THE DEVELOPMENT OF ENVIRONMENTAL EDUCATION ACTIVITIES AND INSERVICE TRAINING FOR INTEGRATING THE USE OF A RESTORED WOODLAND WILDFLOWER GARDEN AT GREEN BAY SOUTHWEST HIGH SCHOOL

A Project Report
Submitted in Partial Fulfillment of the Requirements for the Degree Master of Science In Natural Resources/Environmental Education

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ABSTRACT

During the summer of 1998 a woodland wildflower restoration project was initiated by myself and a group of students in the outdoor classroom of Southwest High School. The garden that was planted over the course of the next three years provided an opportunity for students to learn about not only wildflowers, but also about their connection to nature. Initially, there were no curriculum materials, however, to support this.

The purpose of this project was to create interdisciplinary curriculum materials for the woodland wildflower garden to increase the utilization of the outdoor classroom and the infusion of environmental education across disciplines. A survey was done to assess what the staff at Southwest High School knew about the wildflower garden and the outdoor classroom and what barriers they perceived were preventing them from using it. A garden curriculum booklet was developed and arranged in the order of the Wisconsin Department of Public Instruction’s EE content standards with both EE and science performance standards tied to the objectives of each activity. A teacher inservice was conducted to raise teachers’ awareness and knowledge of how the garden could be utilized for EE instruction. A participant survey was done after the inservice to see how effective the inservice was in reducing the perceived barriers to its use.

The overall results were that the staff at Southwest High School became more knowledgeable about using the outdoors as a classroom and found the wildflower garden to be a unique resource to use across many disciplines. It is recommended that more activities be added to the garden curriculum booklet and that future inservices are offered to not only our high school, but other high schools in the district as well.
ACKNOWLEDGEMENTS

'And what is a weed? A plant whose virtues have not been discovered'.
-Ralph Waldo Emerson

This journey started for me with a suggestion to reestablish a woodland wildflower garden in our outdoor classroom at Southwest High School. Little did I know that a master's project laid in the path ahead! I would like to thank the students that helped me develop the garden and make the field guide for Southwest High School's outdoor classroom. Thanks to Dr. Rick Wilke for his timely guidance in developing this project and for steering me down this path. To the staff at SWHS and those in my masters program, your feedback and comments helped clear some obstacles along the way and inspired me to continue. My unending love and gratitude goes to my parents, Wally and Rose Bauer, and my children, Alyson and Tommy, for encouraging me and giving me the gift of time. And to Bernie, who grabbed my hand when I got weary and helped me complete this journey, thank you! May this project plant the seeds for discovering the simple joys a garden can bring.

'You’re only here for a short visit. Stop to smell the flowers along the way’.

- Walter Hagen
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CHAPTER ONE - THE PROBLEM AND ITS SETTING

Problem Statement: The purpose of this project is to develop a woodland wildflower garden as a resource with corresponding environmental education activities for grades 9 - 12 and provide teacher inservice training to encourage the infusion of these activities across the curriculum.

Subproblems:

Subproblem 1: To identify EE goals and standards that will be achieved through the use of a woodland wildflower garden.

Subproblem 2: To identify activities that address the EE goals and standards and are of interest to teachers from many different disciplines.

Subproblem 3: To investigate barriers that would prevent teachers from using the woodland wildflower garden for instruction.

Subproblem 4: To develop the woodland wildflower garden curriculum booklet.

Subproblem 5: To design, implement and evaluate an appropriate teacher inservice program.

Significance of the Problem:

In the southeast corner of the Green Bay Southwest High School grounds there is a small, wooded site with a creek running through it. In an urban setting like this with private residential lots, cement sidewalks, paved roads and athletic fields, this one and one half acre area is an "oasis" waiting to be developed into an outdoor environmental education site.

The wooded part of the school site contains mostly hardwood trees, woody shrubs and woodland wildflowers. The woodland wildflowers are scattered throughout the site
and many of them adjoin residential property lines. These wildflowers are an untapped resource that students have little exposure to and many teachers could use to enhance their lessons.

The restoration of a woodland wildflower garden was initiated in the summer of 1998 through a research program called Project First. An initial inventory of wildflowers was made, the garden site was prepared and the transplanting of wildflowers began. There are few staff, however, at Southwest High School that are aware of this resource.

With the time constraints and paperwork required to take students off campus for a field trip, utilizing our school site for an outdoor classroom makes sense. Inservicing the teachers in our building about this valuable "additional classroom" space will begin to break down the barriers that are preventing the infusion of environmental education concepts across all disciplines. (Ham, Reillegert-Taylor, Krumpe, 1987)

Limitations:
1. This project does not seek to become the entire environmental education program for Southwest High School.
2. This project does not mandate teacher and student use.

Definition of terms:
Outdoor classroom - a site located in a natural setting which will serve as a teaching area where students can do hands on activities to learn environmental concepts.
Hands on - a method of education where students actively participate through manipulation, questioning and experimentation.
Woodland wildflowers - flowers found on the floor of a deciduous forest.
Deciduous forest - trees with leaves that fall on the floor of a deciduous forest.

Infusion - the integration of a particular content with existing courses.

Inservice training - providing resource information and skills to teachers about a particular content area.

Project First - a research program sponsored by the Academy of Letters, Arts and Sciences at UW - Madison which involves teachers and students in research.

Assumptions:

1. There is a need for an outdoor classroom site at Southwest High School.
2. Grades 9 - 12 can utilize this outdoor classroom site.
3. The administration at Southwest High School will continue to support the development of a woodland wildflower garden on the school grounds.
4. The teacher inserviceing program can be implemented during our regular teacher inserviceing days on the school calendar.
CHAPTER TWO – LITERATURE REVIEW

The Value of an Outdoor Setting for Environmental Education

The ‘goal of environmental education in an outdoor setting should be to help students become environmentally aware, knowledgeable, skilled, and dedicated citizens who are committed to work, individually and collectively, toward achieving and maintaining a dynamic equilibrium between the quality of life and the quality of the environment’ (Kalinowski, 1990). In order to meet this goal, Wil Kalinowski suggests that ‘the most comprehensive environments for children to learn about are those in their immediate locale’ (1990).

‘Technological efficacy has served to remove human feet from the soil and the rhythms of ecosystems’ (Quinn, 1993). Contact with nature has been reduced to weather reports on the radio for a majority of people and there is an arrogance that the natural world is a resource which is ‘dispensable according to human whim, immediate necessity, or utility’ (1993).

It seems imperative that students get reconnected with nature. One way to accomplish this is by teaching science in the field. ‘As in the classroom, lessons designed to foster “meaningful learning,” provide “hands-on activities” and promote student “inquiry” can be effectively implemented’ in the outdoors (Landis, 1996). A prime outcome of this type of learning is ‘to teach a commitment to human responsibility for stewardship or care of the land’ (Ford, 1986).

As our planet continues to become more urbanized and technology isolates humans from the out of doors, outdoor settings provide some much-needed balance to instruction. It’s important, however, that this type of educational experience not be
limited to a one-time event. Outdoor education must be a continuous education effort and ‘must be taught at all levels and pursued throughout life’ (1986).

‘The schoolyard may emerge as the community’s shrine to the importance of nature in their lives, an oasis in the suburbs where both children and adults develop stewardship skills nurture each other, and touch their ancestral home’ (Coffee, 1998).

The Educational Value of School Sites and School Gardens

The development of a woodland wildflower garden on our school grounds will ‘demonstrate to our children the external learning environment of the school is as important as the internal learning environment’ (Jakab, 1999). ‘As more and more children are raised in harsh urban and biologically banal suburban environments, school gardens are being seen as a natural refuge and discovery site for children. School gardens may be the only link to nature these children experience in their daily lives’ (Heffernan, 1997).

Besides aesthetic appeal, a garden can provide a place of solace and reflection, something sadly missing from school grounds. ‘Most schoolyards offer no respite or solace from chaotic throngs of children, schoolyard bullies and noise’. Yet ‘natural features such as trees, wildflowers, vegetable gardens and water appear to have a positive effect on everyone’ (Cheskey, 1996).

The educational benefits of a garden habitat are limitless. Gardens can be used to study endangered species, Native American culture, art and American history and, at the same time, encourage character skills like patience and hard work (Hall, 1999). Besides the obvious educational benefits, there are social benefits. The ‘outdoor learning
environment reduces anti-social behaviour such as violence, bullying, vandalism, and littering' (Coffey, 1996).

Margarete R. Harvey’s research on the relationship between children’s experiences with vegetation on school grounds and their environmental attitudes showed a ‘small but significant’ contribution to botanical knowledge and environmental attitudes (1990). ‘Only by spending time with their hands in the earth, planting and exploring, do children really learn to love the plants. Watching something transform from seed into seedling, and from seedling into mature plant is an experience not available to everyone’ (Brynjegard, 2001). Crystie Ballard (1998) states that the purpose of a garden on school grounds is to ‘foster students’ awareness of community and environmental issues, nurture their beliefs in their own capacities to make a difference, and to help them develop a commitment and compassion for the larger ecological community we all live in.’ These positive changes in environmental attitudes are important in achieving the goals of environmental education.

The Design and Development of School Gardens

Most school grounds are designed so that the land surrounding the school is set up for the ‘surveillance of students, ease of maintenance and team sports’ (Cheskey, 1996). Disrupting these wide-open spaces with the biodiversity of a garden habitat provides an opportunity for students to practice the action phase of environmental education. ‘School ground development involves students in acting locally to improve their living environment while thinking globally about broad issues of conservation and protection of natural environments. The empowerment of seeing their own actions having positive
outcomes helps overcome some of the gloom and doom feelings that can be associated with world problems’ (Jakab, 1999).

Developing a school garden is limited only by the resources and the type of space available. An inner-city school may be restricted to container gardening while a rural school may have a large tract of land suitable for a prairie. The first step in any project is to establish property lines and then walk the property with a professional to ‘prioritize needs, realistically assess what’s there, evaluate the workload, and help focus your purpose’ (Megalos, 1998). Once the focus of the project is established it’s important for the ownership to be shared so that the project’s survival doesn’t rely on just one individual.

Kim Denman (1996) offers this advice in designing a school garden: ‘Plan the layout of your garden carefully and prepare the site by digging out any unwanted plant life’. If you decide to plant in stages, plant ‘trees and shrubs in the fall followed by the flowers in the spring’. Labeling the plants in the garden is helpful as well as marking ‘their location on a sketch’. Grouping ‘several small plants of the same variety together so that they grow to form clumps’ makes a ‘bolder visual splash’. Maintenance is also important and adding a layer of ‘organic mulch is a wonderful method of keeping down weeds and preserving moisture’.

Kirk Meyer (1998) reminds us, in the midst of all of this work, to not lose site of why we are establishing these gardens, ‘to provide our children with outdoor spaces in which to learn, recreate, and socialize’. He states, ‘lessons learned in developing and maintaining their school grounds will have a ripple effect throughout their lives as they grapple with how to live in harmony with each other and their world’.
Developing Interdisciplinary Environmental Education Activities

The components of a garden lend themselves to educational activities across the curriculum. Although science class seems to be the obvious place for using an outdoor site such as this, there are a wide variety of plant activities that can be used in all curriculum areas (Reading and Taven, 1996). It's important to follow the Guide to Curriculum Planning in Environmental Education (Engelson and Yockers, 1994) to choose those activities that will most efficiently accomplish the goals of environmental education which are: perceptual awareness, knowledge, environmental ethics, citizen action skills and citizen action experience.

An example of how to incorporate Environmental Education goals in an English class is through the use of literature. 'The nature-human interaction is one of the major themes of American literature' (Simpson, 1998). Reading authors such as Steinbeck, Twain and even Gary Larson in conjunction with a garden may 'offer insights to humankind's relationship with nature not addressed in any other subject'. Poetry is another way of interpreting nature. 'Haiku is a form of poetry that in its simplicity captures the essence of natural events' (Gabauer, 1984). Haiku is an effective environmental education tool because it 'seeks to re-experience the Zen-moment, the "ah-ness," or oneness with nature'.

For math a garden offers the opportunity 'to do extensive calculations' about the needed materials like 'rocks, topsoil, and plants'. 'Concepts such as perimeter, circumference, diameter, volume, angle ratio and scale' can also be measured' (Reading, 1996).

