THE CREATION OF A SCHOOL-WIDE COMPOSTING PROGRAM TO BE RUN BY THE EIGHTH GRADE STUDENTS AT PARKSIDE SCHOOL IN WAUTOMA, WISCONSIN

by

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ABSTRACT

The purpose of this research is to create a school-wide program which will be run by the 8th grade students to compost all food waste products at Parkside School in Wautoma. Eighty-two percent of the 525 students at Parkside School eat hot lunch on a daily basis. The other eighteen percent either eat cold lunch or do not eat. Federal regulations require that they be served a portion of each of the major food groups, even if they do not want to take it. This leads to a huge amount of food waste generated on a daily basis. Having students develop and implement a composting program prevents this waste from going to a landfill or through a garbage disposal to the water treatment plant. Just as important, it provides students with an opportunity to learn about an environmental problem and develop the citizen action skills to deal with it, empowering them with the knowledge that even though they are still children, they can make a difference. Students who grow up with this knowledge and hands-on experience are much more likely to become adults who will continue to value the environment and become actively involved in its protection.
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# TABLE OF CONTENTS

ABSTRACT ................................................. ii
ACKNOWLEDGEMENTS ................................. iii
LIST OF APPENDICES ................................. v
STATEMENT OF THE PROBLEM ...................... 1
IMPORTANCE OF THE STUDY ....................... 4
REVIEW OF LITERATURE .............................. 6
PROJECT METHODOLOGY ............................... 20
RESULTS .................................................. 33
CONCLUSIONS AND RECOMMENDATIONS ........... 53
REFERENCES CITED ..................................... 64
APPENDICES .............................................. 68
# LIST OF APPENDICES

<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Weight of food collected</td>
<td>68</td>
</tr>
<tr>
<td>II</td>
<td>Traffic flow for composting in the cafeteria</td>
<td>70</td>
</tr>
<tr>
<td>III</td>
<td>Workers schedule poster</td>
<td>71</td>
</tr>
<tr>
<td>IV</td>
<td>Survey results</td>
<td>72</td>
</tr>
<tr>
<td>V</td>
<td>Compost bin designs</td>
<td>84</td>
</tr>
</tbody>
</table>
CHAPTER ONE
THE PROBLEM AND ITS SETTING

Statement of the Problem
The purpose of this research is to create a school-wide program which will be run by the 8th grade students to compost all food waste products at Parkside School in Wautoma, WI.

Subproblems
1. The first subproblem is to meet with the kitchen staff to develop a workable system to separate compostable food waste from other kitchen garbage.
2. The second subproblem is to meet with the custodial staff to develop a workable system to move and store compostable food waste.
3. The third subproblem is to educate the 8th grade students about composting.
4. The fourth subproblem is to build compost bins and to educate the staff and entire Parkside student body about the composting system.
5. The fifth subproblem is to implement and maintain the composting program.
6. The sixth subproblem is to determine the impact of the composting program on food waste reduction and disposal at Parkside School.

Delimitations
1. The project will be planned and implemented by the 8th grade students at Parkside School.
2. The project will involve all students and staff at Parkside School only.
3. The project will be limited to food waste produced only at lunch.
4. The project will not attempt to measure pre- and post-student knowledge resulting from the implementation of this program.

**Definitions of terms**

**block scheduling** This is a system for organizing a school schedule; in this case students will meet with their classroom teacher three times per week in 70 minute sessions.

**classroom setting** This is a standard classroom structure, accessible to a 10 acre field and Bird Creek. Each class has approximately 25 students comprised of all ability levels.

**composting** This is the process of collecting and processing food waste into a usable nutrient rich soil.

**curriculum** This is a description of a course of academic study; the current status of the 2007 8th grade science curriculum was “in development”

**environmental education** Environmental education is “a learning process that increases people’s knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action.” (UNESCO, 1977)
infuse  This is the process of incorporating one topic into another during instruction. In this case environmental education will be incorporated into the life science curriculum.

learning target  These are learning goals based on one of the Wisconsin Model Academic Standards

lesson plan  This is a format of an instructional lesson comprised of objectives, materials list, procedures for implementation, and methods of assessment

Parkside School  Parkside is a 4th through 8th grade school with approximately 525 students. Over half the students are on free or reduced lunch. Grades 6-8 are departmentalized with reading/language arts, science, social studies, math, and elective classes in technology, Spanish, and the arts.

unit  Designed to unite lessons into a common topic, a unit is a set of lesson plans based around a common subject

Wautoma Area School District  A school district located in rural central Wisconsin.

Wautoma, population 2,000, is the county seat of Waushara County. The population is largely white non-Hispanic, with 7% Hispanic; approximately one-third of the Hispanic population are migrants. 75% of Wautoma’s population has graduated from high school while 20% have a college degree. Unemployment is high at 11%. The median annual income is $31,700 placing it well-below the Midwest median income level. The school district has a student population of 1,486 students, 126 teachers, and 9 administrators and consists of one high school grades
Assumptions

1. The school administration will provide an adequate budget to fund the proposed program.

2. The school administration will ensure the cooperation of all building staff and students.

3. Students will be released from study hall and band to periodically perform composting duties.

Importance of the Study

The United States comprises 5% of the world’s population, but produces 30% of the world’s waste (Rogers, 2005). We are a nation of garbage. While recycling rates are on the upswing, so is the amount of garbage we produce. Most Americans have been aware of the situation since the 1960’s when Ladybird Johnson began her “Keep America Clean” campaign in 1965. Gaylord Nelson built on this by implementing Earth Day in 1970. Most of us now can cite the “3 R’s” – Reduce, Reuse, Recycle. Given the fact that fully 25% of the waste produced in the United States is yard waste and food scraps, and the fact that items that can be composted into a usable product rather than going into landfills, it might be appropriate to add a fourth “R” to the slogan – Rot.

