# THE DEVELOPMENT OF AN ENVIRONMENTAL SITE BY SIXTH GRADE STUDENTS AT MITCHELL MIDDLE SCHOOL IN RACINE, WISCONSIN, AND ITS EFFECT ON THEIR ENVIRONMENTAL ATTITUDES

by

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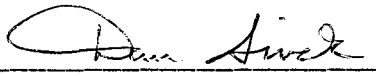

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## ABSTRACT

The purpose of this study was to determine the extent to which environmental attitudes improve in students while they are involved in the development and use of a school environmental site.

This study consisted of four sixth grade classes, approximately 80 students, from Mitchell Middle School in Racine, Wisconsin. Two classes represented the treatment group while the other two classes represented the control. Both treatment and control groups were given a pretest survey based on the structure of the The Children's Attitude Toward the Environment Scale (Musser and Malkus 1994) with modified statements related to things students would experience interacting in the environmental site: plants, animals, chemical use, the environment, waste, ethics. For each question, the survey's format gave children a choice between two statements. The students chose which statement was most like them. Next to each statement were a large box and a small box. The large box meant "I am a lot like this person". The small box meant "I am a little like this person". The students chose the box that best represented themselves next to their chosen statement.

The treatment group was then immersed in the development of the environmental site. Activities included removing weedy vegetation, hauling topsoil into the raised garden beds, generating lists of compatible native Wisconsin plants, researching and making books on the native plants, developing a planting layout for the courtyard, ordering the plants, and planting the native plants in the environmental site.

After the treatment was completed, both the control and treatment groups were given the same survey as a posttest.

The pre and posttest surveys were tabulated in the following manner: Each of the survey statements had four possible choices. Each of these choices was allotted a number from 1 to 4 with 4 representing the highest environmentally conscious attitude. A total individual score was determined by totaling the score for each of the 14 responses. This means that individual scores could range from 14 to 56. The individual scores were used to calculate the mean individual score. In addition, each individual survey statement was analyzed for its individual results by tallying the number of responses for each of the 4 possible responses. These mean scores were then compared to find changes in environmental attitudes.

The overall conclusion from these comparisons is that environmental attitudes did not change. This leads to the possible conclusion that involvement in the development on an environmental site, in itself, does not change environmental attitudes over the short term. A possible reason for this is that the environmental issues represented in the site development and survey were not discussed in enough depth for a change in environmental attitudes to occur. Finally, it's possible that students needed to play more of a leadership role in site development decisions so they could lead, influence and encourage student ownership.

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# CHAPTER I: INTRODUCTION

## The Statement of the Problem

To what extent can the involvement of sixth grade students in the development and use of the Mitchell Middle School environmental courtyard site improve their environmental attitudes?

## The Subproblems

1. The first subproblem is to organize an environmental site planning committee.
2. The second subproblem is to develop goals for the development and use of the environmental site.
3. The third subproblem is to create an environmental site development plan.
4. The fourth subproblem is to plan and implement a treatment that involves students in the development of the environmental site.
5. The fifth subproblem is to design a survey to measure the extent to which environmental attitudes change during the development of the environmental site.
6. The sixth subproblem is to organize a treatment group and a control group.
7. The seventh subproblem is to administer a pretest and posttest to the treatment and control group.
8. The eighth subproblem is to analyze and interpret the pretest and posttest data to determine the extent to which environmental attitudes change in sixth grade students.

## The Limitations

1. The study will not evaluate the development success of the environmental site.

2. The study will not evaluate the development plan for the environmental site.

3. The study will not evaluate the students' awareness, knowledge, skills or participation in relation to the environmental objectives set down by DPI.

4. The treatment group will be limited to two sixth grade classes (approximately 40 students) who will participate in the courtyard project.

5. The control group will be limited to two different sixth grade classes (approximately 40 students) who will not participate in the courtyard development.

The Definition of Terms

**Courtyard**: A courtyard is an area enclosed by four walls and is open to the sky. It contains concrete sidewalks and garden areas. The actual sizes of the two garden areas, the subject of this study, are 50'X22' and 12'X10', while the total area of the Mitchell School courtyard is 92'X43'.

**Development**: Development means the manner in which something is changed into something more useful for a particular purpose.

**Environmental attitudes**: Environmental attitudes are a set of values and feelings which show a concern for the environment and influence participation in environmental maintenance and improvement.

**Environmental site**: An environmental site is an area which can be used to enhance environmental teaching and learning experiences for teachers and students. This also refers to the courtyard site.

**Improve**: Improve means the manner in which something positively changes.

The Abbreviations

**DPI**: Department of Public Instruction

The Assumptions

1. The first assumption is sixth grade students' environmental attitudes need to improve.
2. The second assumption is the development of an environmental site will improve environmental attitudes.
3. The third assumption is environmental attitudes are measurable.
4. The fourth assumption is the Mitchell Middle School courtyard can be turned into an environmental site.

The Significance of the Study

Mitchell Middle School in Racine, Wisconsin, is an urban school with a student body that varies greatly in respect to race, socioeconomic level and exposure to non-urban environments. Urban students play an important environmental role in the future of the world . Though they may not be exposed to great expanses of wild areas, they still need to understand their role in maintaining these wild areas for future generations and for the overall health of our planet. Some of the Mitchell Middle School students may not interact with these wild areas directly, but indirectly they consume products made from natural resources, support businesses expanding outwards from the city and may be part of urban sprawl, as people exit the city looking for "green" space or escape from the atmosphere of the inner city.

An environmental site at Mitchell Middle School offers students a natural atmosphere to study their direct or indirect impact on the environment. Students can interact with a remnant of Wisconsin's history as well as an example of how natural areas can be restored. The site allows a small amount of exposure to an ecosystem that is different than many urban settings.

Frequent use of this site may pique students' interest in other natural sites in

Wisconsin, local environmental issues, or restoration of larger tracts of land in urban settings. Students need to be exposed to natural areas to develop and reinforce positive environmental attitudes. Research studying current environmentalists' early influences (Tanner, 1980) indicates that frequent experiences in outdoor settings contributed greatly to their environmental consciousness.The environmental site at Mitchell Middle School will provide the students with the needed environmental exposure to develop values and feelings which show concern for the environment. The development of an outdoor site at Mitchell Middle School will give students a way to interact positively with the environment. Teachers and students will use the site to link environmental issues to their community and possibly will help them to solve environmental problems within their urban community. This site will provide them with a sense of ownership as well as a sense that they have the ability to improve the environment (Hines, 1987). In the long run, improved environmental attitudes in the students and staff will give them a base of knowledge and opinions to draw from for making future environmental decisions.

Students are the key players in the environmental future of our planet. The Wisconsin Department of Public Instruction (DPI) has recognized this importance by mandating educational guidelines that make environmental education an integral part of each curricular area. An environmental site project can assist teachers in developing curriculum for teaching environmental issues to students. This site gives teachers a natural motivator for students while integrating environmental education into their courses.

## CHAPTER II: REVIEW OF RELATED LITERATURE

Student exposure to environmental areas is important in the development of positive environmental attitudes. The creation of an environmental site at Mitchell Middle School is intended to help build environmental attitudes in sixth grade students. The success of building an environmental site is based on planning and funding. The Review of Related Literature contains five sections which are major influences in the successful development of an environmental site.

