DOCUMENT RESUME

ED 468 294 EA 031 860

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TITLE	The Impact of Community Involvement on the Success of Schoolyard Ecosystem Restoration/Education Programs: A Case Study Approach.
PUB DATE	2002-04-00
NOTE	33p.; Paper presented at the Annual Meeting of the American Educational Research Association (New Orleans, LA, April 1-5, 2002).
PUB TYPE	Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE	EDRS Price MF01/PC02 Plus Postage.
DESCRIPTORS	Case Studies; *Community Involvement; Community Support; *Ecology; Elementary Secondary Education; *Environmental Education; *Outdoor Education; Program Evaluation; School Community Relationship; Trails
IDENTIFIERS	*Florida

ABSTRACT

Schoolyard ecosystem programs, such as mini-farms, gardens, or nature trails on school grounds, are usually designed to promote greater insight and understanding of ecological relationships and develop an appreciation of an individual's responsibility for environmental quality. This paper focuses on evaluation practices of schoolyard habitat restoration efforts. Ten Florida schools that received schoolyard ecosystem restoration grants were selected as case studies. Contact persons, administrators, grounds-crew personnel, and students were interviewed; 109 teachers were mailed a questionnaire. Findings indicate that administrative support and faculty support were not significant factors influencing the educational and environmental success of schoolyard ecosystem restoration efforts. The most successful projects were planned and implemented by a committee of diverse stakeholders along with actively involved parents and other community members. Lack of money is not a prohibitive factor in the potential success of a project. The case studies highlight the importance of soliciting community input in the form of physical materials, as well as time and labor to ensure project success. Three appendices include a map highlighting locations and names of participating elementary schools, an Ecosystem Site Evaluation System evaluation form, and an overall chart of school educational and ecological successes. (Contains 31 references.) (RT)

Running Head: COMMUNITY INVOLVEMENT IN SCHOOLYARD ECOSYSTEMS

The Impact of Community Involvement on the Success of Schoolyard Ecosystem Restoration/Education Programs: A Case Study Approach

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A paper presented at the annual meeting of the American Educational Research Association

New Orleans, LA

April 2002

Introduction

"That which ought and can be taught inside the schoolrooms should there be taught, and that which can best be learned through experience dealing directly with native materials and life situations outside the school should there be learned"

-L.B. Sharp (Hammerman, 1994, p. 253)

As young people, we spend the early years of life using our basic senses to explore and learn about our world. As we acquire the language needed to relate words to things and events, we begin to get more information by listening, questioning, and observing. Using nature as a means of educating students is not new, as a matter of fact, the seeds of outdoor education were planted over 4,000 years ago (Hammerman, 1994). Programs conducted in the outdoors occur at all levels in the formal educational system, but typically are more common at the elementary level. Outdoor programs include long and short fieldtrips, as well as residential outdoor schools. A popular extension of outdoor education is the development of mini-farms, gardens, or nature trails on school grounds. School-based outdoor programs are usually designed to promote a greater insight and understanding of ecological relationships, and develop an appreciation of an individual's responsibility for environmental quality (Studies for Educational Reform, 1995).

The educational reforms of the 1990s have been marked by more coherency than earlier waves of school reform. The establishment of national education goals, identification of rigorous standards, design of state-level curriculum frameworks, and the development of new forms of assessment have all served as tools to systematically reinforce reform efforts and to upgrade our nation's schools (Studies of Education Reform, 1995). One concept that has been gaining momentum is the notion of school and community partnerships.

In the early 1980's, the federal government began to encourage partnerships between schools and businesses. By 1989, the U.S. Department of Education estimated that over 140,000 school-business partnerships existed nationwide. These diverse types of partnerships provided a variety of resources to schools from equipment to financial support, but recently partnerships have focused on "the next generation of partnerships" (Bainer, Barron, & Cantrell, 2000, p. 12). These newer partnerships are aimed at going beyond providing equipment to impacting instruction, learning and teachers.

Conventional wisdom tells us that "the school IS the community" in many parts of America (Boyer, 1995). In fact, many influences have not only weakened the connection between schools and their communities, but also weakened the communities themselves (Howe & Disinger, 1988). Much of the research and development on the relationship between schools and communities can be sorted into five major categories (Howe & Disinger, 1988):

- The school as a focus of community identity;
- The school's role in the continuing development of young people;
- Schools and local economic development;
- The community as a source of curriculum in schools; and
- Threats to school viability and strategies for resilience.

Partnerships between schools and their community have been advocated as promising vehicles for the success of all those involved in the process. Inherent in the concept of partnering is the premise that all parties benefit from the relationship. More and more schools and districts are recognizing the need to develop effective parent, community, and school partnerships. They also are recognizing the need to collect systematic survey information about what parents, teachers, and students think of their current practices and their ideas for improving the program of school, family, and community partnerships.

A survey of school jurisdictions and schools in Alberta, Canada was conducted in April 1995 to determine the current state of school-business partnerships (Knight 1995). With the response rate at 93%, researchers found that about half the schools had an individual who was responsible for school-business partnerships. Of these respondents, 223 had a partnership, 370 did not, and 86 schools indicated they were in the process of establishing a partnership. More than 90 percent of the schools judged the partnership to be successful or very successful.