Children are aware of the problem and it concerns them greatly. In one survey, environmental issues ranked second only to AIDS in issues that worried students in
grades 4-12 (Rockland, 1995). Children are not just concerned; they want to make a difference. While some children have parents who can and will help them to learn about the issue of waste and implement a plan to reduce it, many do not.

The implementation of a school-wide composting plan addresses many of these issues. Eighty-two percent of the students at Parkside School in Wautoma, WI eat hot lunch every day. Federal regulations require that they be served a portion of each of the major food groups, even if they do not want to take it. This leads to a huge amount of food waste generated on a daily basis. Having students develop and implement a composting program prevents this waste from going to a landfill or through a garbage disposal to the water treatment plant. Perhaps even more importantly, it provides students with an opportunity to learn about a problem and develop the citizen action skills to deal with it, empowering them with the knowledge that even though they are still children, they can make a difference. Students who grow up with this knowledge and hands-on experience are much more likely to become adults who will continue to value the environment and become actively involved in its protection.
CHAPTER TWO
REVIEW OF LITERATURE

The Importance of Environmental Education

The question of what schools should teach is as old as schools themselves. On a formal level, as early as 1892 the National Education Association worked to evaluate what type of curriculum would work for the diverse student body coming from the many cultures immigrating to America (Wilke 1993). The question still exists today. What should we teach in our schools? Wisconsin has developed a set of state standards specifying objectives that must be covered in the curriculum, but has left the matter of how these standards are met up to the local school systems. Many of these standards are tested on the Wisconsin Knowledge and Concepts Evaluations (WKCE), thus assuring that they will be covered in the classroom. Other standards, however, are not and many schools have shown the tendency to give less priority to their coverage. Environmental education is one of the standards areas not specifically covered on the WKCE resulting in the question, “Should environmental education be taught in our schools?”

A large base of today’s research would indicates that it should be. This belief extends far back into the history of American education. In the mid-1800’s Louis Agassiz stated that his students should “study nature, not books.” (Wilke 1993). The catastrophic Dust Bowl of the 1930’s grabbed the country’s attention for the need to address environmental problems. Over the decades the definition of environmental education has evolved. In 1977, the world’s first Intergovernmental Conference on
Environmental Education was held in Tbilisi, Georgia. The Tbilisi Declaration, one of the most important documents in environmental education, was written. This document provides an outstanding definition of what environmental education should be:

Environmental education, properly understood, should constitute a comprehensive lifelong education, one responsive to changes in a rapidly changing world. It should prepare the individual for life through an understanding of the major problems of the contemporary world, and the provision of skills and attributes needed to play a productive role towards improving life and protecting the environment with due regard given to ethical values. By adopting a holistic approach, rooted in a broad interdisciplinary base, it recreates an overall perspective which acknowledges the fact that natural environment and manmade environment are profoundly interdependent. It helps reveal the enduring continuity which links the acts of today to the consequences for tomorrow. It demonstrates the interdependencies among national communities and the need for solidarity among all mankind (Tbilisi, 1977)

Why is environmental education so vital? A simple look at today's environmental situation is answer enough. The global population is skyrocketing, the use of natural resources is escalating at a rate that the earth cannot sustain, and global warming is threatening to alter our climate. The list is seemingly endless. According to Wisconsin Governor Jim Doyle:

"Natural resources are a fundamental part of who we are in Wisconsin, and we owe it to future generations to preserve them. Not only do our kids need a clean and healthy environment to live in now, they'll also inherit what we leave behind, and become responsible for sustaining it. That's why it's so important to develop a sense of stewardship and responsibility in our children, and involve them in activities that allow them to experience the outdoors.” (WEEB, 2006)

A desire to protect and preserve our environment is not the only reason to include environmental education in our schools. Many studies show that environmental
education enhances the quality of learning. In a report from the Environmental Education Association of Washington, it was found that students in schools using environmental education consistently scored higher on standardized tests, tended to have a higher overall grade-point average, stayed in school longer, and were more responsible both in the school and the community (New Report, 2006).

It has long been recognized that each of us has our own set of learning styles or intelligences. In 1995, Gardner added the “naturalist intelligence” to his list of seven intelligences. According to Glock (1999), “developing the naturalist intelligence is no less important than teaching math or reading skills. The naturalist intelligence offers one more way to help students understand and learn.” Some students simply learn better when they are outdoors; environmental education provides an obvious connection to accomplish this.

Environmental education is an essential component to quality education of our youth. It provides an educational mode to which many students respond positively (Glock 1999). It has been shown to improve the quality of education. And most importantly, if we are to create a generation that will be able to use our earth’s resources in a sustainable and responsible manner, we must provide them with the tools to accomplish this by providing quality environmental education programs in our schools.

