AN ENVIRONMENTAL AND OUTDOOR EDUCATION PROSPECTUS
FOR McGRAW CENTRAL SCHOOL

A Research Project Presented to the
Department of Recreation
State University of New York
College at Cortland

In Partial Fulfillment of the Requirements for
the Master's Degree in Recreation

Kim I. Massari, December 1991

Approved:

Date Charles H. Yaple, Project Advisor

Date Herman J. Kitzmann, Project Committee

Date Vicki L. Wilkins, Project Committee

Date Anderson B. Young, Department Chair
It is with great appreciation and gratitude that I acknowledge the members of this project committee, Herman Altmann and Dr. Vicki Wilkins, for their enthusiastic support, patience, and contributions.

A special thanks is extended to Dr. Charles Yaple, Project Advisor, whose constant guidance, patience, and wisdom made this prospectus possible.
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CHAPTER I
INTRODUCTION

Outdoor education is both a valuable and valid method of teaching and learning that uses experience as the primary focus. It is a way of curriculum enrichment that can be applied to any and all school subjects. "It is not a separate discipline with prescribed objectives like science and mathematics; it is simply a learning climate which offers opportunities for direct laboratory experiences" (Smith, 1969, p. 1) that helps the student grasp concepts more easily, gain insights, and develop concern about humans and their relationship to the natural environment. In 1957, L.B. Sharp provided a definition of outdoor education that is still widely recognized today:

Outdoor education is a common sense method of learning. It is natural; it is plain, direct, and simple. The principal thesis which underlies the implications of outdoor education for all subject matter, in all areas of study, and at all levels is:

- That which can best be learned inside the classroom should be learned there.
- That which can best be learned in the out-of-doors through direct experience, dealing with native materials and life situations, should there be learned (Sharp, in Ford, 1981, p. 4).

According to Ford (1981), "as an integral part of the school site, an outdoor classroom expands the learning environment readily accessible to children and teachers"
Environmental and outdoor education (hereafter referred to as E & OE) often go "hand in hand" as both are concerned about protection of the natural world. Environmental education, however, goes beyond learning in and about the out-of-doors. Environmental education can be viewed as a broader, all-inclusive process (Ford, 1981) whose aim is to enable persons to understand and appreciate the biophysical and sociocultural systems of which they are a part; to understand problems and identify ways to solve problems that are associated with those systems; and to be committed to work toward the solution of these problems, thereby empowering students with the ability to create optimal environments for living (Young, 1983).

Outdoor education is an effective way to transmit this type of knowledge about the environment and natural resources. Several studies (Brockmeyer, Bowman, & Mullins, 1982; Case, 1979; Elks, 1987; Jones, 1976) that have tested gains in knowledge from outdoor curriculums indicate that being taught concepts in the outdoors is indeed a valid learning experience. Previous studies (Elks, 1987; Henderson, 1986) further support outdoor education as an effective method of instruction, noting that outdoor curriculums offer a more conducive and appropriate atmosphere for learning certain concepts.

Furthermore, because attitudes can guide our
behavior and are shaped early in life (Ford, 1981; Gross, 1977; Miller, 1975) outdoor education is a vehicle through which positive attitudes toward the environment can be shaped in students during the main developmental period.

Outdoor education for the public school student can take place virtually anywhere. Typically, secondary school students are taught concepts that enrich the curriculum at locales such as nature centers, residential outdoor education centers, and museums. Although these are effective climates for outdoor education, the cost, transportation, and inconvenience associated with field trips are barriers that discourage their utilization (Keown, 1986). This indicates that teachers may be more inclined to teach concepts in the outdoors if the resource is convenient, accessible, free, and immediately available for follow-up and subsequent studies.

Finally, outdoor education on school grounds has proved to be less disruptive to learning than a field trip (Falk & Balling, 1982). School property offers many advantages for conducting outdoor lessons. Its availability is important for following up on observations, for independent student study projects, and for taking advantage of the 'teachable moment' (Ford, 1981). Several other advantages to outdoor education on school property cited by Ford (1981) are that no special permits, permission slips signed by parents, or authorizations are required, lunches need not be arranged,
and class schedules need not be shifted. Furthermore, its proximity to shelter, medical facilities (school nurse), and restrooms make the school property an appealing learning site.

In conclusion, Steinhart (1985) suggests that "even where we manage to fit environmental education into the curriculum, we may not generate the concern we seek for nature" (p. 13). In agreement with this belief, Thomas Tanner of Iowa State University conducted a study that investigated the backgrounds of "adults who were active and informed citizen conservationists" (Tanner, 1982, p. 706). Respondents to Tanner's survey of "what nurtured their commitment to the environment" (Steinhart, 1985, p. 13) suggested that "their interest in conservation was not acquired in schools". Rather it was the love of a relatively pristine place (such as a farm, small rural town, or park) where they spent much time as children. In his study, Tanner concluded that "environmental education programs that are limited solely to classroom instruction, to occasional field trips, or to short outdoor camping experiences may not be achieving their main goal" (Tanner, 1982, p. 706). Giving students an opportunity to learn and play in a readily available pristine habitat may provide the impetus for forming positive life long attitudes about the environment in an ever-increasing urbanized society.

McGraw Central School is an ideal site for E & OE
because it owns over 40 acres of property adjacent to the school and has several faculty members interested in environmental and outdoor education. This natural area is secluded, mostly wooded, and undeveloped and its diversity of terrain, vegetation and wildlife is suited perfectly for outdoor lessons. Its unique sociocultural, biophysical, and natural features can provide a meaningful focus for several curriculums.

Statement of the Problem

As the state of the environment continues to deteriorate, the consensus emerging among educators indicates a need for the vast majority of schools in the United States to provide students with more exposure to the natural world. In general, American schools should be more concerned with fostering stewardship within our youth and empowering them to act responsibly. According to research done by Howison, Niedermyer, & Shortridge (1988) students do not necessarily apply what they have learned in the classroom to everyday behaviors. Therefore, to foster positive environmental attitudes in children so that they will help to diminish the deterioration of this planet, methods reflecting global awareness and stewardship must be utilized. These methods can be implemented through the powerful medium of E & OE.

Since McGraw's curricula are not immune to these educational shortcomings and are indeed representative of
the nation's public schools, the intent of this project is to produce a plan (or environmental and outdoor education prospectus) that will provide teachers with the means to effectively utilize a portion of the natural area for outdoor use. Therefore, the goal of this prospectus is to assess outdoor learning opportunities at McGraw Central School and suggest ways that teachers might more fully utilize the site.

The prospectus includes recommendations for developing, accessing, and maintaining a trail; maps of the natural area; a land inventory; and outdoor lessons for use with seventh grade science, language arts, math, and social studies students.

Review of Literature

Several studies (Case, 1979; Elks, 1987; Henderson, 1986; Nichols, 1989) have been conducted to determine the usefulness of outdoor education. Case (1979), in studying the effects on environmental knowledge and attitudes of sixth grade students from environmental education integrated into the school curriculum, found that outdoor education is a valid method of learning. In a study of the use of an environmental education center, Elks (1987) found that the outdoors was a more appropriate environment than a traditional classroom setting for teaching science concepts. Henderson (1986), in an attempt to determine whether or not outdoor education promotes a more solid
grasp of environmental concepts than a similar curriculum taught in a traditional classroom setting, found that outdoor curriculums offer a more conducive atmosphere to learning. From his study on the use of an interpretive trail in an outdoor education program, Nichols (1989) also found that outdoor education could be viewed as a valid method of learning.

Research has also established that there is not only a need for outdoor education, but a need for an increase in environmental knowledge which can be gained through outdoor education. Keown (1986), in a survey assessing use of outdoor resources by secondary natural science teachers in U.S. schools, found that there are strongly held beliefs in using outdoor resources to teach science concepts and for including outdoor education in science curriculums. In addition, previous studies by Bohl (1976) and Jones (1976) have indicated that students and teachers possess a limited amount of environmental knowledge. Jones (1976), in measuring current levels of environmental education competencies among third grade students and their teachers, found that overall levels in both students and teachers were generally low. Likewise, Bohl's (1976) survey of the cognitive and affective components of environmental information among tenth and twelfth grade students, found that the majority of students possessed a significantly low level of both cognitive information and positive attitudes concerning the environment. Both these
findings point to an urgent need for environmental education programs in the schools.

It would follow that increasing environmental knowledge would result in more positive attitudes toward the environment. Indeed, numerous studies have shown that a positive relationship exists between the cognitive and affective domains of a student and that outdoor education fosters positive environmental attitudes. One such study, conducted by Jaus (1982), sought to determine the effectiveness of environmental education instruction on fifth grade student's attitudes towards the environment, and found that students receiving the instruction held significantly more positive attitudes than those who did not receive instruction. Jones (1976) also found a highly significant correlation between environmental knowledge and attitudes toward the environment in her study to determine if a relationship exists between environmental knowledge and behavior towards the environment in third grade students and their teachers.

Furthermore, in an analysis of attitudes of elementary school students following participation in an environmental outdoor education program, Gross (1977) found that the program resulted in significantly more positive attitudes toward the use and preservation of nature and the environment. Another study by Henderson (1986) concluded that a residential outdoor education center promoted a positive influence in several areas of
the affective domains in students such as responsibility, self-awareness, self-esteem, cooperation among peers, and reduced anxiety. Research by Elks (1987) found that the utilization of an outdoor education center motivated positive attitudes toward environmental education in students. All of these works strongly indicate that outdoor and environmental education are viable ways to foster positive attitudes in students.

Program length is another factor that has been considered in the effectiveness of outdoor education. In a study that "sought to determine whether or not any measurable impact on environmental attitudes occurred as a result of participation in a specific outdoor education program" it was shown that a positive relationship may exist between program length and positive environmental attitudes (Shepard & Speelman, 1986, p. 20). Henderson's (1986) research sought to determine the utilization, among outdoor education professionals, of the outdoors to enrich the curriculum and promote more effective learning. This study expressed a consensus among professionals that residential outdoor education programs may promote positive influences on affective domains of students. Therefore, these findings suggest that by enabling outdoor study to occur regularly, schools may positively influence students. These findings lend support to the notion that school property is an ideal location for outdoor study to occur regularly.
Falk & Balling's (1982) research also indicates that school property is a logical and effective setting. Their study sought to determine the impact of field trips on students, and showed that extremely novel settings negatively influenced concept learning. This study also determined that school sites were perceived as more familiar settings to students. In Keown's (1986) survey of natural science teachers, he found that common barriers to outdoor education were cost and transportation. Use of school property eliminates both these barriers. Although these studies do not directly address school property as a locale, they do indicate that it is a valid setting for outdoor education to take place.

Finally, student age and grade are important factors in the implementation of outdoor education programming. Both Miller (1975) and Knapp (1972) determined in their studies that environmental attitudes are formed during early years (before 8th grade) and are fixed by the time a student enters 9th grade. Knapp (1972), in studying the attitudes and values of elementary and secondary school students regarding environmental education, concluded that environmental instruction should take place during the elementary or middle school years. In Miller's (1975) research of the development of attitudes toward environmental conservation and pollution during the elementary school years, he concluded that the level of concern grows rapidly and the understanding of
environmental issues increases in sophistication during the years prior to 8th grade.

Furthermore, in studying the effects of a specific environmental education program utilizing sensory and conceptual approaches on the attitudes, knowledge, and perceptions of 5th and 6th grade students, Gross (1977) indicated that as students mature "an egocentric orientation to an orientation towards others and society" may occur (p. 29A). This finding suggests that 7th grade students have developed and matured to a level that may allow them to gain more positive environmental attitudes from an outdoor program.

In summary, the research reviewed suggests that there is not only a need for increases in environmental knowledge, but that outdoor education is a viable method of obtaining this knowledge. Furthermore, the research implies that an increase in knowledge can increase positive attitudes toward the environment. The research also indicates that although residential outdoor education centers are beneficial because they provide students with opportunities for direct experience, environmental and outdoor education conducted on school property has advantages over E & OE conducted at locations that are distant from the school. Finally, since previous studies have shown that attitudes may be developed prior to eighth grade, it would seem that seventh grade is an appropriate age for developing positive environmental attitudes.
Therefore, this project focuses specifically on an environmental and outdoor education curriculum that takes place on school property for seventh grade students.

Definition of Terms

Outdoor education - "education in, about, and for the out-of-doors" (Sharp, in Ford, 1981, p. 12). It is a learning climate rather than a discipline in and of itself that uses direct experience as the main focus of instruction.

Environmental education - in this context, is defined as a process whose aims are to enable persons to understand and appreciate the biophysical and sociocultural systems of which they are a part; to understand problems and identify ways to solve problems that are associated with those systems; and to be committed to work toward the solution of these problems, thereby creating optimal environments for living (Young, 1983).

Environmental attitude - personal perspectives of stewardship and ethics for the land that ultimately guide our behavior.

Traditional classroom instruction - the standard method of instruction that typically combines lecture and hands-on learning and takes place in an indoor classroom; it is the method primarily used in the American educational system.

Natural area - in the context used here, an area that is undeveloped and in its natural state.
Secondary school students - for the purposes of this project, students who are enrolled in grades 7-12.

Elementary school students - for the purposes of this project, students who are enrolled in grades K-6.

Cognitive domain - in the process of knowing, the area pertaining to perception, introspection, or memory; intellect.

Affective domain - in the process of knowing, the area pertaining to feelings or emotions; attitudes.

Residential outdoor education center - a site that has been developed specifically for the instruction of outdoor and environmental education and can accommodate students for overnight experiences.

Mobility impairments - for the purposes of this project, mobility impairments include non-ambulatory, semi-ambulatory, and incoordination disabilities. "Non-ambulatory disabilities are those impairments that, regardless of cause, [result in use of wheelchairs for ambulation]. Semi-ambulatory are defined as impairments that cause individuals to walk with difficulty or insecurity; examples include persons who require the use of braces, crutches, or canes, or persons with arthritis. Incoordination disabilities result from brain, spinal, or peripheral nerve injuries" (Ries, p. 2, 1973).

Switchback - the purpose of switchbacks is to assist in ascending or descending steep grades and reduce erosion by avoiding a path that follows the grade of the slope. "The
lateral area available for a sidehill trail is limited by terrain, so the trail must turn and start its lateral motion in the opposite direction" (Proudman & Rajala, 1981, p. 24). This turn is called a switchback.

Accessibility - able to be reached by persons of all abilities.

Organization of the Project

Chapter I provides an introduction by supplying a rationale for this project as well as a statement of the problem, and a review of literature related to the problem. A definition of key terms has also been provided.

The land inventory presented in Chapter II lists the unique, ecological, and general features that this natural area possesses. A map depicting where these features occur is also provided.

Recommendations for specifications and construction improvements for the trail are presented in Chapter III. A brief introduction to this section states a rationale
for student participation in the process of trail building and maintenance. A "Trail Specifications" map is located at the end of the chapter.

Chapter IV presents recommendations for improving the trail so that it can be made accessible to persons with differing abilities. The introduction to this chapter provides a brief rationale supporting the value of accessibility and an "Accessibility Recommendations" map is provided at the end of the chapter.

Chapter V contains outdoor lessons that were written for use on the natural area with seventh grade language arts, math, social studies, and science classes. These lessons are accompanied by maps depicting areas where the lessons can be taught.

Finally, Chapter VI contains recommendations for the implementation of this project.

At the conclusion of chapters II, III, and IV, a specific list of related resources is provided so that further information can be obtained. A complete bibliography is listed at the end of this work.
CHAPTER II
LAND INVENTORY

With the assistance of Bob Myers, Recreation Specialist for the Soil and Water Conservation District, an inventory of the natural area was conducted. This inventory profiles the unique, ecological, and general features that the area possesses. Unique features refer to attributes that are not commonly found on the land in this geographic region; ecological features refer to characteristics that illustrate concepts of ecology (interrelationships, habitats, etc.); and general features list vegetation that are found throughout the property. The general features are not illustrated on a map, as these flora do not occur in any one place on the property.