The first section, Overview of Attitudes, discusses how beliefs, attitudes, and values build on each other to create our environmental ethic. The second section, Environmental Sites and Their Effect on Environmental Attitudes, cites a variety of studies that support the need for students to have frequent exposure to environmental areas to develop positive environmental attitudes. The third section, Measuring Environmental Attitudes, explains The Children's Attitude Toward the Environment Scale (Musser & Malkus, 1994). This scale was modified in this study to measure sixth grade students' environmental attitudes as they developed and interacted with the Mitchell Middle School environmental site. The fourth section, Development of an Environmental Site, reviews components for a successful site development project. Finally, the last section, Finding Funding for Environmental Sites, lists the steps that need to be taken to get funding for an environmental site project.

### Overview of Attitudes

A Guide to Curriculum Planning in Environmental Education (Engleson, 1990) published by the Wisconsin Department of Public Instruction (DPI) states the following subgoal for environmental education:

> Environmental Ethic: To help students develop a universal ethic on which they may act to defend, improve and sustain the quality of the environment.

Environmental ethic incorporates one's beliefs, attitudes and values. It is important to understand the relationship between these three. We need to understand that these three facets fall into a hierarchical relationship. Our attitudes are derived from a set of our beliefs (Rokeach, 1976). Beliefs are "a simple proposition, conscious or unconscious, inferred from what a person says or does, which can be preceded by the statement, "I believe that..." (Rokeach, 1976). Attitudes differ from beliefs in that attitudes are always accompanied by an emotional element and a behavioral tendency (Sherif & Cantril, 1945). Attitudes that carry similar attributes then form our values. "Values are enduring convictions that a specific mode of conduct or end state of existence is personally or socially preferable to an opposite mode of conduct or state of existence" (Rokeach, 1973 & 1976). Understanding this relationship, we can see the importance attitudes play in the development of our values' system.

Attitudes are very complex, they are influenced by many things, and they in turn influence our values. When looking at attitudes and how they relate to one's actions, we need to take into account many characteristics of a person's behavior, personality, experiences, values and knowledge. As Arbuthnot (1977) says:

"The success of public policy decisions, educational programs, and other efforts dependent upon specific individual action in the realm of environmental issues may well hinge upon our understanding of the relationships among personality characteristics, attitudes, and environmental values, knowledge, and behaviors."

Our attitudes are affected by many things and we need to understand what influences our behavior, so we can encourage environmental responsibility. One influence is locus of control. Locus of control is the behavior of a person due to his/her perception of control over the situation (Hines, 1987). There are two forms of locus of control: internal and external. People with an internal locus of control believe that

their behavior can make a change. People with an external locus of control believe things happen because of fate. Hines found that people with an internal locus of control were more likely to participate in environmentally responsible behavior. The importance of attitude cannot be underestimated when considering environmental values.

Environmental Sites and Their Effect on Environmental Attitudes

Many studies suggest a positive relationship between environmental attitudes and outdoor experience. Fazio and Zanna (1978) have suggested three possible reasons for this observation:

1. Direct experience may simply make more information available and thus result in a more accurate attitude.
2. Direct experience may cause the person to focus on his or her behavior, and behavior itself may be the basis for an attitude.
3. Direct experience may involve repetition or mental rehearsal leading to an attitude that is more easily or accurately remembered.

Harvey's (1989) study of 8 to 11 year old children in England supports this direct experience theory. She found that students at schools with vegetated landscapes tended to have higher scores on pastoralism (enjoyment of the natural environment in an intellectual and aesthetic way) and lower scores for human dominance over nature. This suggests that exposure to environmental areas creates positive environmental attitudes.

Hendee (1968) supports this direct experience theory through his research on wilderness users and goes a step further to suggest that our environmental attitudes start at a young age (cited in Newhouse, 1990). Hendee found that 70% of the wilderness users in his study went on their first wilderness trip before the age of fifteen. Hendee suggests that positive wilderness attitudes are developed early in life and are

supported throughout life through social behavior.

After looking at studies with similar results concerning environmental sensitivity, Hungerford and Volk (1990) suggest that it is important that learners have positive experiences in nonformal outdoor settings in order to develop environmental sensitivity. This exposure may be especially necessary to influence the attitudes of urban students.

Not all students are guaranteed to have the same environmental attitudes. Correlations have been seen between environmental attitudes and the environment in which one grew up. Kostka (1976) found inner-city students scored lower on an environmental attitude assessment than suburban students. This could be due to many factors, but a strong possibility could be the suburban students' exposure to environmental areas.

The underlying suggestion from all of these studies is that students need to be involved in outdoor experiences. Tanner (1980) sums this up nicely by suggesting that positive outdoor experiences at a young age and pristine environments are major influences in environmental attitudes. Tanner suggests that children need to be exposed to the environment more often than most currently are. He says children need to participate in field trips or be given release time to spend a number of hours in nearby woods, vacant lots, or parks.

Measuring Environmental Attitudes

The relationship between environmental site exposure and environmental attitudes is very important, but are environmental attitudes measurable and what needs to be understood in measuring attitudes? There are many factors that go into creating, implementing and evaluating tests. There is the risk of sensitizing students to the study. The order in which tests are administered may influence results. The

reliability and validity of the test must be addressed. The test results must be considered from many different angles to get the most reliable answers to the problem. The sample group must be chosen carefully.

The Children's Attitude Toward the Environment Scale (Musser & Malkus 1994) has a useful format for measuring environmental attitudes. It was set up to be easy to read for children and easy to score for researchers. For each question, the format gives children a choice between two major themes. For example: "Some kids touch or catch wild animals...but...Other kids never touch or catch wild animals they find outside." The students choose which one is most like them. Under each statement are two boxes; a large box and a small box. The large box means "I am a lot like this person". The small box means "I am a little like this person". The students choose the box that best represents them under their chosen statement.

The scoring of the test is also quite easy due to the numbering system. Each of the survey statements has four possible choices. Each of these choices is allotted a number from 1 to 4 with 4 representing the highest environmentally conscious attitude and 1 representing the lowest environmentally conscious attitude. A total individual score can then be determined by totaling the score for each of the responses.

This scale is applicable to the study of environmental attitudes of sixth graders at Mitchell Middle School. The questions in the survey can be modified to create a more specific test related to the environmental site. This scale can be utilized in a pretest-posttest situation with a control and treatment group. It is also very easy to tabulate and evaluate.

Development of an Environmental Site

While environmental attitudes can be measured, an effective treatment plan must be developed and implemented so environmental attitudes can be measured in

this study. Dewey (1947) maintains that experience has to have continuity and quality. This is important to remember when developing an outdoor site. Hungerford and Volk (1990) have created a list of "Critical Education Components" that must be considered if change in the learner's environmental behavior is to be achieved:

1. teach environmentally significant ecological concepts and the environmental relationships that exist within and between these concepts;

2. provide carefully designed and in-depth opportunities for learners to achieve some level of environmental sensitivity that will promote a desire to behave in appropriate ways;

3. provide a curriculum that will result in an in-depth knowledge of issues;

4. provide a curriculum that will teach learners the skills of issue analysis and investigation as well as the time needed for application of these skills;

5. provide a curriculum that will teach learners the citizenship skills needed for issue remediation as well as the time needed for the application of these skills; and

6. provide an instructional setting that increases learners' expectancy of reinforcement for acting in responsible ways, i.e., attempt to develop an internal locus of control in learners.

Keeping the above components in mind, we can look at resources that will provide significant environmental experience. Wild School Sites (Schiff & Smith-Walters, 1993) has an excellent step-by-step approach to developing an environmental site. It is a general approach to outdoor sites, and it can be related to a small or large site. Explaining how to create an effective team which is student - centered, it places students at the root of the development. It outlines who should be involved and who should be notified of the project. Recognizing the importance of community involvement, it describes how to elicit community support. It suggests how to plan for and implement the outdoor site. Finally, it suggests ways to keep the site

active year after year.