**The Role of Citizen Action in Environmental Education**

Educators have long recognized that simply lecturing and presenting facts to middle school students is fairly ineffective. Children must be presented information in a
manner in which they can experience and internalize the material in order to make it more memorable. Students at the middle and high school levels are examining the world around them and are beginning to develop values. While it is not the school's job to impose values on students, it is their job to help students gain the skills needed to develop their own philosophies and values (Chapman 2007). Young adolescents often question their place in society and feel somewhat disenfranchised. Cole (2007) refers to the need of students to find their sense of place and "to live well in a place (p.30). They are worried about the world around them. According to a national survey of students in grades 4 through 12 done by the National Environmental Education and Training Foundation (NEETF), among ten critical issues that currently affect youth, solving environmental problems came second only to concerns about AIDS. The data found that while non-disadvantaged youth had a more altruistic view of environmental problems, disadvantaged youth were more concerned about environmental problems that were more present and immediate, probably because they often live with threatening problems. Both groups agreed that environmental problems were of a high priority (Rockland 1995).

By introducing a citizen action based environmental education program into our schools we can meet many of these needs for our students. Proponents of environmental education have long included citizen action as being a vital part of the curriculum (Wilke 1997). According to Engleson and Yockers (1994, p. 51):

- The purpose of citizen action education is to teach citizens (students) to function in a particular relationship with the state.
The most desirable relationship between citizens and the state is that outlined in the structure of a constitutional, representative democracy. The major way in which this relationship differs from others is that the state belongs to its citizens, and citizens have an unalienable right to influence what the state shall do. Therefore, a primary education mission must be to teach citizens to exert influence in public affairs, for without the competence to influence the state, the unalienable right to do so cannot be exercised.

Through the learning processes involved in a citizen-action based program, students discover that they can control their own successes and failures and that they can make a difference in the world around them (Wilke 1997).

It is important that these citizen-action based programs be authentic. While educators have often used games and simulations as a method to teach citizen action skills, they are finding that these approaches seldom lead to the intended behavior changes in students (Jensen and Schnack, 2006). Being involved in real-life environmental issues in a place that is real to them is vital to a successful citizen-action based program. Gruenewald (2003) states:

Place-based educators do not dismiss the importance of content and skills, but argue that the study of places can help increase student engagement and understanding through multidisciplinary, experiential, and intergenerational learning that is not only relevant but potentially contributes to the well-being of community life. (p.7)

San Francisco’s Literacy for Environmental Justice (LEJ) program exemplifies the impact of such programs. LEJ has trained and employed local youth to serve as community organizers for such issues as food access, restoring open space, and environmental health. The program has worked with teachers to utilize place-based
learning models in their classrooms. By providing culturally linked environmental education, LEJ hopes to create future citizens who will continue as adults to be involved in community projects. (Cole 2007)

In a school district such as Wautoma where poverty levels run high, providing a program that enables students to take ownership in environmental issues is particularly critical. Cole (2007) quotes Dana Lanza, the founder of LEJ:

For too long people of color, low-income people, and youth have been forgotten or intentionally marginalized from efforts to heal ecological systems, revitalize cities, and conserve precious resources . . . The underrepresentation of low-income people and people of color enables environmental inequity to continue because these populations have no forum to share their voices and talents. (p. 42)

By promoting environmentally based citizen-action programs in our schools, we meet many needs of our students. They become actively engaged in the education process and have a strong motivation to learn the necessary accompanying academic material. They examine and develop their sense of values. Young adolescents find a sense of place and belonging in their community, and feel empowerment by working on projects that create change that they believe in. Environmental issues are largely social issues. By giving our younger citizens the skills to recognize, examine, and deal with these issues, we create a society that is willing to do so as well.

Infusing Environmental Education into the Curriculum

Because of its importance, environmental education must be made a part of the school curriculum. This can be done in several ways: establish environmental education as a separate program, create a separate environmental education unit as part of another
course, or infuse environmental education into existing curricula. Ask any classroom teacher what their number one problem is and they will probably respond with one word: time - time to plan and time to instruct all the content that is required. In all likelihood, adding another program into the school day is not practical. Even adding another unit to the yearly curriculum would impose on instructional time. Infusion, then, seems to be the logical course. By utilizing infusion, "environmental education does not become another add-on to the curriculum, another subject that needs to be fit into an already overburdened schedule. Rather, it takes only a little extra time to use environmental issues and concerns to teach skills and concepts within the normal scope and sequence of subject areas." (Simmons 1989).

Infusion, sometimes referred to as integrated instruction, is usually defined as "the focusing of instruction around a key idea or concept in which all of the school disciplines support and share in the instruction (Rakow and Vasquez, 1998). Ideally, infusion is interdisciplinary and taught across all subject areas. Due to the structure of most middle and high schools, subject matter is still divided into separate disciplines and teachers mistakenly believe that an interdisciplinary approach is not possible. For that reason this study infuses environmental education into a physical science curriculum utilizing themes from the core subject areas (math, reading, and social studies.)