All of these features are briefly described in the following pages. The inventory has been provided so that McGraw teachers can become aware of the natural area's characteristics and make use of them in lessons and study projects.
LAND INVENTORY -- UNIQUE FEATURES
SEE "LAND INVENTORY" MAP, PAGE 20

<table>
<thead>
<tr>
<th># on Map</th>
<th>Feature:</th>
<th>Possible Interpretations:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><em>Myrtle</em></td>
<td>Indicates an old homestead</td>
</tr>
<tr>
<td>2</td>
<td><em>Barberry</em></td>
<td>Red berries; alternate host to white pine blister rust</td>
</tr>
<tr>
<td>3</td>
<td><em>Spruce</em></td>
<td>Norway; shade tolerance, wildlife cover</td>
</tr>
<tr>
<td>4</td>
<td><em>Perennial Stream</em></td>
<td>Caddis fly on rocks</td>
</tr>
<tr>
<td>5</td>
<td><em>Pond</em></td>
<td>Sensitive fern around it</td>
</tr>
<tr>
<td>6</td>
<td><em>Hickory</em></td>
<td>Wildlife, nuts</td>
</tr>
<tr>
<td>7</td>
<td><em>Pollution</em></td>
<td>Environmental damage</td>
</tr>
<tr>
<td>8</td>
<td><em>Mounds, Undulations</em></td>
<td>Hummocks; edge of spruce plantation; agricultural - old fence, mounds from fallen trees, evidence that it could have been a pasture</td>
</tr>
<tr>
<td>9</td>
<td><em>Regeneration</em></td>
<td>Of hardwoods under pines</td>
</tr>
<tr>
<td>10</td>
<td><em>Spring Formation</em></td>
<td>Spring originates here</td>
</tr>
<tr>
<td>11</td>
<td><em>Water Impoundment</em></td>
<td>Dam in stream from #4</td>
</tr>
<tr>
<td>12</td>
<td><em>Intemlittent Stream</em></td>
<td>Erosion</td>
</tr>
</tbody>
</table>

LAND INVENTORY -- ECOLOGICAL FEATURES
SEE "LAND INVENTORY" MAP, PAGE 20

<table>
<thead>
<tr>
<th>Letter on Map</th>
<th>Feature:</th>
<th>Possible Interpretations:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td><em>Wetland</em></td>
<td>Buttonbush, Silky Dogwood</td>
</tr>
<tr>
<td>B</td>
<td><em>Pine Plantation</em></td>
<td>Eastern White Pine (and Norway and Black Spruce)</td>
</tr>
<tr>
<td>C</td>
<td><em>Early Stage Succession</em></td>
<td>Goldenrod, Apple; good rabbit and songbird habitat</td>
</tr>
<tr>
<td>D</td>
<td><em>Spruce Plantation</em></td>
<td>Norway and Black Spruce (and Eastern White Pine and Red Pine)</td>
</tr>
<tr>
<td>E</td>
<td><em>Brush Community</em></td>
<td>Sapling stage (precedes pole stage)</td>
</tr>
<tr>
<td>F</td>
<td><em>Open Fields</em></td>
<td>Evidence of wildlife</td>
</tr>
<tr>
<td>G</td>
<td><em>Natural Draw</em></td>
<td>Watershed concepts</td>
</tr>
<tr>
<td>H</td>
<td><em>Soil Profile, Succession</em></td>
<td>Erosion; earliest stage of succession</td>
</tr>
<tr>
<td>I</td>
<td><em>Hardwoods</em></td>
<td>Sugar Maples - could tap trees; also Ash and Black Cherry; saplings, large pole, and some bigger trees; winter nests of squirrels</td>
</tr>
</tbody>
</table>
### GENERAL FEATURES
(\textit{NOT SHOWN ON A MAP})

**Pertinent Information:**

<table>
<thead>
<tr>
<th>Species</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{Sugar Maple}</td>
<td>Colonists learned of the maple as a source of sap and maple sugar products from the Indians.</td>
</tr>
<tr>
<td>\textit{Red Maple}</td>
<td>Pioneers made cinnamon-brown and black inks and dyes from a bark extract.</td>
</tr>
<tr>
<td>\textit{Hickory}</td>
<td>The name &quot;hickory&quot; is from the Indian word pawcohiccora, referring to the oily part that was removed from the pounded kernels after steeping in boiling water. The pioneers made a yellow dye from the inner bark.</td>
</tr>
<tr>
<td>\textit{Aspen}</td>
<td>A pioneer tree that is short-lived and eventually replaced by conifers. Twigs and leaves are browsed by deer; bark, foliage, and buds eaten by rabbits and other small mammals; grouse and quail eat winter buds.</td>
</tr>
<tr>
<td>\textit{Black Locust}</td>
<td>Usually planted for ornament, shelterbelts, and erosion control. British colonists in Jamestown discovered the species in 1607 and used the durable timber as cornerposts for their homes.</td>
</tr>
<tr>
<td>\textit{Black Cherry}</td>
<td>A cough medicine can be obtained from the bark, and jelly and wine can be made from the fruit. Attracts wildlife.</td>
</tr>
<tr>
<td>\textit{Pin Cherry}</td>
<td>Grows in moist soil. Often appears after forest fires. It is sometimes called a &quot;nurse&quot; tree because it provides shade and cover for seedlings of the next generation of hardwoods. The fruit is often consumed by wildlife.</td>
</tr>
<tr>
<td>\textit{Buckthorn}</td>
<td>Introduced, ornamental, widely planted in Europe for centuries. The fruit can be used medicinally as a laxative.</td>
</tr>
<tr>
<td>\textit{Apple, Thornapple}</td>
<td>Edible fruit. Naturalized locally. Fruit is consumed by wildlife.</td>
</tr>
<tr>
<td>\textit{Sumac}</td>
<td>Native. Indians used raw young sprouts in salads. Sour fruit can be prepared as an 'ade' in water, or chewed to quench thirst. In winter, it is consumed by small mammals and birds; deer browse twigs and fruit all year.</td>
</tr>
<tr>
<td>\textit{Scotch Pine}</td>
<td>Introduced. Usually used for ornament, shelterbelts, Christmas trees.</td>
</tr>
<tr>
<td>\textit{Norway Spruce}</td>
<td>Introduced from Europe. Commonly used for shade, ornament, shelterbelts, forest plantations, and Christmas trees. Largest cone of spruces.</td>
</tr>
<tr>
<td>\textit{Blue Spruce}</td>
<td>Grows in wet soils, often in pure stands. Lowest branches sometimes root when deep snow bends them to the ground; this forms a ring of small trees around a large one.</td>
</tr>
<tr>
<td>\textit{Larch}</td>
<td>Although a member of the pine family, this deciduous tree sheds its leaves in winter. Indians used the roots for sewing strips of birch bark together to make canoes.</td>
</tr>
<tr>
<td><strong>White Pine</strong></td>
<td>Largest conifer in the Northeast; straight trunk, crown of horizontal branches with one row added each year.</td>
</tr>
<tr>
<td><strong>Red Pine</strong></td>
<td>Irregular, rounded crown of spreading branches with one row added each year. This New World species is also called Norway Pine, possibly because of early English colonists' confusion of this tree with the Norway Spruce.</td>
</tr>
<tr>
<td><strong>Raspberry</strong></td>
<td>Edible fruit (round stems). Fruit is consumed by wildlife.</td>
</tr>
<tr>
<td><strong>Blackberry</strong></td>
<td>Edible fruit (square stems). Fruit is consumed by wildlife.</td>
</tr>
<tr>
<td><strong>Barberry</strong></td>
<td>Bears flowers, attracts wildlife.</td>
</tr>
<tr>
<td><strong>Goldenrod</strong></td>
<td>Often forms large masses on fields that were once cultivated.</td>
</tr>
<tr>
<td><strong>Viburnum</strong></td>
<td>Shrub or small tree whose fruit is consumed by wildlife.</td>
</tr>
<tr>
<td><strong>Honeysuckle</strong></td>
<td>Usually ornamental. Attracts wildlife.</td>
</tr>
</tbody>
</table>
RELATED RESOURCES

Amanda Barber, District Technician, and Jeff TenEyck, District Manager, Cortland County Soil and Water Conservation District, Room 205, Grange Place, Cortland, NY 13045, 756-5991. [Technical assistance.]

Bob Myers, Recreation Specialist, James M. Hanley Federal Building, 100 South Clinton Room 771, Syracuse, NY 13260. [Contact through Amanda Barber or Jeff TenEyck from SWCD above. Can offer educational/interpretive assistance.]
CHAPTER III
TRAIL SPECIFICATIONS AND CONSTRUCTION

Because of cost, time, and labor limitations, the recommendations offered here are designed to keep construction and maintenance of the trail at a minimum. The work that is required can be done by students and teachers and can even be extended to involve parents and members of the community. Making this population aware of the project is not only good public relations but also offers the community the opportunity to support the McGraw Central School outdoor learning area.

Involving students in planning, constructing, and maintaining the trail can have many advantages. By incorporating different tasks into existing curriculums, trail work can serve as a hands-on learning experience for students. For example, science students studying erosion can learn about it outside the classroom by seeing its effects on the trail. They can choose methods of reducing it, actually apply those methods, and then study the short and long term results of their work.

Working on the trail will also give students a sense of ownership and pride in their work. Because humans typically won't harm what they own, what they are proud of, and what they have a part in, vandalism may be kept to
a minimum. As expressed by Fazio (1983), the best vandalism prevention tool is good public relations and fostering pride and support in the students and community. Peer association may even relay this attitude to students that do not participate in designing, planning, and constructing the area.

Students that participate in different phases of constructing the trail are also afforded the opportunity to become more aware of their natural surroundings, which often instills long lasting commitment to environmental stewardship (Steinhart, 1985). The opportunity for students to participate in this project can help bridge the gap between awareness and environmental stewardship.

**Trail Width and Clearance**

A trail 4-6 foot trail wide is preferable for class use (Myers, 1972; Fazio, 1983). This width is helpful for effective teaching and class management because it allows the teacher to be visible to the whole group, provides room for students to stay together as they walk along the trail, as well as to see, hear, and participate during the lesson. In addition, for accessibility the minimum dimension required for two wheelchairs passing each other, and for a wheelchair to turn 180-degrees is 60 inches (Architectural and Transportation Barriers Compliance Board, 1985). To provide further safe and easy passage along the trail, a clearance of 8 feet in height is
recommended (Proudman & Rajala, 1981).

Pruning branches and limbs along the trail will help establish these clearances while maintaining a natural appearance and preserving the plants structure and health. Professional resources on how to remove unwanted parts of trees and bushes should be consulted. Pruning Techniques, a handbook published by the Brooklyn Botanic Garden, is an excellent reference and is listed in the bibliography.

Trail Surface

Although hard, impacted soil provides a satisfactory surface during dry weather, it is not recommended as a surface for this trail. The trail has been observed several times during the 1990-1991 school year (September through June) and it is apparent that wet conditions prevail, especially during the winter and spring (snow and rainfall). Therefore, it is recommended that wood chips are used as a trail surface to reduce impact to the resource. Wood chips provide a durable surface and their natural appearance is aesthetically appealing, as well (Ashbaugh, 1967, p. 31). Chips are equally effective and less likely to scatter off the trail if they are finely ground.

Trail Drainage

Water drainage along the trail is essential for protecting the natural resource and will also reduce trail
maintenance (Hultsman, 1982). Water movement accelerates erosion which has damaging effects on the trail. In addition to causing unsafe (slippery) walking surfaces, erosion can damage resources on and beyond the trail. The following recommendations for the McGraw school site are suggested for erosion control and to minimize unnecessary impact to the trail environment.

Water seepage and an intermittent stream are two drainage concerns on the trail that should be addressed. These areas are depicted by a culvert and corduroys on the "Trail Specifications" map on page 30.

Log corduroys (Proudman & Rajala, 1981; Sharpe, 1982; and A. Barber, personal communication, October 24, 1990) are an inexpensive, simple, low maintenance option in areas that are muddy (especially in springtime) from water seepage. To prevent corduroys from sinking, it is recommended that gravel be placed under them (V. Wilkins, personal communication, March 18, 1991). To protect the trail from the intermittent stream, an open top culvert is recommended (A. Barber, 1990). Construction of a box culvert should be done in the spring or early summer to afford the least disturbance to the area. This will also give weeds, which help reduce erosion, a chance to grow back before the heavier flows return (A. Barber, 1990).

The Cortland County Soil and Water Conservation District (see "Related Resources", page 29) is familiar with the trail and can offer technical information and
assistance in design, placement, and construction of log corduroys and a culvert. Additional resources and further information about clearing, constructing, and maintaining the trail are listed in the bibliography.

**Trail Grade**

The trail entrance (nearest the school building) is a steep grade that will eventually suffer from erosion if used frequently. In addition, a grade of its steepness can be an uncomfortable and difficult climb, reducing the pleasure of the user experience. Therefore, it is recommended that a switchback be constructed to provide a steady grade (see map, page 30).

Careful planning and designing of a switchback can minimize the amount of trees that must be removed, and will discourage users from developing shortcuts by spacing the turns far apart (Proudman & Rajala, 1981). The references at the end of this work should be consulted for further information on designing and building switchbacks.

One final area of concern is cross slope and is shown on the "Trail Specifications" map. Cross slope refers to the sideways cut, or levelness of the trail. Cross slope can be corrected by filling in the downhill side of the trail and leveling off the uphill side. It is helpful to place a border along the downhill side so there is a barrier that can retain the soil that is used to fill in this side.
**Trail Maintenance**

The following requirements will help reduce damage to the trail and the surrounding area as well as prevent potential hazards to trail users:

- The trail should be checked regularly (3-6 times a school year, depending on the frequency of trail use) for safety hazards (broken glass, dead tree limbs, etc.) damage to corduroys or culvert, excess erosion, drainage problems, trail signs, and any other damage, trouble areas, or hazards (Luce & Pauzer, 1972).
- Each spring, winter blowdown should be removed and any damage to the trail that resulted should be repaired.
- Overgrown trees and shrubs to the side and above the trail should be pruned once each spring.
- Litter should be removed frequently, especially in the spring after the snow has melted.

**Trail Signs**

The following considerations are offered to aid art and industrial arts students as they design and construct signs for interpretation:

- Choose materials that will keep cost to a minimum.
- Signs should discourage vandalism and theft. They should be simple to construct and easy to replicate, as they may have to be replaced.
Location and placement of signs should have the least impact on the natural resource as possible. For example, avoid signs that must be nailed into trees. Height of signs should not exceed 36", so that persons in wheelchairs can easily spot them. Signs should be aesthetically pleasing and easy to spot outdoors. If desired, signs can be color-coded according to the interpretive area (curriculum) they represent. Colors that occur naturally in a forest and that are easy to see should be selected (Hultsman, 1982). Signs made from wood should be weatherproofed.
RELATED RESOURCES

Amanda Barber, District Technician, and Jeff TenEyck, District Manager, Cortland County Soil and Water Conservation District, Room 205, Grange Place, Cortland, NY 13045, 756-5991. [Technical assistance.]

Bob Myers, Recreation Specialist, James M. Hanley Federal Building, 100 South Clinton Room 771, Syracuse, NY 13260. [Contact through Amanda Barber or Jeff TenEyck from SWCD above. Can offer educational/interpretive assistance.]

Wilbert (Tom) Pitts, U. S. Soil Conservation Service District Conservationist, Grange Place, Cortland, NY 13045, 756-5991. [Technical assistance.]