Similar techniques are suggested in "Studying Science Out of Doors" (Shugrue, 1982) from Science and Children. This source reiterates many of the approaches suggested by Wild School Sites (Schiff & Smith-Walters, 1993).

Finding Funding for Environmental Sites

Four steps must be followed when finding funds: define the project, search for funds, select sources that fit the project and tailor the proposal (Heimlich, 1993).

First, a group must define its project. What is the goal of the project? This must be clearly laid out before money is sought. Goals are the end result of the project. Goals must also have clear outcomes. What will this goal accomplish? The group must also look at the project realistically. Can it be done? Are people willing to do it? There must be commitment by the whole group. Finally, the project should have a realistic time line for completing the project.

Second, a group must search for funding. There are a variety of resources available that list grants. Some examples are The Foundation Directory, Grants for Elementary and Secondary Education, and National Guide to Funding for the Environment and Animal Welfare (Heimlich & Puglisi, 1993). Also, local companies, organizations and environmental groups should be contacted.

Third, the group must select sources that fit its project. Foundations have guidelines that describe the foundation's goals, the time line for submitting grants, the current interests of the foundation, the geographic limitations, and the types of projects funded. The group's objectives must fit within these parameters. These guidelines will help the group narrow down its choices and choose an appropriate foundation.

Fourth, the group must tailor the responses on the application to fit both the foundation's guidelines and the project's objectives. The material from the foundation

must be read carefully. The language and style of the foundation should be emulated, but the information should be brief and to the point. One should always follow the application's instructions. If directions are not followed, the group may not receive funding. The application group must be clear on the final goal of the project and what its impact will be. The grant proposal should be creative for optimum effectiveness. Finally, grant writing courses and personal contacts can be useful resources.

Summary

In summary, the related literature has given insight into the complexity of attitudes and the evaluation of environmental attitudes. While teachers can help students to become more environmentally conscious, factors outside of the classroom have a great impact on attitudes. The related literature has shown evidence that suggests that the more exposure children have to environmental areas, the more environmentally conscious they become. These environmental attitudes can be fostered through a well designed environmental site plan. There are many resources that are available to guide individuals in the construction of environmental sites. Before a plan can be implemented, it is important to find funding for the program. This will assist in making the project successful for both teachers and students.

## CHAPTER III: METHODOLOGY

Subproblem 1
(To organize an environmental site planning committee)

A courtyard committee was necessary to develop the goals and an overall plan for the courtyard. I posted a request for teacher volunteers to become members of the committee in our school's weekly bulletin. In this bulletin, I encouraged teachers from various curricular areas, grade levels and administration to join the committee, so the project was part of the whole school.

Subproblem 2
(To develop goals for the development and use of the environmental site)

The setting of goals was an integral part of the development process. At our first meeting, February 5, 1996, we discussed the goals of the courtyard. With my environmental education background, I encouraged the development of a natural, native Wisconsin site which would be used by all staff and students at Mitchell.

Subproblem 3
(To create an environmental site development plan)

A development plan for the environmental site was necessary to determine what was to be done and when. At our first courtyard development committee meeting, February 5, 1996, we evaluated the site for its attributes. The committee brainstormed a list of possible development ideas. At our February 19, 1996, meeting we narrowed the courtyard development focus. Committee members were placed in subcommittees to investigate the cost and feasibility of each area of this plan. At our March 20, 1996, meeting, subcommittees presented their findings. After the presentation, a new development plan was created. The committee created a time line to reflect the development procedure. This time line and plan was posted in the

staff bulletin on April 15, 1996, to inform the staff of the development plan. This plan was also discussed with staff at a staff meeting. As the school year ended, part of this plan had to be postponed until the fall of 1996 due to inclement weather.

Subproblem 4
(To plan and implement a treatment that involves students in the development of the environmental site)

I created a nine lesson treatment that would lead students through the development of the environmental site during the 1996-97 school year (Appendix A). This treatment incorporated the development plan set down by the committee. I looked at how we could achieve our development goals while incorporating the students' input and involvement.

Subproblem 5
(To design a survey to measure the extent to which environmental attitudes change during the development of the environmental site)

During my research of related literature, I was looking for a scale that would model how to measure attitudes in students. I looked for a scale that was easy to use for students and easy to tabulate and evaluate by me. I discovered The Children's Attitude Toward the Environment Scale which was created by Musser and Malkus (1994) and it fit the above criteria. The survey statements of the original scale were changed so specific issues present in the development of and interaction with the Mitchell environmental site were represented. My plan was to measure the extent to which environmental attitudes changed during the development by using this modified scale in a pretest and posttest survey.

Subproblem 6
(To organize a treatment group and a control group)

Two sets of students were chosen as the control and treatment groups for the

survey. The treatment group consisted of two of my science classes since they would be a part of the treatment I developed. I approached Mr. Schultz, a sixth grade science teacher on a different team, to see if he would be willing to let two of his science classes be part of my survey. I told him that it would take fifteen minutes at the beginning of the year for the pretest and another 15 minutes at the end of the year for the posttest. He agreed. These four classes were chosen for their similarities: equal in group size, ability, instructional influences and grade level. This minimized the number of variables to one, the treatment. While all individuals within each group have unique abilities and experiences, it was assumed that the control and experiment groups were different due only to the existence or absence of the treatment.

Subproblem 7
(To administer a pretest and posttest to the treatment and control group)

The pretest was administered to the treatment and control groups in similar conditions and within a similar time frame in October 1996. The test directions were read, sample items were explained, and student questions were answered. No prompting or assistance was given to the students, unless directions were not understood. Students were not told why the survey was being conducted so biases were not created.

The posttest was administered in the same way but in June of 1997.

Subproblem 8
(To analyze and interpret the pretest and posttest data to determine the extent to which environmental attitudes change in sixth grade students.)

The pretests and posttests were tabulated using the process developed by Musser and Malkus (1994) in the Children's Attitudes Toward the Environment Scale. The survey analysis was separated into four separate areas: the treatment pretest, the

control pretest, the treatment posttest and the control posttest. Each of these four areas was evaluated in the following manner: Each of the survey statements had four possible choices. Each of these choices was allotted a number from 1 to 4 with 4 representing the highest environmentally conscious attitude and 1 representing the lowest environmentally conscious attitude. A total individual score was determined by totaling the score for each of the 14 responses. This means that individual scores could range from 14 to 56. The individual scores were used to calculate the average individual score. In addition, each individual survey statement was analyzed for its individual results by tallying the number of responses for each of the 4 possible responses.

Once all tabulations and calculations were completed, the results from the pretest and posttest were compared as follows:

1. The comparison of the students' total average score on pretests for the treatment group and control group. Also, the comparison of the students' average scores for each specific survey question on the pretests for the treatment and control group.
2. The comparison of the students' total average score for the treatment group's pretest and posttest. Also, the comparison of the students' average score for each specific survey question on the treatment group's pretest and posttest.
3. The comparison of the students' total average score for the control group's pretest and posttest. Also, the comparison of the students' average score for each specific survey question on the control group's pretest and posttest.
4. The comparison of the students' total average score on posttests for the treatment group and control group. Also, the comparison of the students' average scores for each specific survey question on the posttests for the treatment and control group.

## CHAPTER IV: RESULTS

Subproblem 1
(To organize an environmental site planning committee)

In the fall of 1995, I discussed the idea of turning the Mitchell courtyard into an environmental site with my principal, John Nickelsen. He was very excited about this proposal and encouraged me to implement my plan.