Environmental education is not the only curricula area to benefit from the infusion process. As American science test scores fall in comparison to the rest of the world, numerous efforts have been made to improve instruction (Ediger 2000, Graham 2001).
One of the problems identified in traditional science instruction is its separation into distinct disciplines which "lacks relevance to students, prepares them poorly in life skills that demand science literacy, (and) leaves US students lagging on standardized tests of science knowledge, and ignores or perhaps even perpetuates naïve conceptions in science (Fortner and Boyd, 1995). Environmental education is inherently interdisciplinary in nature and lends itself easily to alleviate this problem. Numerous studies have shown the success of infusing environmental education into other programs. One noteworthy example was reported by the State Education and Environment Roundtable which examined the impact of Environment as an Integrating Context for learning (EIC). EIC "employs the environment as a comprehensive focus and framework for learning in all areas "(Lieberman and Hoody, 1998). The study found that test scores rose in all curricula areas as a result of this process. Studies in New Hampshire, Pennsylvania and Washington have shown equal success (Belanger, et. al. 2006; New Report 2004). Infusing environmental education into existing school programs improves the education of students in all content areas and provides them with the necessary skills to become successful global citizens.

**The Need for Composting**

In 2007, the United States Protection Agency reported that the United States generated approximately 251 million tons of trash. This breaks down to 4.6 pounds of waste per person per day. The overall rate of recycling in the United States has increased by 26 million tons over the last twenty years. In 2006, recycling 82 million tons of
municipal solid waste saved the energy equivalent of over 10 billion gallons of gasoline (EPA, 2007). Unfortunately, as we increase our recycling levels, we also increase our waste production. The fact is that the United States comprises 5% of the world’s population, but produces nearly 30% of the world’s waste (Rogers, 2005). While the majority of Americans know the benefits of recycling paper, plastics, glass, and metals, little has been done to develop an awareness of composting. Of the waste generated in the United States, 12.95% is yard waste and 12.4% food scraps, or 25% of the national waste production. In 2006, Americans composted almost 21 million tons of waste, just one-third of the total amount of compostable waste generated.

Looking at this on a state level, Wisconsin was the first in the nation to gain approval by the United States Environmental Protection Agency for its solid waste program. We generate about 4 pounds of waste per person per day, a figure under the national average. While great strides are being made in our state to reduce waste production and to increase recycling, it is the state’s goal to do more. While the Reduce Reuse Recycle campaign has done much to increase the recycling of paper, plastic, metals, and glass, composting has not received the same level of attention. Wisconsin currently has 148 composting facilities. This comes to about 2 facilities for each of its 72 counties. Half of Wisconsin households report composting yard waste and 73% leave grass clippings on their lawns (WDNR, 2001). However, statistics for composting food waste are virtually impossible to obtain, indicating that the amount is not significant enough to report.
Food waste is generated in households, businesses and schools. While composting home food waste is a relatively simple task, composting food on a larger scale in schools and businesses is somewhat more difficult. It can, however, be done. Organizations such as the Cornell Waste Management Institute out of Cornell University (2007) have been promoting successful school composting programs since the early 1990's. Books such as “Worms Eat Our Garbage: Classroom Activities for a Better Environment,” (Sharp and Mitchell, 2003) and “Composting in the Classroom: Scientific Inquiry for HS Students” (Trautmann and Krasny, 1997) have increasingly gained in popularity. School composting accomplishes two important tasks. Most obviously, it saves on food waste being sent to local landfills or through garbage disposals into local water treatment plants. Secondly, and possibly more importantly, composting in the schools brings an awareness of the benefits of composting to the entire school community. Not only are the student body and staff made aware of the benefits of composting, so are their families, thus increasing the likelihood that composting will spread beyond the school walls. As these children become adults it is more likely that they will become home composters and possibly even operate businesses that compost, creating an ever-increasing impact on improving our nation’s environment.

The Benefits of Cross-Age Instruction

As long ago as the first one room schools, cross-age instruction has been recognized as a beneficial form of instruction, both for the tutor and the tutee. Numerous studies have shown that cross-age tutoring gives tutors additional opportunities to review
material, think about it in a new way, and communicate their knowledge. It benefits self-esteem, school attendance, intergroup relationships, attitudes towards school, and acceptance of others (Puchner, 2003: Thrope and Wood, 2000). In describing SHARE: Students Helping Achieve Reading Excellence, a school-wide multi-age peer tutoring program designed to increase reading comprehension, Baird (2006) cites the reasons for its undertaking. Among these are introducing learning strategies to younger students while helping middle schoolers master the concepts they will be teaching, as well as building a sense of community.

Cross-age instruction usually involves an older student teaching a younger student. Although the older students may have already learned the material, they must reach a level of mastery in order to instruct it. They are more likely to remember the material as a result of teaching it. This benefit has been shown to extend even to training disabled students to be tutors (Bond and Castagnera, 2006). Why does teaching others help learning? Puchner (2003) offers a variety of cognitive theories. Two of these are “role theory” and “cognitive elaboration.” In role theory the student takes on the characteristics of the person they are playing. If they become a teacher, they take on the characteristics of a teacher which include status, authority, and achievement. Cognitive elaboration suggests that in order for children to explain things to each other they must tie the concepts to ideas that they already know, making new cognitive connections and enhancing memory and learning.
In addition to cognitive gains, cross-age instruction provides an excellent opportunity for leadership training. Children need to develop such skills and be given the chance to implement them. Even those with in-born leadership skills must receive training to enhance and refine their abilities. In a study of gifted students, Manning (2005) found that peer mentoring programs provided an obvious opportunity for students to receive training and practice their leadership skills.