Phillip D. Metzger, Resource Conservation and Development Coordinator, South Central New York RC&D, 9 Maple Street, Norwich, NY 13815, (607) 334-4715. [Contact through Tom Pitts from SWCD above. RC&D can offer technical and possible financial assistance.]

Dr. Charles Yaple, Cortland College Center for Environmental and Outdoor Education, SUNY Cortland, 753-4968.

Dr. Vicki Wilkins, Assistant Professor of Recreation and Leisure Studies, SUNY Cortland, 753-4972.
1 Switchback (......)
2 Culvert
3 Cordoroys
4 Cross Slope
CHAPTER IV
ACCESSIBILITY RECOMMENDATIONS

Historically, our society's attitudes toward persons with disabilities have been formed by the belief that this segment of the population is inferior or is made up of second-class citizens that, at best, should be treated with charity or sympathy. Unfortunately, since attitudes can shape behavior and consequently attempts to reduce physical barriers for access to natural areas have been minimal.

Fortunately, improved societal attitudes and legislation that now holds public agencies accountable regarding the needs of access for all, have alleviated many former barriers. However, more awareness and action is still necessary to create a barrier-free society that accepts all its citizens equally.

The educational process is a critically influential societal tool that can help develop concerned, empowered citizens. As responsible educators, we have an obligation to adopt a humanistic approach by reinforcing the rights of persons of all abilities. Through our own awareness, attitudes, and actions we can positively influence future generations.

When the natural area and trail, that is the focus of this project, is developed, McGraw teachers can seize an opportunity to enlighten, expand, and teach its students
through direct experience, about the concept of accessibility for all. The value of having an accessible trail on school property will be a positive step towards creating awareness and attitudes that must accompany a commitment to the rights of all individuals.

The guidelines set forth here are intended to eliminate natural barriers on portions of the trail so that persons with partial mobility can make use of the trail with assistance from another person. For a definition of mobility impairments, see "Definition of Terms" in Chapter I.

A tremendous amount of work will be required to modify the entire length of the trail for accessibility; indeed some portions would require major alterations that may prove virtually impractical. Therefore, the recommendations given here are to modify a portion of the trail that follows a line beginning in the parking lot of the high school and ending at the cemetery. Users may return the same way. Refer to the "Accessibility Recommendations" map on page 39 to see this area in detail.

McGraw's proximity and association with Cortland College provides an important resource that is available to assist in developing trail accessibility. Dr. Vicki Wilkins, Assistant Professor of Recreation and Leisure Studies is familiar with this project and possesses extensive knowledge and experience in the design and
construction of accessible trails. Wilkins' expertise and contributions in the field of therapeutic recreation make her and her students a valuable resource. She has willingly expressed her desire to assist McGraw, if they choose to undertake this endeavor. Dr. Wilkins is listed at the end of this section and should be contacted for further consultation.

Trail Entrance

To avoid the steep grade at the trailhead, an alternate entrance has been recommended for accessibility and is detailed on the "Accessibility Recommendations" map. A foot bridge must be constructed across the gully to connect the bus garage parking lot and the trail. The same guidelines given for the bridge at the stream (see "Trail Surface" below) should be followed for this bridge although additional support will be necessary. Also, in choosing a passage from the bus garage to the trail, consideration should be given so that the least amount of brush and trees is removed.

Trail Width and Clearance

The recommendations that were made in Chapter III's "Trail Specifications and Construction", are appropriate for accessibility. As mentioned in that section, the minimum dimension required for two wheelchairs passing each other, and for a wheelchair to turn 180-degrees, is
60 inches (Architectural and Transportation Barriers Compliance Board, 1985). Therefore, it is recommended that the width of the trail for accessibility is a minimum of 5 feet in width.

**Trail Surface**

Covering obstacles such as roots and stumps, should be the first trail surface concern. Roots are especially difficult and dangerous for individuals who use wheelchairs, particularly if they are perpendicular to the trail. Problem roots on this trail should be covered with soil by building up the trail. Although not as dangerous as roots, stumps also present a hazard for individuals who use wheelchairs and should be removed before a trail is surfaced (V. Wilkins, personal communication, March 18, 1991). To insure a safe experience for an individual who uses a wheelchair, someone should walk ahead and eliminate debris and obstructions along the way.

In its current condition, the trail surface is impassable for a wheelchair. Although there are many alternatives, the least expensive and most convenient method is to surface the trail with finely ground wood chips (as recommended in "Trail Surface", Chapter III.) However, an expensive but much more durable and low maintenance method, would be to install a new product called Safetytred. Manufactured from recycled rubber tires, Safetytred consists of interlocking non-slip, woven
mats that allow grass to grow through. Additional information about Safetytred can be found in Appendix III.

Log corduroys have been recommended for this trail in areas that are muddy from water seepage. These are a safe alternative for accessibility as long as they are built to cover the entire width of the trail. If they are not as wide as the trail they can be a hazard to individuals who use wheelchairs by sending them over the edge of the trail. Another consideration in building log corduroys for accessibility is to ensure that the logs are placed evenly with the ground so there are no 'curbs' to prevent passage.

The final consideration is safe passage over the intermittent stream. Although a culvert has been recommended for drainage in this area, it would be insufficient for wheelchair passage. A foot bridge is the safest alternative providing certain guidelines are followed. First, the bridge must be constructed with curbs and 32" high railings (Plourde, Orr, & Hammond, 1979). Secondly, for a one-way bridge, a 37" width must be maintained between railings (Plourde, Orr, & Hammond, 1979). Thirdly, the bridge should be constructed to maintain as level a passage as possible and eliminate any curbs or changes in surface at the entrance and exit of the bridge (V. Wilkins, 1991). Finally, if two-way circulation is necessary near the bridge, a rest area (see "Rest Areas", page 36) should be constructed on one or
both sides of the bridge.

**Trail Grade**

The grade, or slope of the trail should not exceed 4-5% (Plourde, Orr & Hammond, 1979; Myers, 1972). As mentioned earlier, to avoid the steep grade at the trailhead, an alternate entrance has been recommended for accessibility.

However, one portion of the trail will need some modification to lessen the steepness of the grade (see map). Switchbacks are recommended for this area. Three to four switchbacks will be sufficient and with careful planning it can probably be done without removing any trees (V. Wilkins, 1991). An important consideration in building switchbacks is to design the corner, or turn of the switchback so that it is squared off and provides a sufficient turning radius for a wheelchair. According to Hultsman (1982, p. 24) switchbacks "should have a minimum turning radius of four feet, and the turn should be as level as possible". A wheelchair requires a minimum of 42" to negotiate a 90 degree turn (Plourde, Orr & Hammond, 1979).

The final consideration of grade for this trail is the cross slope. Cross slope refers to the sideways cut, or levelness of the trail. Cross slope can be more dangerous, and unpleasant to a wheelchair user than incline. The maximum ratio should be 1:20 (Heritage
Conservation and Recreation Service, 1980). Cross slope (see map for problem areas) can be leveled by a combination of raising one side and lowering the other. This method involves placing an edge (such as fallen trees or railroad ties) on the downhill side of the trail to provide a border for a filler to be placed against.

Rest Areas

Persons with mobility impairments will exert a lot of energy on the trail and rest areas will be necessary for their safety and enjoyment. Rest areas should be located about every 500 feet, whenever possible and should be designed to accommodate seating as well as room for one or more wheelchairs (Plourde, Orr & Hammond, 1979; V. Wilkins, 1991). If possible, wooden benches with armrests and backs should be provided (Plourde, Orr, & Hammond, 1979).

Finally, rest areas should be built so they are level with the trail to avoid an uphill battle entering or exiting them. Otherwise, the energy exerted getting into or out of them will not be worth the rest (V. Wilkins, 1991).
RELATED RESOURCES

Dr. Vicki Wilkins, Assistant Professor of Recreation and Leisure Studies, SUNY Cortland, 753-4972.

Dr. Charles Yaple, Cortland College Center for Environmental and Outdoor Education, SUNY Cortland, 753-4968.
ACCESSIBILITY RECOMMENDATIONS

1 Entrance
2 Bridges
3 Cross Slope
4 Roots
5 Switchback

Alternate entrance — — —
CHAPTER V
LESSONS

The following lessons were developed for seventh grade language arts, math, social studies, and science students at McGraw Central School. The seventh grade curriculum was chosen for its general content, which provides a good spectrum of topics that can be taught in the outdoors. Lessons were specifically designed to be used in the school's adjacent natural area and are accompanied by maps depicting locations where lessons can be taught.

Each of the following lessons strives to achieve the goals of environmental education as defined in this project (i.e. a process whose aims are to enable persons to understand and appreciate the biophysical and sociocultural systems of which they are a part; to understand problems and identify ways to solve problems that are associated with those systems; and to be committed to work toward the solution of these problems, thereby creating optimal environments for living). The purpose of these lessons is twofold: first, since they were developed specifically for the school's natural area, it is hoped that they will be used to introduce and expose McGraw students to the world around them; and secondly, that they will serve as examples for teachers at McGraw Central School and encourage them to develop and implement
their own E & OE lessons.

Each lesson provides a list of "Related Resources" so that teachers may adapt existing lessons and create new ones. **Essential Learnings in Environmental Education** is an especially valuable resource that is recommended for further development of environmental and outdoor education lessons. Excerpts from the book can be found in Appendix II, and the citation is listed in the bibliography.

Included in the ten lessons are:

- **2 science lessons**: Science Lesson #1 and #2 provide considerable detail and can be taught 'as is'.
- **2 math lessons**: Math Lesson #1 provides considerable detail, while Math Lesson #2 provides an outline that can be further developed. "How tall is that tree" is a supplemental activity description that accompanies Math Lesson #1.
- **3 social studies lessons**: Social Studies Lessons #1 and #2 provide considerable detail, while Social Studies Lesson #3 provides an outline that can be further developed. "Map Reading" and "Tracing Your Lineage" are supplements to the Social Studies lessons.
- **2 language arts lessons**: Language Arts Lesson #1 provides considerable detail, while Language Arts Lesson #2 provides an outline that can be further developed.
- **1 interdisciplinary lesson**: This lesson is a long-term project that entails several different curriculums. The purposes and values of this activity are to join the
majority of seventh grade teachers and students in a common mission, at the same time contributing a worthwhile resource to the school. Participation in this activity can also provide a sense of ownership for students.

These ten lessons follow a format that focuses on concept analysis and are organized so they can be used without modification or as a foundation for a more in-depth lesson (i.e. modified and developed to suit the teacher's individual needs).

EXPLANATION OF MAPS

The following maps ("Trail Only", "Soils", and "Topography") and those that accompany the lessons were designed to facilitate making copies, overheads, and overlays. They can be used alone or several maps can be combined to develop one map, i.e., the "Trail Only" map can be combined with the "Soils" and/or "Topography" maps to show more details and features of the land.

The following people were instrumental in developing these maps:

Amanda Barber, District Technician, and Jeff TenEyck, District Manager, Cortland County Soil and Water Conservation District, Room 205, Grange Place, Cortland, NY 13045, 756-5991. [Technical assistance.]

Dr. David Miller, Associate Professor of Geography, SUNY Cortland.

Bob Myers, Recreation Specialist, James M. Hanley Federal Building, 100 South Clinton Room 771, Syracuse, NY 13260. [Contact through Amanda Barber or Jeff TenEyck from SWCD above.]
Wet spot

HbA Homer silt loam, 0-2 percent slopes
HdB Howard gravelly loam, 3-8 percent slopes
HdC Howard gravelly loam, 8-15 percent slopes
HdD Howard gravelly loam, 15-25 percent slopes
LaC Langford channery silt loam, 8-15 percent slopes
LaD Langford channery silt loam, 15-25 percent slopes
PdA Phelps gravelly silt loam, 0-3 percent slopes
WbA Wayland silt loam, 0-1 percent slopes

Intermittent, unclass.
SCIENCE--SEVENTH GRADE--LESSON #1

THE CONCEPT:
The Water Cycle: An endless path that water takes, from oceans, lakes, streams, ponds, etc. to the air, to the soil, to living things, and back to the oceans, lakes, streams, etc. It is a continuous process; water goes through this cycle over and over again.

ATTRIBUTES:
• Evaporation is the changing of water to water vapor; when a liquid becomes a gas.
• When water is heated, it changes to a gas known as water vapor.
• Water vapor mixes with the air.
• When a gas changes into a liquid, it is called condensation.
• Water evaporates from all living things (soil, plants, and animals).
• In plants, the process of evaporation is called transpiration; the loss of water through the leaves (stomates) of a plant.

BEHAVIORAL OBJECTIVES:
The student will be able to:
• Accurately define in writing, the terms evaporation, condensation, and transpiration.
• Describe how evaporation and condensation are part of the water cycle.
• Explain how evaporation is a cooling process.
• Successfully demonstrate in an experiment, that water evaporates from plants.
• In an experiment, successfully gather and measure water that has evaporated from a coniferous and a deciduous tree.
• In an experiment, successfully build a solar still.
• In an experiment, successfully gather and measure water that has condensed in a solar still.
• In writing, give examples of three other things that water evaporates from.
• During discussion, infer why evergreens give off less water than deciduous trees.
• In writing, give other examples of evaporation and condensation.
• Through discussion, give an example of how pollution can enter the water cycle.

INSTRUCTIONAL STRATEGIES:

Set:
Day 1:
Set up the following demonstrations in the classroom and then discuss what has occurred.
• Boil a beaker full of water and place a plastic sheet above the steam.
• Set up a basin of warm water. Ask the students to hypothesize the following: Which hand will be cooler? A hand that you have dipped in warm water and then allowed to dry, or a hand that has remained dry? Next, have them each dip one hand in warm water, remove the hand and shake off excess water, and hold both hands up in the air. Students should then touch both hands to their cheeks and tell which hand feels cooler. (This demonstrates that evaporation is a cooling process).

Day 1--Materials:
• 12 plastic bags with twisties (to tie bags)
• waterproof markers (one blue, one red)
• each student should bring a pen or pencil, journal/notebook, and a hard surface to write on (clipboard).

A journal simply refers to a notebook that is used throughout the school year to record findings, answer questions, problem solve, take notes, etc.
Positive Examples:
The class will conduct two experiments at the areas (1A and 1B) indicated on the "Science Lessons" map (page 53). During these lessons, students will record all measurements, findings, and answers to questions in their journal.

Day 1--Procedure:
1. Give each student 2 plastic bags and 2 twisties. They should each write their initials (one in blue, one in red, with the waterproof markers) on their bags.
2. Go to the area marked 1A on the map on page 53. Students tie one plastic bag around the tip of a deciduous tree (red initials) and one around the tip of a coniferous tree (blue initials).
3. Students should mark in their journals where they tied their bags. They should note whether their tree branch receives a lot of sun or if it is shaded, and whether it is broad-leaved or narrow. They should also identify and record the types of trees they tied their bags to.

The bags will be left on for several days. At this point, the class can discuss and write in their journals the following:
- the definition of evaporation
- identify three other things on the trail that moisture evaporates from
- state a hypothesis for what might happen in this experiment

4. Several days later, return to the bags and observe the results.
- Remove the bags from the trees, being careful not to spill any water. Note which tree each bag came from (red-deciduous, blue-coniferous).
- Measure the water that accumulated in the bag.
* One apple tree can give off up to 320 quarts (300 liters) of water on a hot summer day (Busch, 1984).
5. Compare the amount of water measured from the deciduous tree to the amount collected from the coniferous tree. Students should determine why this might be so and how this relates to why evergreens don't shed their leaves.
6. Students can compare their measurements with each other. Based on the location of their bag and other factors, explain why some trees may have evaporated more water than others.

Day 2--Materials:
shovel
clean container (large can or bucket) to collect water in
large piece of plastic (cut-up garbage bag)
small rocks to hold the plastic in place
each student should bring a pen or pencil, journal/notebook, and a hard surface to write on (clipboard).