Studies of Education Reform: Parent and Community Involvement in Education (1995) focused on school/family and community partnerships in nine sites throughout the United States. These nine sites employed different strategies to successfully involve parents, family members, businesses, and their communities in education, but came to the same conclusion as to the success of partnerships involving schools:

> Policies, at all levels, must support school/family and community partnerships. Federal, state, and local education agencies can empower school/family and community partnerships through clear definitions, regulations, guidance, and communication; support for activities at the school level; provision of information and resources; and dissemination of existing and promising practices in the field of school/family and community partnerships. (p. 1).

The Los Angeles County Planning Council's School-Community Partnerships Committee study (2000) suggested that partnerships were an invaluable way to weave together a large number of resources and strategies to enable success in students both in and out of school. The report also recommended blending resources from one or more schools with the resources available in a neighborhood or community to build a long-term program that will benefit all involved parties.

One long-term program that has gained in popularity at the community partnership level is the idea of school beautification. Projects such as butterfly gardens, vegetable gardens, birdfeeders, nest boxes or ponds have become commonplace on many K-12 school campuses transforming once plain, trampled patches of grass into outdoor learning areas (Ballard, Tong, & Usher, 1998; Coffee & Rivkin, 1999 Dahlgren, 2000; Dungey, 1997; Heffernan, 1997; Pivnick, 1994).

Results of recent research indicate that out-of-classroom experiences can be effective in helping students develop accurate concepts related to the environment and students learn just as much or considerably more outdoors than in traditional classroom settings (Bogner, 1998; Cronin-Jones, 2000; Disinger, 1984; Howe & Disinger, 1988; Keteyian, 2001). Real and familiar environments appear to be more effective than unfamiliar environments. Educational successes in schoolyard programs are well documented from many participant angles. Teachers show improved attitudes toward teaching science and their students exhibit greater enthusiasm and more positive attitudes toward science (Bainer & Williams, 1996). When schoolyard programs are used, teaching becomes less traditional, more integrated and collaborative, uses more hands-on components, has a greater process emphasis, and is more analytical and reflective (Bainer & Williams, 1996). Gardens and other outdoor schoolyard learning areas bring concepts to life and offer unlimited subject integration possibilities for teachers (Mohrmann, 2001; Reading & Taven, 1996).

In a study looking at professional development of teachers through school-based partnerships, participation in long-term partnerships resulted in raised levels of teacher subject knowledge and confidence in individual abilities to teach their subjects (Bainer, Cantrell, & Barron, 2000). According to teachers involved in school garden projects, "The experience is priceless and the rewards are endless" (Martin, 1994, p. 18). In the midst of these rewards, successes, and continued program development, however, comes the stark realization that these projects are resource intensive and cannot be sustained by a small group of individuals (Studies of Education Reform, 1995). Outside money is a necessity, but in order to receive extra funding, such programs must be considered successful in attaining their goals and objectives.

According to Blanchard (1995), even when outdoor programs are used successfully to achieve their goals, the program itself is rarely carefully or systematically evaluated. "Too often, educational programs consist merely of planning and implementation, without the solid foundation of research or the basis for difficult decisions based on an evaluation of performance" (Blanchard, 1995, p. 46). In evaluation studies of other large-scale environmental education programs such as Project WILD and Project Learning Tree, Simmons (1989) reported that despite in-service training experiences, the majority of classroom teachers do not infuse these activities into their school curricula. In a national curricular study of environmental education in the U.S., Childress (1978) reported that environmental education in American schools is largely disorganized, fragmented, and probably ineffective.

When making suggestions for systematically incorporating environmental education into school-based curricula, Ramsey, Hungerford, and Volk (1992) stressed the importance of initial and follow-up evaluation of environmental education programs. One potential reason cited for the apparent lack of effectiveness of environmental education programs in the U.S. is the lack of follow-up monitoring, evaluation, and subsequent enhancement of programs. In their 1988 large-scale evaluation of the extent of implementation of environmental education curricula in U.S. elementary schools, Ham and Sewing reported that when large-scale programs are developed, agencies and organizations do not conduct follow-up evaluations, but rather assume that desired outcomes occur.

Bennett maintains that evaluation within the field of education is seen as a "chore, designed to satisfy someone…that a program is worth the money" (1989, p. 14) and emphasizes that educational professionals "…cannot afford *not* to evaluate our programs…In fact…we *must* evaluate our programs" (1989, p. 14).

Program Description

The Florida Schoolyard Wildlife Project (SWP) was initiated in the early 1990's. The project is sponsored and funded by the Florida Fish and Wildlife Conservation Commission and consists of two components: inservice schoolyard ecology and schoolyard ecosystem workshops for teachers and action grants for schoolyard ecosystem development and restoration.