In social studies interweaving the values of Native Americans with outdoor education may 'help alter the attitude of arrogance that mandates the natural world as a resource'.
and lead to feelings of 'biotic companionship rather than human ascendancy' (Quinn, 1992). For art, a naturalized area 'provides a place for sketching, painting, rubbing, and for considering the aesthetics of colour schemes and patterns' (Reading, 1996).

As the populations in our schools become more culturally diversified, educators are looking for ways to incorporate diversity into their classrooms. 'School gardens are used as a tool to help foster understanding and respect for various cultures from African-American, to Native American, Hispanic, and Asian'. They are 'also being revived to help children learn better nutrition habits' (Heffernan, 1997).

'The schoolyard presents an opportunity to counteract a very dangerous myth, that nature is something that exists in far away places, unconnected to our lives and managed by experts' (Coffee, 1998). Michael J. Cohen (1991) has developed outdoor activities that 'empower people to incorporate nature into their thinking'. These activities create "teachable moments" and 'enables a person to embrace nature'. It is through these types of experiences that students can reconnect and learn to respect the environment around them.

Barriers to Using an Outdoor Teaching Site

Environmental education often involves taking the class on a field trip or using an outdoor site. The barriers secondary teachers reported to taking environmental study trips were transportation, school finances, and time conflicts (McCaw, 1980). Bixler and Floyd (1999) found high disgust sensitivity as a barrier to both educators and students. They define disgust as 'a basic emotion that moderates reactions to organic objects with certain perceptual characteristics'. Because of this, 'teachers may choose not to offer activities that involve handling soils, water samples, manure, microbes, or invertebrates
and to avoid field trips where insects, dirt, or facilities without modern bathrooms maybe encountered’.

The particular nature setting also presented its own set of barriers. Teachers interested in a deep woods setting overwhelmingly expressed a need for experts to teach lessons as well as a desire for training and background information. A trip to a county park, on the other hand, required some background information, a site visit and extra staff (Simmons, 1993).

In planning and implementing a successful EE program, its important to consider all of these barriers and find ways to minimize them for the teachers willing to take their classes outdoors.

Teacher Training and Inservice in Environmental Education

One way to overcome the barriers to teaching outdoors is through teacher inservice training. William C. Ritz (1977) believes 'that the beginning involvements in EE for teachers need not be overly “science-y”, what they need do, first of all, is to produce teacher enthusiasm for EE and secondly, to give beginning teachers of EE some easy-to-grasp handholds for getting on with it’.

Historically, professional development in environmental education focused on 'activity-based, nationally produced curricula that was concerned more with environmental content than educational context’ (Wade, 1996). It is obvious that some changes have to be made to make inservice training appealing to teachers from many disciplines. The success of a workshop depends not only on how its message is delivered but also on helping teachers ‘understand that environmental education can enhance their curricular objectives without adding extra lessons’ (Nowak, 1995).
Clark (1975) reminds us that 'no teacher has to become a specialist in order to teach environmentally' and urges teachers to just teach within an environmental context.

To reduce conceptual barriers to EE a good inservice workshop should increase 'teachers' perceptions of EE as being both multi-disciplinary and interdisciplinary'. To reduce logistical barriers information should be provided on where to obtain EE instructional materials and personal assistance. Decreasing 'the perceived importance of a strong science background in conducting EE' will help reduce the educational barriers (Ham, et al, 1987). The inservice should also 'bring teachers into direct involvement with the particular environments under consideration' (Ritz, 1977). This may not only help reduce some high disgust barriers but it will also allow the teachers to explore the environment and feel comfortable in it. It will also allow them time to evaluate their own personal values and feelings about their relationship with the natural world. This may be the important lesson of all.
CHAPTER THREE – METHODOLOGY

Subproblem One

The first subproblem was to identify EE goals and standards that would be achieved through the use of a woodland wildflower garden. These goals and standards covered the five content standards of EE: questioning and analysis, knowledge of environmental processes and systems, environmental issue investigation skills, decision and action skills, and personal and civic responsibility. They were identified from Wisconsin’s Model Academic Standards for Environmental Education by the researcher prior to the fall of 2000.

Subproblem Two

The second subproblem was to identify activities that address the EE goals and standards and that would be of interest to teachers from many different disciplines. The criteria used to select the activities were that they 1) relate to a garden experience, 2) be interdisciplinary and appropriate for grades 9-12, and 3) fulfill a state standard for environmental education. The activities were found by referencing quality resources reviewed in The EE Materials Guidelines for Excellence. Many of these resources were accessed through the Wisconsin Center for Environmental Education (WCEE) Resource Center. The activities were selected by the summer of 2001.
Subproblem Three

The third subproblem was to investigate barriers that would prevent teachers from using the woodland wildflower garden for instruction. A survey was developed, based on current research, to determine the types of things that restrict teachers from using an outdoor education site. The survey was reviewed and approved by my graduate advisor prior to its use. The survey was placed in all of the mailboxes of the entire staff of Southwest High School in the fall of 2001 to obtain their input on what needed to be addressed in the teacher inservice training. The staff was instructed to fill out the survey and return it to my mailbox.

Subproblem Four

The fourth subproblem was to develop the woodland wildflower garden curriculum booklet. This booklet arranges the eight garden activities in the order of the five subgoals of environmental education as outlined by the Guide to Curriculum Planning in Environmental Education. The order is awareness, knowledge, developing environmental ethics, developing action skills and gaining action experience. The booklet was completed for the inservice in the spring of 2002.

Subproblem Five

The fifth subproblem was to design, implement and evaluate an appropriate teacher inservice program. As part of the survey in the fall of 2001, additional questions were asked to determine what the teachers would like to see happen in an inservice training of this type. The information from this survey was compiled so that a teacher inservice
training could take place in the spring of 2002 when the wildflowers were blooming! Administrative approval was sought before the inservice took place. This required the principal’s verbal approval and a workshop form for the Green Bay School District needed to be filled out for approval from the district office. I “marketed” the inservice by placing flyers in our staff mailboxes announcing the date, time and topic. To remind the staff of the inservice, an announcement was printed in our daily announcement bulletin.

An agenda was developed for the inservice that included having the teachers actually do some of the activities from the woodland wildflower curriculum booklet out in the garden. Additional resources that I had collected to encourage the use of the garden across disciplines were exhibited as well as the display board describing the process of developing the garden.

An evaluation followed the inservice to see what was done well, what needed to be improved, and what changes needed to be made in our school for teachers to infuse EE into their classrooms.
CHAPTER FOUR – RESULTS

Subproblem One

Using Wisconsin’s Model Academic Standards for EE I identified the performance standards that seemed appropriate for a woodland wildflower garden in each of the five content standard areas: questioning and analysis, knowledge of environmental processes and systems, environmental issue investigation skills, decision and action skills, and personal and civic responsibility. As I was working with the EE standards I realized that they would dovetail well with Wisconsin’s Model Academic Standards for Science. I went through the state science standards and identified performance standards under the following content standard areas: science connections, nature of science, science inquiry, physical science, life and environmental science, and science in social and personal perspectives. By using both sets of standards, teachers would have a more complete picture of the many standards one activity could cover. It would also demonstrate how EE could be integrated into a curriculum.

Subproblem Two

Gathering ideas for activities to use for the wildflower garden was an adventure! There were many resources to explore and many ideas to pursue. The WCEE provided many excellent books and ideas, as did several of the science journals that I receive. I had also started to collect many books about nature and gardening that could be used as resources for this project. The process of identifying wildflower garden activities became a procedure of sorting, selecting, reviewing and adapting.

Below is a summary of the resources I found helpful:
Periodicals:


Books:


Although there were a lot of materials that had good ideas, it was difficult to find activities that related to a garden experience, were interdisciplinary, appropriate for grades 9 – 12, and fulfilled a state standard for environmental education. I decided to let the EE standards be my guide. By identifying activities that met or nearly met an EE standard I could easily start to sift through the assortment of materials I had gathered. Once those activities were set aside, I began to look at how I could integrate ideas and adapt the activities to make them useful across many different disciplines. The disciplines I decided to target were science, math, social studies, art, language arts, computer technology, industrial arts and graphic arts.

In the process of sorting through all of my resources I found that there were many ideas that were not suitable for my wildflower curriculum booklet but could be useful to motivate teachers to get their classes outdoors or integrate environmental education into their classrooms. I took those ideas and generated a list (Appendix A) entitled ‘Where Does A Woodland Wildflower Garden Fit Into the Curriculum?’ This list included
activities that could be used with a few more disciplines such as music and physical education.

Subproblem Three

To investigate the barriers that would prevent teachers from using the woodland wildflower garden for instruction I developed a survey (Appendix B) to determine the types of things that restricted teachers from using an outdoor education site. This I submitted to my advisor, Dr. Richard Wilke, for approval. I distributed the survey in the staff mailboxes of Southwest High School in the fall of 2001.

Out of the 100 surveys I distributed to the Southwest High School staff, 43 of them were returned. I felt this was a good response. The results of the survey (Appendix C) were not surprising to me. 65% of the respondents did not use the outdoors for instruction. 79% were not aware of the outdoor classroom on our school grounds. 81% were not aware of the woodland wildflower garden. One surprise the survey revealed was that 58% of the teachers surveyed did not integrate environmental education into the classroom. Since this is mandated by the state, I thought more teachers were finding ways of incorporating environmental education into their curriculum.

The top barriers to using an outdoor teaching site were lack of knowledge regarding resources at the site, limited class time to complete an activity, lack of developed curriculum and activities and lack of knowledge regarding outdoor teaching techniques. There was some concern as well for the safety and liability of the students. It became clear to me that my inservice must demonstrate easy to integrate, hands on lessons, that cross many disciplines and teach those that visit the garden about the types of
plants found there. The activities must also be possible to complete within a class period.

Subproblem Four

Developing the woodland wildflower garden curriculum booklet was an organizational challenge. I wanted to give a brief description of the activity, identify which disciplines and standards the activity covered, and provide enough background so teachers felt comfortable using it. I also wanted to provide the student's instructions so that the activity could simply be run off and used immediately in the classroom.

I decided to create two separate pages for each activity. The first page is just for the teacher. That page includes the title and a brief description of the activity, the subjects where the activity would be appropriate, the materials needed, the objectives the activity addresses, and the required teacher background. The EE and science standards are keyed directly to the activity objectives by the standard number. The actual EE or science standard is then listed in full at the end of the teacher page for clarification.

The student page lists the materials required and the procedure for the activity. Data tables, guiding questions, minimum requirements or follow up questions are included with the activities as needed. The teacher and student pages are printed on one side of the paper to allow for easy duplication.

When the teacher and student pages were completed, the eight activities were put in order in accordance with the five subgoals of environmental education. Any activities that dealt with awareness went first, followed by knowledge, developing environmental ethics, developing action skills and gaining action experience. As I put these sections
together in the garden curriculum booklet, I realized that a title page for each section would be helpful along with the EE content standard for that section. For ease in navigating through the curriculum booklet (Appendix D) I made a table of contents page. With the table of contents teachers can easily find the teacher or student page for any activity.

**Subproblem Five**

The development of the in service for the garden started with seeking the principal’s approval. Our principal, Mrs. Utnehmer, immediately approved the in service and directed me to submit a workshop proposal form (Appendix E) to the Green Bay Public Schools District Office. This proposal form would allow the participants in the in service to earn a portion of their 22.5 staff development hours that are required annually. The workshop proposal form also requested an outline of the program content and agenda along with a rationale (Appendix F) for why this in service would meet the district inservice required in the 'strategies that enhance student learning' category.

With the workshop proposal form completed I had set my date, created my agenda for the in service and my timeline. I went about creating a flyer that would “market” the in service to our staff. Late in the school year when our mailboxes were already full of field trip notices, retirement parties and junk mail, I realized that I needed to visually catch the attention of my audience and inspire them to attend. For visual appeal I went to Microsoft Publisher and found a brochure layout that inserted a color graphic of a garden scene. That was the easy part. For inspiration I had to have something clever that would make the teachers want to give up their time after school. I decided to build upon the title “Secret Garden” since it was our school’s play in the spring and it seemed
that my garden was indeed a secret. I also needed to stimulate some added interest across disciplines. Earlier in the school year our marketing class sponsored a “Who’s the Man?” contest. This is a male beauty pageant that raises money for the marketing classes to participate in regional and national competitions. The contest is all in good fun and is well attended. The winner this year was my colleague in science, Rick Berken. Rick has taken his title “seriously” by wearing his crown at any possible appropriate moment and playing the song ‘Who’s the Man?’ I knew if I could get him to participate in an activity for my inservice that people would come. I also asked Ruth Ann Reynen, a language arts teacher, to participate as I knew she would add drama and style to offset Rick’s antics. Food is also important at an after school inservice so I decided to include some “garden” refreshments.