Besides developing academic skills, cross-age instruction provides an extremely effective medium to develop a sense of community within a school. The Peer Research Laboratory at the City University of New York has designed a new tutor-centered model in which all students eventually get the opportunity to become a tutor. Tutees not only benefit from the instruction they receive, but also view it as training to eventually become tutors themselves. Students see themselves both as givers and receivers. Schools participating in this model have noted resulting academic success as well as a means of preventing social problems (Gartner and Riessman, 1993). Thrope and Wood (2000) found that cross-age instruction brought an increase in both the academic and affective domains. While tutors benefited from being role models and being looked up to by another student, the tutee felt and equal benefit by being the recipient of the attentions of an older student. Both the tutors and tutees found an increase in their sense of personal accomplishment, and grew in their understanding and compassion for one another.

Studies have shown that cross-age tutoring benefits everyone involved and can be applied to students of all age levels and abilities from disabled to gifted. Teachers have
extra assistance with instruction. Tutors improve academic and leadership skills, increase their self-esteem, and develop a heightened sense of compassion. Tutees also see an improvement in academic skills, increase their self-esteem, and set goals for helping others as they have been helped. Clearly, cross-age tutoring is a win-win program in which everyone benefits.

Summary

What separates the human race from other species is our drive to ask, “Why?” We want to know how things work and why things happen. At this juncture in time, finding the answers to these questions is no longer simply a means to satisfy our curiosity. It is a means to protecting the well-being of our planet. In 1854, Chief Seattle spoke these words (UNAHI 2006):

Humankind has not woven the web of life.
We are but one thread within it.
Whatever we do to the web, we do to ourselves.
All things are bound together.
All things connect.”

In stark contrast, in his review of Richard Louv’s Last Child in the Woods,” Bill McKibben states, "Our children are part of a truly vast experiment — the first generations to be raised without meaningful contact with the natural world.” (McKibben 2006)

If our children are to develop the skills to face the problems of today’s society, particularly the wise use of our resources, they must have the understanding of the forces that drive our planet. We owe them exemplary instruction. Knowledge of processes, however, is not enough. By providing them with a strong foundation in environmental
education we will provide them with the skills necessary to examine all sides of an issue, understand the concepts involved, and make an educated decision about what must be done. Children need to recognize and understand the interconnectedness of all that is around them. By improving our methods of instruction and infusing environmental education into that curriculum, we can give them the skills they need to become responsible caretakers of our planet.
CHAPTER THREE
PROJECT METHODOLOGY

Subproblem one

The first subproblem was to meet with the kitchen staff to develop a workable system to separate compostable food waste from other kitchen garbage.

Because this project is wholly centered around food waste in our school cafeteria, having the support and cooperation of the kitchen staff was essential. The key step was meeting with the head of the cafeteria staff to explain the vision of the composting program and get her input on how we could best work with them without disrupting their food service program. This meeting was held in August 2005 just prior to the start of school with the understanding that the students would schedule a future meeting to finalize plans for implementation. The questions asked at this meeting were as follows:

1. What are the sources generating food waste in the cafeteria?
2. What is currently done with food waste generated by the hot lunch program?
3. Approximately how much food is thrown away daily, both in preparation and by the students?
4. How could we best set up a system for students to compost their food without disrupting the normal kitchen routine?
5. Would it be possible to also set up a system to dispose of food produced during the preparation of the food?
6. How many students eat hot lunch at Parkside each day?
Subproblem two

The second subproblem was to meet with the custodial staff to develop a workable system to move and store compostable food waste.

The purpose of meeting with the custodial staff was to determine a location for the composting bins and the best method to move the food from the cafeteria to the outdoor compost area. The custodians were aware of many of the potential problems involved with the waste management program in our building and were aware of existing equipment already available. They also had the best knowledge of the buildings and grounds situation which would assist in determining the best location for the compost bins. This meeting was held in August 2005 just prior to the start of school. The questions asked at this meeting were as follows:

1. What problems do you foresee implementing this program?
2. Where do you think the best site would be to set up the compost bins?
3. Do you think this program will impact you in any way? If so, how, and will this be a problem for you?
4. Should the science budget cover the cost of garbage bins and garbage bags for composting or is there school equipment already available?
5. How do you recommend we move the food from the cafeteria to the compost bins outside?

Subproblem three

The third Subproblem was to educate the 8th grade students about composting.
Beginning in mid-September 2005 students did an internet investigation on the amount of waste generated in the United States. A field trip was taken to the Valley Trail Recycling and Disposal Facility (the area landfill) for students to actually see the amount of garbage generated in our community and what is done with it. Students then narrowed their research to food waste management in general and specifically in our school. Next students investigated composting. Rather than having each student research all aspects of composting, the subject was divided into the following areas:

1. defining composting and determining the foods that can and cannot be composted
2. how to maintain a balance between nitrogen and carbon based materials to achieve optimal decomposition
3. different methods of composting
4. different types of compost bins explaining the costs and advantages and disadvantages of each type
5. maintaining the compost bins throughout the collection process.

Each class was divided into five groups with each group assigned one of the topics about composting. Dividing the subject into these five areas accomplished two things: it reduced the amount of class time needed to do the research and it made it possible for each group to become experts in a particular area, insuring that everyone would play a valuable role in providing information. Each group used the internet to research their topic and developed a narrative presentation that incorporated visual aids such as posters or PowerPoint presentations which was then shared with the rest
of the class. Each student kept a copy of their group’s narrative in their science folder to be used as a reference in future stages of the project. Next, the class held a group discussion to develop an action plan for implementing a program to compost the food waste generated in our building. Notes were kept on the white board as comments were made, and the overhead projector was used to write the final proposal. Included in this discussion was a vote on which type of compost bin should be used, based on the information presented by the group researching this topic. Each student received a copy of the final proposal which also was saved in their science folders to be used as a reference as the project progressed. This unit of instruction lasted four weeks.