As part of schoolyard ecology workshops, participants receive copies of a field guide and an activity guide. The Handbook to Common Schoolyard Plants and Animals (Feinsinger & Minno, 1990) provides teachers with background information regarding the natural history of plants and animals commonly found in Florida schoolyards and the Schoolyard Wildlife Activity Guide (Cronin-Jones, 1992) contains complete lesson plans for 35 schoolyard-based hands-on activities focusing on these common schoolyard organisms. As part of schoolyard ecosystem workshops, participants receive a guide for planning, installing, and maintaining schoolyard ecosystems (Schoolyard Ecosystems for Florida, Schaefer, Donelin, & Cronin-Jones, 1995). The schoolyard ecology and schoolyard ecosystem workshops are all provided by trained facilitators.

Once educators have completed the schoolyard workshop series, they can apply for a $200-$500 Project WILD Action Grant. The Project WILD Action Grant program was designed to provide funds for the development and implementation of community-based school improvement programs specifically designed to restore or enhance natural schoolyard ecosystems. These grants were designed to encourage schools and communities to develop lasting partnerships and identify specific educational and environmental project objectives. At the time the current study was initiated, no systematic or comprehensive evaluation of the effectiveness of these schoolyard ecosystem restoration activities had been conducted. This study was designed to evaluate the overall effectiveness of both the SWP and the Project WILD Action Grant program in order to guide the development of additional school site improvement programs.

The evaluation design used in this project was based on Bennett's (1989) program evaluation model for environmental education programs and focused on obtaining input from a representative sample of all major stakeholders involved in the SWP, including schoolyard workshop facilitators, schoolyard program participants, teachers, students, administrators, groundskeeping staff and community members at Project WILD action grant sites. In keeping with Bennett's model, both qualitative and quantitative evaluation data were collected for triangulation purposes. Three major components of the SWP were examined: print resources, workshops, and schoolyard habitat restoration. This paper focuses specifically on the third component of the program, namely, evaluation of schoolyard habitat restoration efforts.

Methods

Based on input from the director of the Florida Project WILD Action Grant program, a representative sample of 10 schools that received schoolyard ecosystem restoration grants were selected for the study. Using input from former Project WILD coordinators, two school sites were selected from each of the five major geographic regions of the state to ensure a representative sample of urban, suburban, and rural schools. Names and locations of each school site chosen for this phase of the project are illustrated in Appendix A.

Next a list of key stakeholder groups involved in the schoolyard ecosystem restoration process was compiled and interview protocols and paper-and-pencil questionnaires were developed to solicit input from each identified stakeholder group. Once all instruments were developed and reviewed by SWP staff, the chosen school sites were contacted to schedule site visits. Two site visits to each of the 10 selected schoolyard ecosystems were conducted between the dates of March 12 and April 29, 1998.

Over the course of the two site visits to each schoolyard site, six different tasks were scheduled:

1. Interview with the contact person (lead teacher) in charge of managing the schoolyard ecosystem restoration project (n=9),
2. Interview with the school principal or other key administrator (n=10),
3. Interview with at least one representative from the school's custodial or grounds crew involved with maintenance or upkeep of the restored schoolyard ecosystem (n=7),
4. Delivery of a paper-and-pencil questionnaire and return mail envelope to every teacher (n=109),
5. Videotaped focus group interview of a representative sample of 10 students who participated in the schoolyard ecosystem restoration project (n=77), and
6. Videotaped walk-through inspection and inventory of the actual restored schoolyard ecosystem site.

Interviews and focus groups were used as data sources to evaluate the educational success of each restored schoolyard ecosystem site, whereas the ecological success of each site was determined using videotaped walk-through inspections and inventories of each restored schoolyard ecosystem site. Educational success was evaluated using six criteria: 1. the amount of time students spent actually using the restored site for environmental education or other activities, 2. the level of faculty involvement in site development and use, 3. the amount of administrator support for the site, 4. overall student involvement in the schoolyard site development and maintenance process, 5. the level of community involvement in the site development and maintenance process, and 6. the number of days the site was used per month. Ecological success was determined using the Ecosystem Site Evaluation System (ESES) which provided a quantitative score for each schoolyard ecosystem site (The ESES is found in Appendix B).

Interviews

Contact people (lead teachers). Extensive oral interviews were conducted with the designated contact people from nine of the 10 school sites. The contact person from Socrum Elementary School in Lakeland no longer worked at the site and no replacement person had been named. The oral interviews lasted 45-60 minutes, although in some cases they were broken up into multiple smaller sessions due to the contact person's time constraints. Based on the information provided in the interviews, a follow-up paper-and-pencil questionnaire was also given to each contact person to complete at his/her leisure. These completed questionnaires were mailed back for analysis.

Administrators. A key administrator at each school site participated in a 15-minute oral interview. At nine of the school sites, the principal was interviewed, and at one site the viceprincipal, who was more directly involved with the community-based schoolyard restoration project, was interviewed.

Groundskeeper. Representatives from the custodial or grounds crew staff at 7 of the 10 schools were interviewed using a six-item instrument. Due to centralization of custodial responsibilities in three school districts, school-based staffs were not available for interviews at Eastside Elementary, Garden City Elementary, or Wadsworth Elementary.