Day 2--Procedure:
1. Go to the area marked 1B on the map on page 53. On a fairly level site, dig a hole 2 feet in diameter and about 1 foot deep (see Figure 1, page 48).
2. Place the container in the bottom of the hole to collect water.
3. Place the plastic over the entire hole (be sure it covers it completely).
4. Place small rocks around the perimeter of the hole, to hold the plastic in place, leaving enough slack so the plastic can be weighted down over the container.
5. Place another small rock on the plastic so that it is weighted down, forming an inverted apex above the collector.

The solar still should be left untouched for several days. At this point, the class can discuss and write the following:
- the definition of condensation
- state a hypothesis for what might happen in this experiment
6. Several days later, return to the solar still and observe the results.
   • Remove the collector and measure the water in it.
   • Fill the hole back in and put the rocks back where they were found, restoring the area to its original condition; try and leave no trace of the experiment.

![Diagram of a solar still](image)

**Figure 1**

**Closure:**
Discuss both experiments. Students should write answers in their journals to the following:

**Experiment 1:**
- Which trees gave off the most moisture and why that might be?
- How does this process of evaporation fit into the water cycle?
- What happens to the water vapor after it leaves the plant? Does it mix with the air? If so, how might it change the air?
- What are other ways to demonstrate the process of evaporation?
- What ways might a polluted body of water effect the evaporation process?

**Experiment 2:**
- Where did the water that collected in the can come from?
- What are some other examples of condensation? What happens to the bathroom mirror when you take a hot shower?
- How does condensation fit into the water cycle (i.e. talk about formation of clouds)?

**To do at home:**
Have students do a survey of the land around their house by sketching a map. They should note:
- types of trees (deciduous vs. coniferous)
- bodies of water (streams, creeks, ponds, etc.)
- sun exposure
- other vegetation (grass, shrubs, etc.)
EVALUATION:
• Collect student 'journals' and evaluate their recordings and answers to discussion questions.
• Have students draw and label a picture of the water cycle on a large piece of paper. They can add to this picture as they learn more about the cycle, until they have a complete picture of it.
• Have students bring in the maps they've sketched of the land around their house. Each student should examine the vegetation, water, and sun exposure and write a brief description of how different trees, water, and exposure might effect the house. (eg. deciduous trees planted on the south side of a house provide shade in summer and allow exposure in winter; a stream that receives exposure from the south would not freeze as quickly in winter and more evaporation would occur.

SUBSEQUENT OR RELATED LESSONS:
• Discuss the importance of trees in the environment.
• Discuss environmental impact (eg. air conditioners vs. trees).
• Do a survey of the community.

SUGGESTIONS FOR TEACHING OUTDOORS

• Environmental concerns. To reduce environmental impact and foster positive environmental attitudes in your students, explain that it is each persons responsibility as a member of the ecological community to be aware of their impact upon the outdoor environment. Students should leave no traces of their presence, being careful where they walk, and being sure to replace and/or restore all things to their previous condition. Choose an area to stand where the environmental damage from a large group will be minimized (Bonney & Drury, 1991).
• Become familiar with the teaching site so you can anticipate sightings and discover any trail hazards.
• Prepare students for outdoor study. Get them excited by relating classroom activities to the outdoor lesson. Establish standards of behavior and make your expectations known.
• Plan appropriately for the weather. Stress the importance of being dressed properly for the outdoors. If necessary, look through the lost & found for warm clothing. Schedule a rain date, just in case!
• Create a positive learning environment. Encourage students to ask questions and make observations. Make use of the 'teachable moment' (spontaneously drawing from the natural surroundings even if it is unrelated to the lesson.) Be aware of the groups needs and revise plans if students are too cold, hot, wet, or uncomfortable. Position the group so that their backs face the sun. Position yourself so that students can see both you and the area of interest. If you must pick a specimen, choose one large enough for all to see and/or pass it around; explain that students should not pick one themselves.
• Post trip learning. Plan activities for the classroom that draw upon experiences from the outdoor lesson. Use these activities to clarify concepts, reinforce observations, emphasize ideas and issues, and bring closure to the lesson or unit.

REFERENCES AND RELATED RESOURCES


Busch, P. S. (1985, Spring-Summer). Teaching basic science environmentally. Concept: Water that comes down as rain is used over and over again. Outdoor Communicator, 16 (1), 41-42.


THE CONCEPT:
Microclimates: A small area that differs in climate from the bigger area surrounding it.

ATTRIBUTES:
- **Temperature** is a factor that determines a microclimate.
- The amount of **sunlight** is a factor that determines a microclimate.
- **Vegetation** is a factor that determines a microclimate.

BEHAVIORAL OBJECTIVES:
Students will be able to:
- Correctly define microclimate.
- Accurately measure and record temperature and light readings in different microclimates.
- Identify at least five different microclimates on the trail.
- Explain how vegetation, sunlight, and temperature interrelate to create microclimates.
- Identify microclimates that provide habitat for wildlife.

INSTRUCTIONAL STRATEGIES:
This lesson can be done effectively any time of year, even with snow on the ground.

Set:
To stress the importance of plants and trees in the natural environment, show slides or photographs of places such as Germany where the air smells bad, people spit black saliva and young people have to be sent away so that sores on their skin can heal. Explain that this describes life in parts of Germany today, why it is this way, and discuss possible solutions to improve the quality of the environment (e.g. planting trees). According to the American Forestry Association, "a single forest tree absorbs 15 pounds of CO$_2$ per year and each acre of forest absorbs about 2.6 tons of CO$_2$".

Positive Examples:
Working in groups of 3 or 4, students will go outdoors to the area #2 on the "Science Lessons" map (page 53) to identify and take temperature and light readings of areas listed on the "Microclimate Chart" (page 52). For each area, students will also observe and record the type of vegetation growing there.

Materials:
- 1 "Microclimate Chart" (page 52) for each group of students
- 1 thermometer for each group of students
- 1 light meter for each group of students
- each student should bring a pen or pencil and a hard surface to write on (clipboard).

Closure:
- On the "Microclimate Chart", indicate which areas (a through I) you think would provide the best habitat for wildlife. Explain why.
Where do you think animals go during cold days? Hot days?
Where do you go during cold days? Hot days?
- Using the recordings on the "Microclimate Chart", students can answer questions such as:
Is the vegetation in open, sunny areas the same as the vegetation in shaded areas? Why or why not?
What areas have the greatest variety of vegetation? What areas have the least?

EVALUATION:
- Collect the "Microclimate Charts" and evaluate their findings.
- Evaluate the students on their answers to the questions in the Closure.
- Have students choose a place other than school (in the home or community) to repeat this assignment.
SUBSEQUENT OR RELATED LESSONS:
• Artificially change the climate of a plant. Discuss how plants need specific temperature ranges, amounts of moisture, and sunlight. Students can bring in small plants (ask them not to dig them up from the woods) and identify their climate needs. Students can develop ways to alter their climates and write a hypothesis. As the climate is altered, students can observe the plant each day and record their observations. Summarize the recorded results after 1-2 weeks (Payne, 1985b, p. 287-288).
• Build a terrarium in class to develop, identify, and experiment with microclimates.

SUGGESTIONS FOR TEACHING OUTDOORS
• Environmental concerns. To reduce environmental impact and foster positive environmental attitudes in your students, explain that it is each person's responsibility as a member of the ecological community to be aware of their impact upon the outdoor environment. Students should leave no traces of their presence, being careful where they walk, and being sure to replace and/or restore all things to their previous condition. Choose an area to stand where the environmental damage from a large group will be minimized (Bonney & Drury, 1991).
• Become familiar with the teaching site so you can anticipate sightings and discover any trail hazards.
• Prepare students for outdoor study. Get them excited by relating classroom activities to the outdoor lesson. Establish standards of behavior and make your expectations known.
• Plan appropriately for the weather. Stress the importance of being dressed properly for the outdoors. If necessary, look through the lost & found for warm clothing. Schedule a rain date, just in case!
• Create a positive learning environment. Encourage students to ask questions and make observations. Make use of the "teachable moment" (spontaneously drawing from the natural surroundings even if it is unrelated to the lesson.) Be aware of the groups needs and revise plans if students are too cold, hot, wet, or uncomfortable. Position the group so that their backs face the sun. Position yourself so that students can see both you and the area of interest. If you must pick a specimen, choose one large enough for all to see and/or pass it around; explain that students should not pick one themselves.
• Post trip learning. Plan activities for the classroom that draw upon experiences from the outdoor lesson. Use these activities to clarify concepts, reinforce observations, emphasize ideas and issues, and bring closure to the lesson or unit.

REFERENCES AND RELATED RESOURCES


MICROCLIMATE CHART

Find these areas and take temperature readings of them. Fill in the chart below with your readings.

a. An area that has been changed by humans.
b. Open, exposed areas.
c. Sheltered areas.
d. Holes in trees, holes on the ground.
e. Surfaces above grass, blacktop, gravel, concrete, wood.
f. Shaded areas.
g. Areas in direct sunlight.
h. Different slopes.
i. Various sides of the school building.
j. Base of a tree.
k. Lower branches of the same tree.
l. Tip of outer branches of the same tree.

<table>
<thead>
<tr>
<th>Describe the microclimate:</th>
<th>temp</th>
<th>light</th>
<th>Describe vegetation in the area:</th>
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<tbody>
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<td>a.</td>
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SCIENCE LESSONS

1A - Lesson #1
1B - Lesson #1 (gravel area)
2 - Lesson #2
THE CONCEPT:
Determining cordage: How much firewood a tree would produce.

ATTRIBUTES:
• Firewood can be measured in cords.
• Cordage can be determined mathematically.
• Timber management practices can be determined by environmental and economical factors.

BEHAVIORAL OBJECTIVES:
The student will be able to:
• Numerically define a cord.
• Using a tape measure, determine the circumference of a tree trunk at breast height.
• Using a mathematical equation, compute how many cords in a tree.
• Determine the amount of wood (in cords) in an acre of land.
• Identify two methods of timber management.
• Using a mathematical process, determine which is a more wise method of timber management.

INSTRUCTIONAL STRATEGIES:
Before introducing this lesson, explain what a cord of wood is: A standard cord is a stack of cut wood measuring 4'x4'x8' or 128 cubic feet.

Also, students should know how to determine the height of a tree before doing this lesson. (See "How tall is that tree", page 57).

This lesson could be enhanced by inviting a forester from the Department of Environmental Conservation, Syracuse’s Environmental Science and Forestry school, or the United States Forest Service to speak to the students and show them different methods of measuring timber for purposes other than firewood (pulpwood, lumber, etc.)

Set:
*A four-foot diameter, 500-year-old tree [Sequoia or Redwood] is worth $2,000 to $3,000 in lumber...that's twice the value of what it was worth ten years ago. The cost to replace that 500-year-old tree depends on the cost of seedlings and what the interest rate is during the life of the tree. Assuming a seedling costs $1, a 500-year-old tree at 6% interest has a replacement cost of $4.5 trillion* (Buzzworm: The Environmental Journal, Nov/Dec 1990, p. 11).

Positive Examples:

Materials:
• One 100-foot tape measure for each group of students.
• Each group should have a pencil, paper, and a hard surface to write on (clipboard or notebook).

Procedure:
1. Bring the students to the area depicted by #1 on the "Math Lessons" map (page 63). Divide the students into groups of four or five and have each group select a large tree to work with.

Each group will:
2. Determine the height of the tree. They must also measure the circumference of the trunk at "breast height" (the lumberjack unit of measure representing 41/2 feet from ground level).
Knowing the circumference at breast height and the height of the tree, the students compute cordage as follows:

Let $C$ represent the circumference
Let $H$ represent tree height
3000 is the constant

\[
\text{Cordage} = \frac{C^2H}{3000}
\]

If a tree has a breast-height circumference of 5 feet and a height of 32 feet, then the cordage for this tree is computed as follows:

\[
\text{Cordage} = \frac{(5^2)(32)}{3000} = \frac{800}{3000} = .26
\]

The tree contains about one-fourth of a standard cord of wood. (This formula does not take into account wood which may come from the limbs of the tree.)

**Closure:**
- Have the students determine how many trees of this size make a cord of wood.
- Estimate the number of trees in an acre of land (see Lesson #2 for determining an acre).
- Have the students determine approximately how many cords of wood is contained in an acre.
- Have the students find out how many cords of wood are needed to: build a house, heat a home for a winter, print a local newspaper for one day’s circulation, etc.
- Have the students determine how much wood is saved by recycling.
- Given an acre of land, use these variables (average age of a tree ready for harvesting; # of trees in a given area; yearly profit gained from harvesting trees; environmental integrity, etc.) to determine mathematically, the wisest method of management. Students can find information about tree harvesting from the Department of Environmental Conservation (753-3095) or the Soil and Water Conservation Service (756-5991). Discuss different methods of harvesting trees (clearcutting vs. selective cutting and replanting) and have students identify examples of these methods (old growth forests in the Pacific Northwest).

**EVALUATION:**
Evaluate based on students accuracy and understanding of measurements and calculations.

**SUBSEQUENT OR RELATED LESSONS:**
- Start a paper recycling program in the school, if one doesn’t already exist.
- Measure the number of board feet of lumber in a standing tree and determine its commercial value.
- Estimate how many seeds that have fallen from a plant have begun to grow. Estimate the total number of seeds formed by the plant. Tie this in with a discussion of conservation management practices.
OTHER OUTDOOR MATH LESSONS:
- Estimate the amount of water given off by a tree in one day through transpiration.
- Estimate the ages of living trees without cutting them down (increment bore).
- Compare the approximate area covered by tree and shrub canopies of different forest species.
- Devise a way of measuring the evaporation rate of water in different locations.
- Determine the amount of water in a cubic foot of snow and calculate the ratio of air to water.
- Determine the surface area and volume of water in a pond or section of stream.
- Determine the rate of flow of a stream in various locations.
- Measure land areas using different standard units such as a yardstick, tape measure, meter stick, forester's chain, or rod.
- Measure land areas using different non-standard units such as a pace, arm-yard, cross-reach, or body length.

SUGGESTIONS FOR TEACHING OUTDOORS

- Environmental concerns. To reduce environmental impact and foster positive environmental attitudes in your students, explain that it is each person's responsibility as a member of the ecological community to be aware of their impact upon the outdoor environment. Students should leave no traces of their presence, being careful where they walk, and being sure to replace and/or restore all things to their previous condition. Choose an area to stand where the environmental damage from a large group will be minimized (Bonney & Drury, 1991).
- Become familiar with the teaching site so you can anticipate sightings and discover any trail hazards.
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- Post trip learning. Plan activities for the classroom that draw upon experiences from the outdoor lesson. Use these activities to clarify concepts, reinforce observations, emphasize ideas and issues, and bring closure to the lesson or unit.

REFERENCES AND RELATED RESOURCES


**HOW TALL IS THAT TREE?**

**The Concept:**
To determine the height of objects using two methods of estimation.

**Positive Examples:**

**Materials:**
Popsicle sticks (one per student)
100-foot tape measures (one per group)
Each student should bring a pen or pencil, journal/notebook, and a hard surface to write on (clipboard).

**METHOD 1:**
1. Students should work in groups of 2-3. Give each student a popsicle stick and have them select one person in their group to serve as a "unit" of measure. The group will have that student (Mary) stand beside the base of a tree. The rest of the group will stand about 100 feet from the tree, facing it.

2. Holding the stick at arm’s length in front of them, the group will look at Mary so that they see her "standing" next to the stick. She will appear shorter than the stick and they should then mark her height on the stick. This will be referred to as a "Mary unit".

3. Have the groups determine how tall their tree is in "Mary units" by holding the stick in front of them, looking at the tree, and moving up the tree in increments of "Mary units". Then ask them how they would convert from "Mary units" to a standard unit of measure.