After the flyer was designed and printed I realized how important it was for visual appeal to have the graphic and some of the printing in color. A colleague of mine in the science department had just bought a new color laser printer and generously allowed me to run 100 copies. The flyer (Appendix G) was distributed to all of the staff mailboxes with a week to RSVP to me.

In the midst of my inservice planning came the spring transplanting season in my garden. Woodland wildflowers are a tricky bunch to move and there’s no better time than early spring. Luckily the weather was cool so the transplanting could be done a little later than usual. I went to a designated rescue site and dug several pots of bloodroot, Dutchman’s breeches, trilliums, violets, mayapples and spring beauties. As I transplanted and documented the placement of these additions to my garden, I also did the necessary spring “clean up” on the site. This included twig and leaf removal, pulling buckthorn and digging weeds. I realized as I moved around in the garden that if the
staff came through the garden, they wouldn’t know where it was safe to walk. So I reestablished a path by laying down cedar mulch.

A week before the inservice I had received 17 replies from the Southwest staff that they would be attending the inservice and 4 replies from people that could not attend but were interested in more information about the garden or teaching outdoors. With an approximate head count I could work on planning what type of garden refreshments to serve. I have several books on wild edibles so I wanted to incorporate some actual wildflowers into the recipes. I came across a recipe for appetizers with violets and rosewater lemonade (Appendix H) and included gummy worms to connect with the ‘There’s a Hair in My Dirt’ activity.

The day of the inservice I had my classroom set up with refreshments on one lab table and my garden display board and resources on another. The inservice participants arrived by 3:15 p.m. The group consisted of not only teachers but also support staff and our principal. We started with refreshments and introductions. I showed a few slides about the development of the garden and demonstrated how to use the field guide that my students and I had developed for the woodland wildflowers in our outdoor classroom. I distributed my garden curriculum booklet and described the layout by verbally “walking through” one of the activities so the staff understood how easy it was to use and how it could fit into their curriculum.

The first activity I had the group do was Biodiversity Cards. Each member was given a card with a description of something they should look for in the garden. This is a good icebreaker activity and initiates good observation skills. I led the group out to the garden and allowed some time for people to look around and then work on finding their items on their Biodiversity Cards. When everyone was ready, we shared what each
person had found. The exchange that ensued was a learning opportunity for everyone and the group quickly realized that the activity provided an opportunity to share observations not just right or wrong answers.

The second activity was 'There's a Hair in My Dirt'. This lesson centers on the book written by Gary Larson and allows people to reevaluate their perceptions about the interconnections in nature. I developed the activity to be read by five people (Appendix I). I selected the principal, an art teacher, and a science teacher along with Rick Berken and Ruth Ann Reynen to read the parts. The other people in the group were handed the activity on a clipboard to do. This activity was a huge success. Because the readers were from many different disciplines they brought their own style and flare to their parts. The language arts teacher was very dramatic while the art teacher used a German accent. The “audience” not only laughed at the dramatization of the story but also got a very strong message about the interrelationships that nature has to offer. Many of the teachers commented on how easily they could use this activity with their classes.

We headed back into the classroom and I spent the remainder of the inservice answering questions and having those in attendance fill out my Outdoor Classroom Site Survey II (Appendix J) and the survey for the Green Bay school district (Appendix K). There was also time for an informal discussion on how the activities could be used in different disciplines and how various disciplines could add to the value of the garden.

The results of my Outdoor Site Survey II were as follows: 91% of those in attendance better understood what a woodland wildflower garden was and the resources available there. 91% gained some knowledge regarding outdoor teaching techniques and were shown a way to incorporate EE into their coursework. 82% felt the
activities were user-friendly and their confidence in using and outdoor classroom had increased. 64% felt the activities in the garden curriculum booklet were appropriate for their discipline. Some additional comments were “It was nice to see other subject areas and discuss their content”, “Many of the activities listed in the curriculum are very adaptable to the CDS population”, and “I whole heartedly support a greater environmental focus”.

The results of the Green Bay school district survey were as follows: 89% of those in attendance felt that the presentation met the stated objective. 100% gained new information from the presentation, felt the material was presented in an interesting and organized manner, and the handouts facilitated their learning. 78% felt the material presented would be helpful in their teaching. Some of the changes people planned to make in their professional practice included creating new lessons to incorporate wildflowers, teaching more about wildflowers in literature (like Shakespeare’s garden), a nature stories theater, and using the outdoors for lessons!

Since the inservice there have been a number of positive reactions. A language arts teacher that is teaching summer school asked if she could borrow my materials to do the “There’s a Hair in My Dirt” activity with her students. It turns out she was looking for a lesson that tied language arts to science. An advanced biology teacher that never used the outdoor classroom previous to the inservice took both of his classes out to the garden twice. Once to do a lesson and once to pull buckthorn. He used the outdoor learning opportunity to tie up some ecological concepts at the end of the year. The principal publicly thanked me for conducting the inservice in our weekly newsletter (Appendix L) and several teachers and staff asked me for more information about the garden when news of the inservice got around.
CHAPTER FIVE – CONCLUSIONS AND RECOMMENDATIONS

Subproblem One

The first subproblem was to identify EE goals and standards that would be achieved through the use of a woodland wildflower garden. The researcher was pleased with using both the EE and Science standard for each of the garden activities. It is recommended that other state standards in other content areas be added to each activity. This would make the activities even easier to incorporate across many different disciplines.

Subproblem Two

The second subproblem was to identify activities that addressed the EE goals and standards and that were of interest to teachers from many different disciplines. Having teachers from different disciplines work together to develop the activities for the garden curriculum booklet would be recommended. Common planning time is always a problem during the school year but finding time outside of the school day would be a possibility. The garden activities could be expanded to include other grade levels. The researcher’s environmental science class already does an activity with a third grade class at a nearby elementary school. It is recommended that outdoor activities led by the high school students also be offered to the elementary students.
Subproblem Three

The third subproblem was to investigate barriers that would prevent teachers from using the woodland wildflower garden for instruction. Additional workshops could be done with the staff at Southwest High School to further reduce the barriers teachers encounter with using a garden or outdoor learning site. The teachers that attended the inservice indicated that they would like to see more people exposed to this type of resource. The workshop could also be opened up to teachers across the district so they could be assisted in finding ways to use their school grounds for environmental education.

Subproblem Four

The fourth subproblem was to develop the woodland wildflower garden curriculum booklet. The researcher recommends that additional activities be developed for the garden curriculum booklet. Working with Jerry Landwehr, head horticulturist at the Green Bay Botanical Gardens, new activities could be developed to be used both at the Botanical Gardens and in the outdoor classroom at Southwest High School. The activities should follow the content and performance standards for environmental education.

Subproblem Five

The fifth subproblem was to design, implement and evaluate an appropriate teacher inservice program. One of the problems encountered with holding an inservice in the spring is the many conflicts with other activities. One of the things that prevented more staff from coming to this inservice was the number of athletic events taking place the
day of the inservice. The researcher had no idea there was a track meet that day that involved a number of the staff or that there was a home softball game for the school's undefeated team. Checking the school athletic calendar and changing the date may have enabled more people to attend.

It is highly recommended to get teachers across disciplines involved in the inservice activities. Some of the participants shared with the researcher that they might not have attended the inservice if they had not personally been asked to participate in an activity. Thus, it is suggested that personal invitations to participate be used to increase participation in inservices like this. The teachers that are actively involved will not only gain confidence in teaching outdoors but may become more inspired to incorporate environmental education into their curriculum.
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APPENDIX A

Where Does a Woodland Wildflower Garden Fit Into the Curriculum?
WHERE DOES A
WOODLAND WILDFLOWER GARDEN
FIT INTO THE CURRICULUM?

Art and Music:
- Illustrate the Southwest High School ‘Wildflower’ field guide with original artwork.
- Use wildflowers for T-shirt printing. (The abundant ones!)
- Produce a photo essay of a plant’s life cycle.
- Make nature prints.
- Develop pamphlets describing the wildflower garden to the public.
- Listen to ‘Flight of the Bumblebee’ and create an insect symphony.
- Write the lyrics of a song that describes the benefits of the serenity and beauty of a garden.
- Make and use dyes from woodland wildflowers.

Language Arts:
- Keep a nature journal. (Journaling through the seasons creates a phenology of the area).
- Compose a poem, sonnet or Haiku for a plant.
- Write a dialog between a plant and a pollinator.
- Write a letter from a settler’s perspective on the value of a particular wildflower as they settle the new frontier.
- Read the journal writings of famous environmentalists (i.e. Aldo Leopold’s Sand County Almanac).
- Create a detailed description of a wildflower so that someone could make an accurate drawing of it.
**Tech Ed/Graphic Arts:**

- Create a power point presentation on the garden’s restoration process.
- Design trail markers and identification signs.
- Propose some outdoor amphitheater seating designs that could be incorporated into the landscape.

**Math:**

- Map the woodland wildflower garden and identify the scale used.
- Calculate the population density of each wildflower type in the garden.
- Examine and calculate the buckthorn to wildflower ratio in the garden area.
- Graph phenological sequences.
- Use planting data to calculate the percentage of survival for each species planted over the past three years.
- Calculate the percentage of grassed, paved, woodland and wetland areas on the school grounds.

**Social Studies:**

- Interview residents in the area about the local history of the Southwest area over the past 50 years.
- Research the folklore and medicinal uses of a wildflower.
- Read Native American stories about plants and the significance that they held in their culture.
- Research exotic species and how they were introduced to our area from other countries.
- Find local town and landmark names which reflect a wildflower heritage.
❖ Create a fictional journal of an early settler and how they used the woodland wildflowers in their everyday lives.

**Physical Education:**
❖ Conduct challenge course activities in the outdoor classroom.

**Science:**
❖ Observe and record phenology sequences. (i.e. blossoming time, color, insect hatches).
❖ Identify and classify woodland wildflowers as they blossom.
❖ Dissect a flower. Identify the structure and function of the parts.
❖ Design a landscaping plan using native wildflowers and vegetation for your home.
❖ Investigate wild edibles and their nutritional value.
❖ Research, grow, transplant and label new plantings.
❖ Adopt a wildflower!
APPENDIX 8

Pre-Inservice Survey of the Staff

At Southwest High School
Dear Staff at Southwest High School,

I am currently working on a Masters Degree in Natural Resources/Environmental Education and would appreciate your cooperation in filling out this survey. This is not an evaluation tool but rather an assessment that may increase the utilization of the outdoors for instruction.

Thanks for taking a moment out of your busy schedule to do this for me. Please place your completed survey in my mailbox.

Lynn Hudock

OUTDOOR CLASSROOM SITE SURVEY

1. What subject area do you teach? ____________________________________________

2. Within the last school year, how many times have you used the outdoors for classroom instruction? (check one)
   ___ 0 ___ once ___2-4 times ___5-7 times ___more than 8

3. Are you aware of the outdoor classroom at Southwest High School? ___yes ___no

4. Are you aware of the woodland wildflower garden in the outdoor classroom? 
   ___yes ___no

5. Do you integrate Environmental Education into your classroom? ___yes ___no

6. Select what you consider to be the 3 largest barriers to using an outdoor teaching site. Label the greatest concern as “1” and the next greatest as “2”, etc.

   ___ safety/liability of students
   ___ limited class time to complete an activity
   ___ limited prep time
   ___ lack of developed curriculum and activities
   ___ lack of knowledge regarding resources at the site (i.e. what’s out there!)
   ___ lack of knowledge regarding outdoor teaching techniques
   ___ class sizes too large or small
   ___ lack of equipment
   ___ Other (please state) ____________________________________________
7. Check any of the following that apply to you. I would use a woodland wildflower garden for my subject matter if:

___ I had more knowledge of what a woodland wildflower garden was.

___ I had more knowledge of activities/lessons that utilize a woodland wildflower garden.

___ I had more time to prepare for activities that would utilize a garden of this type.

___ I were provided with materials that would not require additional class time but rather enhance what I am currently doing in my classes.