Teacher Surveys. Copies of an 18-item written survey were placed in the mailboxes of every educator on staff at each of the 10 schoolyard case study sites. Every attempt was made to provide a survey to every faculty member who could potentially use, or be impacted by, the schoolyard ecosystem site, including regular classroom, speech, special education, and physical education teachers, along with guidance counselors and school psychologists. A total of 417 surveys were delivered throughout the 10 school sites. After a re-distribution of a duplicate survey, the total response rate was 26% (n=109) completed, returned surveys. A sample of teachers from all of the school sites, except Lauderdale Manors, responded to the mail-in surveys.

Videotapes

Student Focus Group Activities. Student focus groups were held at the seven schools where a schoolyard ecosystem still existed and was actively being used or where students were enrolled who had actively used the site before it was destroyed for building construction. At the seven sites where focus groups were convened, students were chosen by the school's contact person. Each contact person was asked to select 10 students, consisting of 1 male and 1 female, from five different classes that use the schoolyard ecosystem site. Each contact person was also asked to select students from a variety of ability levels and ethnic groups. The focus groups, which lasted between 45-60 minutes, were videotaped and written transcripts of each session were prepared.

Schoolyard Ecosystem Site Inspection. At each school site, a thorough walk-through of each restored schoolyard ecosystem was conducted. In addition to still photographs, a videotape of all the natural and man-made features included in the restoration project was made and an inventory of key components was conducted. To provide more objective quantitative data for comparing the ecological/environmental success of different school site restoration programs, a formal Ecosystem Site Evaluation System (ESES) was developed and a quantitative score was generated for each schoolyard ecosystem site.

Results

Contact people (Lead Teacher Interviews & Teacher Surveys). Relatively few elementary schools in Florida contain restored schoolyard habitats. Of the schools that have attempted restoration projects, only about half of these projects can be considered educationally and ecologically successful. Science is the subject area most often addressed in restored schoolyard ecosystems (89%), followed by language arts activities, such as reading and creative writing. Eight out of nine lead teachers interviewed viewed schoolyard sites as areas for reinforcing content topics covered first in a traditional classroom setting. Most teachers at schools containing schoolyard habitats do not use their sites as much as they would like to and teachers cited several reasons for limited use of the sites, such as time constraints, poison ivy, vandalism, and proximity to their classroom. When lessons are conducted in school sites, most last 30 minutes or less. Teachers implementing lessons in schoolyard habitats primarily use Project WILD and the Schoolyard Wildlife Activity Guide as curriculum resources. Although schoolyard sites are used by teachers at all elementary grade levels, very few teachers (33%) work together or coordinate their schoolyard site lessons with other teachers at their school.

The frequency of use of schoolyard habitat sites for instruction varies widely from school to school and teacher to teacher. Attitudinal barriers are significant factors, which limit the number of teachers who actively use the restored schoolyard sites for instruction.

Most teachers have encountered problems while using their schoolyard sites. Lack of administrative support was the most frequently cited problem. Vandalism, liability concerns and budget constraints were other frequently cited problems. Longitudinal documentation of the progress of schoolyard sites rarely occurs. Although most schoolyard sites contain a variety of habitat components, teachers tend to focus on butterfly gardens more than any other component.

Administrators. The general attitude of administrators toward schoolyard sites was summed up by the Sullivan administrator who, when asked about the overall importance of the site, responded "to familiarize children with nature and science at an early age. It is part of the curriculum that often gets overlooked." This attitude was also cited by administrators as the one big benefit of having an outdoor learning area on their campus. Money, maintenance and the amount of time the sites require were the most common drawbacks mentioned, and along with the liability of snakes and poison ivy, vandalism was listed as a specific concerns by seven administrators.

All of the administrators said that their sites were valuable educational tools, but only five administrators were actively involved with the site and only four administrators actually encourage their teachers to use the sites.

Groundskeepers. Four of the seven groundskeepers interviewed said that they liked the schoolyard site, one was indifferent to the site (but the contact person reported that this groundskeeper volunteered frequently to help out) and two groundskeepers wished that their school did not even have a restored schoolyard site. All of the groundskeepers listed problems that they had to deal with on a regular basis, the most common being poison ivy, ants, litter, and vandalism. Only one member of the groundskeeping staff was consulted in the planning of the habitat restoration, and two groundskeepers participated in the installation of the site. None of the people interviewed had received any instructions or training about maintaining the schoolyard sites, except for one groundskeeper who was told, "Don't touch!"

Student Focus Group Activities. Gardening activities and activities with animals were reported as being done the most in the sites, both of which corresponded with the reported most favorite things to do in the outdoor labs. Students reported being scared of snakes, spiders and being stung by a bee, but in general, students at schools containing restored habitats had positive feelings about these sites and wanted to be more involved in their use and maintenance. Virtually all students interviewed said that they do not get to spend as much time as they would like to in their schoolyard sites.

These focus groups are valuable in that they offer the students' point of view with respect to the various schoolyard ecosystems. Of the seven schools, only one (Sullivan Elementary) seemed to have a low student participation rate in activities, lessons, or projects in its schoolyard ecosystems. Pinewood and Central Elementary seemed to have average participation, while the remaining schools had very high levels of student participation. Across the board, however, students recalled doing more non-academic activities, such as gardening than academic activities.

