



ECO-ACT

PAST, PRESENT, AND FUTURE

**Outcomes of the Missouri Botanical Garden
environmental leadership program
after twenty years**

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A report based on master's thesis (Hope, 2004)

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Published 2007 by The Hoenny Center, PO Box 9388, St. Louis, MO 63117
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ABSTRACT

The ECO-ACT Environmental Leadership Program, operated by the Missouri Botanical Garden since 1981, has graduated more than 1,500 high school students who have been trained in investigation of environmental issues, ecology topics, and outdoor and leadership skills. The program, long perceived as successful and having a positive impact on program graduates, lacks effective evaluation tools and the basis for those assumptions.

The purpose of this project was to determine whether the program has been successful in reaching its goals. In addition, I was especially interested in program graduate memories related to the program and the extent to which the experiences and knowledge gained through participation in the ECO-ACT Environmental Leadership Program impacts environmental literacy of participants.

"ECO-ACT was the best experience that I had out of all my years of schooling. It has truly shaped my life!" – Gateway Institute of Technology Student, 1994-95

This study was intended to serve as a comprehensive source of data relating to the ECO-ACT program, giving special consideration, after more than twenty years in existing, to what past program participants consider the lasting impacts of the program on their lives.

In an evolving design, results of a survey of program graduates were analyzed and used to inform the process of voluntary interviews of several program graduates. Program graduate survey results and comments showed that these individuals value the program for the unique opportunities it provides to work with peers from other schools, to develop classroom leadership and bring lessons to fourth graders, and to experience outdoor activities afforded them by the ECO-ACT program they would not otherwise have explored on their own. While limited in scope, the study results show that the program has, indeed, met its stated goals. Program graduates' participation in daily activities on behalf of the environment illustrates the program's lasting impact on participant environmental literacy.

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INTRODUCTION

Background and Rationale

ECO-ACT, or Ecological Action, is an environmental leadership program begun by the Missouri Botanical Garden in 1981. It provides St. Louis area high school students with opportunities to discover environmental and human ecology issues, recognizing the complexity and variety of opinions involved. ECO-ACT is a collaborative arrangement between the Missouri Botanical Garden (hereafter, “the Garden”) and participating area schools, for which high school students receive grades and course credit. The objectives of the ECO-ACT program, which are supported by experts in the field (McMillan, 2003 citing Dibble; Orr; Kuenen; Niedermeyer; Weidner; Fien; Ham & Kelsey; Newhouse; and Uzzel, Rutland, & Whistance) are:

1. To increase student knowledge of environmental science and ecology and the inherent issues within those topics, recognizing the complexity and variety of opinions involved;
2. To contribute to the development of an environmentally responsible citizenry;
3. To foster an awareness and respect for the natural world;
4. To help students recognize and apply leadership skills;
5. To empower students to function effectively in a group through team work;
6. To increase students’ comfort and effectiveness when presenting information;
7. To foster the development of open-minded individuals; and
8. To encourage self-discovery and acceptance.

The literature review that supported my master's thesis the work on which this report is based, (Hope, 2004; see Appendix E), revealed that environmental education encompasses a wide range of activities, although it is fairly well established that the goal of all of those activities—if they are to be defined as environmental education (EE)—is to increase students’ environmental literacy (EL). While the importance of environmental literacy is not as widely accepted as the literacy we associate with reading and writing, at least within the EE field, it is considered to be a key goal and a step toward the outcome of responsible global citizenship.

Devising methods of determining the impact of programs on students’ EL has been a subject elusive to research, because of the blurring of the division between cognitive and affective dimensions present in “values” education. Many individual

programs have proven memorable to students, and participants in environmental education programs have shown changes in attitude that have led to self-reported behavioral change. While several scales have been developed for the assessment of individual environmental concern and commitment to action and researched for validity and reliability, no one scale is accepted as the standard by which environmental affect or knowledge is evaluated due to the need for program-specific evaluation in many cases. Long-term impact of environmental education on environmental literacy is an area in need of further research.

The ECO-ACT Experience

“Developing conceptions in environmental education involves the use of a range of strategies designed to integrate an individual’s environmental knowledge, attitudes/values, and behavior” (Ballantyne & Packer, 1996, p. 1). The key activities of the ECO-ACT program encompass all three of the forms of outdoor and experiential

"I firmly believe that participation in ECO-ACT led me to my career in science teaching. ... Fantastic program!" – University City H.S. Student, 1987-88

education described by Boss (1999). A three-week summer training program for the high school participants including a week on the Meramec River, which provides many students with their first canoeing and camping experiences, and outings

throughout the year, including such activities as caving, backpacking, and rock climbing, are what Boss considers “adventure education” components of the program.

Investigations of local environmental issues and the completion of an in-depth local environmental issue project provide experiences in “cultural journalism and participatory research.” Learning to teach ecology and environmental science helps ECO-ACT participants to integrate and communicate what they have learned (Ballantyne & Packer, 1996).

For thirty weeks during the school year following the summer experience ECO-ACT students participate in “service learning” as they work together as small teaching teams to teach ecology and environmental science concepts. Each team teaches in the fourth-grade classroom of a nearby school at least once each week, leads those students in two educational field trips during the school year, and works with the elementary

classroom in planning a culminating environmental action project. Teams select and teach their lessons based on a set of activities and supplies provided by the program staff. Each team writes unit and lesson plans before teaching their lessons, which are submitted to program staff for review and grading. They are also responsible for an evaluation of each curriculum unit after it has been taught. High school students' teaching and leadership skills are evaluated throughout the year by the cooperating high school and fourth grade teachers as well as ECO-ACT program staff. To support this major teaching effort, the high school participants attend a workshop at the Garden each month where teaching techniques, science concepts, local environmental concerns, diversity issues, and leadership roles are the focus.

The teaching aspect of the program provides practical experience in the field of education and a glimpse into teaching as a possible future career, as well as the opportunity for the teenagers to build powerful relationships as mentors to fourth graders. Many fourth graders who have been mentored have grown to become ECO-ACT leaders in high school.

To this point, the ECO-ACT program has continued in a path of acknowledged excellence in environmental education, without formal evaluation. In its Non-Formal Guidelines Review (NPEE, 2003), the National American Association for Environmental Education (NAAEE) states that "Effective Environmental Education Programs define and measure results in order to improve current programs, ensure accountability, and maximize the effects of future efforts" (p.1). ECO-ACT, an environmental leadership program for high school students, was developed and has existed at the Missouri Botanical Garden for 21 years. In that time, leadership and evaluation techniques have varied. Past evaluation efforts have focused mainly on program satisfaction and student opinion of specific components of the program. Most recently, a comprehensive evaluation plan for the program has been developed by program staff, based on the premise that "It is important to study whether these programs are effective, meaning, whether they have a beneficial impact on the environmental values of students" (McMillan, 2003, p. 91). Components of this evaluation effort focus on program outcomes and include, in addition to grades earned by high school student participants for completion of program assignments:

- 1) High school student pre- and post- science content assessment;
- 2) High school student pre- and post- environmental literacy survey;
- 3) Program evaluation by high school and elementary school teachers;
- 4) End of year content, environmental literacy, and program satisfaction evaluation by fourth grade students;
- 5) Regular observation of high school student teaching by program staff;
- 6) Two-page written reflection paper by high school students.

Data collected through these methods is processed and used to inform continual program improvements as well as to garner continued school participation and financial support for the program.

A backward glance at a twenty-three year old program claiming to have positively impacted the lives of more than 1,300 high school participants causes a reflective practitioner to pause in wonder that no data exists to support the premise that the program is, indeed, a successful environmental education endeavor. Additionally, it is important, in order to market this long-standing program for potential expansion to include additional school districts and also to more successfully secure funding for the program, to show tangible evidence of the program's historical success. Specifically, however, my interest lies in the relationship between high school student program participation and environmental literacy. For this study, the environmental knowledge of fourth graders was not examined.