Subproblem four

The fourth subproblem was to build the compost bins and to educate the staff and student body about the composting system.

Each class chose two delegates to meet with me during two study hall periods to create the final action plan for implementing the program (my study hall students were assigned to other study halls during this meeting). Each team of delegates presented their class’s action plan to the rest of the group along with an explanation of why they had chosen the style of compost bin their class recommended. A discussion then was held regarding how to combine the five class action plans into one 8th grade plan and which compost bin design should be used. As an infused math activity, each class calculated the materials and equipment that would be needed to build the bins. They wrote letters to
their families explaining the project and asked for volunteers to assist with construction, the loan of tools, and the donation of materials.

I met with the 8th grade team during two of our weekly team meetings in early October 2005 to introduce a preliminary plan to schedule building the compost bins, go through the packets of building instructions, determine the classrooms to be used, and troubleshoot any potential problems they anticipated. Because the design chosen by the students involved some use of power saws, I contacted the industrial arts teacher at the high school to see if he would be interested in having his students work with us by doing the preliminary board cutting. Materials were purchased and stored in the science room. Eighth grade students were divided into 20 work crews of six or seven members. In mid-October during science class, students read the instructions for building the bins. Each crew precut the hardware cloth and made a supply bag of necessary materials. Students divided the jobs involved in building the compost bins. The crews were also responsible for making sure that they had all the tools necessary for building the bins. Letters were sent to parent volunteers explaining their role in assisting students with the project, along with construction plans to familiarize themselves with beforehand. The building day was scheduled for the last week of October. Students went to the science room to collect materials and took them to an assigned work area. There were eight classrooms used as work areas. Each work area housed 4 work crews and was staffed by one staff member and four volunteers (either a parent or high school industrial arts student) to assist each team. Four panels were built for each bin in the work area and final assembly of the
panels was done outside. The bins were set up in the area previously chosen by the students and approved by the administration and custodial staff. Following the construction project volunteers were invited to join the students for lunch in the cafeteria.

Once the construction process was completed it was time to develop plans to educate the students and staff about the composting program. In the first year of the project each construction group was assigned to one of the 4th, 5th, 6th, or 7th grade classrooms to teach about the composting project. Groups were responsible for creating an age-appropriate fifteen to twenty minute presentation that would actively engage the students in their assigned classroom. The initial process of having the students determine what was age-appropriate proved to be somewhat challenging. Consequently I provided each group with a copy of each grade’s reading book along with several workbook pages to use as a guideline. In addition to the presentation, each group was required to write a summary of the program for the classroom teacher so that teachers would later be able to assist their class with the program. Groups were required to contact their assigned classroom teacher to schedule a time during the second week of November to give their presentation and to get consent from their own teacher to be excused from class during that time. Once the presentations were made the students could then begin implementing the program. The original plan with this project was to then have my students instruct the incoming fourth graders each fall about our composting program. Because of changes that occurred in implementing the program (which will be addressed in the following subproblem) adjustments in educating the student body were necessitated.
**Subproblem five**

The fifth subproblem is to implement and maintain the composting program.

Once the program went into effect during the last week of November, daily supervision of the cafeteria and taking the compostable food out to the compost bins was rotated among the five science classes. The custodians had provided a large garbage bin and trash can liners in which to collect the food waste. Shovels were borrowed from the environmental center that the school district was leasing from the Department of Natural Resources. Students were to sign up during science class in pairs for 10 minute shifts on their class’s assigned day. Each class was assigned four compost bins in which to throw their food waste and mix it with rotted hay donated by area farmers and leaves collected during Make a Difference Day. Once a month during science class students were to go outside to turn the compost in their bins. In May students would empty their bins, shoveling the contents into two central piles to allow the compost to finish decomposing over the summer. In the fall of 2006, it was intended that the new 8th grade class would screen, bag, and sell the finished compost, and take over the program for the 2006-07 school year.

When I contacted the kitchen supervisor during the third week of November to make final plans to implement the cafeteria food collection process, she informed me that she no longer wanted to have the students compost their lunch food waste. She felt that it would be too messy and slow down the disposal lines. After explaining that we had done all of the work to implement the program, she agreed to let the students come up to
collect the food waste produced from preparing food. This would not be a daily process, but would only occur on certain days when waste was available. She would notify me by email on the days food waste was available. The students were very upset when they received this news and the question was raised, “What do we do with all the leaves from Make a Difference Day? What do we mix them with?” Students brainstormed this issue and decided that students who had chickens, horses, and livestock at home could bring manure to mix with the leaves. There were a number of parents who agreed to help with this. Students who had a manure supply at home invited friends over to load manure into trailers or pickup trucks. Students unloaded the manure at school into a central pile. Each class then mixed leaves with the manure in their four compost bins. The food scraps from the kitchen were added to these as they became available. We had leftover leaves and manure, so as the year progressed and the piles decomposed and shrank, the students combined the contents of their bins and started a new cycle of leaves and manure. In the spring the compost had decomposed considerably, but still contained enough large leaf pieces that we decided to postpone screening and bagging the compost until the following year.