From an academic perspective, Big Cypress Elementary and Garden City Elementary had the highest levels of integration for the environment with various subjects taught to the students.

Many of the other schools use their schoolyard ecosystem to teach only two or three subjects. All seven schools use their ecosystems to teach science. According to student comments, Sullivan Elementary, Central Elementary, and Wadsworth Elementary use their ecosystem only to teach science. Pinewood Elementary most frequently incorporated math, science, and writing instruction into the schoolyard ecosystem. Students from Pinewood Elementary also seemed to have a greater understanding and appreciation of ecological concepts than students at the other schools.

Almost all students participating in the focus groups said they had done some gardening in their schoolyard ecosystem. Other activities included studying plants, trees, animals, and learning how to identify plants and animals. Three of the seven schools had students that leaned about the butterfly life cycle by raising them from caterpillars and releasing them.

Schoolyard Ecosystem Site Inspection. The ESES was based on a possible score of 160 points, with points given to a site based on the components of food, water, cover, and space (size of the habitat). Of the 10 original schoolyard sites selected for inclusion in this study, one elementary school's site (Lauderdale Manors) was completely destroyed to make room for a building expansion project. As a result, only nine sites were available for inspection and analysis.

The ESES was developed as a tool to objectively and quantitatively evaluate the ecological success of the nine schoolyard sites visited as part of this study. Please refer to this checklist to interpret the scores discussed below. Site components that provided food, cover, water, and space were treated separately on the form. The "Food" portion of the instrument assessed the quality of four specific components. The "Cover" portion of the instrument assessed the quality of seven specific components. The "Water" portion only consisted of one component while the "Space" portion of the instrument assessed four specific items. The maximum number of points allocated to each of these 16 components was 10, for a total maximum score of 160 points.

The average score of all schools was 45, with scores ranging from 11 to 91. Unfortunately, only one site (Garden City, score = 91) received more than half of the total 160 possible points. As such, Garden City is by far the most ecologically successful site. Pinewood (total score = 63), Eastside (total score = 59), and Big Cypress (total score = 55) were the only other sites that received more than one-third of the total possible points. The original Sullivan schoolyard ecosystem site was vandalized and the contact person at that school is now in the beginning stages of restoring another site. The total score for the two Sullivan sites combined was 44. The Socrum site (total score = 30) is basically a butterfly garden with some native plants found in and around an ephemeral retention pond. It was rated fairly low in cover because it does not contain any non-plant cover components. It is also a relatively small site without any space components. The Central site (total score = 35) lacks water and space components and the Parker site (total score =16) lacks cover, water, and space components. Wadsworth (total score = 11) is the least ecologically successful site of the nine visited and only contains a few nectar plants and pine and oak trees.

Overall Ecological and Educational Success (Detailed in Appendix C)

With a score of 91 out of a possible 160, Garden City is by far the most ecologically successful site, with Pinewood (63), Eastside (59), and Big Cypress (55) in a distant second. Wadsworth, with a score of 11 out of 160 and Parker (16) are in greatest need of improvement, primarily due to lack of food plants, lack of cover water, and space components, and overall small size.

Using the previously mentioned six criteria to evaluate educational success provided mixed and very interesting results:

1. *The amount of time students spent actually using the restored site for environmental education or other activities.* In this category, Wadsworth and Big Cypress would be seen as the most successful, as they both taught environmental education (EE) on an average of four times per month. Parker and Garden City reported teaching EE three times per month, and with the exception of Sullivan (1 time per month), the remaining schools do not report teaching EE at any time.
2. *The level of faculty involvement in site development and use*. The trend in this category was one of two positions, either the faculty strongly supported the site or there was little to no support from the faculty. Eastside, Parker, Big Cypress, and Socrum all reported that faculty support was poor or very non-committal. Garden City did not answer this question.
3. *The amount of administrator support for the site.* Only two schools suffered from lack of administrative support: Pinewood and Socrum. All the other schools reported strong to very strong support from their administration. One school, Big Cypress, reported starting out with strong administrative support but experienced a sharp decrease in administrative support after the site was completed.
4. *Overall student involvement in the schoolyard site development and maintenance process*. With the exception of Pinewood, Socrum, and Wadsworth, all of the schools enlisted student involvement with the development and maintenance of their schoolyard site.

5. *The level of community involvement in the site development and maintenance process.* The most common form of community involvement came in the form of parents, with seven out of the ten schools relying on student's parents for help. Four schools, Central, Garden City, Big Cypress, and Parker, called on other businesses and friends within their communities for support. Parker took it a step further and advertised the need for community support to help with the installation and maintenance of their site. This was the only case of this type of community outreach from a school. Eastside, Socrum, and Lauderdale Manors reported having no community involvement with their schoolyard sites.

6. *The number of days the site was used per month.* Wadsworth and Parker reported using their site an average of 20 days per month, meaning that there was a group using their site every school day! Big Cypress used their site anywhere from 4-12 times per month and Garden City 3-4 times per month. The remaining schools reported using their sites 2 times per month or less. Socrum and Eastside did not use their sites at all throughout the month.