Purpose

The purpose of this study was to utilize existing information and data collected from program graduates to establish a basis for past claims to program success and also to inform the process of interviewing a group of willing program graduates in an effort to gather supporting qualitative data. The main focus of the data collection was on perceived program value and impact on graduates' lives after their participation in the program.

Specific questions posed for this study were:

1. To what extent has the ECO-ACT Environmental Leadership Program met its stated goals?

2. To what extent does experience and knowledge gained through participation in the ECO-ACT Environmental Leadership Program impact environmental literacy of participants?
3. What do past program participants consider the lasting impacts of the program on their lives?

Design and Rationale

This research was completed to determine the extent of the impact of the ECO-ACT Environmental Leadership Program on program participants of the last twenty-three years. The design of this study evolved, based on responses to the environmental literacy survey, and also, the responses to a few pilot interviews. This research option was selected in order to allow flexibility in revising questions to interviewees as a function of the quantitative data collected through the survey as well as qualitative data gathered via interviews. Both types of data were necessary and relevant to a comprehensive review of the program impact, so that information not gathered in one format may be ascertained by the other, and so that the quantitative may inform the process of gathering the qualitative data.

METHODOLOGY

Subjects

Subjects for the study were chosen: 160 ECO-ACT program participants who graduated from 15 St. Louis-area high schools (10 located in St. Louis County, and 5 in the City of St. Louis; 11 public schools and 4 private schools) and who completed and returned a survey mailed to all ECO-ACT graduates on file.

Interview subjects were drawn from the 160 respondents to the above survey. The pool of interview candidates was selected by drawing every tenth individual in an alphabetical arrangement of those 136 questionnaire respondents who indicated they would be willing to be interviewed about their experiences in the ECO-ACT program, for a minimum of twenty interview candidates. After a slow and limited response from the first twenty selected candidates, an additional fifteen candidates were selected using the

same method of selecting every tenth individual, starting from the end-point of the original drawing. Even after soliciting these additional graduates for an interview, because of time limitations, a total of only ten interviews were completed.

Procedure

In the role of ECO-ACT Program Coordinator for the Missouri Botanical Garden, it is essential to have data to support the long standing tradition of the ECO-ACT program's "success," both to market the program for expansion into new schools, and also to facilitate the process of program funding. In an effort to gather substantial data to

"Because of ECO-ACT (the Costa Rica trip) I am spending two quarters of my junior year of college at Punta Mona in Costa Rica. Thanks for everything." –Parkway West H.S. Student, 2001-02

that end, a pilot survey (Appendix A) was designed and tested on program participants at the end of the 2002-03 school year. That pilot survey served as a learning tool for the development of two evaluation schemes: the ECO-ACT Pre- Self-Evaluation (Appendix B) implemented prior to

program participation to evaluate the experience of 2003-04 participants to begin the routine annual collection of data (to be compared to a subsequent ECO-ACT Post- Self-Evaluation), and the ECO-ACT Program Impact Survey for Graduates (Appendix C), to be used as a self-reporting tool for all past high school graduates of the ECO-ACT program.

The ECO-ACT Program Impact Survey was mailed to all past graduates for which there was an address on file (a total of 1300 individuals) in December 2003. Due to outdated records, 247 of those mailed were returned unopened, and it is assumed that many others were otherwise lost in the mail. More than 160, however, were completed and returned. Data from these completed surveys was compiled and analyzed using percentage of response (ECO-ACT Program Impact Survey Results, Figure 1). Respondents indicating a degree or career in the fields of education or science were analyzed further to determine reported strength of relationship between participation in ECO-ACT and degree and/or career choice (Reported Occupations, Appendix D). Additional comments made by respondents to an open answer section of the survey were analyzed for consistent themes (Additional Comments, Appendix E).

This archival data, collected and analyzed, served as a basis for the development of interview questions asked of a pool of candidates who indicated on their returned survey that they would be willing to be interviewed about their ECO-ACT experience. From the data, ten basic questions were developed into an unstructured interview format, the goals of which were to identify: 1) awareness of and involvement in environmental issues; 2) involvement with children and/or education; 3) involvement in the outdoors and or nature; 4) key experiences or program aspects for growth; and 5) longevity of program impact (Interview Questions Appendix F). Question order and wording evolved throughout the process to allow for greater flexibility in prompting interviewees and probing for clarification.

Interviews were conducted, based on interviewee preference, in person, by telephone, or by email. One was conducted in person at the Missouri Botanical Garden; four were conducted by phone, recorded, and transcribed; five were conducted by emailing the questions to willing participants, and then receiving responses back via email as well. In-person and telephone interviews were audio taped upon permission by the interviewee, transcribed, and then, along with the email interview responses, qualitative analysis was performed. Interviews were scanned for key words and or phrases for each response item, which were then applied to the table of specifications set for the interview questions.

This project was designed to span eight weeks, with the following steps taken during those weeks to guide the flow of the project.

- Week 1: Process and analyze questionnaire responses.
- Week 2: Identify pool of interview candidates and develop pilot questions.
- Week 3: Conduct at least 3 pilot interviews.
- Weeks 4: Evaluate and refine interview questions.
- Weeks 4-6: Conduct interviews with at least 17 more ECO-ACT graduates
- Weeks 6-8: Analyze and compare data.

Limited response from potential interviewees actually yielded ten, rather than the intended twenty interviews for qualitative data. Time limitations of the study precluded further interviewing to be included in this analysis. Interview responses, together with questionnaire responses and demographic information provided the opportunity to look at these ten program graduates as case studies representative of the larger sample.

RESULTS AND DISCUSSION

Surveys

The ECO-ACT Program Impact Survey was completed by 160 program graduates. Another 247 surveys were returned, unopened, by the post office. Results by percentage of response are illustrated in Figure 1.

Subjects ranged in age from 19 to 38, their ECO-ACT participation having occurred between the years of 1981 and 2003. Fifty-six percent of the survey respondents hold a bachelor's degree or higher level of education; 39% are high school graduates (90% of which are currently seeking a college degree); 4% have completed an associate's degree. Those completing the survey represent a population which is made up of 125 females, 25 males, and 10 individuals whose sex is unknown; the group's racial diversity is 78% Caucasian, 11% African-American, 2% Asian, 1% Hispanic or Latino, and less than 1% of some other ethnicity. (Six percent preferred not to indicate race.)

Enjoyment and Perceived Value ECO-ACT Program Components

The program components rated the highest were the canoe trip and teaching experience; 82% of respondents gave each of these the highest rating of enjoyment and value and less than 2% rated them "least enjoyable and valuable." Outings received 79% rating of "most enjoyable and valuable" with less than 1% rating outings "least enjoyable and valuable." ECO-WEEK received 51% highest rating and 1% lowest rating. Workshops (52%), Environmental Project (45%), and Environmental Issue Exploration (43%) were the only items for which more respondents selected the middle rating more than the highest. Clearly, and understandably, the personally rewarding experiences of classroom teaching and outdoor adventure activities were perceived as more valuable and enjoyable than the more academically rigorous training and research portions of the program, although none of the program components were rated "least enjoyable and valuable" by more than 12% of respondents.

An overwhelming 90% rated the "Overall ECO-ACT Experience" as being "most enjoyable and valuable." None rated it "least enjoyable and valuable." This shows

clearly that a population representing twenty years of program history recalls the program favorably to memory and continue, whatever the years since their completion of the program, to consider the ECO-ACT experience worthwhile and pleasurable.

ECO-ACT Program Impacts on Life Choices/Activities

In responding to the extent of life aspects affected by ECO-ACT, results were less dramatic. Responses to each item were more widely distributed over the options for answering between a “remote relationship between participation and the item” and a “strong relationship.”