4. Use the tape measure to determine Mary's height. If feet is the unit to be used, have students compute the height of the tree after converting "Mary units" to feet.

**METHOD 2:**
1. This method requires a bright, sunny day, when shadows are easily discernible. Measure the length of the shadow cast by the tree. Then measure the length of the shadow cast by one of the students.

2. Let the shadow of the tree be $D$ (assume that it is 10 feet). Let the shadow of the student be $D^1$ (assume that it is 2 feet). Now measure the height of the student (assume that it is 5 feet). Let this be $H^1$. Height of the tree ($H$) equals the height of the student ($H^1$) times the length of the shadow of the tree ($D$) divided by the length of the shadow of the student ($D^1$).

$$H = \frac{H^1 \times D}{D^1}$$

$$H = \frac{(5) \times (10)}{2} = 25$$

The estimated height of the tree, using this method, is 25 feet.

The problem may also be set up as a simple ratio:

$$5:2 :: H:10$$

$$2H = 50$$

$$H = 25$$

THE CONCEPT:
Locating an acre: To reinforce several mathematical skills (geometry, measurement, appropriate computational skills) while developing the idea of the dimensions of an acre.

BEHAVIORAL OBJECTIVES:
The student will be able to:
• Layout an outline for a square acre.
• Use basic compass reading skills.
• Use a measuring tape to determine yardage.
• Locate the center of a square acre.

INSTRUCTIONAL STRATEGIES:
Students will need to taught basic compass reading skills before doing this lesson.

Set:
To get students interested in the size of an acre, present them with a hypothetical situation and have them problem-solve.

For example:
You are given the option of accepting a gift of some land, but there may be a catch: 10 acres of valuable property providing that you mow it (with a hand mower) once a week. Do you think this is a reasonable condition?

Also, you might discuss these statistics:

"...just 0.2% of the Earth’s land surface contains between 12% and 20% of all plant species. Given the current rate of deforestation, as many as one-fifth of all plant varieties and the animals they support face extinction" (Buzzworm: The Environmental Journal, May/June 1990, p. 12).

Each hour 5,500 acres of rainforests are destroyed. That’s over 50 million acres per year.
Positive Examples:

Materials:
• One compass for each group of nine students
• Four tape measures (50 or 100 foot tapes are best) for each group of nine students
• About 60 feet of yarn

Procedure:

In the classroom:
Explain to the students that the first task is to locate the center of an acre. To do this, they will first have to lay out an outline for a square acre.

Each angle in this lesson will be 90 degrees. Use the "three, four, five right triangle" method (Pythagorean theorem) to demonstrate the concept of a right angle as follows:

Cut three pieces of yarn:
1. 12 feet long
2. 16 feet long
3. 20 feet long

Form the pieces of yarn into a triangle. The Pythagorean theorem holds true for this triangle, thus defining it as a right triangle. The formula defining a right triangle follows (a, b, and c represent the pieces of yarn from shortest to longest):

\[ a^2 + b^2 = c^2 \]

If \( a = 12 \), \( b = 16 \), and \( c = 20 \), then:

\[ a^2 = 12 \times 12 = 144 \]
\[ b^2 = 16 \times 16 = 256 \]
\[ c^2 = 20 \times 20 = 400 \]
\[ 144 + 256 = 400 \]
\[ 400 = 400 \]

The angle formed by \( a \) and \( b \) measures 90 degrees.

Outdoors:
Bring them to the area (#2) designated on the "Math Lessons" map (page 63). First, divide the students into groups of nine. Next, divide each group of nine into three groups of three:

STEP 1
Group 1: stays at the starting point.
Group 2: measures 69.5 yards north.
Group 3: measures 69.5 yards east.
STEP 2
Group 2 sends one member 69.5 yards east
Group 3 sends one member 69.5 yards north

STEP 3
One member from each group measures 49 yards towards the group farthest away from you (diagonally across the acre). The point where the four students meet (point of intersection of lines a and b) is the center of the acre.

STEP 4
All group members look at the location of all other group members. They should be able to see what an acre looks like and where its center is located.

The following background information about measurements of an acre may be useful:

1. One acre = 4840 square yards
2. One square acre has four equal sides, each = 69.57 yards ($4840 = 69.57^2$)

3. .57 of a yard = $57/100$ of 36 inches = 20.5 inches
   $57/100 \times 36/1 = 2052/100 = 20.52 = 20.5$
4. Pythagorean Theorem (all right triangles):

\[ a^2 + b^2 = c^2 \]

The sum of the squares of the shorter sides (legs) equals the square of the longest side (hypotenuse).

\[ a^2 + b^2 = c^2 \]

\[ 69.57^2 + 69.57^2 = c^2 \]

\[ 4839.98 + 4839.98 = 9679.96 \]

If \( c^2 = 9679.96 \), \( \sqrt{c^2} = \sqrt{9679.96} \)

Then \( c = 98.38 \)

Therefore, the longest side measures 98.38 yards and the midpoint of the longest side, at 49.19 yards, would be the center of the square acre.

**Closure:**

Students determine the overall value of 40 acres of wooded school property versus selling and developing that 40 acres given the following factors:

- cost per acre
- educational value
- market value of timber
- community value (recreational, educational, etc.)
- long term vs. short term environmental effects of development vs. non-development (trees and plants contribution to air quality, aquifer, etc.)

Hopefully, they will determine that it is best left in its natural state!

SUGGESTIONS FOR TEACHING OUTDOORS

• Environmental concerns. To reduce environmental impact and foster positive environmental attitudes in your students, explain that it is each person's responsibility as a member of the ecological community to be aware of their impact upon the outdoor environment. Students should leave no traces of their presence, being careful where they walk, and being sure to replace and/or restore all things to their previous condition. Choose an area to stand where the environmental damage from a large group will be minimized (Bonney & Drury, 1991).

• Become familiar with the teaching site so you can anticipate sightings and discover any trail hazards.

• Prepare students for outdoor study. Get them excited by relating classroom activities to the outdoor lesson. Establish standards of behavior and make your expectations known.

• Plan appropriately for the weather. Stress the importance of being dressed properly for the outdoors. If necessary, look through the lost & found for warm clothing. Schedule a rain date, just in case!

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REFERENCES AND RELATED RESOURCES


MATH LESSONS

Lesson #1

Lesson #2
SOCIAL STUDIES--SEVENTH GRADE--LESSON #1

THE CONCEPT:
The New York Central College

ATTRIBUTES:
• The college was located on the site of the high school.
• The New York Central College was founded in 1848.
• The New York Central College was a liberal college that admitted anyone regardless of race, creed, or color.
• The New York Central College and the village of McGraw were involved in the Underground Railroad.
• Students are buried in the cemetery on school property.

BEHAVIORAL OBJECTIVES:
Students will be able to:
• In an essay, accurately list national events that occurred at the time of the establishment of the college.
• In an essay, accurately describe conditions during the mid-1800's in central New York.
• In an essay, demonstrate an understanding of how conditions in central New York compared to the rest of the country.
• Successfully complete a data sheet of factual information about the cemetery and present the findings to the class.
• Correctly answer questions about the area surrounding the cemetery and make inferences about the college in an oral presentation to the class.
• Design a useful questionnaire for interviewing the town historian.
• Effectively interview the town historian.
• Successfully complete rubbings of the tombstones in the cemetery and display them in the classroom.

MATERIALS NEEDED:
Something to write with: Groups 1,2,3,4,6
Paper and something to write on: Groups 1,2,3,4,6
1 Data Sheet (plus a spare): Group 1
2 Information Sheets (plus a spare): Groups 2,3
3 Large, fat crayons: Group 5
3 Sheets 24x36" plain, white paper (plus a few spare): Group 5
1 of each Chart (plus a few spare): Group 4
Information collected from other students and the cemetery in town: Group 4
INSTRUCTIONAL STRATEGIES:

Set:
This series of lessons should be preceded by a visit to one of the local cemeteries where students can work in pairs to collect data (using the data sheets on pages 68-72) about people buried in the 1850's that might have been affiliated with the New York Central College.

This lesson can be introduced by having students obtain information about the Underground Railroad and identifying notable figures of that era including Harriet Beecher Stowe. To stimulate interest, a mystery (what was the college and what happened to it) could be set up so that students get clues each day bringing them through major events that were related to the establishment and demise of New York Central College.

Three or four days prior to going outdoors for this lesson, students can be given an assignment to complete at home. The assignment would involve finding a person (relative, friend, etc.) who is a descendant of someone that was living in McGraw in the mid-1800's. Students can find out this persons name, what their occupation was, how old they were when they died, and what they died of. All students will submit their findings to Group 4 (see below). Also, a week or so prior to this lesson, Group 5 will contact the town historian (Pauline Strong) and arrange for her to visit the class the day after this lesson (Day 2). The students can decide where they want to interview her (in the classroom, or back outside at the cemetery).

Positive Examples:

Day 1:
Students are brought up to the cemetery on the school property marked #1 on the "Social Studies" map (page 83). The class should be divided into six groups to complete the following tasks:

Group 1: Students will fill out the "Data Sheet" (page 68).
Group 2: Students will fill out the "Information Sheet" (page 69).
Group 3: Same as Group 2.
Group 4: Students will use the information from this cemetery, the town cemetery (see Set) and other class members about people living in McGraw in the mid-1800's and fill in the charts (pages 70-72). For simplicity, students can choose a span of 5-10 years (1850-1858) to use for filling in the charts.
Group 5: Students will make rubbings of the headstones in the cemetery.
Group 6: Students will design a questionnaire for the town historian.

Closure:

Day 2: Group 6 will interview Pauline Strong.
Day 3: Groups 1,2,3 will work with their groups and prepare their findings for an oral presentation. 
Groups 5, and 6 summarize Pauline's interview for two other social studies classes. Group 5 can display their rubbings in the classroom.
Day 4: Groups 1,2,3 present their findings to the class.
Day 5: In an essay, students will list national events occurring at the time of the establishment of The New York Central College. They will also describe conditions during the mid-1800's in central New York, and compare these conditions to the rest of the country during that time.

To do at home: Students can make a genealogy chart of their own family (see "How to Trace Your Lineage", page 74).
EVALUATION:
Evaluation can be based upon the essays and oral presentations.

SUBSEQUENT OR RELATED LESSONS:
• Because the cemetery on the school property is small and limited to three headstones, it is recommended that students should visit either of the local cemeteries prior to this unit. Working in pairs, they can collect data about people that were buried in the cemetery in the mid-1800s, and who might have been involved in the college or the Underground Railroad.
• An effective follow-up to this lesson is a class trip to Lamont Memorial Library and the museum upstairs to look at the documents from the college. Students can look up the names from the headstones in the college records and the grade ledger.
• If any old maps can be obtained (see "Related Documents" below), a map reading lesson can be given (see "Map Reading", page 73).

Other follow-up activities:
• Students choose a person from the cemetery that they have gained some information about and write a creative story about what that persons life may have been like.
• Students write their own obituary and/or epitaph.
• Research names found in the town cemetery and determine their historical significance to the community; determine if anyone in class may be related.
• Discuss ethnic origins of names in the school and town cemetery and possible community settlement patterns.
• Determine the history and background of the town cemetery.

Related Documents:
• Cortland County Real Property Tax Service (see "Resources" below) has a map of McGrawville dated in the late 1800's that shows property lots with the names of the parcel owners.
• Lamont Memorial Library has at least one map dated 1876, that shows street names, land owners, and McGrawville Union School, which stands on or near the site of the New York Central College and the present-day high school.

SUGGESTIONS FOR TEACHING OUTDOORS
• Environmental concerns. To reduce environmental impact and foster positive environmental attitudes in your students, explain that it is each persons responsibility as a member of the ecological community to be aware of their impact upon the outdoor environment. Students should leave no traces of their presence, being careful where they walk, and being sure to replace and/or restore all things to their previous condition. Choose an area to stand where the environmental damage from a large group will be minimized (Bonney & Drury, 1991).
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REFERENCES AND RELATED RESOURCES


RELATED RESOURCES FOR SOCIAL STUDIES LESSONS

Pauline Strong, McGraw Village Historian, 836-8990 (home)
Mary Kimberly, McGraw Village Clerk, 836-6294 (work)
Alice Blatchley, McGraw Village, 756-8707
Lamont Memorial Library, and Historical Society upstairs, Debbie Barth, Librarian, 836-6767
Cortland County Historical Society, Tues.-Sat. 1-5pm, 756-6071
Catherine Hanchett, (has researched New York Central College), SUNY Cortland Library, 753-2525
Cortland County Real Property Tax Service, Cortland County Office Building, 1st floor, (maps) 753-5040
McGrawville Baptist Church, (for information about the cemetery), 836-6614
McGraw Village Clerk, (for permission to study in either cemetery), 836-6294
DATA SHEET

Your name:

Name on tombstone:

Male/Female: (circle one) M F  Was the person married?: (circle one) Yes No Can't tell

Date of Birth: Date of Death: Age at Death:

Cause of Death, if known: What time of year (season) did this person die?:

Hometown, if any: Occupation, if known:

Size of tombstone (approximate): Epitaph, if any:

What is the tombstone made of?: Is there a footstone with initials?:

Draw the shape of the tombstone: Describe any artistic designs on the tombstone:

Describe what you know about this person based on the information gathered from the tombstone:
INFORMATION SHEET

Why do you think the cemetery was located way up here on the hill?

Do you see any vegetation that is growing around the cemetery that you don't see elsewhere? If so, what type of vegetation? (Ground cover, shrubs, trees, etc.).

Who do you think the people that are buried here were? Students? Teachers?

Where are the people buried here from?

Why do you think these people were buried here and not in town? Or not in their hometown?

Do you think these people were wealthy? Why or why not?

What type of heritage (ancestry) do you think these people had? Guess by looking at their last names.

How old were they when they died?

What do you think they died of?
CHART #1-CAUSE OF DEATH

1. First fill in this chart with the data.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>CAUSE OF DEATH</th>
<th>HOW MANY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>tuberculosis</td>
<td>4</td>
</tr>
<tr>
<td>1850</td>
<td>small pox</td>
<td>9</td>
</tr>
<tr>
<td>1850</td>
<td>childbirth</td>
<td>2</td>
</tr>
<tr>
<td>1851</td>
<td>tuberculosis</td>
<td>1</td>
</tr>
<tr>
<td>1851</td>
<td>small pox</td>
<td>11</td>
</tr>
<tr>
<td>1852</td>
<td>small pox</td>
<td>14</td>
</tr>
<tr>
<td>1852</td>
<td>childbirth</td>
<td>4</td>
</tr>
</tbody>
</table>

2. Next, draw and fill in a graph for each year with the data you collected.

Example:

List Cause Along this axis

How Many

1850
CHART #2: OCCUPATION

1. First fill in this chart with the data.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>OCCUPATION</th>
<th>HOW MANY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>farmer</td>
<td>12</td>
</tr>
<tr>
<td>1850</td>
<td>student</td>
<td>3</td>
</tr>
<tr>
<td>1850</td>
<td>mother</td>
<td>8</td>
</tr>
<tr>
<td>1851</td>
<td>farmer</td>
<td>10</td>
</tr>
<tr>
<td>1851</td>
<td>student</td>
<td>1</td>
</tr>
<tr>
<td>1852</td>
<td>farmer</td>
<td>14</td>
</tr>
<tr>
<td>1852</td>
<td>student</td>
<td>2</td>
</tr>
</tbody>
</table>

Example:

2. Next, draw and fill in a graph for each year with the data you collected.

Example:
CHART #3-AGE AT DEATH

1. First fill in this chart with the data.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>AGE AT DEATH</th>
<th>HOW MANY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>infant (0-2 years)</td>
<td>4</td>
</tr>
<tr>
<td>1850</td>
<td>child (2-6 years)</td>
<td>7</td>
</tr>
<tr>
<td>1850</td>
<td>young adult (12-18)</td>
<td>15</td>
</tr>
<tr>
<td>1850</td>
<td>adult (18-30)</td>
<td>6</td>
</tr>
<tr>
<td>1850</td>
<td>older adult (30-50)</td>
<td>4</td>
</tr>
<tr>
<td>1850</td>
<td>over 50</td>
<td>2</td>
</tr>
</tbody>
</table>

Example:

2. Next, draw and fill in a graph for each year with the data you collected.

Example:
MAP READING

Concept:
Compare new and old maps and aerial photos of McGraw. What changes have taken place over the years?