___ I had more knowledge of the opportunities a woodland wildflower garden could provide.

Thank so much for completing this survey. 😊
APPENDIX C

Results of the Pre-Inservice Survey

Of the Staff at Southwest High School
Results of Outdoor Classroom Site Survey

Of the 100 surveys distributed, 43 of them were returned with the following results:


2. Within the last school year, how many times have you used the outdoors for classroom instruction? (check one)
   - (28) 0 __(1) once __(7) 2-4 times __(2) 5-7 times __(4) more than 8 __ (1) N/A

3. Are you aware of the outdoor classroom at Southwest High School? _(_9)_yes __(_34)_no

4. Are you aware of the woodland wildflower garden in the outdoor classroom? __(_8)_yes __(_35)_no

5. Do you integrate Environmental Education into your classroom? _(_17)_yes _(_25)_no __(_1)_N/A

6. Select what you consider to be the 3 largest barriers to using an outdoor teaching site. Label the greatest concern as “1” and the next greatest as “2”, etc.
   ___ safety/liability of students __ #1 (1), #2 (3), #3 (4)
   ___ limited class time to complete an activity __ #1 (9), #2 (3), #3 (4)
   ___ limited prep time __ #1 (1), #2 (0), #3 (3)
   ___ lack of developed curriculum and activities __ #1 (5), #2 (9), #3 (8)
   ___ lack of knowledge regarding resources at the site (ie. what's out there!) __ #1 (11), #2 (9), #3 (4)
   ___ lack of knowledge regarding outdoor teaching techniques
      __ #1 (2), #2 (6), #3 (6)
   ___ class sizes too large or small __ #1 (3), #2 (1), #3 (2)
   ___ lack of equipment __ #1 (1), #2 (2), #3 (3)  (easels)
Other (please state) Not in curriculum (2), difficulty with set up and take down, outdoor not fit for my curriculum, my class is not mature or responsible enough, lack of trails, N/A my students use computers, no barriers for Physical Education, the outdoor classroom needs to be marketed.

7. Check any of the following that apply to you. I would use a woodland wildflower garden for my subject matter if:

_(12)_ I had more knowledge of what a woodland wildflower garden was.

_(15)_ I had more knowledge of activities/lessons that utilize a woodland wildflower garden.

_(9)_ I had more time to prepare for activities that would utilize a garden of this type.

_(17)_ I were provided with materials that would not require additional class time but rather enhance what I am currently doing in my classes.

_(22)_ I had more knowledge of the opportunities a woodland wildflower garden could provide.

11 people left the back of the survey blank.

Other Comments:

I would go there to draw if my classes were smaller.

It would be great for studying the flowers and herbs mentioned in Shakespeare’s plays.

Now that I know – we will visit and draw – or draw and paint.
INTRODUCTION

This woodland wildflower curriculum booklet has been developed as part of a master's project for the University of Wisconsin – Stevens Point. The materials developed here were created to inspire teachers to not only discover the wildflowers on our school grounds but to incorporate environmental education into their curriculum. The booklet is not intended to serve as a complete environmental education program.
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QUESTIONING AND ANALYSIS

Content Standard: Students in Wisconsin will use credible research methods to investigate environmental questions, revise their personal understanding to accommodate new knowledge and perspectives, and be able to communicate this understanding to others.
Lab: How can you measure plant growth and development without destroying the plant?

Subjects: Science, Math, Math Connections, Computer Technology

Materials: copy paper, pencils, scissors, clipboards, balance, SWHS Wildflower guide. (Optional: computer access with Graphical Analysis software.)

Description: This is an inquiry-based lab where students are faced with determining how to measure plant growth and development over time in a woodland wildflower garden. They are given access to simple materials and must design a procedure, carry it out over a time frame they develop, present their findings to their classmates and visually represent their data.

Objectives:
- Students will design and carry out their own method of collecting data on plant growth and development. (EE Standard A.12.2, Science Standard C.12.1, C.12.2)
- Students will identify variables that could influence plant growth and development. (EE Standard A.12.4)
- Students will assess their procedure and identify what worked well and what didn't. (EE Standard A.12.3, Science Standard C.12.3, C.12.4)
- Students will present their data in a visual manner and interpret their results. (EE Standard A.12.4, Science Standard C.12.6)

Teacher Background: Growth is defined as an irreversible increase in size while development is the production of new structures, such as leaves, flowers or fruits. In this lab, students will study both plant growth (increase in leaf area) and development (the production of new leaves).

Using leaf area as an indicator of plant growth is more sensitive than simply measuring plant height. To begin, count the number of expanded leaves. Any leaf, no matter how small, should be counted. Surface area can be difficult to measure directly without destroying the plant. Here is one nondestructive method. Carefully trace the outline of each leaf using a pencil and copy paper. (See figure below). Keep the paper dry and be sure to use the same "type" of paper to insure accuracy of the results. Using a scissors, cut out all of the leaf traces for each flower and weigh them together. The total mass of the paper is directly correlated to the total leaf area. This data can be presented as change in mass over time or as change in mass per day.

The lab is designed to run over the course of two weeks. The first day will be used to organize groups, identify the wildflower, and brainstorm ways to measure plant growth and development. Day 2 will be used to polish the procedure and begin collecting data. Only partial class periods will be needed after the procedure is established to collect data. The final day will be used to
present the group's findings.

Environmental Education Standards:

A.12.2 Suggest possible investigations and describe the results that might emerge from the investigations.
A.12.3 Evaluate personal investigations and those of others, critiquing procedures, results and sources of data and suggest improvements to the investigation.
A.12.4 State and interpret their results accurately and consider other explanations for their results.

Wisconsin's Science Standards:

C.12.1 When studying science content, ask questions suggested by current social issues, scientific literature, and observations of phenomena; build hypotheses that might answer some of these questions; design possible investigations; and describe results that might emerge from such investigations.
C.12.2 Identify issues from an area of science study, write questions that could be investigated, review previous research on these questions, and design and conduct responsible and safe investigations to help answer the questions.
C.12.3 Evaluate the data collected during an investigation, critique the data-collection procedures and results, and suggest ways to make any needed improvements.
C.12.4 During investigations, choose the best data-collection procedures and materials available, use them competently, and calculate the degree of precision of the resulting data.
C.12.6 Present the results of investigations to groups concerned with the issues
explaining the meaning and implications of the results, and answering questions in terms the audience can understand.


Addendum to Lab: How can you measure plant growth and development without destroying the plant?

Activity: Biological Drawing

Subjects: Science, Art

Materials: copy paper, pencil, clipboard

Description: An excellent way to describe an object is to draw it. The goal of the observer is to move beyond simple, preconceived mental images (stick figures) of what he/she thinks an object looks like and instead concentrate on the unique identity of that specimen.

Objectives:  
• Students will focus on observation and drawing skills to clarify their assumptions about the natural world. (Science Standard B.12.5)

Teacher Background: Plants are good subjects to draw because they are stationary. In this regard, they are an appropriate starting point for drawing nature that allows the observer to concentrate on drawing skills.

Contour drawing is a technique that focuses on the object to be drawn and not the actual drawing of it. Students place an object in front of themselves with a sheet of copy paper out of their field of vision, yet within easy reach. (In the field, a clipboard would be helpful as a drawing surface.) The goal is to imagine the pencil touching the object, carefully moving over its surfaces. To do this, let the pencil move slowly around the paper as the eye gradually moves around the lines that define the edges and important interior aspects of the object. (Note: It is important NOT to look at your drawing ad to NOT lift the pencil!) Encourage students to try several drawings of different objects before actually doing field work. An interesting extension is to have students display their drawings and discuss what they discovered while making their drawing.
Examples of Contour Drawing:

- Lilac leaves
- Cinnamon Fern frond
- Red Maple leaf

Wisconsin Science Standards:

B.12.5 Explain how science is based on assumptions about the natural world and Themes that describe the natural world.

Lab: How can you measure plant growth and development without destroying the plant?

Materials: copy paper, pencils, scissors, clipboards, balance, SWHS Wildflower guide. (Optional: computer access with Graphical Analysis software.)

Procedure:
1. Divide up into groups of three.
2. Choose one wildflower in the SW woodland wildflower garden.
3. Using the SWHS Wildflower guide, identify your flower.

The common name of my flower is ________________________________.

The biological name of my flower is ________________________________.

Something new I learned about this flower from the field guide is:

4. You will be using only this flower throughout the study. Draw a sketch of what your flower looks like today. Add as much detail as possible.
5. List some variables that influence plant growth and development.

6. Growth is defined as an irreversible increase in size while development is the production of new structures, such as leaves, flowers or fruits. Consider the variables you just listed in question #5. In the space below, brainstorm ways your group could measure this flower's growth and development. Star those ideas that would not be destructive to the flower.

7. From the starred list you generated in Question 5, choose a procedure to measure this flower's growth and development. (Remember that this is a fragile ecosystem and we do not to destroy any flowers that are getting established here).

Write the method you will use to do this and design a data table you will use to collect the necessary data.

*Have the instructor approve your procedure before you begin collecting data.

Procedure:
8. You will be presenting how you measured your flower's growth and development to the class. Include the following:

- Common name of flower
- Sketch of flower (how it looks at the end of your study)
- Methodology - how did your group measure plant growth and development?
- What biotic or abiotic (living or nonliving) factors influenced your flower's growth and development?
- What did you learn?
- Visual representation of your data. (Here's where Graphical Analysis software can be used to generate line graphs, bar graphs, etc. Be creative!)
- 3 new things you learned about your flower, the woodland wildflower garden or yourself after doing this study. (*Each group member must do this individually).

Remember I expect every group member to be a part of your presentation!
KNOWLEDGE OF ENVIRONMENTAL PROCESSES AND SYSTEMS

Content Standard: Students in Wisconsin will demonstrate an understanding of the natural environment and the interrelationships among natural systems.
Activity: There's a Hair in My Dirt!

Subjects: Biology, Language Arts

Materials: Book - There's a Hair in My Dirt by Gary Larson, clipboards, student worksheets, carpet squares (for sitting outside!)

Description: Students will read the book, 'There's a Hair in My Dirt' by Gary Larson and evaluate the value of an ecosystem from a human and a worm's perspective.

Objectives:
- Students will evaluate the relationship of matter and energy in an ecosystem. (EE Standard B.12.1, Science Standard F.12.10)
- Students will be able to distinguish the value of ecosystems from a natural and a human perspective. (EE Standard B.12.2, Science Standard A.12.2, A.12.4)

Teacher Background:
Gary Larson is best known as the cartoonist of 'The Far Side' cartoon. His biology background surfaces in a humorous way in his story, 'There's a Hair in My Dirt'. E.O. Wilson lends credibility to this story by providing the foreword. Wilson, a Harvard professor for 40 years, has written 20 books, won 2 Pulitzer prizes and discovered hundreds of new species. Dr. Wilson is often called, "the father of biodiversity" and is considered one of the world's greatest living scientists.

This book, which may first appear to be a children's story, shows an ecosystem through the eyes of a fair maiden and a worm. It allows the reader to evaluate what is really happening in the natural world and provides an interesting lesson.

Environmental Education Standards:

B.12.1 Evaluate the relationship of matter and energy and the flow of energy in natural managed and built systems.

B.12.2 Describe the value of ecosystems from a natural and human perspective.

Wisconsin Science Standards:

A.12.2 Show how conflicting assumptions about science themes lead to different opinions and decisions about evolution, health, population, longevity, education, and use of resources, and show how these opinions and decisions have diverse effects on an individual, a community, and a country, both now and in the future.

A.12.4 Construct arguments that show how conflicting models and explanations of events can start with similar evidence.

F.12.10 Understand the impact of energy on organisms in living systems.
Activity: There's A Hair in My Dirt

Materials: Book - There's a Hair in My Dirt by Gary Larson, clipboards, student worksheets, carpet squares (for sitting outside!)