With financial backing of a $500 Eisenhower mini-grant, I was spurred into organizing a courtyard committee. I wanted to get input from many individuals from Mitchell and, ultimately, wanted representation from all curricular areas and grade levels. I asked for staff volunteers through our weekly bulletin on February 2, 1996. I was pleased with the response and our committee was made up of four sixth grade teachers, one sixth grade teacher of emotionally disturbed students , two assistant principals, one seventh/eighth grade Spanish teacher, and one seventh/eighth grade art teacher. This group was diverse in knowledge of plants, construction and interest in getting children involved.

Subproblem 2
(To develop goals for the development and use of the environmental site)

The following goals were created for the development, structure, use and future of the Mitchell Middle School environmental site:

1. Engage all students of each grade level (6-8) and curriculum area in all aspects of the development.

2. Promote the integration of environmental topics in all subject areas by using the environmental site.

3. Develop a site that reflects the native flora of Wisconsin.

4. View the courtyard as a place of continual change and growth year after year.

5. Involve parents and community in the development and use of the environmental site.

Subproblem 3
(To create an environmental site development plan)

The following development plan was created by the courtyard committee:

Phase One: Removal of a few overgrown trees to allow more light into the courtyard (April 1996)

Phase Two: Raise the sides of the garden beds with 4"X6" studs (April 1996)

Phase Three: Weed the area and add clean topsoil to the raised beds (October 1996)

Phase Four: Plant native Wisconsin flora in the beds (April, May 1997)

Subproblem 4
(To plan and implement a treatment that involves students in the development of the environmental site)

The key to changing the environmental attitudes of students was to get them involved in the development of the courtyard. While the general parameters were developed by the courtyard committee, the actual details and development involved students during the school day. The committee did not want this project to become an adult-only project. The unit plan (treatment) was implemented in the development of the courtyard. The development plan occurred over a period of three years so the lessons were used with various groups of sixth grade students. The treatment group (school year 1996-1997) did experience the bulk of these lessons (lessons 3-9). The unit plan lays out the overall goal and specific objectives for each lesson (See

Appendix A):

Unit Goal: This unit will involve students in the construction of the garden beds, the selection of native Wisconsin flora and the planting of these plants within the courtyard. It will provide students with a sense of ownership in the project.

Unit Objectives:

Lesson 1. Students will map the attributes and dimensions of the courtyard. (April 1996)
Lesson 2. Students will construct the raised beds for the courtyard's garden. (April 1996)
Lesson 3. Students will weed and deposit topsoil in the raised beds. ( October 1996)
Lesson 4. Students will generate a list of plants that would be appropriate for the Mitchell courtyard. (February 1997)
Lesson 5. Students will research the chosen plants. (February 1997)
Lesson 6. Students will develop a plant layout of the courtyard. (February-March 1997)
Lesson 7. Students will order the plants or seeds needed for the courtyard. (early March 1997)
Lesson 8. Students will create a booklet of the plants that will be in the courtyard (March-April 1997)
Lesson 9. Students will plant the flowers in the courtyard. (early May 1997)

Subproblem 5

(To design a survey to measure the extent to which environmental attitudes change during the development of the environmental site.)

A survey was developed using The Children's Attitude Toward the Environment Scale (Musser & Malkus 1994) as a guide and a framework (See Appendix B). This scale was chosen for its ease in student use and result tabulation. Three types of statements were used to mirror the The Children's Attitude Toward the Environment Scale: belief statements (I think...), behavior statements (I do...) and affective statements (I like...). "These statements are based on the classic view that attitudes have three components: beliefs, affect, and behavioral intentions" (Fishbein & Ajzen, 1975). The survey contained 14 questions (six belief statements, four behavior statements and four affective statements) that were related to specific aspects of the

courtyard project. These statements were related to things students would experience while interacting with the environmental site: plants, animals, chemical use, the environment, waste, ethics.

The survey was set up so each statement contained two different attitudes toward an issue. These two attitude statements were separated by the word "but". Students were to choose the attitude statement that was most like them. Next, the students broke down this attitude statement even further by selecting the larger or smaller box next to the statement they had chosen. If the children felt this statement was a lot like them, they would place an "X" in the larger box. If they thought the statement was only a little like them, they would place an "X" in the smaller box.

Subproblem 6
(To organize a treatment group and a control group)

Four sixth grade classes from Mitchell Middle School participated in the environmental attitude survey. Two classes received the treatment and two were the control group who did not receive the treatment. The treatment group was made up of 38 students, and the control group was made up of 40 students. The treatment group and control group were comparable in that they were both groups of sixth grade students from Mitchell Middle School who were instructed with the same curriculum and were taught within a similar classroom structure. The main differences between the treatment and control groups were the teachers and their teaching styles.

Subproblem 7
(To administer a pretest and posttest to the treatment and control group.)

The pretest was administered to the treatment and control groups using the same format in October 1996. The students were asked to clear their desks of everything except a pencil. I told the students I was conducting a survey for my

master's program and that their truthful responses were appreciated and important. Furthermore, I told the students their responses would not be individually scrutinized since no names would appear on the survey. I read the survey directions (See Appendix C) aloud and asked if there were any questions. Next, we looked at and discussed sample A. To make sure there was no confusion, I had the students work sample B while I moved around the classroom to check that only one box was marked for each statement. The students then proceeded to take the test, being sure to do both sides. When they finished, I had them make sure each item had only one box marked. The entire survey process took about fifteen minutes.

The same procedure was used in June of 1997 with the same students for the posttest.

Subproblem 8
(To analyze and interpret the pretest and posttest data to determine the extent to which environmental attitudes change in sixth grade students.)

The survey results were analyzed by using comparisons of mean scores.

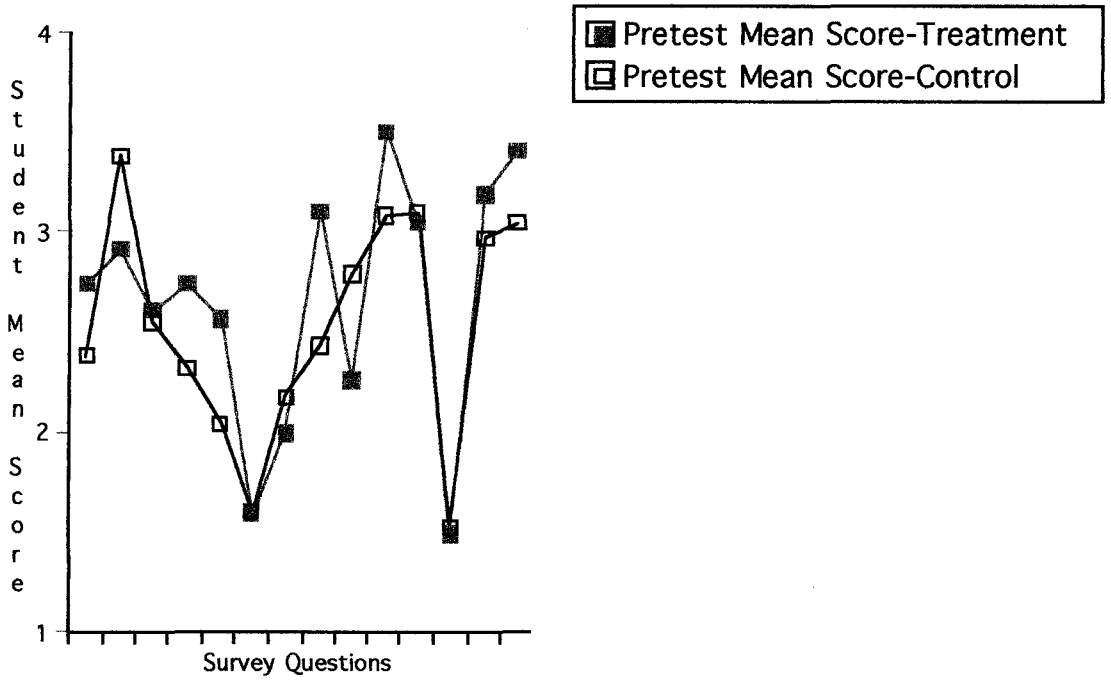
Table 1 below provides an overall comparison of the four surveys.