This mix of results highlights some interesting contradictions when evaluating the overall success of a schoolyard ecosystem site. For example Wadsworth, considered the most ecologically unsuccessful site, used their site the most, had garnered a high level of support from faculty, administration, and parents, but chose not to use their students in the development or maintenance of their site. Parker also received a very low ESES score (16) but tied Wadsworth in the amount of time their site was used and were the only school to advertise to gain community support for their restored site. In terms of support, Sullivan, Eastside, Central, and Pinewood all reported having strong support in one or more categories, and yet used their sites two times or fewer per month, and rarely taught EE. Interestingly, the school that reported having very strong support on every level, with heavy student involvement and high site use was Lauderdale Manors, the site that was destroyed due to school expansion.

At first glance, a clear pattern does not emerge, but on closer inspection, one tie to a successful schoolyard ecosystem restoration becomes clear. All the schools that were ecologically successful, educationally successful or met success in both categories had high levels of community involvement. These schools used a variety of community resources and involved the interested community members in many areas of both site development and maintenance. Except for Garden City, which maintained high levels of ecological and educational success, the cumulative success chart in Appendix C clearly shows that success in one category was not a significant predictor of success in the other category. This aspect would prove of interest in future studies.

Overall Program Strengths:

1. The majority of teachers using schoolyard ecosystems view them as a valuable tool for reinforcing concepts learned in traditional classroom settings.
2. The majority of teachers at schools containing schoolyard ecosystems do actively use curriculum resources such as the *Schoolyard Wildlife Activity Guide* and *Project WILD.*
3. The great majority of contact teachers at schools containing restored schoolyard ecosystems have developed original activities and lesson plans for use at their sites.
4. Most schoolyard ecosystem sites are used by classes at all elementary grade levels (K-5).
5. Most schools rate the overall educational success of their schoolyard sites as "Good".

6. Many teachers at schools containing schoolyard ecosystems do conduct formal and/or informal evaluations of the educational impact of school site experiences on their students.
7. Most schoolyard site restoration efforts are completed in one year or less.
8. Most schools do consult local experts when designing and planning their school sites.
9. All schoolyard sites report receiving donations of physical items such as plants, gardening tools, and building materials.
10. Most schools developing schoolyard ecosystems have had help from community volunteers, especially parents.
11. Most schools developing schoolyard ecosystems have publicized the project via letters, press releases or television coverage.
12. Students are actively involved with site maintenance in most schools containing restored schoolyard ecosystems.
13. All contact people involved with schoolyard ecosystem sites have conducted at least some habitat restoration activities at their homes.

Program Weaknesses:

1. At schools that do have a restored ecosystem, frequency of use varies from school to school and teacher to teacher.
2. Teachers at schools with restored schoolyard ecosystems do not use their sites as often as they would like. The majority use their sites only once a year.
3. The average length of time spent in schoolyard sites is 30 minutes or less per visit.
4. Many teachers who actively use schoolyard ecosystems do not interact or coordinate their activities with any other teachers at their schools.

5. Lack of comfort in the outdoors and other attitudinal barriers significantly inhibit the use of schoolyard ecosystem sites by many elementary teachers.
6. Most teachers have encountered problems using their schoolyard ecosystem sites.
7. Schools containing schoolyard ecosystems do not collect baseline data or engage in any systematic surveys/longitudinal evaluation of the ecological success/changes occurring in their sites.
8. Teachers heavily favor butterfly gardens over the other components of schoolyard ecosystems.
9. Follow-up training of new and/or veteran teachers after initial development of schoolyard ecosystem sites is rarely conducted.
10. Most contact persons do not think their schoolyard ecosystem sites have met the original educational goals.
11. Initiation and continued maintenance of the schoolyard ecosystem sites is usually the responsibility of one teacher at a school rather than a team effort.
12. Schoolyard sites are viewed primarily as outdoor classrooms rather than dynamic living labs.
13. The majority of schoolyard site development programs focus on restoring one small schoolyard habitat rather than a campus-wide restoration effort.
14. No schoolyard restoration sites have funding from an ongoing source, but depend on one-time grants.
15. The level of administrator support for schoolyard ecosystem site restoration efforts varies widely from school to school.

16. The majority of schools containing restored schoolyard ecosystems have encountered maintenance problems including vandalism and destruction of site components by uninformed groundskeepers.
17. Groundskeepers' attitudes toward schoolyard ecosystems varies widely from school to school.
18. Students do not get to visit their schoolyard sites as often as they want to.
19. Schoolyard sites are not used for interdisciplinary instruction but rather are used primarily for science activities.
20. Most schoolyard ecosystem restoration efforts are not as ecologically successful as they could be.
21. Many schoolyard ecosystem restoration efforts do not use the committee approach during the planning stages.

Discussion/Conclusion

Administrative support and widespread faculty support were not significant factors influencing the educational and environmental success or failure of schoolyard ecosystem restoration efforts. However, success rates were significantly higher for projects that had strong community-based partnerships and other types of volunteers involved in the planning, design, installation, and maintenance of ecosystem sites than those sites where one teacher or a small group of teachers were in charge of the schoolyard ecosystem.