Procedure:
1. As the story is read aloud, fill in the table below:

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>FAIR MAIDEN’S PERSPECTIVE</th>
<th>WORM’S PERSPECTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Squirrels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wildflowers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fawn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turtle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dragonflies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salmon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fireflies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Old tree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby bird</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest fire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snake</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. List three misconceptions you have made about nature:
   a. 
   b. 
   c. 

3. List three new things you learned from the worm:
   a. 
   b. 
   c. 

4. Give an example of the recycling of matter in this story. 

5. Give an example of energy being transferred from one species to another.

6. What is the message this story is trying to convey?
Activity: Biodiversity Cards

Subjects: Any subjects, when used as an icebreaker activity

Materials: Biodiversity cards

Description: This is a quick, introductory activity to be used as a means of getting students to make some specific observations of a woodland wildflower garden that they might not normally make.

Objectives:
- Students will make guided observations in a woodland wildflower garden and explain some common occurrences. (Science Standard D.12.11)
- Students will evaluate the importance of biodiversity. (EE Standard B.12.7)

Teacher Background:

*Biodiversity* is defined as the 'full variety of life on earth'. (Chadwick, 1992)

In general, the more biodiverse an ecosystem is, the more stable it is.

In an ecosystem such as a woodland wildflower garden, where blooming occurs in a relatively short period of time, it's important to make careful observations and document them. It is also important to compare this ecosystem with the other ecosystems that surround it (i.e. athletic fields, woods).

This activity is intended as an icebreaker to get the students interested in the area they are about to study.

Environmental Education Standards:

B.12.7 Evaluate the importance of biodiversity.

Wisconsin Science Standards:

D.12.11 Using the science themes, explain common occurrences in the physical world.
Activity: Biodiversity Cards

Materials: Biodiversity cards

Procedure: Cut out the Biodiversity cards below. Give one to each student as he or she prepares to go outside. Have the student do the activity that's described on their card in the garden and then briefly share their experience with everyone else in the class. **NOTE: Do not remove anything from the ecosystem.**

<table>
<thead>
<tr>
<th>Find something in nature ready to burst.</th>
<th>Find a biodiverse place.</th>
<th>Find a smooth bud.</th>
<th>Find a plant in the shape of a circle.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find a plant that is smooth.</td>
<td>Find a spot where you can name the flower on your left and right.</td>
<td>Find a plant in the shape of a heart.</td>
<td>Find a change made by humans that reduced biodiversity.</td>
</tr>
<tr>
<td>Find a change made by humans that increased biodiversity.</td>
<td>Collect a wild seed. How does it get dispersed?</td>
<td>Find a wild plant that is edible.</td>
<td>Find a plant with a protective part. (i.e. Thorn) Be careful!</td>
</tr>
<tr>
<td>Find a plant in a sunny spot and 1 in a shady spot. How are they alike? Different?</td>
<td>Find a plant that climbs</td>
<td>Find a dead plant part. What role does it play in this ecosystem?</td>
<td>Find a lichen and inspect it with a magnifying glass. What did you see?</td>
</tr>
<tr>
<td>Find evidence of a plant's response to an environmental problem.</td>
<td>Find 2 flowers that look similar but smell different.</td>
<td>Name 3 ways you could group the flowers in the wildflower garden.</td>
<td>Find an exotic species plant.</td>
</tr>
<tr>
<td>Find a flower whose leaf has a smooth margin.</td>
<td>Find a flower whose leaves have parallel veins.</td>
<td>Find a plant whose leaves are hairy.</td>
<td>Find a plant with a special feature to attract insects. What is it?</td>
</tr>
</tbody>
</table>
Lab: Quantifying Biodiversity

Subjects: Science, Math

Materials: stakes to delineate sites, meter sticks, pencils, clipboards, student worksheets

Description: This activity provides students with the opportunity to investigate and compare the biodiversity of a woodland with a lawn ecosystem.

Objectives:
• Students will determine the number of plant species in a 2 m x 2 m quadrant in two different ecosystems. (EE Standard B.12.4)
• Students will predict a population’s response to changes in environmental conditions. (EE Standard B.12.6)
• Students will evaluate the data they collected and the methods they used to collect it. (Science Standard C.12.3)

Teacher Background:
A woodland ecosystem contains a rich combination of plant and animal life. As man transformed this area into a schoolyard, much of the original woodland ecosystem has been replaced with lawn. This activity will attempt to show the importance of the woodland wildflower restoration project.

Part A:
Divide the students into groups of 3. Have half of the groups choose a spot in the woodland that they consider to be representative of the woodland. Have them lay out a 2 m x 2 m quadrant and count the number of different species of plants in their quadrant. Have the other half of the groups choose a spot on the lawn that they consider to be representative of the lawn. Have these students lay out a 2 m x 2 m quadrant and have them count the number of different grass species in their quadrant.

Compile the class data in a chart such as this:

<table>
<thead>
<tr>
<th>Group</th>
<th># of Plant Species</th>
<th># of Grass Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Average # of species/Plot
Total # of species/Class

Determine the average number of species for the plant groups and the total number of species per class. Do the same for the grass groups.

In many instances, a single woodland quadrant may not have as large a number of different species than the lawn quadrants but all woodland quadrants together
will reveal a far greater diversity than all the lawn quadrants. This is because woodland species tend to clump together, whereas a lawn tends to have its species more evenly distributed.

Part B:

The second part of this activity uses a species-area equation to make predictions about the ecological impacts of human activity. In our example here, we would be looking at how changing woodland into lawn would impact species diversity. (Note: If Part B of this activity cannot be completed in one class period, save data to be used the following day.)

The species-area relationship was first formalized in the 1920's by Olaf Arrhenius, and much ecological literature has been written since that time debating the meaning of the mathematical constants by which the species-area relationship can be algebraically described.

The species-area equation is, \( S = cA^z \).

Example, let \( S = 25 \), \( A = 256m^2 \), and \( z = 0.30 \). You must first solve for \( c \).

\[
25 = c \times 256^{0.30} \\
25/256^{0.30} = c \\
25/256^{0.30} = c \\
4.7 = c
\]

If students reduce the size of the lawn by 25%, as might occur through habitat loss, they can find out how many species remain.

\[
(75\%) \times (256m^2) = 192m^2 \\
A \ (area) = 192m^2 \\
S = cA^z \\
S = (4.7)(192^{0.30}) \\
S = 22.7
\]

Students can see that a 25% reduction in lawn would decrease the number of species from 25 to 22.7.

Environmental Education Standards:

B.12.4 Analyze the factors that determine the number of organisms that can live in a certain area.

B.12.6 Predict population response to changes in environmental conditions.

Wisconsin Science Standards:

C.12.3 Evaluate the data collected during an investigation, critique the data-collection Procedures and results and suggest ways to make any needed improvements.

Source: Based on:

'What's Green and Grows All Over' by Greg Bisbee and Kathleen Morgen and 'Quantifying Biodiversity' by Brad Williamson
Lab: Quantifying Biodiversity

Materials: 4 stakes to delineate site, meter stick, pencil, clipboard

Procedure: Part A

1. Divide into groups of 3. The instructor will assign you either a woodland site or a lawn site for your group to investigate.

2. In your group, randomly select a portion of your site that you feel is representative of the woodland or the lawn you are studying.

3. Lay out a 2 m x 2 m site in the following manner:
   a. Pound 1 stake in the ground. Measure to the right 2 m and pound another stake in the ground at that point.
   b. Using your clipboard as a square, measure another 2 m at a right angle to the 2nd stake. Pound a 3rd stake at this point.
   c. Repeat step b to complete the 2 m x 2 m square.

4. Count the number of different plant species in your quadrant. To keep track of your plant species, draw an outline of each different plant leaf and note any other identifying traits. Record the number of each species type in the table below.

<table>
<thead>
<tr>
<th>Species</th>
<th>Leaf Outline</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Continue this chart on the back of this sheet if you need more room.
5. When you return to the classroom record the number of plant species for your group in the class data table that your instructor has provided. (Note: Be sure you record your data underneath the correct heading; plant species (woodland) or grass species (lawn).

6. Calculate the average number of species for each site type by adding up the total number of species under one heading and dividing by the number of entries under that heading.

   Average Number of Species for Woodland = ____________
   Average Number of Species for Lawn = ______________

7. Look at your results from question 6. What do you think accounts for the difference between the woodland site’s average number of species and the lawn site’s average number of species?

8. Compare your data with the data from the opposite collection group. Were there any species that were common to both? ________ If there was a common species, draw it in the space below.

9. What is the purpose of the lawn on the school ground?

10. Is the lawn a natural or manmade habitat? _____________________________

11. What is the purpose of the woodland on the school ground?
12. Is the woodland a natural or manmade habitat? ____________________________

13. How could your data collection methods have been improved?

Part B:

Scientists use the species-area equation to make predictions about the ecological impacts of human activity, such as the rate of species extinction due to habitat loss. Its premise is simple, the number of species increases in direct proportion to the size of the area.

Different ecosystems have different biotic and abiotic components, as well as different relationships amongst those components. It is necessary to factor those differences into the species-area equation. The $c$ and $z$ values provide variables for this algebraic formula.

The $z$ value constant reflects two possibilities: a.) that observed values for $z$ might be the result of a simple statistical consequence of the distribution of species abundance; and b.) habitat diversity increases with the size and topographic diversity of a study area. The calculated $z$ value equals 0.30.

The species-area equation is:

$$S = cA^z$$

- $S$ = the total number of species
- $A$ = the total area surveyed
- $Z = 0.30$
- $c$ = constant reflecting the ecological makeup of the community of organisms under study

Procedure:

1. Using the species-area equation above, solve for $c$. Substitute the values in the following manner:
   
   The total number of species will equal the total our class observed in the woodland area. Use 16 m$^2$ as our total area as we had 4 groups using a 2 m x 2 m area. Use the provided $z$ value of 0.30. **Show all of your work below.**
2. Now assume the woodland area has been reduced by 50% to put in grass for athletic fields for a schoolyard. (Hint: 50% of 16 m² = 8 m²). Using the species-area equation, calculate the number of species that would remain. Remember to use the \textbf{c value} you calculated in problem 1. \textbf{Show all of your work below.}

3. Would the entire woodland habitat need to be protected in order to preserve all of its species from extinction? Explain your reasoning. (Hint: Think of the species-area equation).

4. If a partial woodland restoration area was created, should a wide path be established through the middle of it? Explain the possible ecological impacts.

5. What are the potential risks of establishing a restoration area on the school grounds?
ENVIRONMENTAL ISSUE INVESTIGATION SKILLS

Content Standard: Students in Wisconsin will be able to identify, investigate, and evaluate environmental problems and issues.
Activity: Southwest High School Outdoor Classroom Issue Investigation

Subjects: Science, Social Studies

Description: Students will investigate one of three environmental issues on the Southwest High School grounds. These issues are: 1) investigating an exotic species that has invaded our outdoor classroom, 2) urban sprawl and development in the Southwest High School neighborhood, or 3) water quality changes in Beaver Dam Creek. The students will include a historical perspective of the issue, the consequences of human actions and some proposed solutions to the problem.

Objectives:
- Students will research a local environmental issue on their school grounds including past, present and future considerations. (EE Standard C.12.3)
- Students will gain an understanding of the changes that occur when exotic species are introduced, land is developed and water quality changes over time. (Science Standard F.12.7, F.12.8)
- Students will evaluate how man’s use of resources impact the environment and quality of life in an area. (Science Standard H.12.5)

Teacher Background: Common Buckthorn is an exotic invasive that is very abundant in our outdoor classroom area. There have been several attempts to remove this woody shrub which have included cutting, pulling and the spraying of Round-up. Because this plant has berries that are very desirable to several bird species, the seed from the plant continues to get “redistributed”. The Green Bay School district is opposed to the heavy use of herbicides on school grounds and the neighbors in the area do not understand why any plant removal is being done. Common Buckthorn is still sold as an ornamental at nurseries in the area.

There are aerial photographs of the Southwest High School neighborhood taken in 1970 and in 1990 in the science department. These will be very helpful in examining the extent of urban sprawl and development in the Southwest High School neighborhood.

Beaver Dam Creek was historically once a trout stream. Students will have to look at some county historical records to examine how the water quality has changed as the land use patterns in this area changed.