Objectives:
1. To read maps and aerial photos.
2. To compare maps and aerial photos to determine where features are/were located and when changes took place.

Positive Examples:
Ask the following questions to motivate the students:
1. What changes have taken place in this area over the years?
2. How can you find out what changes have taken place?
3. How can maps and aerial photos help answer these questions?

Obtain old and new maps and aerial photos of the area. Sources of maps:
• Cortland County Historical Society • USDI Geological Survey
• LaMont Memorial Library • Homes (older citizens)
• Cortland County Real Property Tax Service • Soil Conservation Service
• Cornell University Remote Sensing Program, Eugenia Barnaba (607) 255-0880 • Realtors

Arrange maps chronologically and according to type. Note any changes that occurred during the time elapsed between one map and the other. For example:
• New roads/roads abandoned
• New houses
• Buildings erected/demolished
• Streams, impoundments, ponds

Using the maps, go to the areas where the changes have taken place. Prepare a display with a time line indicating the changes that have taken place over time. Can include a series of old photos of a certain landmark in the display. Also include dates of changes (if known). Place maps and aerial photos in proper positions on the time line.

(Knapp, 1986, p. 32)
TRACING YOUR LINEAGE

1. Starting with yourself, make a family chart using family bibles, photographs, old letters, and other family memorabilia.

2. Talk to relatives for information about your family. Ask them for sources of information such as books, letters, photographs, etc.

3. Check the local records in communities where your family and ancestors lived. You can check the county repository of vital statistics for birth certificates, marriage certificates, death certificates, property deeds, and cemetery records. You can also check genealogy and local history sections at the town library.

4. Write to genealogical collections for information about your family. Some sources are:

   New England Historic Genealogical Society, 101 Newbury St., Boston, MA 02116; National Genealogical Society, 4527 17th Street, N. Arlington, VA 22207; National Archives and Records Administration, Washington, DC 20408; Library of Congress, Washington, DC 20540; libraries of Los Angeles, New York City, Chicago (the Newberry Library) and Fort Wayne, IN; LDS Genealogical Library, 35 North West Temple St., Salt Lake City, UT 84150. This is the library operated by The Church of Jesus Christ of Latter-day Saints (Mormons) in Salt Lake City. It is a valuable source of information and maintains 170,000 books and 1.4 million reels of microfilm that contain records from all over the world.

Helpful books:
- *Shaking Your Family Tree*, by Ralph Crandall, Yankee Publishing, Inc. A good, basic guide.

SOCIAL STUDIES—SEVENTH GRADE—LESSON #2

THE CONCEPT:
Settlement: a group of organisms with common interests.

ATTRIBUTES:
• Early settlers explored new territories and surveyed the land to establish a settlement.
• The area possesses natural features that are important in selecting a settlement.

BEHAVIORAL OBJECTIVES:
Students will be able to:
• Observe and record evidence of wildlife, vegetation, and humans in the natural area.
• Determine the suitability of an area for settlement.
• In an essay, describe factors that determined where colonists established their settlements.
• In an essay, describe how settlers might have used this particular land.
• Demonstrate an understanding of how humans historically have dealt with the environment.
• List five ways that humans can reduce their impact on the environment.

MATERIALS NEEDED:
1 Activity Guide Sheet (page 77) per group (plus spares)
3 adults (teacher aids) to assist
each student should bring a pen or pencil, journal/notebook, and a hard surface to write on (clipboard).

A journal simply refers to a notebook that is used throughout the school year to record findings, answer questions, problem solve, take notes, etc.

INSTRUCTIONAL STRATEGIES:
Set:
Present the students with an imaginary scenario that will stimulate them into thinking about human values as they relate to the environment. For example, the United States is invaded by 10-foot, hairy, tree-eating aliens. How would they react to our natural and human-made environment and how would their values conflict with ours?

An interesting element to weave into this lesson is the values and attitudes of the first people to arrive in the New World. The attitudes that colonists brought with them from their European culture held great significance in the way they settled America. Their beliefs and attitudes about religion, work, and especially wilderness helped shape American society. Historically, wilderness signified evil; it was an element to be conquered and tamed.

The first people to arrive in the New World from Europe were confronted with uncultivated, forested land that was very different from the world they left behind. Europe had been civilized for centuries; to them, wilderness was "a single peak or heath, an island of uninhabited land surrounded by settlement" (Nash, 1982, p. 26). The seemingly endless wilderness the colonists faced when they arrived in this country terrified them and physically threatened their survival, and resulted in a bias against wilderness. Consequently, drastically altered environments would ensue.

Positive Examples:
For this activity, divide the class into 3 or 4 groups. Each group, accompanied by a teacher or teacher’s aid, should be given an Activity Guide Sheet and a ‘Social Studies Lessons’ map (page 83) to show their route. The routes are indicated on the map by the numbers 2. Students will record their observations on the Activity Guide Sheet and discuss their findings the following day.
Closure:
• Each group will share their findings with the class.
• Discuss the ways in which the settlers adapted the environment. Compare this with the way Indians adapted to the environment.
• Have students assess environmental problems in the Village of McGraw and discuss solutions.

EVALUATION:
In an essay, students can describe factors that determined where colonists established their settlements, and how they might have used this particular land.

SUGGESTIONS FOR TEACHING OUTDOORS

• Environmental concerns. To reduce environmental impact and foster positive environmental attitudes in your students, explain that it is each persons responsibility as a member of the ecological community to be aware of their impact upon the outdoor environment. Students should leave no traces of their presence, being careful where they walk, and being sure to replace and/or restore all things to their previous condition. Choose an area to stand where the environmental damage from a large group will be minimized (Bonney & Drury, 1991).
• Become familiar with the teaching site so you can anticipate sightings and discover any trail hazards.
• Prepare students for outdoor study. Get them excited by relating classroom activities to the outdoor lesson. Establish standards of behavior and make your expectations known.
• Plan appropriately for the weather. Stress the importance of being dressed properly for the outdoors. If necessary, look through the lost & found for warm clothing. Schedule a rain date, just in case!
• Create a positive learning environment. Encourage students to ask questions and make observations. Make use of the “teachable moment” (spontaneously drawing from the natural surroundings even if it is unrelated to the lesson.) Be aware of the groups needs and revise plans if students are too cold, hot, wet, or uncomfortable. Position the group so that their backs face the sun. Position yourself so that students can see both you and the area of interest. If you must pick a specimen, choose one large enough for all to see and/or pass it around; explain that students should not pick one themselves.
• Post trip learning. Plan activities for the classroom that draw upon experiences from the outdoor lesson. Use these activities to clarify concepts, reinforce observations, emphasize ideas and issues, and bring closure to the lesson or unit.

REFERENCES AND RELATED RESOURCES


ACTIVITY GUIDE SHEET

The year is 1795 and you have just arrived in America from England. The British government has asked you to explore this uncharted territory. You must describe it to them so they can determine if it is suitable for other settlers to move in.

As you walk along the designated route, record your observations about the geology, geography, fauna, and flora of the land. Other teams are exploring other routes in this region. We will put all the information together and determine whether or not it is suitable for human settlement. If you walk quietly and softly, you will help protect the environment and you may even see some wildlife.

From starting point to point A on the map:
1. Describe the terrain between your starting point and point A on the map (elevation changes, water, type of soil, etc.)

2. Do you think that this area is suitable for settlers? Why or why not?

3. List any wildlife or evidence of wildlife that you see (sightings, sounds, tracks, scat, etc.)

4. List the main types of vegetation (deciduous or conifer trees, shrubs, brush, wildflowers, etc.)

5. List any evidence of humans.

From point A to point B on the map:
1. Describe the terrain between your starting point and point A on the map (elevation changes, water, type of soil, etc.)

2. Do you think that this area is suitable for settlers? Why or why not?

3. List any wildlife or evidence of wildlife that you see (sightings, sounds, tracks, scat, etc.)

4. List the main types of vegetation (deciduous or conifer trees, shrubs, brush, wildflowers, etc.)
5. List any evidence of humans.

Overall evaluation:

Consider the following factors before answering this next question:

- You have only explored this area for a very brief time. It would be very shortsighted to make a decision about inhabiting the area based upon a half hour investigation. A long-term study of the area would be ideal, so you could see it in all four seasons.

- Consider the costs of settling here. Is there an adequate water supply? Can the settlers' septic needs be easily met? Would it be a reasonable area for raising crops? Would trees have to be cut down, and if so, how difficult or easy would that be?

1. Was the area you explored suitable for human settlement? Explain.

2. How might the early settlers have felt when searching a new territory?

3. List 5 ways that humans can reduce their impact on the environment.
SOCIAL STUDIES--SEVENTH GRADE--LESSON #3

This lesson is presented in an outline form and can be used by the teacher as a foundation for a more in-depth lesson.

THE CONCEPT:
The discontinued farm: an area where cultivation once occurred. Also a place where people toiled, laughed, played, cried, and raised children.

ATTRIBUTES:
• Changes occur in the environment around us.
• There is an interrelationship between weather and land.
• There is an interrelationship between human beings and land.

BEHAVIORAL OBJECTIVES:
Students will be able to:
• Describe the characteristics of a specific area of land.
• Demonstrate an understanding of how this area was once used by human beings.
• Explain how humans interrelate with land.

MATERIALS NEEDED:
• each student should bring a pen or pencil, journal/notebook, and a hard surface to write on (clipboard).

A journal simply refers to a notebook that is used throughout the school year to record findings, answer questions, problem solve, take notes, etc.

INSTRUCTIONAL STRATEGIES:
This lesson is most effective if preceded by the lesson about the New York Central College so that the students are familiar with the areas earlier inhabitants.

Set:
Show the students current aerial photographs of the school area (Cornell University Remote Sensing Program, Eugenia Barnaba (607) 255-0880), and discuss what it might have looked like 100 years ago.

Positive Examples:
Bring the class to the area (#3) designated on the "Social Studies Lessons" map (page 83). Divide the class into 4 groups and give each group an Activity Guide to fill out. Each group should receive a different aspect of the land (apple trees, water impoundment, plants, stumps) to identify and answer questions about.

Closure:
• Each group will share their findings with the class.
• Discuss the ways that this land might have been used in the past.
• Discuss how previous land use has altered the area. Can make use of old and new aerial photos.
• Students can assess a parcel of land in the community or at home as an outside assignment.

EVALUATION:
Collect the Activity Guides and evaluate their responses. Evaluation can also be based upon their class presentations.

SUBSEQUENT OR RELATED LESSONS:
• Have the class examine the map and choose other areas to do observations. They can find areas that are in different stages of succession (brush communities, short-lived trees, hardwoods, etc.) and mark these areas on the map. Then, they can examine the map and try to determine how the first inhabitants (probably the New York Central College) used the land.
SUGGESTIONS FOR TEACHING OUTDOORS

• **Environmental concerns.** To reduce environmental impact and foster positive environmental attitudes in your students, explain that it is each person's responsibility as a member of the ecological community to be aware of their impact upon the outdoor environment. Students should leave no traces of their presence, being careful where they walk, and being sure to replace and/or restore all things to their previous condition. Choose an area to stand where the environmental damage from a large group will be minimized (Bonney & Drury, 1991).

• **Become familiar with the teaching site** so you can anticipate sightings and discover any trail hazards.

• **Prepare students for outdoor study.** Get them excited by relating classroom activities to the outdoor lesson. Establish standards of behavior and make your expectations known.

• **Plan appropriately for the weather.** Stress the importance of being dressed properly for the outdoors. If necessary, look through the lost & found for warm clothing. Schedule a rain date, just in case!

• **Create a positive learning environment.** Encourage students to ask questions and make observations. Make use of the "teachable moment" (spontaneously drawing from the natural surroundings even if it is unrelated to the lesson.) Be aware of the group's needs and revise plans if students are too cold, hot, wet, or uncomfortable. Position the group so that their backs face the sun. Position yourself so that students can see both you and the area of interest. If you must pick a specimen, choose one large enough for all to see and/or pass it around; explain that students should not pick one themselves.

• **Post trip learning.** Plan activities for the classroom that draw upon experiences from the outdoor lesson. Use these activities to clarify concepts, reinforce observations, emphasize ideas and issues, and bring closure to the lesson or unit.

REFERENCES AND RELATED RESOURCES


ACTIVITY GUIDE

**Trees and an old apple orchard**  Apple trees are natives of Europe and West Asia. They were introduced to this country when it was first settled and they now grow here naturally. This tree has a short trunk and stands about 15-20 feet high. Its leaves are 2-4" long, are ovate, or elliptical with saw-toothed edges. The bark is grey, fissured and scaly. In spring, the tree blossoms with white or pink flowers. Can you identify the apple tree? If not, ask your teacher. Also, look for tap marks on maple trees. Tap marks were made by people collecting sap from the tree for use in maple syrup production.

Approximately how big is the apple orchard?

Approximately how many trees are there in it?

What is happening to the orchard now that no one is taking care of it?

How long ago do you think it was used?

Who do you think planted these trees? Why?

Look for other apple trees on your way back the school building. Where else do you see them growing?

**Water Impoundment**  The water impoundment is an arrangement of rocks and logs in the stream that runs along the trail. If you can't find it right away, ask your teacher for help.

How big is the water impoundment?

How was it made?

Who do you think might have put it there?

Why do you think it was built? What purpose might it have served?

How long ago do you think it was put there?
Plant types. Look around at the types of plants on the ground, as well as the trees. Don’t worry if you don’t know the names of these plants. Just observe what types they are. A typical cycle in forest growth is for abandoned farm land to be taken over by weeds, then brush, then short-lived trees, then more lasting hardwood or coniferous forest trees.

What types of trees and shrubs do we find in the area?

What type of ground cover is there?

What other type of plants are there?

Can you tell how long it has been since this area was used by people?

On your way back to the school, look for other areas that might have similar types of plants and ground cover. Note these areas and try and describe where they are (how far from the first area, how far from the school, how far from the trail, etc.)

Stumps. Look at tree stumps as well as dead and decayed trees that are laying on the ground. How are the stumps cut? Flat or diagonally cut? Jagged or broken?

What can we learn about the tree by the way the stumps are cut?

Do you think the area was used for lumbering? Why or why not?

Do you think a flood or hurricane might have passed through the area? Why or why not?

What is the extent of decay of the stumps?

What can you learn about the area by looking at fallen trees, decay, and stumps?
LANGUAGE ARTS--SEVENTH GRADE--LESSON #1

THE CONCEPT:
Nature observation and appreciation through the use of journal entries.

ATTRIBUTES:
• Nature can provide a silent, contemplative environment.
• All the senses can be used to connect with nature.
• Words can creatively evoke feelings about nature.
• Regular journal entries help to increase awareness, express feelings, and appreciate nature.

BEHAVIORAL OBJECTIVES:
The student will be able to:
• Choose two natural areas that are special to them.
• In writing, describe why specific areas are special for them.
• In writing, creatively describe the characteristics of a special area.
• Record observations about a special area over a period of time.
• In writing, express the feelings that a special area evokes in them.
• Write a poem that describes a special area.
• Creatively express feelings about a special area by reading a poem aloud to the class.

