning non-formal environmental education programs in Texas, their instructional objectives, and their methods of evaluation. This research will help fulfill requirements for completion of a Master's degree in geography and planning at Southwest Texas State University.

Your input is invaluable to this study. Please take a few minutes to answer the enclosed survey regarding your non-formal environmental education program. It would be very helpful if the survey could be completed and returned in the self addressed, stamped envelope by **December 1st, 1997**.

If you indicate your interest below and return this form along with your survey, I will send you information at a later date about how to obtain a copy of the survey results.

Thank you for your assistance in this study.

Sincerely,

Ann Miller
1077 Hidden Hills Dr.
Dripping Springs, Texas 78620
Wk.(512) 912-7025 Hm.(512) 894-4224
ann.miller@tpwd.state.tx.us

Dr. James Kimmel
Department of Geography and Planning
601 University Dr.
San Marcos, Texas 78666-4616
(512) 245-3201

(Please check to indicate your interest in obtaining survey results.)

☐ Yes, I am interested in the survey results.

☐ No, I am not interested in the survey results.

Non-formal Environmental Education Program Survey

Part 1 - Program Description

Program Title _____

Program Location _____

Program Director _____

Address _____ City _____ Zip _____

Phone _____ Fax _____ E-mail _____

Person completing this survey _____

Part 1 - Continued

Please describe your environmental education program in terms of:

1. Student age group(s) served : _____
2. Number of students per year (on the average): _____
3. Program time length : _____
4. Average number of students served at each program : _____
5. Ratio of adult leaders/teachers to students: one teacher to every ____ students
6. Do students come to your program during regular school hours ? (please circle one)

A YES

B NO

If you circled **NO**, when do they come? _____

7. How is your program supported financially? (Please circle all answers that apply.)

A STUDENTS PAYING TUITION

B FOUNDATION SUPPORTED

C SCHOOL DISTRICT SUPPORTED

D OTHER (please explain) _____

8. Do program participants receive some type of credit or "grade" for participating in your program?

A YES

B NO

If you answered **YES**, please explain below.

Part 2 - Program Objectives

9. Does your program operate with clearly stated instructional objectives (objectives that state how the participant should behave or perform or what they should be able to do as a result of your program)? (Please circle one.)

A YES

B NO

The following is a list of categories of environmental education objectives as they relate to **specific outcomes for program participants.**

10. Circle the category(ies) of learning objectives that apply to your environmental education program.

A APPRECIATION OF AND SENSITIVITY TO NATURE

B SENSE OF PERSONAL RESPONSIBILITY

**C KNOWLEDGE OF NATURAL AND HUMAN PROCESSES
AND SYSTEMS**

**D ENVIRONMENTAL ISSUE INVESTIGATION ANALYSIS
SKILLS**

E ENVIRONMENTAL ISSUE RESOLUTION SKILLS

F FIELD INVESTIGATION/RESEARCH SKILLS

G OTHER (Please explain)_____

Part 3 - Questions Concerning Program Evaluation

11. Have you used any type of evaluation tool(s) to assess the achievement of instructional objectives for participants in your environmental education program?
(Please circle one.)

A YES

B NO

If you checked YES, continue below. If you checked NO, turn to the last page.

12. Circle the category(ies) that describe the instructional objectives that your evaluation assesses:

A APPRECIATION OF AND SENSITIVITY TO NATURE

B SENSE OF PERSONAL RESPONSIBILITY

**C KNOWLEDGE OF NATURAL AND HUMAN PROCESSES
AND SYSTEMS**

**D ENVIRONMENTAL ISSUE INVESTIGATION AND ANALYSIS
SKILLS**

E ENVIRONMENTAL ISSUE RESOLUTION SKILLS

F FIELD INVESTIGATION/RESEARCH SKILLS

G OTHER (please explain)_____

13. Circle the reason(s) listed below that describe **why** you evaluate your program's effectiveness.

**A TO OBTAIN INFORMATION THAT WILL HELP IN FUTURE
PROGRAM DEVELOPMENT**

B TO DOCUMENT ACHIEVEMENTS OF THE PROGRAM

C TO HELP PUBLICIZE THE PROGRAM

D OTHER (Please explain)_____

14. Please circle the method(s) you used to evaluate your program's effectiveness in achieving instructional objectives.

A WRITTEN, OBJECTIVE-TYPE TESTS

B LIKERT-TYPE SCALES

C CONTENT ANALYSIS OF GROUP DISCUSSION

D QUESTIONNAIRES

E LEARNER PRODUCTS (IE. DRAWINGS, REPORTS, OR PRESENTATIONS)

F PERSONAL INTERVIEWS

G OTHER (please explain)_____

15. What benefit(s) did your program derive from completing an evaluation of instructional objectives? Please circle appropriate response(s).

A PROGRAM IMPROVEMENT

B INCREASED ENROLLMENT

C INCREASED REVENUE

D ACCREDITATION

E OTHER (Please explain)_____

16. What obstacles do you experience in trying to evaluate your program? Please circle appropriate response(s).

A LACK OF MONEY

B LACK OF TRAINING/KNOWLEDGE ABOUT PROGRAM EVALUATION

C LACK OF TIME

D LITTLE INTEREST IN PROGRAM EVALUATION

E OTHER (Please explain)_____

Part 4 - Programs that DO NOT evaluate instructional objectives

If you **DO NOT** assess the effectiveness of your environmental education program in terms of the attainment of instructional objectives, please complete the survey below.

17. Circle the reason(s) why you do **not** evaluate your program's effectiveness in terms of achieving its instructional objectives.

A LACK OF TIME

**B LACK OF TRAINING/EXPERTISE IN PROGRAM
EVALUATION**

C LACK OF MONEY TO DO PROGRAM EVALUATION

**D LACK OF CLEARLY STATED INSTRUCTIONAL
OBJECTIVES TO EVALUATE**

E OTHER (Please explain)_____

18. What would facilitate your doing an evaluation of your program's instructional objectives? (Please rank the following as to their importance by circling your answers.)

IMPORTANCE

A An accessible bank of appropriate evaluation tools	Major	Moderate	Minor	None
B Training on creating and performing evaluation	Major	Moderate	Minor	None
C Time set aside for doing evaluation	Major	Moderate	Minor	None
D Funds appropriated for doing evaluation	Major	Moderate	Minor	None
E A set of clearly stated objectives	Major	Moderate	Minor	None
F Other (Please explain)_____				