Thirty percent or more of the respondents consider ECO-ACT to have had the strongest relationship with their current consumer choices (37%), hobbies (35%), community involvement (33%), and day-to-day-activities (30%). Each of these same items was rated a “2” by more than 40% of the respondents, resulting in at least 76% of the group considering ECO-ACT to have at least some relationship to their current involvement in those activities.

More program graduates (62% of respondents) consider ECO-ACT to have only a remote relationship to their selection of college, and 46% to selection of degree.

Of those 33 respondents listing a strong relationship between ECO-ACT participation and choice of degree, fields of study were reported as follows: 55% education; 21% life sciences; 9% social sciences; and 3% each journalism, Spanish, fine art, and landscape architecture. (15% of this group did not provide degree information.)

"ECO-ACT enabled me to interact with students who were different from anyone I knew from science classes at my high school. This was perhaps the most positive part of the program for me." –Clayton H.S. Student, 1994-95

Responses to relationship between ECO-ACT participation and career choice were distributed widely over the choices of responses. Of 36 respondents reporting a strong relationship between ECO-ACT participation and career choice, 66% are educators; 15% are students; and 3% are a biologist, cosmetologist, counselor, journalist, or landscape architect. (15% of this group did not report career choice.)

For “Overall Impact of ECO-ACT,” 60% reported a mid-range, 34% reported the strongest relationship, and 6% reported a remote relationship between the program and

their life after participation in the program. (It is unclear why two percent of respondents considered this item to be “Not Applicable.”)

ECO-ACT graduates seem to generally perceive the impact of their participation in the program to be more greatly related to general lifestyle choices than to decisions relating to college and career choice. For those graduates reporting a strong relationship between ECO-ACT participation and those major life decisions, many chose to pursue educational and career paths related to the science content or teaching experience components of the program.

Interest or Participation with Children and Nature

A majority of survey respondents responded that they “always” feel “comfortable and confident around children” (86%) and “in nature” (79%). This is not surprising, considering the responses to the first section of the survey, which indicated graduates’ highest satisfaction with the classroom teaching and outdoor adventure components of the program. Seventy-four percent of graduates responding to the survey responded that they “like to participate in outdoor activities as often as I can,” which indicates that these students who enjoyed outdoor activities during their participation in ECO-ACT continue to pursue similar activities on their own after graduation from the program.

Interest or Participation in Activities related to Environmental Literacy

Most program graduates responding to the survey expressed interest in environmental topics and/or information related to environmental issues. Fifty-nine percent of survey respondents are “always” “interested in environmental topics.” Another 40% are “sometimes” interested. Only 3% “never” pay attention to environment-related news. Eighty-five percent of the graduates surveyed “seek out information about environmental issues” at least sometimes.

Of survey respondents, a majority (58%) indicated that they “always” “feel compelled to take action to reduce my impact on the natural environment,” and 38% feel so compelled “sometimes.” Nearly 40% “always” and another 56% “sometimes” “feel empowered that I can make a difference in the larger scheme of the environment.”

The most commonly participated in activities survey respondents reported participating in on behalf of the environment (more than 30% “always” participating) were recycling, environmentally-conscious consumerism, driving fuel-efficient vehicles, voting, and speaking with others about the issues. Least common activities, those with less than ten percent indicating “always” being interested or participating included “writing letters to the editor” (1% “always;” 82% “never”); “volunteering for environmental groups” (1% “always;” 39% “never”); “urging elected officials to take action” (4% “always;” 61% “never”); and “making donations to environmental causes” (9% “always;” 32% “never”).

Generally, program graduates seem committed to take actions to reduce their own personal impact on the environment, but are far less likely to be involved in activities on behalf of the environment which involve social or political action on a larger scale.

The exception to this generalization may be the forty-nine percent of responding program graduates who reported “always” considering themselves “an environmentally-aware and active citizen.” Of these individuals professing to be personally committed to the environment, 75% “always” feel compelled to take action to reduce their impact on the environment, and 56% “always” feel empowered that they can make a difference in the larger scheme of the environment. Fifty percent or more of these environmentally-focused program graduates “always” participate in at home and work recycling, show interest in environmental topics, pay attention to environment-related news, vote for environmentally-conscious candidates, speak with others about the issues, and drive a fuel-efficient vehicle. Writing letters to the editor is the only item in this section in which less than 50% of those considering themselves environmentally aware and active indicated interest and/or participation in at least “sometimes.” Considering the low rate of response to this item, the researcher questions whether expression of opinions in letters to the editor may be decreasing on the whole in this increasingly technological age.

Figure 1. ECO-ACT Program Impact Survey for Graduates, with responses calculated by percentage

ECO-ACT PROGRAM IMPACT SURVEY

Please take a few moments to consider and respond honestly to the following items.

A. Please provide the following information for statistical purposes.

- Age (Check One) (160) 18-23 56% 30-35 12.5%
 24-29 23% 36 or above 6%
 No Answer <1%
- Highest Level of Education (Check One) (157) High School Graduate 39% Associates Degree 4%
 (Of these, 90% are in college)
 Bachelors Degree 43% Masters Degree 13%
 Doctorate or beyond
- Race (Check all that apply.) (157) African American 11% Caucasian 78%
 Hispanic or Latino 1% Asian 2%
 Native American Indian Other <1%
 Prefer Not to Answer 6%

B. Circle the number that best reflects your opinion of the following ECO-ACT program components, 1 being the least enjoyable and valuable, and 3 being the most enjoyable and valuable.

Environmental Issue Exploration (156)	1 1%	2 43%	3 42%	N/A 13%
Canoe Trip (159)	1 <1%	2 8%	3 82%	N/A 9%
ECO-WEEK (152)	1 1%	2 32%	3 51%	N/A 15%
Teaching Experience (158)	1 2%	2 16%	3 82%	N/A 0%
Workshops (153)	1 11%	2 52%	3 34%	N/A 3%
Environmental Project (151)	1 12%	2 45%	3 33%	N/A 10%
Outings (155)	1 <1%	2 20%	3 79%	N/A <1%
Overall ECO-ACT Experience (157)	1 0%	2 10%	3 90%	N/A <1%

C. Circle the number that best reflects the extent to which the following aspects of your life were affected by your participation in the ECO-ACT program. (1 indicates a remote relationship between participation and the item; 3 indicates a strong relationship.)

Selection of College (159)	1 62%	2 18%	3 7%	N/A 13%
Selection of Degree (159)	1 46%	2 26%	3 21%	N/A 7%
Career Choice (159)	1 38%	2 31%	3 23%	N/A 9%
Community Involvement (159)	1 15%	2 48%	3 33%	N/A 4%
Day to Day Activities (158)	1 21%	2 46%	3 30%	N/A 3%
Consumer Choices (158)	1 14%	2 48%	3 37%	N/A 2%
Hobbies (151)	1 17%	2 44%	3 35%	N/A 4%
Overall Impact of ECO-ACT (157)	1 6%	2 60%	3 34%	N/A 2%

Figure 1, cont.