Interestingly, the amount of money allocated to the project was not a significant predictor of project successes. The amount of money spent on the schoolyard ecosystem restoration projects ranged from \$500-\$5000 with no clear relationship between money spent and project success. Instead, data from these case studies indicate that school sites with more successful ecosystem restoration projects received more donations of physical items such as, plants, birdhouses, signs and building equipment from local businesses. Successful sites also took greater advantage of volunteer opportunities from service groups and organizations such as Rotary Clubs, Gardening Clubs, and PTA groups (See chart in Appendix I).

Overall the most successful schoolyard ecosystem restoration projects were planned and implemented by a committee of diverse stakeholders along with actively involved parents and other community members. The more successful sites were used more frequently by teachers and their students and were plagued with fewer problems, mainly vandalism and/or neglect. The results of this study affirm the long-held assumption that schoolyard ecosystems have tangible, measurable educational and environmental impacts. If properly designed, planned, and implemented, such projects can provide parents, businesses, and other segments of the local community with opportunities to become actively involved in the restoration of healthy, native ecosystems and to work closely with the elementary school's teachers and students. This study also indicated that a broad base of community support, with a diverse group of stakeholders is more important to the project's success than is the administrative support or widespread faculty support. The results of this study also suggest that lack of money is not a prohibitive factor in the potential success of a schoolyard ecosystem restoration project. Finally, these case studies clearly highlight the importance of soliciting community input in the form of physical materials, as well as time and labor to ensure project success. These results illustrate the crucial role that community participation has in determining the success or failure of schoolyard ecosystem restoration results.

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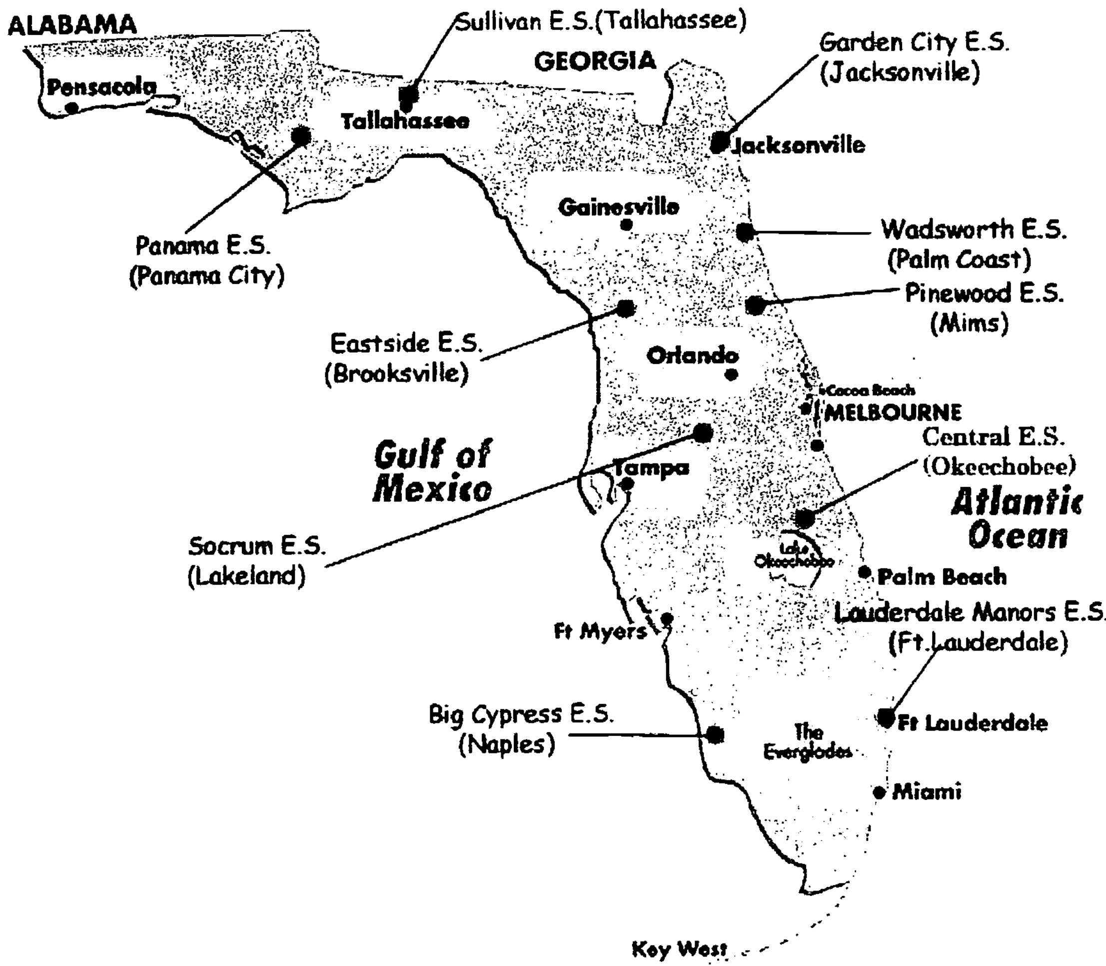
APPENDICES