MATERIALS NEEDED:
• each student should have a journal and a pen or pencil.
A journal can simply be a notebook that is used throughout the school year to record feelings, answer questions, problem solve, take notes, etc. Journals are a wonderful way for students to document and record information regularly and freely. Students should be encouraged to use their journals at home as well as in school.

INSTRUCTIONAL STRATEGIES:
Many students are apprehensive of inactivity and silence. It is valuable to inspire students to be alone with their thoughts so that they can feel more comfortable with themselves and understand and express their feelings about the environment of which they are a part.

Set:
Do any or all of the following:
1) Bring the students outdoors to a wooded or vegetated area that is close to the school building. Students will work in pairs for this activity. One student will be blindfolded and the other will be the leader. The leader will guide the blindfolded student on a short walk around the area without any verbal communication between them. The leader may only use nonverbal signals to ‘show’ the other student different textures, forms, and components in nature. For example, the leader can put the other students hand on the bark of the tree to feel the texture, let them smell a flower, hear the sound of a stream or wind in the trees, feel a ray of sunshine on an outstretched hand, etc.. The blindfolded student may be given a close-up look from time to time at special scenes (sunlight falling on a leaf, a spider web, etc.). Encourage the leader to be creative in helping the "blind" student use as many senses as possible. Caution leaders to think about safety first and prohibit tasting of natural objects. The students can then switch roles. The goal of this activity is to make students more aware of their other senses, while becoming more aware of different natural elements.
2) Read excerpts from various 'nature writers' such as John Muir, Rachel Carson, Walt Whitman, etc. and discuss the excerpt with the class. For example, this excerpt from "The Story of My Life", by Helen Keller:

What a joy it is to feel the soft, springy earth under my feet once more, to follow grassy roads that lead to ferny brooks where I can bathe my fingers in a cataract of rippling notes, or to clamber over a stone wall into green fields that tumble and roll and climb in riotous gladness! (Van Matre, 1988, p. 30)

3) Students can construct a journal to use for this lesson.

**Positive Examples:**

Set aside one day each week for this lesson. Bring the class to an area that you have chosen ahead of time. Choose a diverse area on the wooded property where the students will feel secluded (such as the area designated by the #1 on the "Language Arts Lessons" map on page 92). The first day each student should spend a few minutes choosing their own special place where they will return to for subsequent lessons.

Each week give the students an assignment to complete at their special place. Choose from the following assignments:

- This activity involves using the senses. Students sit quietly at their spot and write down their observations, noting any changes that may have occurred since the last time they were there. They should also listen and write down all the sounds that they hear and smell. Based on the notes they have taken, they can write a short description of their 'special place'.

- Have the students describe, in writing, about a natural object at their 'special place' in an inventive way, without identifying the object. Students can read them aloud to each other and guess what the objects are.

- Students choose an animal that lives in this area (deer, woodchuck, bird, insect, etc.) and imagine that they are that animal. They can describe the area as the animal might see it and write about it from the animals perspective. To help students be creative, suggest that they try and examine the world as the animal might see it (i.e. lie on the ground) or imagine that it is raining or snowing.

- Students work in pairs for this visualization (guided imagery) activity. The activity should be done at each of the two students' 'special place'. One student (John) will close his eyes and the other (Amy) will lead John (safely) to Amy's 'special place'. Amy will describe her area to John. Explain to the class that they should try to imagine and visualize what they are being told about the area. The 'blindfolded' student (John) should then be led back to his 'special place' where they will sit and write about what they just 'saw'. Later, they can read each other's work and return to the area to see what they wrote about.

- Students can write a poem about their 'special place' and read it aloud to the class.

**Haiku:** originated by the Japanese, it consists of three lines of five, seven, and five syllables each. The emphasis is syllabic, not rhyming.

**Example:**

Orange morning--sun leaves  
Awaken deep within me  
The dawn of being
Cinquain: derived from the French and Spanish words for five. This form of poetry is also based on syllables—or may be based on number of words—but there are five lines. Each line has a mandatory purpose and number of syllables or words:

- **Line 1** - the title in two syllables (or two words)
- **Line 2** - a description of the title in four syllables (or words)
- **Line 3** - a description of action in six syllables (or words)
- **Line 4** - a description of a feeling in eight syllables (or words)
- **Line 5** - another word for the title in two syllables (or words)

Example using syllables:

```
Meadow
Peaceful, quiet
Grasses gently blowing
Feeling warm from all the sunshine
Open
```

Diamante: a poem shaped in the form of a diamond. It can be used to show that words are related through shades of meaning from one extreme to an opposite extreme, following a pattern of parts of speech like this:

```
noun
  adjective adjective
  participle participle participle
  noun noun noun noun
  participle participle participle
  adjective adjective
  noun
```

Example:

```
seedling
  tiny delicate
  living sprouting growing
  bud leaf bough branch
  budding blossoming shading
  green grand
tree
```

Closure:
Have the students design and write a 'nature adage' calendar about the natural area. Give the class complete ownership of the project by allowing them to make all decisions necessary for designing, organizing, and implementing the calendar. Then, have students sell the calendar to members of the community and let the class decide what to do with the proceeds.

EVALUATION:
Evaluation can be based upon the journals and the outcome of the calendar.
SUGGESTIONS FOR TEACHING OUTDOORS

• **Environmental concerns.** To reduce environmental impact and foster positive environmental attitudes in your students, explain that it is each person's responsibility as a member of the ecological community to be aware of their impact upon the outdoor environment. Students should leave no traces of their presence, being careful where they walk, and being sure to replace and/or restore all things to their previous condition. Choose an area to stand where the environmental damage from a large group will be minimized (Bonney & Drury, 1991).

• **Become familiar with the teaching site** so you can anticipate sightings and discover any trail hazards.

• **Prepare students for outdoor study.** Get them excited by relating classroom activities to the outdoor lesson. Establish standards of behavior and make your expectations known.

• **Plan appropriately for the weather.** Stress the importance of being dressed properly for the outdoors. If necessary, look through the lost & found for warm clothing. Schedule a rain date, just in case!

• **Create a positive learning environment.** Encourage students to ask questions and make observations. Make use of the "teachable moment" (spontaneously drawing from the natural surroundings even if it is unrelated to the lesson.) Be aware of the groups needs and revise plans if students are too cold, hot, wet, or uncomfortable. Position the group so that their backs face the sun. Position yourself so that students can see both you and the area of interest. If you must pick a specimen, choose one large enough for all to see and/or pass it around; explain that students should not pick one themselves.

• **Post trip learning.** Plan activities for the classroom that draw upon experiences from the outdoor lesson. Use these activities to clarify concepts, reinforce observations, emphasize ideas and issues, and bring closure to the lesson or unit.

REFERENCES AND RELATED RESOURCES

Cohen, Michael J. *Connecting with nature.* World Peace University, Box 10869, Eugene, Oregon, 97440


87
THE CONCEPT:

ATTRIBUTES:
- Recording your stream of consciousness helps to express feelings in writing.
- Editing flow writing can create an effective story.

BEHAVIORAL OBJECTIVES:
The student will be able to:
- Actively use their imagination by focusing for 15-20 minutes on a natural object.
- Express themselves on paper by recording all their thoughts about a natural object.
- Creatively edit their own writing.
- Complete a creative story about a natural object.

MATERIALS NEEDED:
- Each student should bring a pen or pencil, journal/notebook, and a hard surface to write on (clipboard).
A journal can simply be a notebook that is used throughout the school year to record feelings, answer questions, problem solve, take notes, etc. Journals are a wonderful way for students to document and record information regularly and freely. Students should be encouraged to use their journals at home as well as in school.

INSTRUCTIONAL STRATEGIES:

Set:
Draw a small dot on a white piece of paper and ask students to write down (or tell the class) what it looks like to them. Do the same with the drawing on page 91. Have students share their 'answers' with each other. The purpose of this activity is to make students aware of how many different ways there are of looking at one object or scene and to encourage them to sharpen their observation skills (really analyze and scrutinize things).

Another way to introduce this lesson is with the *aardvark* activity (Bonney & Drury, 1991, p. 216). With a blank page in their journal, ask students to draw a picture of the object that you will be describing to them. Ask them not to collaborate with anyone else, and not to show it to anyone until the activity is completed. The students will draw the object (it will be something that is somewhat familiar to them) as you read them a description of it. Read the following description slowly, phrase by phrase:

This 'thing' is oblong in shape with a very hairy body, having a big nose, long ears, a heavy tail, a powerful set of claws, and a slender tongue.

When the students are finished drawing, they should share their pictures with each other. Compare them to see how different everyone interprets the same information.
**Positive Examples:**

Bring the class to an area that you have chosen ahead of time. Choose a diverse area on the wooded property where the students will feel secluded (such as the area designated by the #2 on the 'Language Arts Lessons' map on page 92). Students will find an area and sit alone while they complete this activity. Each student will choose a natural object, such as a tree, plant, or spider to focus on. For about 15-20 minutes they will write down everything that flows into their head about the object. Explain that they should literally record whatever comes into their mind, ignoring grammar, spelling, etc. The pencil shouldn't even leave the paper for the entire 15-20 minutes.

Have the students focus on how it would feel to be that object. For example, if the object were a tree, they can imagine how it might feel to have the roots surrounded by cool, moist soil, how it would feel to have a bird land on its limb, have water and nutrients coursing through the veins of a leaf, or what we might look like to a tree.

Returning to the classroom, students can look back at their work and edit it, correcting grammar, spelling, and adding and deleting thoughts. Students can also draw in addition to or instead of writing for this activity. When they are focused on the object, they should draw what they see and feel, without taking their eyes off the object. The mental energy that is used to focus on the object can be powerful; students may discover artistic abilities they didn't know they had.

**Closure:**

Have the students write a creative story based upon their 'flow' experience.

**EVALUATION:**

Evaluate the creative stories.

**SUGGESTIONS FOR TEACHING OUTDOORS**

- **Environmental concerns.** To reduce environmental impact and foster positive environmental attitudes in your students, explain that it is each person's responsibility as a member of the ecological community to be aware of their impact upon the outdoor environment. Students should leave no traces of their presence, being careful where they walk, and being sure to replace and/or restore all things to their previous condition. Choose an area to stand where the environmental damage from a large group will be minimized (Bonney & Drury, 1991).
- **Become familiar with the teaching site** so you can anticipate sightings and discover any trail hazards.
- **Prepare students for outdoor study.** Get them excited by relating classroom activities to the outdoor lesson. Establish standards of behavior and make your expectations known.
- **Plan appropriately for the weather.** Stress the importance of being dressed properly for the outdoors. If necessary, look through the lost & found for warm clothing. Schedule a rain date, just in case!
- **Create a positive learning environment.** Encourage students to ask questions and make observations. Make use of the "teachable moment" (spontaneously drawing from the natural surroundings even if it is unrelated to the lesson.) Be aware of the groups needs and revise plans if students are too cold, hot, wet, or uncomfortable. Position the group so that their backs face the sun. Position yourself so that students can see both you and the area of interest. If you must pick a specimen, choose one large enough for all to see and/or pass it around; explain that students should not pick one themselves.
- **Post trip learning.** Plan activities for the classroom that draw upon experiences from the outdoor lesson. Use these activities to clarify concepts, reinforce observations, emphasize ideas and issues, and bring closure to the lesson or unit.
REFERENCES AND RELATED RESOURCES


Cohen, Michael J. *Connecting with nature*. World Peace University, Box 10869, Eugene, Oregon, 97440


INTERDISCIPLINARY LESSON—SEVENTH GRADE
This lesson is presented in an outline form and can be used as a foundation for a more in-depth school project.

THE CONCEPT:
An interdisciplinary inventory of the natural area.

ATTRIBUTES:
• Science: identifying species in various ecosystems of the natural area.
• Language Arts: writing, editing, and organizing copy for field guide(s).
• Art: designing the layout for field guide(s).
• Photography: photographing, editing, designing field guide(s).
• Social Studies: researching and writing information about New York Central College and the cemetery.

BEHAVIORAL OBJECTIVES:
The student will be able to:
• Correctly identify different species from various ecosystems.
• Compile and edit information about different species.
• Present information about different species in an organized and attractive manner.
• Present information about cultural and historical aspects of the natural area.

MATERIALS NEEDED:
• cameras
• published Field Guides (e.g. Peterson's or Audubon Society) for various species of the Eastern United States.
• binoculars, if possible
• hand lenses
• historical resources

INSTRUCTIONAL STRATEGIES:
Each class (subject) will contribute to the development of a series of field guide/booklets specifically for the school’s natural area. Species identification may include: birds, insects, trees, wildflowers, and mammals. These field guides can focus on one season, or all four. One field guide may contain all species, or students may decide to design one field guide/booklet for each species.

Each discipline (science, art, language arts, social studies, and photography) will be responsible for a specific portion of the project. Responsibilities can be divided among different classes (periods).

Examples of various tasks are as follows:
Science classes: choose which species to identify; inventory and identify the area for each species.
Photography classes: take photographs of species; develop and print photographs; select appropriate photographs to accompany the text.
Language Arts: write descriptions and edit text to accompany photographs; edit copy contributed by Social Studies classes.
Art classes: draw pictures to accompany text; design a layout for field guides.
Social Studies classes: research the area’s history (New York Central College); write interesting copy for the field guides about the cemetery and the college.

The finished product can be shared with other students and teachers for educational purposes. Also, if the trails in the natural area are accessible for the enjoyment of the community, copies of field guide/booklets can be made available to the public.
SUGGESTIONS FOR TEACHING OUTDOORS

• **Environmental concerns.** To reduce environmental impact and foster positive environmental attitudes in your students, explain that it is each person's responsibility as a member of the ecological community to be aware of their impact upon the outdoor environment. Students should leave no traces of their presence, being careful where they walk, and being sure to replace and/or restore all things to their previous condition. Choose an area to stand where the environmental damage from a large group will be minimized (Bonney & Drury, 1991).

• **Become familiar with the teaching site** so you can anticipate sightings and discover any trail hazards.

• **Prepare students for outdoor study.** Get them excited by relating classroom activities to the outdoor lesson. Establish standards of behavior and make your expectations known.

• **Plan appropriately for the weather.** Stress the importance of being dressed properly for the outdoors. If necessary, look through the lost & found for warm clothing. Schedule a rain date, just in case!

• **Create a positive learning environment.** Encourage students to ask questions and make observations. Make use of the "teachable moment" (spontaneously drawing from the natural surroundings even if it is unrelated to the lesson.) Be aware of the group's needs and revise plans if students are too cold, hot, wet, or uncomfortable. Position the group so that their backs face the sun. Position yourself so that students can see both you and the area of interest. If you must pick a specimen, choose one large enough for all to see and/or pass it around; explain that students should not pick one themselves.

• **Post trip learning.** Plan activities for the classroom that draw upon experiences from the outdoor lesson. Use these activities to clarify concepts, reinforce observations, emphasize ideas and issues, and bring closure to the lesson or unit.

REFERENCES AND RELATED RESOURCES


CHAPTER VI
RECOMMENDATIONS

It is recommended that McGraw Central School seek community and parental support to supplement the efforts of McGraw's teachers and students when implementing this environmental and outdoor education prospectus. The benefits that can be gained from community and parental support are numerous. The chances of vandalism occurring in the natural area are reduced if pride, ownership, and support from the community are encouraged (Fazio, 1983). In addition, parents and community can offer physical, financial, and technical assistance, helping to reduce time, cost, and labor restraints.

Initially, support can be gained by exposing the community and parents to E & OE, thereby increasing their awareness of its value. One effective way to accomplish this is to design outdoor lessons that send students into the community to investigate issues. Examples are provided in the lessons that accompany this prospectus. Likewise, outdoor lessons can bring members of the community to the school to enhance discussions and topics. For example, a language arts lesson might involve students in writing a newspaper article about the natural area and the schools plans to use it for E & OE. To follow up this lesson, student articles could be submitted to the local newspaper and a journalist from the paper could be invited
to speak to the class.