D. Circle the answer which best reflects extent of your interest or participation in each of the following items.

I am interested in environmental topics. (158)	A 59%	S 40%	N 1%
I pay attention to environment-related news. (158)	A 49%	S 49%	N 3%
I seek out information about environmental issues. (158)	A 20%	S 65%	N 15%
I feel compelled to take action to reduce my impact on the natural environment. (157)	A 58%	S 38%	N 4%
I feel empowered that I can make a difference in the larger scheme of the environment. (160)	A 39%	S 56%	N 4%
I take action on environmental issues that concern me by:			
a. speaking with others about the issues. (158)	A 31%	S 54%	N 9%
b. writing letters to the editor. (158)	A 1%	S 16%	N 82%
c. urging elected officials to take action. (158)	A 4%	S 35%	N 61%
d. voting for environmentally-conscious candidates (157)	A 38%	S 48%	N 13%
e. making consumer choices to reduce my impact on the environment (158)	A 49%	S 45%	N 6%
f. volunteering for environmental groups. (158)	A 1%	S 51%	N 39%
g. making donations to environmental causes. (157)	A 9%	S 58%	N 32%
N/A (1)			
I recycle glass, plastic, aluminum, and paper at home. (159)	A 66%	S 25%	N 8%
I recycle glass, plastic, aluminum, and paper at work. (158)	A 42%	S 37%	N 14%
(N/A 6%)			
I drive a fuel-efficient vehicle. (158)	A 41%	S 35%	N 18%
(N/A 6%)			
I walk, bike, or utilize public transportation. (159)	A 21%	S 65%	N 14%
I am comfortable and confident around children. (159)	A 86%	S 14%	N 0%
I am comfortable and confident in nature. (159)	A 79%	S 21%	N <1%
I like to participate in outdoor activities, as often as I can. (159)	A 74%	S 26%	N <1%
I consider myself an environmentally-aware and active citizen. (158)	A 49%	S 48%	N 3%
(N/A <1%)			

E. Additional comments: _____

Please return this survey to the Missouri Botanical Garden in the enclosed self-addressed envelope. Thank you for your participation in this important project.

Additional Comments

In addition to rating each of the items in the survey, many respondents also contributed their own “additional comments” (Appendix E). The following are examples from each of the identified themes drawn from these un-prompted responses, in order of number of related comments.

ECO-ACT is a Fun and Memorable Experience (28)

ECO-ACT was the best experience that I had out of all my years of schooling. It has truly shaped my life! –Gateway Institute of Technology Student, 1994-95

ECO-ACT is a wonderful program, and I felt honored to be one of the small group of students who had the chance to participate. I have a lot of great memories. –Lindbergh H.S. Student, 1998-99

ECO-ACT Impacts Career Goals (13)

I firmly believe that participation in ECO-ACT led me to my career in science teaching. It certainly gave me skills to feel comfortable presenting to groups of any age. Its longevity is a testament to its success. Fantastic program! –University City H.S. Student, 1987-88

ECO-ACT had a large impact on my life and attitudes about the environment and teaching. I had ECO-ACT as an elementary student where I began being conscious of human impact on the environment. Then I taught ECO-ACT in high school whereupon I decided to become a teacher. I now teach in a residential treatment facility in the foothills of Colorado where I emphasize environmentalism. I also teach an after school science club. –Parkway North H.S. Student, 1995-96

ECO-ACT Creates Diversity Awareness and Lasting Relationships (10)

One of my favorite things about ECO-ACT was getting to know other high school students from the St. Louis area. Coming from a private religious single-sex predominately white school it was a great experience for me to learn from others as a result of the high school student diversity. –Nerinx Hall H.S. Student, 1999-00

An important program. I wish you’d asked about the diversity among the participants—ECO-ACT enabled me to interact with students who were different from anyone I knew from science classes at my high school. This was perhaps the most positive part of the program for me. –Clayton H.S. Student, 1994-95

ECO-ACT Increases Environmental Awareness (8)

I'm an environmental studies major now because of ECO-ACT. Before I became involved with this program the environment was not something I thought about. I have no idea what I'm gonna do with my degree, but the environment is definitely something I am passionate about now. This is a great program. I loved the people I met and the gardens is awesome. Thank you!

–Parkway West H.S. student, 2001-02

It has been 14 years since I participated in ECO-ACT and I must admit that it was very instrumental in molding me to be the environmentally conscience woman that I am today. I am always reflecting on my experiences in ECO-ACT and am glad to have the opportunity to say thank you, ECO-ACT. –Academy of Math & Science Student, 1990-91

ECO-ACT Teaches Life Lessons (8)

ECO-ACT may not have inspired my career choice, but it inspired my life. It was one of the best things I ever did. –Nerinx Hall H.S. Student, 1999-00

ECO-ACT helped me speak better in public and become more confident with myself. –Parkway North H.S. Student, 2000-01

I love the ECO-ACT program. I learned so much--Not only about ecology, but myself and children. –Parkway North H.S. Student, 1998-99

Suggestions for ECO-ACT Program Improvement (8)

ECO-ACT was a great learning experience for me. I was from Gateway High School and had the opportunity to participate. Should involve more kids from the city they have less of a chance to learn about the environment and issues with the planet. –Gateway Institute of Technology Student, 1996-97

I enjoyed ECO-ACT, but sometimes it felt like it was watered down more than it could have been. I would have appreciated more outside speakers and real science incorporated into the program. –Nerinx Hall H.S. Student, 2001-02

ECO-ACT Imparts Teaching and Group Leadership Skills (4)

Eco-ACT was a very valuable experience. I draw from the lesson plans used in ECO-ACT to enhance my own science program. –Nerinx Hall H.S. Student, 1994-95

I really enjoyed my ECO-ACT experience—it helped with other teaching/tutoring experience I had through college and made me feel pretty knowledgeable about the

environment. Wish I could've done it for more than one year. –Parkway North H.S. Student, 1995-96

ECO-ACT Motivates Future Involvement in Community Service (3)

ECO-ACT was a great experience & I was fortunate to be a part of such a unique program! I am continuing to volunteer as a teacher in my community. It raised my environmental awareness & sense of accomplishment. Good luck with the future development! –Lindbergh H.S. Student, 1998-99

Although I have participated in many voluntary acts, ECO-ACT was the most enjoyable. The enthusiasm that the students showed for learning was unbelievable. We had so much fun while learning a vast amount of information at the same time. I made a promise to myself that no matter what profession I go into, I will volunteer with children as a hobby. Thanks ECO-ACT.

–Metro H.S. Student, 2002-03

ECO-ACT Provides New Experiences (3)

ECO-ACT was such fun and a great time. I learned so much. I had never done most of the things that ECO-ACT exposed me to. My fondest memory is the float trip/camping trip we took during the summer. I still remember the songs we sang!! –Webster Groves H.S. Student, 1996-97

Because of ECO-ACT (the Costa Rica trip) I am spending two quarters of my junior year of college at Punta Mona in Costa Rica. Thanks for everything. –Parkway West H.S. Student, 2001-02

ECO-ACT Program Future/Interest in Future Program Involvement (3)

ECO-ACT is a wonderful program that gave me so many good memories. I hope it keeps going for future students to participate. –Metro H.S. Student, 2001-02

I hope that the garden and area schools will not only continue to support ECO-ACT, but will also expand their support so ECO-ACT will reach a wider audience. I hope other organizations will provide gifts and grants as well. I would support an ECO-ACT friends or alumni organization. ECO-ACT alumni could participate in programs with their own children. –Anonymous

These unprompted comments generally support the data collected from the survey which illustrate ECO-ACT to be an enjoyable experience for high school participants which impacts graduates' future choices relating to educational and professional paths as

well as environmental commitment, to varying degrees. These comments also indicate outcomes in leadership development, public speaking, open-mindedness, and self-discovery which relate directly to the program's stated goals.

Interviews

Ten interviewees provided responses varied in length and in quality. Generally, and as was expected, in-person and telephone interviews were more in-depth, because they provided a better opportunity for follow-up questions for clarification and probing of a response. Overall, however, the interviews did provide a sufficient response to address the five key areas of inquiry into the ECO-ACT experience for which the interviews were intended. Seven of the interviewees hold a bachelor's degree or higher level of education; all of those not currently holding a bachelor's degree are currently students at a university. Half of interviewees are currently seeking either a bachelor's or master's degree. The group was made up of 7 females and 3 males, eight of which were Caucasian, one African-American, and one who did not indicate race. Interview subjects were graduates from seven area high schools: five located in St. Louis County, and two in the City of St. Louis; four public schools and three private Catholic schools. Subjects range in age from 19 to 38, their ECO-ACT participation having occurred between the years of 1981 and 2003. Table 1 is a tabulation of responses in the interviews by topic.