Table 1. Analysis of the Pretest / Posttest Survey

| Questions | Pretest Treatment | Posttest Treatment | Pretest Control | Posttest Control |
|---|---|---|---|---|
| 1 | 2.75 | 3.19 | 2.38 | 2.51 |
| 2 | 2.92 | 2.81 | 3.38 | 2.49 |
| 3 | 2.62 | 2.47 | 2.55 | 2.27 |
| 4 | 2.75 | 2.42 | 2.33 | 2.29 |
| 5 | 2.57 | 2.19 | 2.05 | 2.05 |
| 6 | 1.59 | 2.13 | 1.6 | 1.67 |
| 7 | 2 | 2.11 | 2.18 | 2 |
| 8 | 3.11 | 2.28 | 2.43 | 2.22 |
| 9 | 2.27 | 2.75 | 2.8 | 2.84 |
| 10 | 3.51 | 2.92 | 3.08 | 3.16 |
| 11 | 3.05 | 3.03 | 3.1 | 3.05 |
| 12 | 1.49 | 1.33 | 1.53 | 1.27 |
| 13 | 3.19 | 3.08 | 2.98 | 2.68 |
| 14 | 3.41 | 2.69 | 3.05 | 3.16 |
| Total Mean | 37.23 | 35.4 | 35.44 | 33.66 |
| Mean Response | 2.66 | 2.53 | 2.53 | 2.4 |
| Number of Analyzed Surveys | 37 | 36 | 40 | 37 |
| Number of Rejected Surveys | 2 | 3 | 1 | 4 |
| Number of Students | 39 | 39 | 41 | 41 |

The first comparison in the survey was the pretest mean scores for the control and treatment groups. These scores were based on the students' total mean score and the students' mean score on each individual survey question. The students' mean score for the treatment group (37.24) was 1.82 points above the control group (35.40). As for the students' mean score on each individual survey question, the graph (Figure 1) shows that the two groups varied (> .2 difference) in 8 of the 14 questions and were similar (< .2 difference) in 6 of the 14 statements.

Figure 1: Student Mean Scores For Survey Questions-Pretests

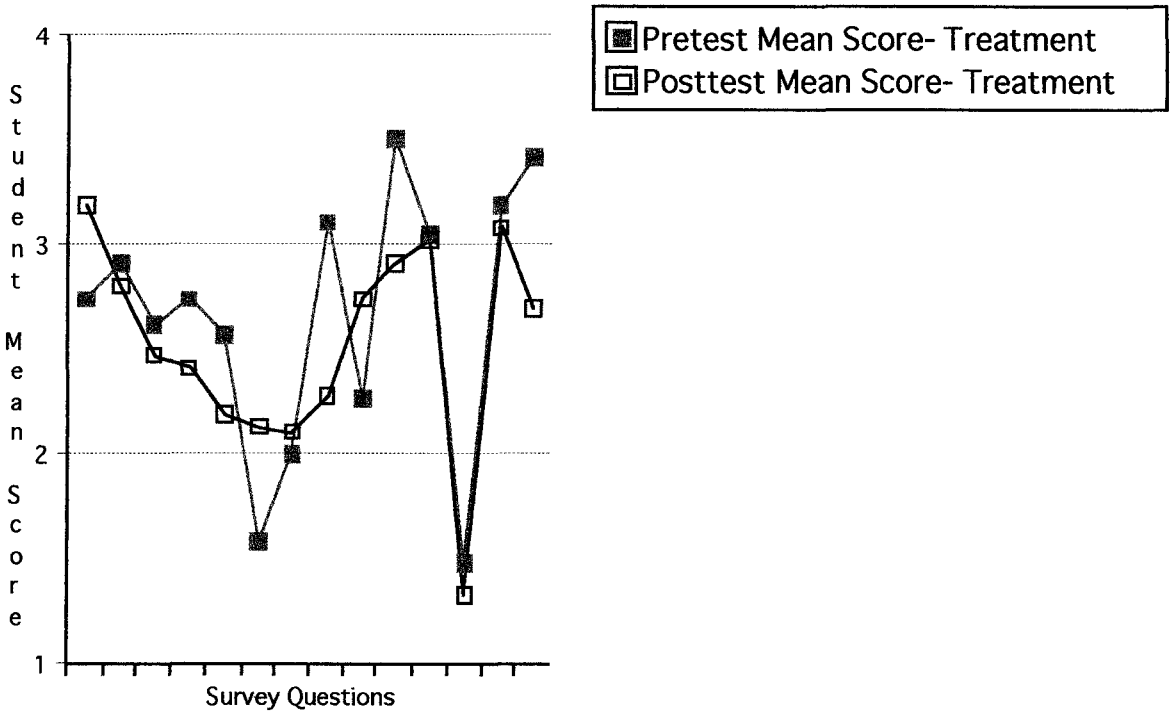


The second comparison was of the treatment groups' pretest and posttest scores. Based on this comparison the overall attitudes were changed little due to the exposure and development of the environmental site. In fact, the posttest mean score (35.42) decreased by 1.82 when compared to the pretest (37.42).