In May 2006 the cafeteria supervisor resigned and was replaced. I met with her to discuss the possibility of implementing the original composting plan in the fall of 2006 and she enthusiastically agreed. In August 2006 my new 8th grade class renewed the composting program. This group had only a vague recollection of what composting was from the presentations they had seen the previous fall; however, since they had not been
involved in composting their food in the cafeteria throughout the year as had been planned originally it was necessary to repeat most of the original education process. We again visited the landfill and researched the five areas of composting. The students reviewed the action plan developed the previous year and decided to use it rather than developing a new plan. Their first step was to empty and screen the compost already in the bins. Rather than taking the time to bag and sell it, we decided to put the finished compost in a central pile so that we could focus our efforts on beginning the school-wide program. The original plan had been to teach only the fourth graders new to our building in September 2006, but since the school-wide composting had never been implemented the students decided to repeat instruction for all 4th through 7th graders. This was accomplished in the same manner as it was done in the previous year. The school-wide composting program went into effect the last week of September and continued until the third week of May 2007.

Parkside School received a grant to provide a healthy snack to all students in the building. This also began in September 2006. The students soon noticed that there were food scraps left from the snacks and wanted to include them in the composting program. They developed a plan to place an ice cream bucket with a lid in each classroom receiving a healthy snack. My students would collect these buckets at the end of the day, take them out to the compost bins, rinse them out in our classroom, and return them to their owners. We implemented this part of the composting program during the first week of November.
After examining the compost bins during the third week of May 2007, the students decided it would be better to let the compost continue decomposing over the summer and to screen it in the fall when the process was more complete, so “put the bins to bed” for the summer by doing a final mix of rotted hay with the existing compost piles. There was not enough compost from the year before to sell so it remained onsite in the central pile.

During this time I decided to switch to teaching 7th grade life science for the 2007-2008 school year and was allowed to bring the composting program with me to be run by the 7th graders. These students had a somewhat better sense of what composting was since they had spent the previous year disposing their cafeteria and healthy snack waste in a compostable manner. However, their knowledge base was not sufficient to knowledgeably run the program, so again we repeated the process of researching waste and composting. Because most of our kitchen food scraps, prior to the implementation of our program, had been put into the garbage disposal in the kitchen’s sink rather than into a dumpster, I chose to have the students visit the local water treatment plant instead of the landfill that we had been to the previous two years. This accomplished several things. The water treatment plant is located in Wautoma making the trip closer and less expensive, it involved visiting a local facility that most of the students knew nothing about, and the use of bacteria at the water treatment plant could be incorporated into the life science curriculum. Because all of the students in the building except the fourth graders new to Parkside had already been disposing of their cafeteria and healthy snack
waste for composting during the prior school year, it was only necessary to teach the fourth grade classes about composting. Each of my five science classes was matched with a fourth grade class. Each science class was divided into five groups with each group researching and developing a presentation on one of the five aspects of composting listed in subproblem 3. The healthy snack grant expired in June 2007 so the program involved only composting the cafeteria food waste. Before restarting the collection process, the students again emptied the compost bins and sifted their contents, placing the finished compost in a central pile. The 7th graders ran this program from the last week of September 2007 until the second week of May 2008. During the third week of May students again emptied the compost bins and sifted their contents. While the students originally planned to sell the compost in the spring when people would be planting their gardens, we decided that we did not have time to develop a good marketing plan and chose to keep the compost in the central pile for another year. The Parkside staff and the school district building and grounds crew were told that the compost was available free for their use. At the time of this writing a number of teachers and parents have taken compost home to use in their gardens.

**Subproblem six**

The sixth subproblem was to determine the impact on food waste reduction and disposal at Parkside School.

430 students eat hot lunch every day at Parkside School. By federal law students are required to take a serving of each of the food groups at each meal whether or not they
like the food or intend to eat it. This portion of food waste cannot be reduced; however, students also often take second servings of food and then do not eat all of it. The goal was to reduce the amount of waste in taking uneaten second servings.

Prior to the implementation of the composting program students emptied their food waste into a small pan which was frequently emptied into the garbage disposal. Consequently students were unable to see the total amount of food being thrown away. Since all of the composted food was thrown into one large garbage can, it was believed that seeing the full amount of garbage would motivate students to reduce their food waste. Further, it was believed that if students had to actually take the responsibility of separating their garbage to compost it that they would try to reduce the amount to make this job easier for themselves.

The original plan was to weigh all of the food thrown out for one week to get a baseline food waste figure. We would then weigh the compostable food waste we collected to determine the level of reduction in total waste. As we began to strategize how to do this, it soon became apparent that it was not going to be feasible to do this. Because the waste was being thrown into the garbage disposal, the food waste receptacle on the counter was continually being emptied throughout the ninety-five minute lunch period. Having students weigh the bin each time before it was emptied was going to be disruptive to the kitchen staff. Therefore we decided to determine only how much waste was prevented from going to the landfill or water treatment plant by weighing the food waste we collected. Logistically this also proved to be difficult. Once the traffic flow of
students emptying their trays began, it continued nonstop until the end of the lunch period. The students already found it difficult to wheel the garbage can outside, tip it over onto the compost pile and drag out and empty the garbage bag. It was simply too unwieldy to have one student lift the entire contents of the bag and stand on a scale to weigh it. It was also difficult to weigh the garbage in smaller amounts during the lunch period. An extra garbage bin would have to be brought in along with an extra team of student workers. While one team emptied and weighed the contents of one garbage can, the other team would continue to collect food waste in the other can. Consequently we decided to limit weighing our waste to the last two weeks of April and the first two weeks of May at the end of the school year.
CHAPTER FOUR

RESULTS

Subproblem one

The first subproblem was to meet with the kitchen staff to develop a workable system to separate compostable food waste from other kitchen garbage.