Involvement with children/education

As has been described, high school participants in the ECO-ACT program are trained by program staff and mentored by high school and elementary school teachers to teach ecology and environmental lessons to fourth graders in elementary school classrooms. Overwhelmingly, this teaching experience afforded participants through the ECO-ACT program was cited throughout interviews as a highlight of the program.

In reported memories, half of the group mentioned their classroom experiences or interactions with younger students. Half of the group also considered the teaching aspect of the program as a benefit they gained through program participation as a high school

Table 1. Summary of Interview Responses

	Response	N	
Related memories	Canoe trip/outings	7	
	Teaching	5	
	Other participants/staff	4	
	Garden overnight	3	
	Workshops	2	
	Team work	2	
Perceived personal benefits (H.S.)	Feeling special/different opportunity	8	
	Teaching experience	5	
	Career exploration	4	
	Diversified social interaction	4	
	Community service	2	
New experiences/skills	Environmental perspective	1	
	Teaching	5	
	Outdoor skills	4	
	Lesson Planning	3	
	Communication skills	3	
	Working with kids	2	
	Team work	2	
	Travel, Organization; Working Independently	1	
Personal outcomes	Environmental awareness/activities	9	
	Continued work with children/education	7	
	Diversity awareness/wider social circle	4	
	Career choice	3	
	Respect for nature	2	
	Leadership skills	2	
	Presentation skills	2	
	Self-confidence	2	
	Communication Skills	2	
	Degree choice; New experiences; How to take a taxi	1	
	Most important aspect	Teaching	5
Interaction with a diversity of peers		3	
Leadership Development		2	
Experiences in the outdoors/nature; Team work		1	
Actions for the environment		Recycling	6
	Responsible waste disposal	3	
	Carpool	2	
	Conserve household electricity use	2	
	Consumer choices	2	
	Teaching others	2	
	Drive fuel efficient vehicle; Read environmental articles/news; Founder of environmental organization; Limit family size; Compost	1	
	Issues of concern	Global Warming	2
		Overpopulation	2
		Energy Issues	2
Lack of mandatory recycling programs		1	
Manitoba Hydro Plan		1	
Land degradation		1	
Ozone depletion		1	
Pollution		1	
Overfishing of oceans		1	
Animal abuse		1	
Water Issues		1	
Habitat destruction		1	
Wasteful American lifestyles		1	
Outdoor activities	Exercising (Running, walking, biking)	18	
	Sports	4	
	Hiking	3	
	Camping	3	
	Gardening	2	
	Canoeing; Horseback riding; Fishing	1	

student, along with four of the ten interviewees stating that they benefited from the teaching experience as an opportunity to explore the possibility of education as a future career. Teaching, lesson planning, and working with kids were cited ten times as new experiences and/or skills gained through the ECO-ACT program, with outdoor skills (4), communication skills (3), and team work (2) following. Of the ten interviewees, three

"It has been 14 years since I participated in ECO-ACT and I must admit that it was very instrumental in molding me to be the environmentally conscious woman that I am today." – Academy of Math & Science Student, 1990-91

have pursued careers in education, and three more either work with children regularly in their profession or seek interactions with children in their volunteer work. A common theme throughout comments related to the teaching experience was the joy of seeing the children's faces "light up" when they saw the high school

"teachers" enter the classroom, or when they understood some concept the ECO-ACT leaders were sharing. High school students felt valued by their elementary students, and enjoyed the opportunity ECO-ACT provided for them to leave their high school classroom for a "different" learning opportunity. One interviewee stated that while several of her teaching team already "had the spark" of interest in teaching before participating in the program, the experience in ECO-ACT classrooms "sealed the deal" on her wanting to become a teacher.

Awareness and Involvement in Environmental Issues & Actions

Nine of the ten interviewees cited environmental awareness as an outcome of the program that has lasted to be a part of their life today. Two individuals credit environmental awareness gained through ECO-ACT with their choice of college degree, and another three associate it with their selection of career. One graduate, a college student who intends to pursue a career in sustainable landscape design has also gone on to co-found and lead a campus environmental organization at her college.

While not citing environmental awareness as a benefit gained as high school students, seven of the ten interviewees stated that they use the knowledge and experience gained through ECO-ACT related to the environment regularly in the form of daily decisions and behavior. One individual who credits ECO-ACT with her engagement in

responsible hazardous waste disposal, home composting, and responsible consumer choices stated that she feels ECO-ACT made her “just a little bit more aware that I’m a visitor here. I don’t own this place, so, I need to respect [it].” Another interviewee has applied knowledge about the environment that he gained through the program in his college classes. He also feels his group’s ECO-ACT environmental issue investigation project on the topic of urban sprawl has given him greater insight into the current problem in the St. Louis area. “I see that happening and understand what’s going on. . . what are the steps and why are these things necessary, and if not, what could be avoided.”

Together, the group listed twelve different activities they engage in on behalf of the environment. More than half of the group is engaged in recycling—one even collects her neighbors’ recyclable waste and recycles it for them. Everyone in the group reported being involved in at least three activities which they consider to be reducing their impact on the environment.

With the exception of three overlapping responses, all ten interviewees expressed greatest concern with very different environmental issues. Thirteen different issues, ranging from over fishing of the world’s oceans to the construction of a specific hydroelectric plant, this breadth of response illustrates the impact of ECO-ACT graduate experience in investigating environmental issues and knowledge gained through the program in preparation for adult life as environmentally literate citizens. Through program participation, individuals gain not only awareness of some specific local environmental issues, but become conversant in the language of general awareness and develop the critical thinking skills necessary to identify and priorities issues of the greatest concern to themselves.

Involvement in the Outdoors/Nature

ECO-ACT program graduates largely value the outdoor opportunities they experienced throughout the program as a novel and enjoyable time in nature with their peers. One individual stated in the interview that the outdoor experiences of the program gave “a high school student who grew up in the city” the idea that there is “just a little bit more out there for you to explore, and that you could possibly do it, if you wanted to.” Three interviewees credit ECO-ACT with their first canoeing and camping experiences.

One other program graduate interviewed had camped and canoed before, but not for any extended length of time before the ECO-ACT summer program. Two program graduates considered the canoe trip and outings to have had lasting effects on their lives since their participation in the program. One interviewee values the outdoor skills she gained through the ECO-ACT canoe trips and outings as the program aspect with the greatest impact on her life because,

It was really neat that we didn't learn only about issues as most school classes do, but we applied [it] and went out and went canoeing, or maple tree tapping, or rappelling. ... I did not have the opportunities or supplies or funds just on my own, or with my family or friends, to go out and do some of the activities that we did. I appreciate lots of stuff like that now, so even if I've only been once—as I reached college and my pool of colleagues and friends widen[s], it's good to be able to say you've tried stuff and can join in the conversations on such issues. . .

Unfortunately, what's true for this program graduate and many others is that a busy life, often including work as well as college classes and/or children at home, doesn't leave a lot of time for pursuing those activities later in life. While seven of the ten related fond memories of the summer canoeing trip or year-round outings, and three remember fondly the camp-out in the Japanese Garden, only one now regularly participates in camping or canoeing. All ten of the graduates interviewed expressed involvement in some outdoor activities. Five graduates said they camp or canoe only rarely (once a year). For the other few interviewees, outdoor activities are limited to exercise (walking, running, or biking) or gardening. Four individuals reported regular engagement in some hiking.