Each project requires the student to make a community contact of some sort. Encourage them to make this contact early on in the project as people are difficult to reach directly by phone.

I have small classes so I would divide the students into groups of 3 and have two groups work on each of the issues. This would allow for comparison and
overlap.

**Environmental Education Standards:**

C.12.3 Maintain a historical perspective when researching environmental issues, include past, present and future considerations.

**Wisconsin’s Science Standards:**

F.12.7 Investigate how organisms both cooperate and compete in ecosystems.

F.12.8 Using the science themes, infer changes in ecosystems prompted by the introduction of new species, environmental conditions, chemicals, and air, water or earth pollution.

H.12.5 Investigate how current plans or proposals concerning resource management, scientific knowledge, or technological development will have an impact on the environment, ecology and quality of life in a community or region.

Source: Parts adapted from 'Color Me a Watershed' and 'Sum of the Parts', Project Wet, 1995
Activity: Outdoor Classroom Issue Investigation

Procedure:
1. Choose one of the following topics to investigate:
   a. An exotic species that has invaded our outdoor classroom.
   b. Urban sprawl and development in the Southwest High School area.
   c. The changes in the water quality of Beaver Dam Creek.

2. Follow the guidelines outlined below for the topic of your choice. Prepare an oral report on your findings to present to the class. Your presentation should be 10-15 minutes long and cover all of the requirements of your project. Remember that visuals and creativity will help hold your audience’s attention!

**Project A: An Alien Invader**

Alien or exotic species are organisms that are purposefully or accidentally introduced into an area which begin to outcompete native species for food, sunlight, water or nutrients.

An alien species has invaded our outdoor classroom! Identify this species and find out the following:
- Where did this species originate from?
- How did it get transported to Wisconsin?
- Diagram and explain the species’ life cycle.
- What are the negative impacts of this species on the environment?
- Are there any positive impacts of this species on the environment?
- What are some ways of controlling this species, both natural and manmade?
- What are the consequences of the control methods?
- List one thing you could do to help control this invasive species.
- List the name, address and phone number of a local agency that is working on this environmental concern. Include the contact person you spoke with.
- What did your contact person suggest you could do about this invasive species?
- How has this project motivated you to take some local environmental action?

**Project B: Urban Sprawl and Development**

Resource managers and policymakers use maps to monitor land use changes over time. Land use changes have a significant impact on an area’s water resources, the economy of an area, and even school district boundaries.

For this project do the following:
- Contact a local agency that can provide you with aerial maps of the Southwest High School area.
- Obtain maps of the same scale from 10, 30 and 50 years ago of this area.
- Cover the maps with clear plastic that can be color coded with permanent marker.
- Create a key for each type of land cover (i.e. forest, grassland, wetland, residential, agriculture) and designate a specific color. Use the same color coding for each map.
- For each map, determine how much area is occupied by each type of land cover.
- Create a table to summarize the percentage of land cover for each map.
- What happens to the amount of forested land as you go from 10 to 50 years ago?
- What happens to the amount of agricultural land as you go from 10 to 50 years ago?
- How have the residential and business areas increased over the past 50 years?
- How has this impacted the watershed of Beaver Dam Creek?
- Would you have handled development differently in this area? How?

**Project C: Changes in Water Quality of Beaver Dam Creek**

Beaver Dam Creek is the small creek that runs through our outdoor classroom on the Southwest High School grounds. The creek today is very shallow and winds through a residential area and alongside Westpoint Road. It was once a trout stream. The quality of water in a waterway is a reflection, to a large extent, of land use in the watershed.

The purpose of this project is to determine which areas of the watershed contribute the highest percentage of contaminants. This information is vital to policymakers and water managers when making decisions on how to best spend money for improvements in an area.

For this project do the following:
- Contact a community agency that can give you data on water quality or a historical perspective on Beaver Dam Creek.
- Where are the headwaters of Beaver Dam Creek? Where is it’s outlet?
- What are the predominant land uses along the creek?
- Determine point and nonpoint pollution sources in the Southwest High School neighborhood.
- Create a table of point and nonpoint pollution sources and best management practices that could reduce the impact of these pollutants. (Some factors to consider are roads, construction, agriculture, residential and athletic fields in the area).
- Conduct some baseline water quality tests. (Test kits can be obtained from the Einstein Academy). These should include temperature, pH, dissolved oxygen, nitrates and phosphates.
- What do these water quality tests tell us?
- What kind of “life” do you see in the creek?
- If you were a water quality manager for this watershed, what would you recommend?
DECISION AND ACTION SKILLS

Content Standard: Students in Wisconsin will use findings from environmental issue investigations to develop decision-making skills, and to gain experience in citizen action skill.
Activity: Legacy Project

Subjects: Science, Industrial Arts, Graphic Arts

Description: Students will create a project of significance to "leave behind" to serve as an educational tool for our outdoor classroom site.

Objectives:
• Students will develop a project to enhance the educational value of the outdoor classroom at Southwest High School. (EE Standard D.12.5)

Teacher Background:
I use this project as one of the student's choices for the final exam assessment. Some legacy projects might include Aldo Leopold benches, wildflower identification markers, trail information signs, tree silhouette plaques, a plaster track display or a physical challenge course.

Environmental Education Standard:

D.12.5 Develop a plan to maintain or improve some part of the local or regional environment and enlist support for the implementation of that plan.

Source: Tri-County Area School District Environmental Education Program
Name

Activity: Legacy Project

Background: A legacy is a gift of money or personal property often left in the form of a will. To leave a legacy is to leave something of yourself behind that will be of value to future generations or students that follow you.

For this project you will find something of significance that you can “leave behind” to serve as an educational tool for our outdoor classroom site. (I have a folder with some ideas to help you.) Your best ideas will come from your experience with the outdoors and what you feel will be useful to others. Keep in mind that the project you choose should match with your interest, talents and access to equipment.

Any permanent structure or improvements must be approved by the Outdoor Classroom Advisory Committee and must fit into the overall management plan which has been established.

Procedure: To help you obtain approval for your project you will need to write a proposal. The proposal should be typed, informative, accurate and have proper spelling and grammar. It must include the following sections:

A. A brief description of the project.

B. Educational benefits (who will benefit? How? Lesson plans?).

C. Proposed location in our outdoor classroom (if applicable).

D. Construction blueprints or plans (if applicable).

E. Materials list with itemized costs.

F. Timeline of how the projects will progress and be completed.

G. Individuals willing to help you (* You must make one community contact).

H. Maintenance or update requirements.

The project must be carried out and completed by the time of final exams. (NOTE: If this is a large scale project, more than one person may work on it but a list of responsibilities and duties must be included in the proposal so I understand who is doing what.)
PERSONAL AND CIVIC RESPONSIBILITY

Content Standard: Students in Wisconsin will develop an understanding and commitment to environmental stewardship.
Activity: Personal Environmental Belief Statement

Subjects: Science, Language Arts

Description: As a follow up to the Outdoor Classroom Issue Investigation activity, students will write a personal belief statement based on the issue they studied and the research they have done.

Objectives:
• Students will write a personal belief statement regarding the environmental issue they investigated. (EE Standard E.12.1)
• Students will evaluate the data they have collected in their community and relate it to their personal beliefs. (Science Standard H.12.6)
• Students will propose a way to advocate for a solution to their environmental issue. (Science Standard H.12.4)

Teacher Background: After students become aware of an environmental issue it is important to reflect on their own beliefs and clarify them regarding the issue. By writing a personal belief statement, students can outline what they have learned about the issue, cite data that supports their viewpoint and suggest some possible solutions. These skills will be invaluable to those students that want to become more environmentally active in their community. They will be well prepared to write a letter to the editor of their local newspaper, speak at a town hall meeting or express their opinions at a public forum.

Environmental Education Standards:

E.12.1 Articulate their personal beliefs regarding their relationship to the environment.

Wisconsin’s Science Standards:

H.12.4 Advocate a solution or combination of solutions to a problem in science or technology.

H.12.6 Evaluate data and sources of information when using scientific information to make decisions.
Activity: Environmental Personal Belief Statement

Procedure: As a follow up to the Outdoor Classroom Issue Investigation, you will write a personal belief statement based on the issue you studied and the research you have done.

A personal belief statement allows you to reflect on your own beliefs about the issue and clarify them. It allows you to outline what you have learned about the issue, cite data that supports your viewpoint and suggest some possible solutions. Having this information at your fingertips will be invaluable when you want to share the information you have with others in the community.

1. Minimum Requirements:
   a. Introduction - One Paragraph
      In the introduction, outline the issue you investigated on our school grounds. Describe what is happening, who is affected by the issue and what, if anything, has been done to correct the problem.

   b. Body - Three Paragraphs citing data from your research
      In the body, express your personal beliefs regarding the environmental issue. Support your beliefs with data from your research. Propose some ways to resolve this issue.

      Be sure to consider:
      1) all of the parties involved and the beliefs they hold about the issue.
      2) the procedures necessary to carry out the solution.
      3) if your values support the action required to carry out the solution.

   c. Conclusion - One Paragraph
      Tie together what you have learned from your research with your personal beliefs and the solutions you would propose to resolve this issue.
APPENDIX E

Green Bay School District

Workshop Proposal Form
NAME: Lyda Hudson
DATE: 5/14/02
ADDRESS: 1331 Packerland Dr.
ZIP: 54304
PHONE: 492-2650

I. TITLE OF WORKSHOP: Integrating a Woodland Wildflower Garden into Your Curriculum.

II. PRESENTATION:
A. DATES: May 14, 2002
B. TIMES: (after teacher workday, weekend—include specific hours)
   3:15—4:45
C. LOCATION: Room 2340 + outdoor classroom, SWHS

D. NUMBER OF PARTICIPANTS: Minimum: __ Maximum: ___
   (*unless negotiated differently through Staff Development; maximum to be determined by presenter in consultation with Supervisor of Staff Development)

E. SUGGESTED AUDIENCE: SWHS staff

III. LENGTH OF WORKSHOP: _______ hours (Do not include breaks)

Do you feel this activity should apply to the 7.5 hour District Designated Inservice credit? ___ yes ___ no (If yes, provide rationale.)

If yes, which designated area would it apply to? Strategies That Enhance Student Learning:

This portion to be completed by Staff Development Office personnel.

This proposal has been ( approved — denied ).
This proposal has been approved for the District 7.5 Hrs. ___ yes ___ no

ACTION TAKEN BY: ___________ Curriculum Council
                     ___________ Staff Development Advisory Committee
                     ___________ Supervisor of Staff Development

   (Signature) Supervisor of Staff Development

REASON FOR DENIAL: ____________________________________________

-over-
VI. PRESENTER COMPENSATION:
(Please check one of the following:)

   a. Staff Development Credit Hrs.            b. Financial Compensation
   c. Combination of a. and b.                d. N/A

(If a combination of credits and financial compensation, be exact.)

IV. PROGRAM CONTENT: (attach additional sheets, if necessary)

A. LIST LEARNING OBJECTIVES OR OUTCOMES. Following this presentation the participant should be able to:

   [Space for objectives]

B. PRESENTER NAME(S) AND QUALIFICATIONS:

   Lynn Hudock - SWHS science teacher
   working on masters in Environmental Ed.

C. OUTLINE OF THE PROGRAM CONTENT AND ACTIVITIES, INCLUDING APPROXIMATE TIME SEQUENCE AND BREAKS.

   [Space for outline]

D. PROGRAM EVALUATION: Please send a completed evaluation to Anneliese Waggoner, Supervisor of Staff Development, 200 S. roadway, Green Bay, WI 54301.

Note: Approval is valid for 12 months. A workshop may be repeated for one year before a renewal proposal must be submitted.
APPENDIX F

Rational for District

Designated Inservice Credit
Rational for District Designated Inservice Credit

To complete my master’s project for UW-Stevens Point I will be presenting an inservice on how to incorporate a restored woodland wildflower garden (in our outdoor classroom) across the curriculum.

Activities have been developed for this garden which address Environmental Education standards. These activities can be used in science, math, language arts, art, social studies and computer technology. I will be doing some of these activities with the teachers attending the inservice out in the garden and give them a copy of all of the activities.

I feel this is appropriate for district designated inservice credit in the 'Strategies that Enhance Student Learning' category because we are actively involving students and teachers in an outdoor learning experience that will enhance what they are already doing in the classroom.