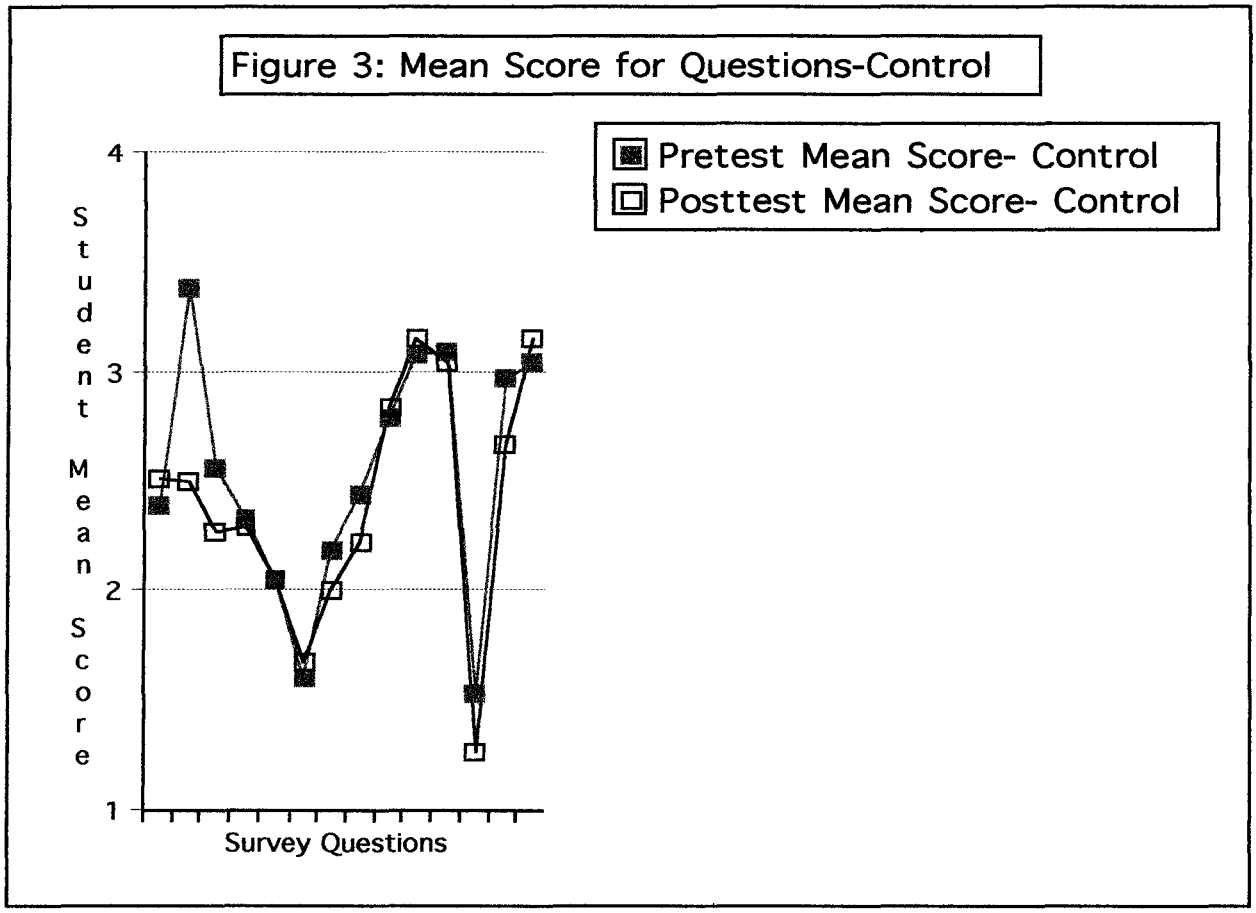
The decrease in posttest scores may be attributed to various reasons: 1) The treatment was ineffective in changing attitudes. 2) Besides just being physically involved in the construction of the environmental site, students need to discuss in detail the issues related to natural gardening. 3) The age of the students may have been a factor in changing attitudes. Students at the 11-12 year age are discovering themselves and peer groups. Maybe environmental concerns are not a priority. 4) The posttest was administered near the end of the school year which is a time of general student slowdown as anticipation for summer break peaks. Students may not have been concerned about performing accurately on the posttest. 5) The survey may have been obscure and difficult to understand or answer easily. 6) The treatment didn't address the issues presented in the survey. 7) Attitudes do not change over the short-term.

The decrease in posttest scores can be seen more easily in Figure 2 below. Students scored higher on 4 , similar on 2 , and lower on 8 of the 14 survey questions.

Figure 2: Mean Scores for Questions-Treatment Pretest and Post test



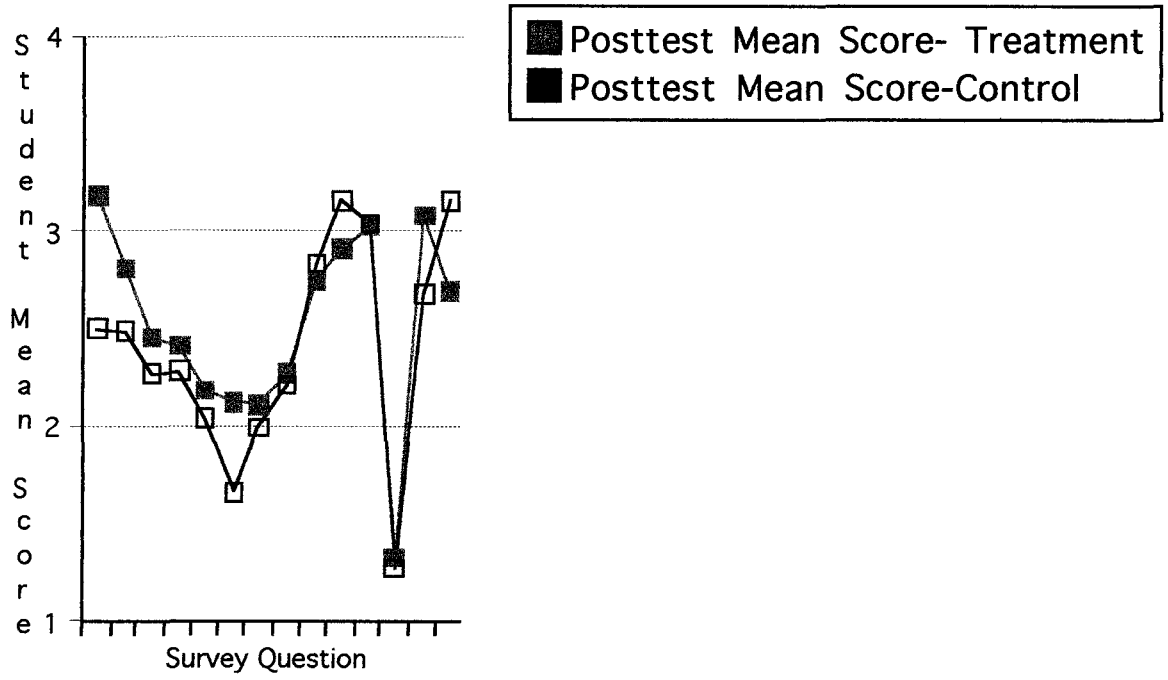
The third comparison was the pretest and posttest for the control group. Once again the posttest survey (33.68) scored 1.72 points lower than the pretest survey (35.4). Figure 3. below shows the comparison of the pretest and posttest results for the control. Though the posttest survey was lower, a similar graph pattern resulted. Only 5 of the 14 survey responses were different (> .2 difference) with .89 being the largest difference. This suggests that the control group's pretest and posttest results were similar in many respects.



Based on the decrease in scores from the pretest to the posttest in both the treatment and control groups, it appears that the treatment was not the cause of the decline in scores for both the treatment and control groups.

The final comparison was of the posttests for the treatment and control group. When the the two posttests are compared, the treatment group (35.42) scored 1.74 points higher than the control group (33.68). Figure 4. below shows how the treatment group and control group's posttest compare on individual survey questions. In fact, 10 of the 14 survey questions' scores for the treatment group's posttest were higher than the control.

Figure 4: Mean Scores for Questions-Postests



## CHAPTER V: CONCLUSIONS, RECOMMENDATIONS AND EDUCATIONAL IMPLICATIONS

The importance of students' frequent exposure to environmental sites and its relationship to positive environmental attitudes is evident in the various studies discussed in the Related Literature section of this report. The Mitchell Middle School environmental site study attempted to show that students who are involved in the development of an environmental site would develop stronger environmental attitudes. This study was built on the premise that "involvement" in the development of the environmental site in itself would change environmental attitudes for the better. After analyzing the results of the survey, the results reveal that attitudes changed very little. In fact, when comparing pretest and posttest surveys in both the treatment and the control groups, environmental attitudes went down though only slightly. The implications of this study are relevant to education since it reveals areas that need to be strengthened if environmental attitudes are to be changed through an environmental site development project. Three areas that need strengthening are the make-up of the environmental site committee; in-depth discussion and investigation into the issues present in the environmental site development; and retaining the idea that the site development is an ongoing school project and not an individual's project.

The make-up of an environmental site committee is a first step to the success of developing environmental attitudes. In February of 1996, I organized a committee of teachers to discuss the future of the courtyard. Our committee was made up of four sixth grade teachers, one sixth grade teacher of Emotionally Disturbed (ED), two assistant principals, one seventh/eighth grade Spanish teacher, and one seventh/eighth grade art teacher. This group was diverse in its knowledge of plants, construction and interest in getting children involved. Their input into the courtyard

was invaluable. The goals and development phases were put into place, and the future of the courtyard development looked promising.