Additional Outcomes

Another outcome of the ECO-ACT program, consistently reported by survey respondents and interviewees, is the strong impact graduates feel the opportunity to interact with their peers from other schools throughout the program had on them, both as social high school students, and in their future societal outlook. One survey respondent noted that “ECO-ACT opened up the world to me a little more, giving me positive interactions with many people with diverse backgrounds and also with the natural environment and the larger community of St. Louis.” Commented on more in the free comment section of the survey than the environmental impact of the program, it is important to note this aspect of the program, reported by four of the ten interviewees as a

benefit of the program while they were in high school. Four also mention an increased awareness of human diversity or expanded social circle as a lasting outcome in their personal lives, and three mentioned the interaction with a diverse group of peers as the single most important aspect of the program. ECO-ACT students, often involved in a wealth of school-based extra curricular activities, seldom have an opportunity to get to know students from different schools, develop long-lasting relationships, and gain an understanding of varying racial and socio-economic perspectives in a safe atmosphere. The rich experiences shared by participants of the ECO-ACT provide the basis for communication and understanding between and amongst peers that is seldom provided in school-based activities.

Brief Synthesis of Results

Through this practical investigation, the ECO-ACT program has been found to be successful in achieving its stated goals (see Page 4). Considering survey respondents as representative of the larger group of ECO-ACT program graduates, the program does generate future career educators and scientists. Former ECO-ACT students consider themselves somewhat environmentally aware and active, and largely make conscious efforts on behalf of the environment a part of their daily lives.

The program design, a unique combination of outdoor skills, environmental issue investigation, environmental education, peer interaction, and classroom teaching is valued by program graduates as a special opportunity to learn science, gain confidence, and work independently. The program provides students who think they may be interested in a career in education to experience the formal classroom first hand, and to hone their skills in teamwork, as well as presentation and communication to fourth grade students. Outings to experience a diversity of outdoor activities are valued by students, especially those who perceive that they may not otherwise have experienced such opportunities in their lives. Despite the general perception of not having enough time in their current lifestyle to pursue the same activities they considered enjoyable during their ECO-ACT year, graduates report a feeling of awareness or respect for nature.

It also appears that the experiences and knowledge gained through participation in the ECO-ACT program does result in an outcome of environmentally literate graduates.

ECO-ACT graduates illustrated in responses to the program impact survey as well as the interviews that they are more than informed about the concepts of ecology and environmental issues; they are applying that information in daily behaviors to reduce their impact on the environment. While the degree of empowerment or compulsion to act on the behalf of the environment was lower than expected by the researcher, the consistency of involvement in environmental action on a regular basis is encouraging and represents a concrete outcome of the program's intention.

As expected, the unique opportunity to work as a team to teach lessons in a fourth grade classroom is a highly remembered experience for ECO-ACT graduates. An activity engaged in for nine of the eleven program months, this sometimes stressful, almost always eye-opening glimpse into the world of education would be difficult for anyone to forget. The consistency of recalled memories involving the lighting up of children's faces and the visible enjoyment of lessons by the fourth grade students shows the positive perception of the program's interaction between the teens and younger students, as well.

CONCLUSIONS AND RECOMMENDATIONS

Discussion & Conclusions

The ECO-ACT Environmental Leadership Program, operated by the Missouri Botanical Garden for over twenty years, has met its stated goals. This program, with a major focus on developing an environmentally-responsible citizenry, has impacted the environmental literacy of high school students who continue to implement daily actions on behalf of the environment up to twenty years after their participation in the program. In addition to this lasting impact, program graduates consider the unique opportunity to interact with elementary school students in the role of teacher and mentor, and the related tasks involved, to be the most important and lasting component of the program.

Limitations to the success of the project included time, access to participants, and levels of participation by the surveyed population. The surveyed population may not be representative, due to aged records and participation in the survey and interview process by choice. The small sample size for the interview may also not be representative of the

larger graduate population, especially considering that these are individuals who felt positively about the program enough to commit the time and share their experiences with the researcher, who was known to be responsible for the program's current operation. All data collected via the survey and interview was self-reported, with no control group or pre-participation data for validity.

The design of the ECO-ACT Program Impact Survey, while not the subject to this inquiry, does lend to the collection of data herein. Combination of elements such as "enjoyment and quality" within the survey limit its effectiveness as a valid and reliable tool. The use of two methods, questionnaire and interview, combined, in an effort to gather consistent data, has been shown in other studies to lend greater confidence to conclusions drawn.

Recommendations

It is recommended that intensive evaluation of all program components continue with each year's class of program participants, in order to preclude the necessity of a comprehensive future study.

Contact with past participants, now that a database of contact information has been created and a baseline of evaluative information has been analyzed, should be consistently maintained. These individuals obviously have positive memories related to their program involvement, and many expressed through the survey an interest in further information about or involvement in program activities. The possibility of an ECO-ACT graduate reunion or "Friends of ECO-ACT" group has arisen from consideration of survey responses.

Interviewing of former program graduates, such as those conducted in this study, will be continued as graduate interest allows in order to add to the collection of qualitative data about the experiences and perceived impact of the program on participants' lives after their graduation from the program.

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APPENDIXES

APPENDIX A

Pre-ECO-ACT Program Self-Evaluation

ECO-ACT Self-Evaluation for High School Students

1. What is your main reason for participating in ECO-ACT?

2. What do you hope to gain from the ECO-ACT experience?

3. Please circle the number after each statement that best describes your skills and knowledge related to the following items.

1 indicates no skill/knowledge; 5 indicates great skill/knowledge, or mastery of that item.

To what extent do you:

- | | | | | | |
|---|---|---|---|---|---|
| a. Set goals and follow through with them? | 1 | 2 | 3 | 4 | 5 |
| b. Have a sense of responsibility and self-discipline? | 1 | 2 | 3 | 4 | 5 |
| c. Have the ability to solve problems and conflicts? | 1 | 2 | 3 | 4 | 5 |
| d. Know and use classroom management techniques? | 1 | 2 | 3 | 4 | 5 |
| e. Speak and communicate effectively? | 1 | 2 | 3 | 4 | 5 |
| f. Critically evaluate your teaching? | 1 | 2 | 3 | 4 | 5 |
| g. Provide a positive role model for elementary students? | 1 | 2 | 3 | 4 | 5 |

4. Circle the number after each statement which best describes your interest, knowledge, and/or comfort regarding ecology and the environment, teaching, and the outdoors.

1 indicates no knowledge/comfort; 5 indicates great knowledge/comfort, or mastery of that item

- | | | | | | |
|---|------|---|---|--------|---|
| a. I am interested in environmental topics. | 1 | 2 | 3 | 4 | 5 |
| b. I pay attention to environment-related news. | 1 | 2 | 3 | 4 | 5 |
| c. I am informed about ecological and/or environmental concepts. | 1 | 2 | 3 | 4 | 5 |
| d. I feel it is important for others to know what I know about the natural environment. | 1 | 2 | 3 | 4 | 5 |
| e. I talk with others about environment-related topics. | 1 | 2 | 3 | 4 | 5 |
| f. I feel compelled to take action to reduce my impact on the natural environment. | 1 | 2 | 3 | 4 | 5 |
| g. I feel empowered that I can make a difference in the larger scheme of the environment. | 1 | 2 | 3 | 4 | 5 |
| h. I am interested in learning more about certain environmental issues. | 1 | 2 | 3 | 4 | 5 |
| i. I am interested in environmental career fields. | 1 | 2 | 3 | 4 | 5 |
| j. I am comfortable and confident around children. | 1 | 2 | 3 | 4 | 5 |
| k. I am interested in teaching as a career. | 1 | 2 | 3 | 4 | 5 |
| l. I am comfortable and confident in nature. | 1 | 2 | 3 | 4 | 5 |
| m. I do/would like to pursue outdoor activities. | 1 | 2 | 3 | 4 | 5 |
| n. OPTIONAL: Indicate your gender | MALE | | | FEMALE | |

APPENDIX B

ECO-ACT Program Impact Survey for Graduates

ECO-ACT PROGRAM IMPACT SURVEY

Please take a few moments to consider and respond honestly to the following items.