Outline of Program Content and Activities:

3:15-3:25  Introductions and background on the development of the garden.
3:25-3:45  Activity- “Biodiversity Cards” as we walk out to the garden.
3:45-4:10  Activity- “There’s a Hair in my Dirt” with “guest readers” Rick Berken and Ruth Ann Reynen.
4:10-4:25  Overview of other activities that have been developed. Hand out activity booklets.
4:25-4:45  Walk back to classroom, refreshments, wrap up and evaluation.
APPENDIX G

Inservice Announcement Flyer
You’re Invited to learn about a "Secret Garden"... an inservice opportunity at Southwest High School

When: Tuesday, May 14, 2002
Where: Room 2340
Time: 3:15-4:45
PREMIUM District Hours Available

Purpose: In the fall I conducted a survey for my master’s program to see how many of our staff knew about the outdoor classroom on the SWHS grounds and, more specifically, about the woodland wildflower garden that is being restored there.

The results of the survey showed that most of the staff knew nothing about this area but that they would be interested in learning more about it if there were activities for their discipline involved. So here’s your chance!! Come and enjoy some “garden” refreshments while you learn about this great outdoor resource right on our school grounds. Copies of cross-curricular activities for classroom use will be provided.

A special reading by Rick Berken ("The Man") and Ruth Ann Reynen will be featured in one of the activities!!

Please RSVP by Thursday, May 9th in Lynn Hudock’s mailbox!

Name_____________________________________

___ I would like to attend the inservice on Tuesday, May 14th.

___ I can’t attend the inservice but would be interested in learning more about teaching in a wildflower garden/outdoor classroom situation.
APPENDIX H

Inservice Recipes
Rosewater Lemonade

Clean and wash the petals from two roses in bloom. Place the rose petals in a Food processor or blender and add 2 Tbsp. Water. Process the mixture until smooth, and add the following:

- 3 ½ cups reconstituted lemon juice
- 2 ½ cups sugar
- 12 cups water

Stir the mixture well until all the sugar is dissolved. Let rest overnight in the refrigerator. When ready to serve, strain the mixture through a fine mesh strainer with a cheesecloth in it. Pour over ice, and garnish with a rose petal and a wedge of lemon.

Violet Hors d'oeuvres

8 oz package of cream cheese
- ¼ lb. Corned beef or chipped ham, finely chopped
- 1 ½ - 2 Tbsp. dark or light mustard (let your taste buds decide)
- 1 cup violet flowers, stems removed
- whole violet leaves

Blend cream cheese, corned beef and mustard together. Roll into 1 inch balls and flatten slightly. Cover completely with violet flowers. Chill and serve on whole violet leaves.
APPENDIX I

'There's a Hair in My Dirt' Script
THERE'S A HAIR IN MY DIRT
By
Gary Larson

Narrator: Beneath the floor of a very old forest, nestled in among some nice, rich topsoil, lived a family of worms. Earthworms, to be exact.

One evening, the three of them—father, mother, and their little worm son—sat down to their usual dinner: dirt.

They had just begun to dine when the little worm, staring wide-eyed at his meal, suddenly spit out his food and screamed,

Little Worm: "THERE'S A HAIR IN MY DIRT!"

Narrator: And sure enough, there it was—plain as day. They could all see it.

At first, the little worm was horrified, but soon that gave way to being just plain mad.

Little Worm: "I hate being a worm!"

Narrator: he screeched, his tiny body trembling.

Little Worm: "We're the lowest of the low! Bottom of the food chain! Bird food! Fish bait! What kind of life is this, anyway? We never go swimming or camping or hiking or anything! Shoot, we never even go to the surface unless the rains flood us out! All we ever do is crawl around in the stupid ground. Oh, and how can I forget? We eat dirt! Dirt for breakfast, dirt for lunch, and dirt for dinner! Dirt, dirt, dirt! And look—now there's even a hair in my dirt! The final insult—I can't stand it any longer! I HATE BEING A WORM!"

Narrator: And with that, the little worm slumped back in his chair, exhausted by his outburst.

Mother Worm, an expression of concern on her face, looked from her pouting son to Father Worm. She had constantly tried to make their home as cheery as possible, even going so far as always putting silverware on the table—despite the fact that none of them had arms.

But Father Worm, a proud invertebrate and a learned member of the Annelida phylum (even with his small, rudimentary brain), was glaring at what he considered to be an ungrateful and ignorant son.

Father Worm: "Well, well, well. Let me get this straight: Not only is your mother's dirt not good enough for you, but you feel being a worm isn't exactly a charmed life, eh?"

Narrator: A strange glint fell across Father Worm's eye.

Father Worm: "My boy, I think it's time I tell you a story."

Narrator: The little worm looked up and sneered sarcastically,

Little Worm: "If this is the one about the teenager worms and the Insane Trout Fisherman, I've heard that one a gazillion times!"
Father Worm: “No, no”

Narrator: Father Worm calmly responded.

Father Worm: “Not that story. (Though it is a good story.) This one is different. This story has a happy ending.”

Mother Worm: “I have an idea!”

Narrator: Mother Worm chimed in enthusiastically.

Mother Worm: “Let’s listen to Father’s story and afterwards, maybe we can all have some fresh, cold dirt for dessert!”

Narrator: And so Father Worm cleared his long, primitive pharynx, took a futile puff on his dirt-filled pipe, and began his story.

Father Worm: Once upon a time, in a forest not too far from here, lived a beautiful young maiden. Her name was Harriet, and Harriet loved the magic of Nature, with all its magnificent plants and animals.

One lovely spring morning, she decided to take a stroll along her favorite woodland trail.

Harriet: “What wondrous things will I see today?”

Father Worm: Harriet thought to herself. I must say, she was as excited as a tapeworm in a meat patty!

With her first steps, Harriet took a deep breath and filled her lungs with the fresh air.

Harriet: Oh, thank you trees and other plants! Thank you for making the air so crisp and clean!”

Father Worm: Well, as any worm with a half a ganglion knows, the plants did little more than just make the air crisp and clean — they made the air air! Every molecule of oxygen in the earth’s atmosphere was put there by a plant, and — last time I looked — the Living were quite fond of oxygen. (Heck, even the Dead need it, or they’d hang around a lot longer and get on everyone’s nerves.)

Soon Harriet met a family of squirrels, who came bounding toward her, unafraid and looking for a possible treat. Gathering nuts from a nearby tree, Harriet was quick to accommodate them.

Harriet: “Oh, you’re all so cute!”

Father Worm: To be sure, these furry creatures had that “cute” thing down real good — regrettable. You see, Harriet was feeding Gray squirrels, a large, aggressive species that had been introduced to this forest and were taking it over from the native Red squirrels, a smaller, more timid species.

All squirrels are rodents, but in the wrong time and place, some are rats.

Around the bend, the forest opened into a meadow of wild flowers as far as the eye could see.
Harriet: "My! I'm gazing at a painting! Oh Mother Nature! What an artist you are!"

Father Worm: "Oh, Mother Nature! What a sex maniac you are!" may have been a better choice of words, for Harriet was actually gazing upon a reproductive battlefield. Using bright colors, nectar, mimicry, deception, and whatever other tricks they had up their leaves, these floral sirens were competing for the attention of pollinating insects.

In a field of flowers, all is fair in bugs and war.

A little ways farther, Harriet happened to look down and saw a column of ants crossing the trail.

Harriet: "Ahhh!

Father Worm: She smiled noticing all the eggs they were carrying.

Harriet: "Even the littlest creatures take good care of their babies! How adorable!"

Father Worm: "Adorable?" Well, as Grandpa Worm used to say, "About as adorable as a nest of baby robins!" These were Amazon ants, a species that, despite its name, lives in many parts of the world and specializes in the enslavement of other species – and Harriet was watching a raiding party returning home with their living booty.

Narrator: Author’s Note: Although most slave ants spend their lives toiling away (e.g., getting up early to milk the aphids), a few escape that fate by doting on the queen. Entomologists often describe these slackers as "abdomen kissers".

Father Worm: As the trail widened and the trees thinned out, Harriet heard a rumbling sound. Looking up, she spied a familiar truck heading her way. She immediately recognized the ruggedly handsome and rosy-cheeked character behind the wheel.

Harriet: "Hello, Lumberjack Bob!"

Father Worm: she called, waving with happy excitement, knowing him to be a gentle man with a quick smile and a big heart.

Well, kind, big-hearted, and rosy-cheeked he might be (the latter caused by expanded capillaries in his skin’s dermal layer), but Lumberjack Bob was really just a regular guy with little education doing the one job he knew how to do – cutting down ancient trees that were here long before the first intestinal worms came over in the Pilgrims.

Harriet then heard a magical sound from the canopy of trees above.

Harriet: "Oh! Listen to the songs of those happy, happy birds!"

Father Worm: Well, if those birds were happy, may the garden gods cut me in half with a rusty shovel! Birds sing to communicate, and what they were communicating was mostly an array of insults, warnings, and come-ons to members of their own species.

(In fact, all baby birds are taught by their parents not to even smile, or their beaks will crack.)
Little Worm: "This story is for the birds, if you ask me! Some lady taking a walk in the woods? Oh, I can't stand the excitement! If you have to tell me a story, you could at least tell me one that's sort of exciting — like 'Mr. Dung Beetle Finds His Field of Dreams.' Now that's a cool story!"

Father Worm: "I'm telling you *this* story. So just put a fish hook in that mouth of yours and let me finish! Now where was I? Oh, yes."

In the distance, Harriet noticed some movement at the far side of the meadow.

Harriet: "Fawns!"

Father Worm: And as she watched them taking turns chasing each other and frolicking while their mother grazed, she mused out loud...

Harriet: "Yes, little ones, go ahead and play your silly games, for soon you'll be all grown-up and have to say good-bye to such carefree antics."

Father Worm: Silly games? Carefree antics? Leech livers! As young animals play, they literally become smarter, as extra neurons are formed in their brains. And, of course, smarter deer have a better chance of survival than dumber ones.

You know, Bambi's mom never played much as a kid, and look what happened to her.

Around the next bend, the path skirted a lovely pond, and Harriet was elated to see a slow-moving, lumpy creature just in front of her.

Harriet: "Mr. Turtle!"

Father Worm: she squealed, excitedly scooping up the startled reptile. And then, with a sympathetic smile....

Harriet: "What are you doing out of your pond, Mr. Turtle? Well, I think I'll just send you right back home!"

Father Worm: So Harriet wound up and hurled the bewildered animal into the middle of the marsh, where it landed with a loud and satisfying *kerplunk*!

Well, unfortunately, "Mr. Turtle" was not a turtle at all, but a tortoise, and while turtles are well adapted for aquatic life, their land-dwelling cousins never even evolved into decent dogpaddlers. Sadly, the little reptile sank to the bottom, where it promptly drowned. (Even worse, who knows how many of our parasitic loved ones went down with the ship!)

As the middle of the pond bubbled, Harriet's eye was caught by large and colorful insects flying just above the surface.

Harriet: "Dragonflies! Oh, look how they dance in the air, like winged ballerinas!"
Father Worm: "Winged ballerinas?" Winged assassins in tutus might have been closer to the truth! Dragonflies are skilled predators, and if their graceful aerobatics have anything to do with dancing, then I'm a sea monkey's uncle.

Harriet thought she saw something move in the tall grass near her feet. Dropping gracefully to her knees, she almost put her hand on a small slug that was wandering by. Recoiling in disgust she cried...

Harriet: "Stay away from me, you slimy little thing!"

Father Worm: And then, seeing the real object of her desire, she lunged forward and came up with her prize.

Harriet: "Hello, Mr. Frog! Should I kiss you and see if you turn into a prince?"

Father Worm: Fortunately for Harriet, she didn't kiss this creature, for it wasn't "Mr. Frog" she was holding, but "Mr. Toad," and like most toads (and some frogs) this one packed a powerful, sometimes lethal, toxin in its skin. On the other hand, the slug slime was actually quite harmless, if perhaps a bit gooey.

Kissing out of your species is not really recommended, Son, but if you have to, always choose a gastropod over an amphibian.

Mother Worm: "Ernie Johnson!"

Father Worm: "What?"