As the 1995-96 school year drew to a close, the interest level of committee members dwindled due to year-end commitments within their own classes. In fact, by May and June of 1996 the only classes involved in the development of the courtyard were my three science classes.

During the 1996-97 school year, the courtyard committee reconvened, but we were fewer in number. During that school year, we did get some parents and other classes involved in the soil hauling and planting phases of the courtyard, but not as much involvement as was necessary to make this environmental site a true "school" success. In actuality, my classes, the treatment group, were the main students involved in the development. This imbalance may have been alleviated if parents and students were part of the courtyard committee.

Parent and student involvement in a development committee is a key dynamic that should not be overlooked. Parent involvement in an environmental site committee shows students that adults in the community are concerned in the school and, in this case, environmental site development. They are invaluable in their knowledge, resourcefulness and assistance. Parents can be role models and stewards for the environment. Equally as important is student involvement in the environmental site committee. Students need to be in the planning stages, so a true sense of ownership can be created. Students must not be underestimated in their ability to make decisions, lead and encourage others (students, teachers or parents).

Having both of these groups represented in the courtyard committee, may have helped develop stronger environmental attitudes in my students. Parents and students would have added another source of leadership which is different than the usual

teacher-led instruction. The students' sense of ownership and purpose may have been more clearly defined with student leadership in the planning committee.

In hindsight, parents and students should have been included on this committee. Though students did the planning and development of the courtyard, their input would have been valuable in setting the parameters of the development plan. Also, the use of parents would have alleviated some of the burden on me in seeking assistance when development began.

Besides the involvement of parents and students in the planning process, students must participate in in-depth investigation and discussion of the issues related to the development of an environmental site. "Involvement" is not enough to create environmental attitude changes.

The survey that was developed for this study was modified from The Children's Attitude Toward the Environment Scale (Musser & Malkus, 1994). These modifications were made to reflect issues that would be present in an environmental site development. The issues students would experience while interacting with the environmental site were plants, animals, chemical use, the environment, waste and ethics.

Students were engaged in a variety of activities that were related to the courtyard development and many of the above issues were touched upon, but students were not involved in actual detailed discussion or investigation of the issues. Students may not have received an adequate understanding of the issues cited in the survey. This may have contributed to the lack of change in scores from the pretest to the posttest.

If this study were to be done again, I would recommend that key issues be discussed in depth so students could have a base of knowledge from which they could

extract their own opinion on an issue. Finally, involvement in itself can be a very positive experience, but without firm connection to one's environmental knowledge and beliefs, attitudes are difficult to change.

Environmental attitudes are constantly being challenged, changed and strengthened. For positive environmental attitudes to be maintained, students need to be exposed to environmental issues on a consistent, long term basis. Two of the goals of the Mitchell Middle School environmental site development were to 1.) Engage all students of each grade level (6-8) and curriculum area in all aspects of the development and use. 2.) Promote the integration of environmental topics in all subject areas by using the environmental site. These two goals are very important, especially in an urban school district like Racine where the chances for all students to be exposed to wild areas may be limited.

To create this consistency, the environmental site project needs to be a responsibility of the whole school and not a select few. This is a difficult problem to tackle. I recommend that the focus of an integrated environmental site committee focus on the future use of the environmental site by all grade levels and subject areas. This will entail curriculum writing by subject area teachers and sharing of ideas. Also, the committee will need to create enthusiasm for the site, so the site will be utilized. At Mitchell Middle School, a new student-led community service project has been implemented, Youth as Resources (YAR). YAR provides funds for student-led projects that integrate the curriculum and involve community service. YAR would provide resources for a number of environmental site activities which would get students and their ideas involved in the site development.

In conclusion, the Mitchell Middle School environmental site development project has been a success in its construction. Native flowers in a pleasant setting

now exist at Mitchell. Students were the key to the development of the environmental site, but involvement in itself does not change environmental attitudes. Environmental issues need to be investigated, discussed and incorporated into everyday life for environmental attitudes to change. Students and parents need to be involved in all aspects of the site development , so they can lead and influence others in the environmental site's goals. Finally, environmental issues need to be discussed on a consistent basis, so environmental attitudes can be supported and changed.

# APPENDIX A

## Lesson 1: Mapping the Courtyard

Materials: List on the chalkboard of objects to measure, Worksheet-Map of the Courtyard, tape measures, clipboards, pencils
Groups: Work in pairs
Time: Two to three days
Curriculum link: math, science, technology education
Procedure:
1. Distribute tape measures. Review inches and feet. Be sure students know the difference between metric and standard measurements.
2. Have students work in pairs to measure items in the room. Make a list of things to measured on the board. Start with small items (length and width of desk top) and work up to larger measurements (length and width of the room). Instruct students on how to measure long distances by marking the end of the tape measure and then to continue measuring from that point. Students should keep a tally of the number of tape measure lengths they use. Then, they should use multiplication to figure out the length.
(EX: 5 tape measure lengths at 5' or 5X5'=25')
3. Once students understand measuring, distribute the map of the courtyard. Tell students they will be going into the courtyard to look for its attributes (trees, water faucets, rocks, doors, etc.) and to measure its dimensions.
4. Take the students to the courtyard. Orient them to the features on the map and discuss what they will be looking for and what they will be measuring. Answer any questions.
5. Allow the students to begin working. Be sure to stress the courtyard rules.
    1. Work with your partner only.
    2. Work quietly so other classes are not disturbed.
    3. Stay out of the gardens
6. Gather together as a class and share results. Discuss ways groups were successful and what they found difficult.

## Lesson 2: Construction of Raised Beds

Materials: 4"X6" lumber, rebar, sledge hammers, gloves, power saw, drill, level, shovels and hand trowels
Groups: 12 students and two adults
Time: Two to three days
Curriculum Link: math, technology education

Safety Note: This aspect of the courtyard construction needs aggressive adult supervision since power tools will be used. No student will use the power tools. Actually, if you would like to be a part of this project, Mr. Floyd will be construction director. He will do any cutting. Also, students should be instructed on how to use a sledge hammer and should be supervised at all times.

Procedure:

1. Students should use their maps to tell Mr. Floyd the dimensions for boards to be cut. Also, students should measure areas where the boards will be tiered.
2. Once a board is cut, the board will be carried by the students to the area for placement. The students will be instructed on how to use a level so the retaining wall is level. Students will use shovels to dig up soil if needed. They will also pack soil under the boards to make a solid base that is free from premature sinking.
3. After the base boards are laid, the tiered boards will be measured and added.
4. Mr. Floyd will drill the holes in the boards for the rebar and cut the rebar to four foot lengths. Students will be instructed on how to use a sledge hammer. Supervised students will pound in the rebar to secure the walls of the garden.

## Lesson 3: Soil Hauling

Materials: wheelbarrows, shovels, rakes, brooms, clean topsoil, parent volunteers
Groups: class is divided into four groups: Shovelers, Wheelbarrow Operators, Rakers, Sweepers
Time: two days
Curriculum Link: technology education
Safety Note: Students should be instructed on how to use a wheelbarrow and how to lift.