A. Please provide the following information for statistical purposes.

Age (Check One)	<input type="checkbox"/> 18-23	<input type="checkbox"/> 30-35
	<input type="checkbox"/> 24-29	<input type="checkbox"/> 36 or above
Highest Level of Education (Check One)	<input type="checkbox"/> High School Graduate	<input type="checkbox"/> Associates Degree
	<input type="checkbox"/> Bachelors Degree	<input type="checkbox"/> Masters Degree
	<input type="checkbox"/> Doctorate or beyond	
Race (Check all that apply.)	<input type="checkbox"/> African American	<input type="checkbox"/> Caucasian
	<input type="checkbox"/> Hispanic or Latino	<input type="checkbox"/> Asian
	<input type="checkbox"/> Native American Indian	<input type="checkbox"/> Other
	<input type="checkbox"/> Prefer Not to Answer	
Occupation (Write in)	_____	

B. Circle the number that best reflects your opinion of the following ECO-ACT program components, 1 being the least enjoyable and valuable, and 3 being the most enjoyable and valuable.

Environmental Issue Exploration (WEEK ONE)	1	2	3	N/A
Canoe Trip (WEEK TWO)	1	2	3	N/A
ECO-WEEK	1	2	3	N/A
Teaching Experience	1	2	3	N/A
Workshops	1	2	3	N/A
Environmental Project	1	2	3	N/A
Outings	1	2	3	N/A
Overall ECO-ACT Experience	1	2	3	N/A

C. Circle the number that best reflects the extent to which the following aspects of your life were affected by your participation in the ECO-ACT program. (1 indicates a remote relationship between participation and the item; 3 indicates a strong relationship.)

Selection of College	1	2	3	N/A
Selection of Degree	1	2	3	N/A
Career Choice	1	2	3	N/A
Community Involvement	1	2	3	N/A
Day to Day Activities	1	2	3	N/A
Consumer Choices	1	2	3	N/A
Hobbies	1	2	3	N/A
Overall Impact of ECO-ACT on My Life	1	2	3	N/A

D. Circle the answer which best reflects extent of your interest or participation in each of the following items.

I am interested in environmental topics.	Always	Sometimes	Never
I pay attention to environment-related news.	Always	Sometimes	Never
I seek out information about environmental issues.	Always	Sometimes	Never
I feel compelled to take action to reduce my impact on the natural environment.	Always	Sometimes	Never
I feel empowered that I can make a difference in the larger scheme of the environment.	Always	Sometimes	Never
I take action on environmental issues that concern me by:			
a. speaking with others about the issues.	Always	Sometimes	Never
b. writing letters to the editor.	Always	Sometimes	Never
c. urging elected officials to take action.	Always	Sometimes	Never
d. voting for environmentally-conscious candidates	Always	Sometimes	Never
e. making consumer choices to reduce my impact on the environment	Always	Sometimes	Never
f. volunteering for environmental groups.	Always	Sometimes	Never
g. making donations to environmental causes.	Always	Sometimes	Never
I recycle glass, plastic, aluminum, and paper at home.	Always	Sometimes	Never
I recycle glass, plastic, aluminum, and paper at work.	Always	Sometimes	Never
I drive a fuel-efficient vehicle.	Always	Sometimes	Never
I walk, bike, or utilize public transportation.	Always	Sometimes	Never
I am comfortable and confident around children.	Always	Sometimes	Never
I am comfortable and confident in nature.	Always	Sometimes	Never
I like to participate in outdoor activities, as often as I can.	Always	Sometimes	Never
I consider myself an environmentally-aware and active citizen.	Always	Sometimes	Never

E. Additional comments: _____

Please return this survey to the Missouri Botanical Garden in the enclosed self-addressed envelope. Thank you for your participation in this important project.

APPENDIX C

Reported Occupations from ECO-ACT Program Impact Survey for Graduates

Reported Occupations (162):

Student (73)
Education (27)
Customer Service/Sales (6)
Stay at Home Mom (5)
Public Relations/Marketing/Development (4)
Cashier (3)
Culinary Arts (3)
Engineer (3)
Graphic Design (3)
Medicine/Nursing/Medical Services (3)
Biologist (2)
Clerical(2)
Finance (2)
Management (2)
Nanny (2)
Program Coordinator (2)
Social Services
Americorps Volunteer
Bank Examiner
Research Assistant
Information Technology
State Representative
Paralegal
Military
Attorney
Sculptor
Hairdresser
Music Therapist
Rabbi & Chaplain
Freelance Editor
Carpenter
Coach
Gymnastics Coordinator, YMCA
Missionary
Organic Vegetable Farmer
Retained Executive Recruiter

APPENDIX D

Interview Questions

What are some of your memories of ECO-ACT?

Describe how participating in ECO-ACT benefited you as a high school student. B. What, if any, specific *new* experiences or skills did you gain through participation in the program?

What outcomes of the program for you personally have lasted beyond high school to be part of your life today?

ECO-ACT is a program of many aspects: environmental issue investigation, teaching, leadership development, outdoor skills, teaching experience, and interaction with peers. A. Describe the aspect of the program that you believe to have had the greatest impact on you. B. Why do you think it was so important? What has been the outcome of it in your life? C. What other program elements affected your personal development?

How have you used the knowledge and experiences you had in ECO-ACT relating to the environment?

If you consider yourself an environmentally aware and active citizen, what (if anything) are you doing to impact the environment in a positive manner?

What environmental issues concern you most today and why? B. Is there anything you can think of that you can do (or have done) to have your feelings heard and/or make a difference for this issue?

What outdoor activities do you participate in regularly?

What community groups do you volunteer with?

Describe your experience teaching elementary students in ECO-ACT. B. What were the outcomes of the experience for you personally? C. How has that experience affected your life? D. To what extent have you sought opportunities to interact with children since ECO-ACT? E. How has ECO-ACT impacted those interactions?

How (if at all) have you been able to apply skills and/or knowledge gained through ECO-Act to your current volunteer and/or professional roles?

APPENDIX E

Literature Review

REVIEW OF LITERATURE

Environmental Literacy

In her study entitled “The Educational Efficacy of Environmental Education,” Hoody (1997) surveyed environmental educators across North America and examined existing environmental education (EE) research to locate studies that analyze the influence of EE methods and content on students’ ability to learn in subject areas throughout the curriculum. In that study, she also acknowledges the multitude of definitions which exist in the research for the term “environmental literacy” (EL), the presumed underlying goal of environmental education. Hazen and Trefic define *scientific literacy* as,

the knowledge you need to understand public issues. It is a mix of facts, vocabulary, concepts, history, and philosophy. It is not the specialized stuff of the experts, but the more general, less precise knowledge used in political discourse. If you can understand the news of the day as it relates to science, if you can take articles with headlines about genetic engineering and the ozone hole and put them in a meaningful context...you are scientifically literate. (Cited by Hoody, 1997, p. 3).