It is also recommended that students participate in the planning and implementation of an E & OE program at the school. Of greatest value are the educational benefits that can be derived from involving students in all levels of implementation. Students can learn abstract and concrete concepts which would not be limited to any one subject. For example, planning how a trail can be improved involves discussion of theory while building and maintaining the trail or constructing trail signs provides hands-on experience.

It is equally important for students to develop a sense of commitment towards the environment. According to Lutts (1985), personal experience of a place is a fundamental step toward understanding the world we live in. Students can gain personal experience with the school's natural area by being involved in outdoor lessons, and planning and building trails. Lutts (1985) states that E & OE programs that "educate for a sense of place and home in our environment...would promote a more caring relationship with the place in which we live" (p. 41), emphasizing the integral role that the concepts of place and home play in fostering commitment towards "the world that we wish our students to call home" (p. 40).

If nothing else, this E & OE prospectus will, at the very least, introduce faculty at McGraw Central School to education in, for, and about the out-of-doors and
encourage use of it. Additionally, faculty can become acquainted with and recognize the value of an outstanding resource that is readily available to both the elementary and junior and senior high schools.

The plans and lessons presented in this prospectus have been carefully developed to stimulate student and faculty interest and to make initial implementation easy to accomplish. Furthermore, these lessons can serve as examples for further development of the multitude of concepts that can be effectively taught in an outdoor setting. Certainly, using the outdoors for teaching is not (and should not be) limited to the four subject areas chosen here (i.e. language arts, math, science, and social studies). Essentially every school subject involves information and elements that can effectively make use of the outdoors. In the past, E & OE has often neglected areas outside of science and social studies, fostering only a scientific or humanistic approach to solving environmental issues, thereby failing to "recognize interrelated aspects of the biosphere" (Garmulewicz, 1986, pp. 1-2). Garmulewicz (1986) continues:

In order for society to come to terms with environmental degradation, people must recognize its various interacting parts and develop a sense and concern for the system as a whole. It is not adequate for people to be, simply, environmentally 'aware'. Society must develop attitudes and behaviours that approach environmental issues from a holistic perspective (p. 2).
APPENDIX I

SAFETY TRED INFORMATION
By teaching all disciplines through the use of the environment and the outdoors, educators can effectively accomplish this holistic ideology. All subjects can "play a fundamental role in the development of a holistic attitude" (Garmulewicz, 1986, p. 2).

As an example, the school's natural area is a perfect place for physical education activities and lessons throughout the school year. Ideally the area will continue to be utilized by physical education teachers for activities such as cross country skiing, orienteering, and adventure games and initiatives. The natural area is also ideally suited for a low elements course.

Community access has been given careful consideration throughout the development of this project. Therefore, it is recommended that the natural area be made available to members of the community so that they can utilize it (with minimal environmental impact) for outdoor recreation activities.

Finally, in recognizing a need for a departure from traditional classroom learning, this prospectus provides ways of increasing students' awareness of relevant issues and problems as well as preparing them with the necessary skills to apply that information. Making use of the natural property adjacent to McGraw Central School is a unique and valuable opportunity for students to apply real-life issues and problem-solving skills, which is the core of Environmental & Outdoor Education. Science-
Technology-Society: Investigating and Evaluating STS Issues and Solutions (Ramsey, Hungerford, & Volk, 1990) and "The Critical Skills Program" are two exceptional resources that are consistent with this theme and provide practical information and assistance for integrating environmental and outdoor education into existing curriculums.

Ramsey, Hungerford, & Volk's teaching guide involves learners in independent investigations of science-related social issues, taking students beyond issue awareness and into investigation and citizen participation and action. The entire citation for this publication appears in the bibliography and a more detailed description of this worktext can be found in Appendix III.

The model developed by the "Critical Skills Program" focuses on the following six goals for students in the classroom: developing "Critical Skills" (problem solving, decision making, critical thinking, creative thinking, independent learning, etc.); attaining essential knowledge; owning, investing, and becoming empowered in their own learning; progressing toward self-direction; holding a collaborative work ethic balanced with individual inquiry and accountability; and assuming responsible membership in a classroom community. Additional information about the "Critical Skills Program" is located in Appendix IV.

The bibliography provided contains several resources
that can assist faculty in implementing and developing outdoor lessons. Most of the articles and books listed are available at the SUNY Cortland library or can be obtained through inter-library loan. Assistance is also available through the Cortland College Center for Environmental and Outdoor Education and from the faculty and students of the college's Recreation and Leisure Studies Department.

From its inception, the purpose of this work was to enrich teaching and learning while educating others about the environment and the outdoors. It also represents the fulfillment of a desire to contribute a worthy and practical tool to a real-life population.

It is hoped that those who read this capture the same excitement and spirit for teaching and learning in the out-of-doors that inspired this writer during the development of the project. Good luck to those who use this work and may it serve you well in passing on a love of the outdoors to your students.
Safetytred is manufactured from Rubberlene and a specially formulated material mix of high quality flexible P.V.C. and rubber compounds to provide a tough, resilient safety matting. Safetytred is designed for long-life exterior use and is stabilised against ultra-violet degradation to N.Z.S. 7601.

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Safetytred tiles are packaged 10 per carton with a carton weight of 42 lbs (19 kg)

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Called Interlocking Grating.

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Roger Maloney
President
APPENDIX II

EXCERPTS FROM
ESSENTIAL LEARNINGS IN ENVIRONMENTAL EDUCATION
ESSENTIAL LEARNINGS IN ENVIRONMENTAL EDUCATION
a database for building activities and programs

North American Association for Environmental Education

Developed by
The State University of New York
College of Environmental Science & Forestry
Syracuse, USA

and

Centre for Environment Education
Nehru Foundation for Development
Ahmedabad, India

As part of the
Children's Environmental Education Television Project
About the handbook

The 1977 Intergovernmental Conference on Environmental Education in Tbilisi, USSR, set forth a challenge to environmental educators around the world: To develop a world population that is aware of and concerned about the total environment and its associated problems, and which has the knowledge, attitudes, motivations, commitment and skills to work individually and collectively toward solutions of current problems and the prevention of new ones.

In working toward this goal, the Centre for Environment Education, Ahmedabad, India (CEE) and the State University of New York, College of Environmental Science & Forestry, Syracuse, New York, USA (CESF) have engaged in a cooperative project to develop a series of half-hour environmental education television programs with supporting teacher guides and student activity materials. The series is targeted for middle school students. It is our intent to make the products of this project available to other environmental educators who can use them to further the Tbilisi Conference goals.

This handbook consists of concepts (i.e., information in various forms) we view as essential for "environmental literacy." The handbook evolved from a computer database developed as a first step in the project. The database format and first round of entries were developed at CESF between September 1986 and January 1987; a team of CEE staff then continued the project, making numerous additions and editorial changes over the next two years. Throughout its development, the database has been thoroughly reviewed by experts from diverse fields.

Our goal was to arrive at a collection that, viewed in its entirety, adequately prepares tomorrow's citizens to deal personally and collectively with the environmental issues they will face. We have attempted to be comprehensive, but there are sure to be gaps in content. And while measures have been taken to verify facts, there may be inaccuracies. Some concepts may be found misleading or biased. We expect and encourage contributions, criticisms and suggestions from users of the handbook.

Through an arrangement with the North American Association for Environmental Education (NAEE), this edition of the handbook has been prepared especially for North American publication. NAEE members have expressed continued interest in the database, and it is hoped that this handbook will meet their particular needs.
for environmental curriculum development. Essential Learnings is also available on 3.5" disk for Macintosh computers, and should be on EcoNet some time in 1990. Inquiries about obtaining the database on disk should be addressed to NAEE.

While an activity of this nature can never be considered complete and finished, we hope that *Essential Learnings in Environmental Education* will be useful for anyone working to develop basic environmental literacy.

David L. Hanselman, Professor  
State University of New York  
Syracuse, USA

Kartikeya V. Sarabhai, Director  
Centre for Environment Education  
Ahmedabad, India

Co-Directors, Children's Environmental Education Television Project
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EXCERPTS FROM

SCIENCE-TECHNOLOGY-SOCIETY:
Investigating and Evaluating STS Issues and Solutions
STIPES PUBLISHING COMPANY

ANNOUNCES

SCIENCE — TECHNOLOGY — SOCIETY AND ENVIRONMENTAL CURRICULA

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... teaching science process skills and other important critical thinking skills.

... highly interdisciplinary in nature — involving content and skills from science, social studies, and language arts.

... consistent with goals recommended by Project Synthesis, the Carnegie Report, NCSS, and NSTA.
ABOUT THESE PROGRAMS

Characteristics Common to All:

* Four instructional goal levels provide a framework for instruction. These four goal levels include science content, information processing, scientific problem solving, and decision making.

* The content is highly relevant - focusing on real-life issues found in the local community and region.

* Students are involved in actual issues, investigating them, making personal decisions concerning them, and gaining an opportunity to help resolve them as well.

* Instruction throughout each program begins with knowledge and skill development using a "define > practice > apply" format.

* Traditional science process skills are developed - identifying problems, writing research questions, data collection, data interpretation and communication, graphing, making inferences and recommendations.

* Other highly recommended and important critical thinking skills are also developed - analysis, synthesis, and evaluation.

* Science, social studies, and language arts are integrated in highly organized and logical ways.

* Students find these materials to be highly motivational and useful - parents support this instruction - administrators typically endorse the emphasis on critical thinking skills and responsible citizenship.

* A Teacher's Edition is available for each program.
Science - Technology - Society: Investigating and Evaluating STS Issues and Solutions is designed to involve learners in today's important science-related social issues. The text introduces learners to the nature of science, technology, and society, and to issues which arise from these three forces. Learners are taught to analyze these issues, and to collect and process information related to these issues. Subsequently, learners apply these skills to the independent investigation of an issue of their own choosing. Following the investigation, citizenship skills and a decision-making model are introduced, as learners learn how issues are resolved through responsible citizen participation. Performance objectives are provided throughout - a contract format is presented and suggested for use during the student research phase.

Investigating and Evaluating Environmental Issues and Actions also involves learners in the investigation and resolution of science-related social issues... environmental issues. This program provides training in the investigation and action skills needed by an autonomous and environmentally-responsible citizen. The program is interdisciplinary and introduces learners to environmental issues, the skills needed to investigate issues, the skills needed for information processing, and those skills used by responsible citizens in applying action. Performance objectives are provided throughout - a contract format is presented and suggested for use during the student research phase. Over ten years of classroom use and several revisions precede this edition and maximize its potential for success. Research shows this program successful in promoting indepth issue investigation and responsible citizen action out in the community. It has been used successfully in middle and secondary schools across North America. 

A Science-Technology-Society Case Study: Municipal Solid Waste focuses on the knowledge and issues related to the generation, reduction, and disposal of household and commercial solid waste. This program was designed for the teacher who wishes to have a class research project focusing on a single issue, rather than autonomous investigations into a number of issues by individual learners. Learners are introduced to foundation information related to solid waste (sources of waste, methods of disposal, waste-related problems), and to the skills associated with issue analysis. They investigate a particular aspect of solid waste management in their community and make recommendations where needed. They then learn how citizens go about helping to resolve issues.
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APPENDIX IV

"The Critical Skills Program"
The Critical Skills Classroom defines the vision.

The Critical Skills Classroom model provides educators with a wide range of options for helping young people to attain a depth of knowledge and a diversity of skills. It weaves goals, attitudes, environments and methods into a rich tapestry of meaningful, positive and balanced in-school experiences for all children, whether they are in a self-contained primary classroom or a twelfth grade physics class.

Students in Critical Skills Classrooms develop knowledge in the context of the issues, problems and questions that are spun from the past, that are woven through the present, and that pattern the fabric of the future. They value skills — problem solving, decision making, creative thinking, collaboration, leadership — skills that are the warp and weft of knowledge. Teachers consciously target both skills and knowledge in the design of learning experiences.

Students are given opportunities in the classroom to use their knowledge and skills to explore issues that touch their lives. They are regularly given real problems to tackle. This makes it possible for them to move outside of the classroom, to take action on issues and to have tangible impact.
For example, elementary students in New Hampshire took what began as an investigation into why balloons rise and turned it into a national campaign to protect marine animals from the dangers posed by escaped balloons. As part of an exploration of solid waste, young children in Maine moved a local fast food restaurant to take specific steps toward addressing the issues of appropriate packaging and waste management long before the company began national recycling efforts. In another situation, high school students made a conscious choice to change the focus of their study of housing into an advocacy for the homeless — culminating in a fundraising march in support of local shelters.

These students are involved and invested. They are enriched by today’s learning experiences, and they are being prepared for the challenges that lie beyond the classroom walls.

All of the diverse components that are framed by classroom vision are unified and made accessible in a Critical Skills Classroom — essential skills, relevant contexts for inquiry, cooperative learning, real problems, learning styles, self-directed learning, classroom communities, motivated students, self-esteem, student and teacher empowerment, evaluation alternatives. These elements are embodied in an integrated, holistic approach that makes sense for all grades and levels of ability.

The Critical Skills Classroom model is practical and implementable. It makes it possible to take a significantly different approach — meeting the demands of curriculum, time and resources by the innovative use of these familiar delimiters.

There are six goals for students in a Critical Skills Classroom.

- To develop Critical Skills.
- To attain essential knowledge.
- To own, invest and become empowered in their own learning.
- To progress toward a concept of self-direction.
- To hold a collaborative work ethic that is balanced with individual inquiry and accountability.
- To assume responsible membership in a classroom community.
The Goals of a Critical Skills Classroom

Developing the Critical Skills:
- problem solving
- decision making
- critical thinking
- creative thinking
- communication
- organization
- cooperation
- collaboration
- management
- leadership
- independent learning
- documentation

Exploring curriculum in the context of larger issues.
Making connections among key concepts within a diversity of contexts.
Investigating real problems and developing solutions.

Celebrating diversity.
Viewing oneself as an invested and socially responsible member of classroom, school, local and global communities.
Building mutual respect and mutual support.

Investing in, taking responsibility for, and being accountable for one's own learning.
Taking action on issues and problems.
Developing self-esteem.

Developing a work ethic.
Taking the initiative.
Cultivating resources.
Pursuing inquiry.
Persevering toward goals.

Investing in a group vision.
Furthering oneself and others within the achievement of common goals.
Optimizing the outcomes of common efforts.
Working together toward a common vision.
Valuing and maximizing others' contributions.

Collaboration

Ownership

Self-Directed Learning

Community
"I believe that a Critical Skills education that allows students to be able to adapt to new or unpredictable situations — to be prepared for new opportunities — is essential for students to successfully participate in the future."

The Critical Skills Classroom vision frames the experience of the Summer Institutes.

Critical Skills Institutes offer an in-depth, experiential exploration of the Critical Skills Classroom to educators from elementary, middle and high school settings. An Institute is an unique and intensive six-day immersion in the model and in its practical implementation. It is an opportunity for educators to develop a framework for cooperative learning, skill development, learning styles, contextual learning, problem solving, essential knowledge, and community/team building — approaches that educators value, but often struggle to integrate and implement.

Institute instruction is provided by active classroom teachers who exemplify the very best of what our schools have to offer. They work at all levels of primary and secondary education. They are proven leaders, innovators and facilitators of learning. They share the vision and have transformed it into reality in their own classrooms.

The Critical Skills Program has offered Institutes since 1982.

The program has grown, changed, responded, and evolved over the past decade, and continues to do so. It has taken a position of leadership and has challenged educators in diverse demographic and geographic settings to invest in the vision and to become an integral part of its dynamic development.
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