A. Map highlighting locations and names of participating elementary schools

B. ESES evaluation form

C. Overall chart of school educational and ecological successes

Appendix A



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Appendix B

Ecosystem Site Evaluation System

Bird houses	
☐ 1 house of recommended specifications for 1 species	1 pt
☐ 1 house of recommended specifications for >1 species	2 pts
☐ 2-3 houses of recommended specifications for 1 species	3 pts
☐ >3 houses of recommended specifications for 1 species	3 pts
☐ 2-3 houses of recommended specifications for 2-3 species	5 pts
☐ >3 houses of recommended specifications for 2-3 species	7 pts
☐ >3 houses of recommended specifications for >3 species	10 pts
Total (of maximum possible 10 pts)	_______ pts
Burrows	
☐ 4 inch diameter opening	3 pts
☐ > 4 inch diameter opening	5 pts
☐ Depth of 1-3 feet	2 pts
☐ Depth > 3 feet	3 pts
☐ Vegetation at least 1 foot tall within 1 foot of entrance	2 pts
Total (of maximum possible 10 pts)	_______ pts
Water	
☐ Above ground bird bath	2 pts
☐ In or on ground bird bath	4 pts
☐ Installed pond with no areas less than 2 inches deep	4 pts
☐ Installed pond with shallow areas	7 pts
☐ Installed pond with marsh or swamp plants from recommended list	8 pts
☐ Installed pond with aquatic and shoreline plants from recommended list	10 pts
☐ Natural body of water (pond, lake, stream, or river)	7 pts
☐ Natural body of water with native aquatic plants	8 pts
☐ Natural body of water with native aquatic and shoreline plants	10 pts
Total (of maximum possible 10 pts)	_______ pts
Butterfly garden	
☐ One species from recommended nectar plants list	2 pts
☐ 2-5 species from recommended nectar plants list	4 pts
☐ > 5 species from recommended nectar plants list	5 pts
☐ recommended larvae plants for 1 species of butterfly	3 pts
☐ recommended larvae plants for 2-5 species of butterfly	4 pts
☐ recommended larvae plants for > 5 species of butterfly	5 pts
Total (of maximum possible 10 pts)	_______ pts
Upland plants	
☐ 1 species from recommended plant lists for your ecosystem(s)	1 pt
☐ 2-5 species from recommended plant lists for your ecosystem(s)	3 pts
☐ > 5 species from recommended plant lists for your ecosystem(s)	5 pts

▫ recommended plants from 1 category (grasses, grasslikes, herbaceous, vines, small shrubs, tall shrubs, small trees, large trees)	1 pt
▫ recommended plants from 2-3 categories (grasses, grasslikes, herbaceous, vines, small shrubs, tall shrubs, small trees, large trees)	3 pts
▫ recommended plants from >4 categories (grasses, grasslikes, herbaceous, vines, small shrubs, tall shrubs, small trees, large trees)	5 pts
Total (of maximum possible 10 pts)	_______ pts
Treefrog houses	
▫ 1 house in appropriate location	3 pts
▫ 2-5 houses in appropriate locations	7 pts
▫ >5 houses in appropriate locations	10 pts
Total (of maximum possible 10 pts)	_______ pts
Brush piles	
▫ 1 brush pile	5 pts
▫ > 1 brush piles	10 pts
Total (of maximum possible 10 pts)	_______ pts
Rock piles	
▫ 1 rock pile	5 pts
▫ > 1 rock piles	10 pts
Total (of maximum possible 10 pts)	_______ pts
Bird feeders	
▫ 1 feeder without black oil sunflower seeds	2 pts
▫ 1 feeder with black oil sunflower seeds	5 pts
▫ >1 feeder without black oil sunflower seeds	2 pts
▫ >1 feeder with black oil sunflower seeds	5 pts
Total (of maximum possible 10 pts)	_______ pts
Likability	
▫ Gabriella likes it	3 pts
▫ Dale likes it	3 pts
▫ Linda likes it	3 pts
Total (of maximum possible 10 pts; 1 pt for synergistic effects)	_______ pts

Appendix C

Overall Chart of School Educational and Ecological Successes

School	EE Taught	Faculty	Administration	Students	Community	Used/Month	ESES
Sullivan	1x/month	Strong then decreased sharply	Strong	Yes.	Yes.	0.4	44
Eastside	0x/month	Non-commital	Strong	Yes.	None	0	59
Central	0x/month	Strong	Very strong	Yes.	Parents, Community	2	35
Garden City	3x/month	did not answer	Strong/Very strong	Yes.	Parents, Community, Businesses	3 to 4	91
Parker	3x/month	Non-commital	Strong	Yes.	Parents, Community, Friends, Advertised	20	16
Big Cypress	4x/month	Poor	Strong then decreased sharply	Yes.	Parents, Community, Friends, Businesses	4 to 12	55
Pinewood	0x/month	Strong	Non-commital	None	Parents	0.2	63
Wadsworth	4x/month	Strong then decreased sharply	Very strong	None	Parents	20	11
Socrum	0x/month	Poor	Non-commital	None	None	0	30
L. Manors	n/a	Strong	Strong	n/a	None	n/a	n/a

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