Most authorities agree that the environmentally literate citizen is more than well-informed; he or she is willing to act on behalf of the environment. The Environmental Literacy Framework states that, “EL has cognitive dimensions (knowledge and skills); affective dimensions; additional determinants of environmentally responsible behavior and personal and/or group involvement in environmentally responsible behaviors” (Cited by Hoody, 1997, p. 4). Roth (Cited by Hoody, 1997, p. 4) examined the concept of environmental literacy in great detail, and agrees that EL goes “several steps beyond acquisition of knowledge.” Hoody (1997) “stresses the students’ ability to interpret and act to maintain or improve the environment” (p.4). “Individuals competent and willing to take action” is the definition for the environmentally literate, according to Hungerford and Tomera (cited in Hoody, 1997, p. 4). Hoody’s study concludes that most assessments for EL, despite the commonly accepted definition of the concept as action-based, are driven by content knowledge, and do not measure action.

Studies of “environmentally responsible behavior,” or ERB, measure higher order cognitive skills (Hoody, 1997). Cases cited by Hoody (1997) as promoting ERB include studies of participants in issue investigation and action projects, which include components such as: “knowledge of environmental issues; values related to the environment; individual and group locus of control; environmental sensitivity; knowledge of and skills in environmental action strategies; and knowledge of ecological concepts” (Ramsey, cited by Hoody, 1997, p. 9-10).

Methods of Environmental Education Program Evaluation

Although environmental education programs vary widely in their focus and scope, “It is important to know whether such specific interventions have a broad influence upon attitudes and knowledge concerning environmental issues or whether their influence is limited to the material explicitly covered” because those programs generating a “broad impact will certainly be of greatest use in the effort to protect and preserve the environment” (Leeming, Dwyer, & Bracken, 1995, p.28).

Several tools for assessing various aspects of environmental attitudes, commitment, behavior, and affect have been developed and researched (Smith-Sebasto & D’Acosta, 1995; Smith-Sebasto & Fortner, 1994; Musser & Malkus, 1994; Leeming, Dwyer, & Bracken, 1995; Cordano, Welcomer, & Scherer, 2003), however “no single scale is widely used to measure children’s attitudes toward and knowledge of a broad range of environmental issues” (Leeming, et al, 1995, p. 22). Most of these scales are divided into sections addressing verbal and actual commitment, affect, and knowledge relating to specific aspects of the environment (such as animals, energy, pollution, water, and recycling) and pro-environment action. (Leeming, Dwyer, & Bracken, 1994; Cordano, et. al, 2003; Musser & Malkus, 1994; Smith-Sebasto & D’Acosta, 1995; Smith-Sebasto & Fortner, 1994).

In his “Evaluation System for Experiential Education Program (ESEE),” Furco has developed a system to “systematically assess the impact of service-learning, school-to-work, and community service programs on students’ educational development” because of the lack of assessment studies on such programs at the time of his research (1997, p. 1). This system depends on multiple techniques of data collection, pre- and

post- program participation, to “assess the full range of program impacts on participants” including 1) academic achievement, 2) career development, 3) social development, 4) social development, 5) personal development, 6) civic participation, and 7) ethical development (p. 1). The quasi-experimental nature of this intensive program evaluation system requires a control group for greatest effectiveness. Fundamental to the success of the evaluation is the clear definition of program goals and objectives, anticipated outcomes, and program components.

Neill (2003) emphasizes the process of selecting instruments for program evaluation as important to the quality of research. He suggests that the following factors are key to consider during a thorough search potential instruments: 1) length & complexity; 2) compatibility of instrument with the program objectives; 3) sensitivity to the assessment goals; 4) specificity to the purpose of the assessment; 5) reliability and validity; and 6) ethical/educational issues (p. 1). Specific to outdoor and experiential educational programs, Neill considers the realities of assessing those programs (field settings, multiple assessments, and wide range of participant abilities) when he suggests that

the shorter and simpler an instrument (reliability and validity aside), the greater the instrument’s potential applicability . . . develop an instrument which would provide a maximum amount and type of unique information in as short a time as possible (i.e. a maximum of about ten minutes) . . . ideally, the instrument would encompass a wide range of life proficiency domains relevant to general and specific program aims... (p. 1-2).

One particular challenge in assessing the outcome of environmentally responsible behavior is the use of assessment tools which rely upon participants’ ability to accurately report their behavior, rather than direct observation of the behavior in action (Hoody, 1997). Robottom and Hart (cited by Hoody, 1997) assert that “the historical, social, and political contexts within which individual and group actions take place are key factors being overlooked” in behavioral research “oriented toward EE programs that focus on the application of environmental knowledge and skills” (p. 11).

Hoody (1997) finds the common problems in traditional educational research are prevalent also in EE research. The benefit of qualitative research methods, including “direct quotation, careful description of program situations, events, interactions and

observed behaviors” (Patton cited by Hoody 1997, p. 12) are increasingly considered valuable in EE research as techniques to capture the nuances of a field so intricately balanced between cognition and affect. In a study of the impact of an environmental studies class on student values, McMillan used a triangulation method, combining the use of questionnaires, observations, and interviews, considering that “the best way to understand a person’s value system is to ask him or her about it” (2003, p. 94).

Lasting Effects of Environmental Education Programs

Existing research in the field of environmental education typically is either affective, cognitive, or a combination of the two (Hoody, 1997), because the two domains function cooperatively (Iozzi cited by Hoody, 1997). Knowledge and attitudes are often studied together to assess the “effectiveness” of environmental education, typically in the form of questionnaires and sometimes interviews (Hoody, 1997, p. 7 & 12). Lieberman asserts that

Environmental education has much to offer the education reform movement. Fundamental to EE are pedagogical methods that include: hands-on activities; relevant subject matter; and topics that engage students, encouraging their active participation. Education reformers recognize EE as an effective tool in capturing students’ enthusiasm for learning in subject areas ranging from science and math to literature (cited by Hoody, 1997, p. 1).

Knapp (2000) researched the length of student memories related to a science field trip. His study included surveying elementary school students one and eighteen months after an environmental science program at a community park. While the results of the evaluation found that student memories were vague and unrelated to specific information taught by the field teacher, “the results from both tests yielded positive responses toward wanting to learn more about the subject matter and an interest in returning to the field trip site” (p. 65).

Knapp cites several studies which confirm that interest and participation in outdoor science field trips is increasing and which have also researched the impact of those field trips. Several of the studies support such field experiences as giving relevancy and application to classroom study, and also contributing to student gains in knowledge and retention. “However, there is both professional opinion and empirical research which suggest that the major advantages of learning activities in non-formal education settings

over those in formal settings may lie in affective domain” (Meredith, Forner, & Mullins cited in Knapp, 2000, p. 66).

Dettmann-Easler and Pease (1999) cite similar literature supporting the effectiveness of environmental education. They also took the beneficial nature of environmental education programs one step further to study the impact of residential EE programs on specific attitudes. In their study of the effect of residential environmental education programming on student attitudes toward wildlife, Dettman-Easler and Pease used a 27-item questionnaire based on several prior studies by other researchers, which included three knowledge items in order to compare knowledge scores to attitudes and to compare responses of students who did and did not participate in the residential experience. The questionnaire was administered to subjects three weeks before the experience, within one week after the experience, and again, two to three months later. Interviews were also conducted with student, parent, and teacher participants. The research included the evaluation of residential programs at six different sites in the Midwest. Results of the study show that the attitudes of students who experienced the residential program were significantly more positive than those of students who were taught similar content in the classroom. Attitudinal change was lasting—students held their more positive attitudes toward wildlife six months after the experience.

A study of the impact of a specific environmental education program on the perception of local biodiversity by eight to sixteen-year-olds in Switzerland was undertaken by Lindemann-Matthies (2002). Using a pre-and post- questionnaire format and a control group, the research shows a significantly higher student perception of local plants and animals after an average of 17 hours of instructional time spent on biodiversity education. Increased perception was directly related to hours of time spent teaching the program. Perception of biodiversity decreased inversely with age, and female participants were more likely to become more acquainted with new organisms. The author deemed the program successful because after participation, students named more specific organisms they observed on their way to and from school.