Procedure:

1. Students will remove all vegetation from the garden beds.
2. A master soil hauling schedule should be made so classes know when they should work.
3. Divide the class into four groups: Shovelers, Wheelbarrow Operators, Rakers, and Sweepers. It is up to the teachers if you want to rotate jobs so all can try each.
4. Shovelers will fill the wheelbarrows to a manageable level. Wheelbarrow operators will haul the soil into the courtyard and dump it in the designated area. Rakers will level out the pile of soil. Sweepers will continually sweep the hallway, courtyard and pile area to keep the area as clean as possible.

## Lesson 4: Generating a List of Plants

Materials: List of plants and grasses from the Prairie Nursery catalog, paper, pencil
Groups: Work in groups of 4

Time: Two days
Curriculum Link: math, science
Procedure:
1. Distribute 2 plant lists for each group.
2. Discuss the chart headings, especially Bloom Time, Moisture, Soil, Sun
3. Students should then work as a group to generate a list of plants that would grow in our courtyard environment based on the following information:

Courtyard Characteristics

**Bloom Time** - April- May and August - October (These are the times students are in school)

**Moisture** - Medium (M)

**Soil** - Loam (L)

**Sun** - Full Sun or Partial Sun

(Remind students that each category must be satisfied for the plant to grow in the courtyard)

## Lesson 5: Research the Plants

Materials: Various resource books on flowers and grasses
Groups: Students should work in pairs
Time: week
Curriculum Link: language, reading, science, social studies, art
Procedure:
1. Assign each pair with a plant from the generated list.
2. Using the resource books, students should gather the following information on their plant:

* Botanical Name
* Height
* Color
* Drawing of the plant (leaves, bloom, stem and roots)
* Origin of the plant's name
* Value of plant to humans beside esthetics (medicine, dye, food, etc.)
* Habitat in which it is found (short grass prairie, long grass prairie, savanna, etc.)
* Stories related to the plant
* Value to animals (food, shelter,etc.)

## Lesson 6: The Layout of the Courtyard

Material: Map of the courtyard, pencil, reports on plants, overhead, transparency of courtyard map
Groups: Same pairs

Time: two to three days
Curriculum Link: math, technology education, science, art
Procedure:
1. As a class discuss how to set up the layout of the courtyard. (Tall plants towards the center, shade tolerant plants toward the trees, grasses mixed into the area, various colors throughout, etc.)
2. Turn the courtyard map into a one foot by one foot grid. Each plant will need one foot of space around it for optimum growth. Designate plants for each grid square. Patches of a certain plant can be created by designating a number of squares adjacent to each other.
3. A plant key may be created so individual letters can be placed into the grid to represent certain plants.
4. Allow students to discuss the appropriate place for their plant.

## Lesson 7: Ordering the Plants

Materials: Copies of the Prairie Nursery order form, pencil, list of the plant and seed prices, calculators, planning maps
Groups: Groups of 4
Time: one to two days
Curriculum Link: math
Procedure:
1. Fill out the name section of the order form.
2. Using the planning map and the price list fill in the plants that the class has decided to plant. Discuss the possibility of growing seedlings in the class.
3. Calculate the prices and total prices including shipping and handling.

## Lesson 8: Bare books

Materials: Information on plants from lesson 5, computer lab, Bareback lay-out sheets, Bare books, colors, pictures from seed catalogs
Groups: groups of 4
Time: two to three weeks
Curriculum Link: language, reading, art, science
Procedure:
1. Show an example of a Bareback from last year. Tell the students that they will be constructing a bareback as a group. It will be a plant identification book that will be used by students in the courtyard for many years to come.
2. Students will use computers to make a neat, corrected print out of their researched plant. For students who are quick, have them create table of contents, title pages, and author pages for their books. Students may need instruction of the use of the Macintosh computer lab.

3. Once final drafts are made of each plant, table of contents, title pages and author pages, copies should be made so each group of four has a copy to place in their book. Do not distribute these to the groups, yet.
4. Distribute a Bareback Layout sheet to each group. Explain that before the book can be constructed a layout must be made to plan where things will go and what they will look like. This way mistakes in construction can be reduced.
5. In groups of four students should plan the layout of their book. They should determine who will be responsible for which pages. Each book should contain a front and back cover, title page, table of contents, all 24 plants (one per page) and an author page. Each page should be numbered, have a colorful border related to that specific page's contents, and the glued in information. The layout should show clearly what each border and illustrated page will look like.
6. Once layouts are completed, distribute the computer generated copies and a bareback. Students will first number all the pages in their bareback. Next, they will refer to their table of contents and layouts to glue in the appropriate copies into each page.
7. After gluing, students will begin to illustrate each page. Since it is difficult for all four students to work on the bareback at the same time, assign deadlines for certain sections to be completed. Remind students that this is a group project and that the group is depending on each member to do their best and meet all deadlines. Students should take the bare books home to illustrate.
8. When all books are finished, have each group share their project with the class. Students should congratulate each other for their hard work.

## Lesson 9: Planting

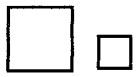
Materials: plants, trowels, hose, parent volunteers, courtyard layout, gloves, shovels, planting instructions
Groups: four students per adult
Time: One day
Curriculum Link: science
Procedure:
1. Instruct students about how to plant the various types of native plants using the instructions that came with the plant order.
2. Have students look at the courtyard layout and find the area in which the plants are to be planted. Students should dig the hole, put in the plants and water them. A plastic stake with the plants name on it should be placed next to the plants. Caution the students about being careful where they walk so plants are not crushed.
3. Monitor the courtyard until the end of the school year. Water it regularly.

## APPENDIX B

1. Some kids like to bring home plants or insects they find outside.

*but*

Some kids don't like to look at plants or insects outside and they never bring them home.



2. Some kids like to live where there are lots of plants and animals.

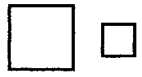
*but*

Some kids like to live where there are lots of people

3. Some kids think we should use insecticides and fertilizer in our gardens.

*but*

Some kids think we shouldn't use insecticides and fertilizers in our gardens.



4. Some kids work outside in the garden.

*but*

Some kids don't work outside in the garden.

5. Some kids like to read books about nature.

*but*

Some kids don't like to read books about nature.

6. Some kids think the environment should be taught in science class.

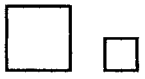
*but*

Some students think the environment should be taught in all subjects.

7. Some kids throw vegetable scraps in the garbage.

*but*

Some kids separate their vegetable scraps and compost them.



8. Some kids think watching birds is fun.

*but*

Some kids don't think watching birds is fun.

9. Some kids don't like studying plants and animals up close.

*but*

Some kids like studying plants and animals up close.

10. Some kids think that people are more important than animals.

*but*

Some kids think that people and animals are equally important.

11. Some kids are concerned about native plants and animals.

*but*

Some kids are not concerned about native plants and animals.

12. Some kids think we should have yards that are mowed.

*but*

Some kids think we should have yards that grow naturally.

13. Some kids think yard waste (grass clippings, leaves, dead branches, trimmings) should be thrown in the garbage.

*but*

Some kids think yard waste (grass clippings, leaves, dead branches, trimmings) should be composted.

14. Some kids put out food for birds.

*but*

Some do not put out food for birds.

## APPENDIX C

## Directions

1. For each question choose which of the two statements best describes you. (The two statements are separated by the word "***but*** ".)

2. Then think about the statement you have chosen. If it is a lot like you, then put an **X** in the large box after the statement. If it is only a little like you, then put an **X** in the small box after the statement.

**Remember**: Only one box for each question will be marked with an **X**. Three boxes will remain empty for each question.

## Examples

A. Some kids worry about air pollution.
***but***
Some kids don't worry about air pollution.

B. Some kids turn off the lights when they leave.
***but***
Some kids leave the lights on.

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