Mother Worm: "Ernie Johnson! I went to my high school prom with a slug named Ernie Johnson! And Ernie's slime might have been harmless, dear, but it certainly wrecked my evening! Before the night was over, I was wishing I had brought a salt shaker!"

Little Worm: "Well, what made you fall for Dad? He's slimy, too, isn't he?"

Mother Worm: "No, not exactly. Your father has always been more on what I'd call the 'sticky' side."

Father Worm: "MAY I PLEASE CONTINUE? That is, if the two of you are through discussing the viscosity of my mucus!"

Releasing the frog, Harriet continued on her way. The trail soon brought her to the edge of a small river, where she saw a most remarkable sight: Large, hook-nosed fish, their red scales shimmering in the sunlight, were struggling to get upstream.

Harriet: "Salmon! Looking for their spawning grounds, I bet!"

Father Worm: Well, technically speaking, the salmon weren't looking for their spawning grounds - they were smelling them. When they hatch, the smell of home is branded into their brains forever, and even though they may wander in the ocean for years, their incredible noses will one day lead them right back to where their life began.

Now, we earthworms have our own little miracle when it comes to breeding: Each of us contain both male and female reproductive organs! (But that's a story I'll tell you when you're a little longer, Son.)
As the trees closed in on Harriet, the forest grew darker and darker. Sensing that she was being watched, Harriet looked up into a nearby tree and was momentarily startled to see a pair of large, ominous eyes staring back at her.

**Harriet:** "Oh, I recognize you now, Mr. Owl! And fireflies! They're the fairies of the night, enchanting the forest with their magical little lights!

**Father Worm:** Ha! Did Harriet ever get taken in by one of the oldest tricks in Nature's book — the old I'm — a — scary — creature — with — giant — eyeballs gag. You see, "Mr. Owl" was really a Royal moth, an insect that uses its large wing spots to mimic a much more frightening animal. (One once scared the dirt out of me!) And those fireflies — which really weren't fireflies at all, but beetles — were using a cold chemical process to produce light and attract potential mates. Beautiful, yes, but if anyone thinks they're magical, I've got some hardpan in Florida to sell them.

Soon our maiden was confronted by a sight that saddened her deeply. An immense tree, as old as the forest itself, was lying on the ground.

**Harriet:** "Oh, I'm so sorry! Such a tragedy! Such a waste! Oh, you poor, beautiful tree!"

**Father Worm:** Well, truthfully, the tree's fate was a far cry from being a "waste". These huge "nurse trees," as their name implies, are the key to new growth and the survival of the entire forest. In fact, a fallen tree is arguably more alive than a standing one, so much of their mass is taken up with other organisms. As a famous worm once wrote,

*I think that I shall never see*
*A poem as lovely as*
*A big, rotting tree carcass.*

Harriet was suddenly surprised to come across a little baby bird lying helplessly on the ground. She gently scooped up the scared little creature and searched for a nest in the highest reaches of a nearby tree.

**Harriet:** "Poor little guy. Did you fall out of your home? Well, I'll put you right back where you belong!"

**Father Worm:** Climbing the tree, Harriet peered into the nest.

**Harriet:** "There you go!"

**Father Worm:** she said, placing the trembling baby bird alongside its sibling.

**Harriet:** "You two youngsters are together again!

**Father Worm:** But not for long. As soon as Harriet was gone, the fledgling found itself plummeting back to earth. You see, she had rescued a baby Golden eagle, a species in which the strongest sibling ensures its own survival by giving its younger brothers and sisters the old "heave — ho".

**Narrator:** Author's Note: This behavior always takes place in the parents' absence, which would come as no surprise to the younger siblings of all other species.
Father Worm: Scrambling up the tree, Harriet's view was marred by the sight of a forest fire, raging out of control, but fortunately moving away from her.

Harriet: "Oh the suffering! The loss of life! Someone should try and put it out!"

Father Worm: Someone should just mind their own business, from Nature's point of view.

Big healthy trees don't burn very easily, unless the flames are stoked with a lot of fallen branches and debris. Occasional fires (if certain two-legged vertebrates would just let them run their course) benefit the forest by keeping all that dangerous "kindling" from piling up. But, boy, if it does pile up, WHOOSH!, better watch your anterior end.

But Harriet's spirits didn't stay dampened for long, and she decided it was time to return home. As she hummed a cheery tune, she reflected on how lucky she was to live in the forest and be so close to Nature. Oh, the things she had seen!

But then, without warning, Harriet came across something she didn't want to see. A sight that chilled her blood!

Harriet: "A SNAKE!"

Father Worm: And trapped within the serpent's coils, being slowly suffocated, was a small, helpless mouse. The poor creature, almost expired, was emitting faint squeaks, and his scared eyes seemed to meet Harriet's in one last look of hope.

Acting quickly, Harriet grabbed a nearby stick and began striking the reptile repeatedly.

Harriet: "Take that, you dreadful thing!" BONK! "And that!" BONK! "And two more!" BONK! BONK!

Father Worm: Soon it was over. The snake was dead. (Boy, was he ever.)

Catching her breath, Harriet reached down and gently removed the unconscious mouse from the snake's lifeless coils. And as the fair maiden watched, a miracle occurred: The little mouse stirred. He was alive! A minute later, he got groggily to his feet, looked up at Harriet, and wiggled his nose.

Harriet beamed. As she held the little mouse in on hand, she wiped a tear away with the other.

She put the little fellow down at her feet, where he quickly bounded off into the tall grass, safe and sound. Harriet headed home. Good had triumphed over Evil, and the forest was just a little bit safer for everyone.

Well, actually, the snake Harriet killed was a rodent-eating predator, and that cute little mouse she saved was a vector for a deadly disease. When Harriet wiped the tear from her eye, a virus, which was living on the mouse's fur invaded her body. And one lovely spring morning, Harriet, delirious with fever, stumbled out of her little cottage, fell over, and died. The End

Little Worm: "SHE DIED? What kind of story is that? That's supposed to cheer me up? Boy, I'm really full of warm, wormy feelings now! Thanks, Dad!"

Narrator: Father Worm sat back in his chair, trying to be patient but secretly thinking his son was perhaps short a neuron or two.
Father Worm: “Look, my boy. I’m afraid you haven’t quite grasped the point of this story. You see, Harriet loved Nature. But loving Nature is not the same as understanding it. And Harriet not only misunderstood the things she saw – vilifying some creatures while romanticizing others – but also her own connection to them. Ah, connections, Son. That’s the fateful key that Harriet missed, the key to understanding the natural world.”

Narrator: Father Worm sat back, stretching himself out to his full, glorious three and a half inches.

Father Worm: “Take us worms, for example. We till, aerate, and enrich the earth’s soil, making it suitable for plants. No worms, no plants; and no plants, no so-called higher animals running around with their oh-so-precious backbones!”

Narrator: He was really getting into it now.

Father Worm: “Heck, we’re invertebrates, my boy! As a whole, we’re the movers and shakers on this planet! Spineless superheroes, that’s what we are!”

Narrator: And since Father Worm didn’t have a fist to bring down on the table, he just yelled

Father Worm: “BANG!”

Narrator: The little worm sat there for a moment, thinking about what his father had just told him. And it was true, he was feeling a little better about his lot in life. Maybe even a little proud.

But then he remembered something.

Little Worm: “Okay, I get it – being a worm ain’t so bad. But you’re wrong about one thing: That story didn’t have a happy ending! You said it had a happy ending!”

Father Worm: “Well, it does, if you’re a worm.”

Narrator: And then he leaned across the table until his face was very, very close to his son’s and said with a big grin....

Father Worm: “Which brings us back to that hair in your dirt. Or should I say………..Harriet?”

Narrator: Mother giggled. Father guffawed. And the son frowned, then smiled, then broke out into laughter.

And after they all stopped laughing, the little worm finished his whole dinner, went to bed, and had the best dreams ever!  

Author’s Note: Well, truthfully, earthworms don’t really sit around dinner tables complaining, telling stories, laughing, and so on. On the other hand, they do have a message for all of us....
APPENDIX J

Outdoor Classroom Site Survey II
1. What subject area do you teach? ____________________________

2. Within the last school year, have you used the outdoors for classroom instruction? _____ If yes, how many times? ________

Please circle the appropriate number to the statements below:
1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree

3. I understand what a woodland wildflower garden is and have a better idea of the resources at the site. 1 2 3 4

4. From this inservice I gained some knowledge regarding outdoor teaching techniques. 1 2 3 4

5. The ideas and activities provided in the SW garden curriculum booklet were appropriate for my discipline. 1 2 3 4

6. The ideas and activities provided were user-friendly. 1 2 3 4

7. This inservice has shown me a way to incorporate Environmental Education into my coursework. 1 2 3 4

8. This inservice has increased my confidence in using an outdoor classroom site. 1 2 3 4

Additional comments and/or suggestions:
APPENDIX K

Green Bay School District

Staff Development Evaluation
Program Title: __________________ Presenter: ____________

Please check the appropriate space pertaining to your instructional level:

__ Primary   __ Middle School   __ Administrator (Title): ___________

__ Intermediate __ High School   __ Other (Specify): ____________

1-Poor quality, strongly disagree
2-Disagree
3-Agree
4-Excellent, strongly agree

1. The presentation met the stated objective. 4 3 2 1
2. I gained new information from this presentation. 4 3 2 1
3. The material presented will be helpful to me in my teaching. 4 3 2 1
4. The material was presented in an interesting and organized manner. 4 3 2 1
5. The audiovisuals and handouts facilitated my learning. 4 3 2 1
6. The time allotted for the course content was sufficient. 4 3 2 1
7. The facility was appropriate for my learning experience. 4 3 2 1
8. The resource people were prepared for the presentation. 4 3 2 1

Please complete comments section I - III.

COMMENTS:

I. What will be the best remembered one or two ideas/concepts presented in this program?

1. __________________________________________
2. __________________________________________

II. What changes or suggestions would you make to the presenter?

1. __________________________________________
2. __________________________________________

III. What suggestions do you have for future program topics, presenters, and/or follow-up activities?

1. __________________________________________
2. __________________________________________

Signature (optional): __________________________

Please hand in at the end of the workshop.
APPENDIX L

Southwest High Lights
"The most useless day is that in which we have not laughed."

Throughout the year it is important to share our thoughts, comments and good wishes with our colleagues: heard about...congratulations...thank you...just because...

This week's activities..

Monday, May 20  Awards Assemblies, Period 2, Grade 9, Period 3 Grade 10
Tuesday, May 21  Principal's Coffee, 9:00 a.m.
Wednesday, May 22 Awards Assemblies, Period 2, Grade 11, Period 3, Grade 12
National Honor Society campus and neighborhood cleanup, 5:00 p.m.

Thank you..
To Lynn Hudock for showing staff the "secret garden" in the back yard. The reading of "There's Hair in my Dirt" with fair maiden Harriet (RuthAnn), Father Worm (Rick the Man Berken), Little Worm (Jon Taft) and narrator (Steve Abitz) was hilarious, yet provided a great staff development to understand our connection to nature.

To faculty and staff for accompanying your students to the multi-media presentation, Boundaries. I hope it provided some teachable moments.

End of the Year Breakfast...
Mark your calendars for June 6. We are once again planning a breakfast like we had last year to wrap up our school year. The breakfast will have a minimal cost. More details to follow.

RETIREMENT DINNER REMINDER...
Don't forget to turn in your reservation form for this year's retirement dinner being held on May 29 at Rock Garden Supper Club. Please return your reservation form to Nancy Moran by May 20. If you have lost your form we do have extras. Don't miss this fun opportunity to bid farewell to some great Southwest teachers. The teachers retiring this year are Mavis Andler, Jim Hayes, John Kabele, Mary Schwartz and Dick Sieg.

Future Field Trip...
Wednesday, May 22  TimberRattler Game, Nancy Brunner, 30 students, 12 adults.

ATTENTION READERS...
Laura Zerjav and I are interested in forming a professional readers' group here at Southwest. Our purpose is to read books that help to inspire, encourage, and allow us to grow as professionals. We feel that having such a group would allow teachers to read professional books on a variety of subjects and share their insights with one another while earning Staff Development hours.

OVER
'In the end, we will conserve only what we love.
We will love only what we understand.
We will understand only what we are taught.'

~Baba Dioum
conservationist from Senegal