My initial meeting in August with the first services supervisor went very well. She was very supportive of the composting program and said she would support its implementation. We discussed six main points.

1. What are the sources generating food waste in the cafeteria?

There are three sources of food waste: scraps generated from food preparation, food not served that could not be used in a later meal, and food thrown out by the students.

2. What is currently done with food waste generated by the hot lunch program?

All of this food was going either into the garage and then to the landfill or into the garbage disposal where it made its way to the water treatment plant.

3. Approximately how much food is thrown away daily, both in preparation and by the students?

The kitchen supervisor was uncertain as to how much was being thrown away, but said it was at least on large garbage can full each day.

4. How could we best set up a system for students to compost their food without disrupting the normal kitchen routine?
Students needed to develop a system in which the following issues could be addressed:

- placing unopened milk cartons in a cooler
- throwing nonfood garbage such as empty milk cartons, napkins, and plastic cups into a separate garbage can
- placing noncompostable food in a bin on the kitchen counter so it could be thrown down the garbage disposal
- placing silverware in a bin on the kitchen counter so it could be washed
- not interfering with the kitchen staff
- not slowing the traffic flow of students emptying their trays

The students developed a system to address these issues. As part of their presentations to students in their classrooms, the students developed a traffic flow diagram of how students would dispose of their waste.

5. Would it be possible to also set up a system to dispose of food produced during the preparation of the food?

The cooks could throw any scraps they had into a container and place it in a spot where students could collect it each day to throw it out when they took out the other food waste collected during lunch.

6. How many students eat hot lunch at Parkside each day?

Approximately 430 students are served each day.
A group of student representatives and I met again with the kitchen supervisor in October and proposed their system of waste disposal (see Appendix Two). At this time the supervisor’s support was not as enthusiastic, but she agreed to continue with the program. As was stated earlier, when I met with the supervisor in mid-November to finalize the program she told me that she was not willing at that time to compost the food waste produced by the students emptying their trays. She felt it would be disruptive to the kitchen and cafeteria routine. However, she was willing to allow the students to collect the food waste created by the kitchen staff during food production. We agreed on a procedure for students to collect this waste and made plans to implement the program the last week of November.

Later in the school year we learned that the supervisor had been diagnosed with cancer. This explained her sudden reluctance to become involved with our program. In April she resigned and a replacement was hired. I met with her in May of 2006 to explain our original program and ask if she was willing to participate in it. She was very enthusiastic and made an interesting request. The kitchen had a problem with disappearing silverware. Students were not stealing it. They were throwing it away with their garbage! She asked if I could have the workers pay special attention to this problem as they supervised students emptying their trays. I assured her that we would, and we agreed to start the program in its entirety in the fall of 2006. In answer to her question, we did, indeed, find over a dozen pieces of silverware when we examined the compost. These were returned to the kitchen for sterilization and reuse.
Subproblem two

The second subproblem was to meet with the custodial staff to develop a workable system to move and store compostable food waste.

The custodial staff has been very supportive of this program from our first meeting. When I spoke with them they expressed a concern about attracting bugs and rodents. I assured them that if the food was properly composted this would not be a problem and in the event that a problem did arise, we would find a solution or stop the project. They suggested placing the bins in a grassy area outside of my classroom. There was a driveway leading from the back of the kitchen to this area which would make it easy for the students to transport the waste from the kitchen to the bins. Because it was by my classroom it would be easy for me to supervise the students and be available if they had problems. It would also be close to our classroom for the monthly work in the bins. The custodians offered to provide a large garbage can on wheels and the garbage bags needed for the project. They said they would include this in their daily routine of setting up the kitchen for lunch. They volunteered to keep an eye on the students during the program and alert me if they noticed any problems. I made a point of telling them that if the program created any problems for them, no matter how small, to let me know.

Throughout the three years of this program, the custodial staff has gone above and beyond what I could have asked for. On days that students forgot to work a shift and take the compost outside, the custodians covered for them. I actually had to ask them to let me know when this happened so they wouldn’t have to do the students job. When it
snowed they shoveled out a path to the bins. They provided me with a garage door opener to the garage where we stored our shovels and gloves to make it easier to get in and out. They were an enormous contribution to the success of the program.

**Subproblem three**

The third Subproblem was to educate the 8th grade students about composting.

In the first year of the project (2005-06 school year) the overwhelming majority of students had little or no knowledge about the amount of waste generated in the United States, where their local garbage went, or what composting was. The trip to the Valley Trail Recycling and Disposal Facility was an excellent motivator to get students interested in learning about how they could reduce waste. After seeing the amount of garbage and learning about the cost of running the landfill, they were very interested in learning about how they could make a difference to reduce garbage production. Students made comments such as, “This is disgusting! I wouldn’t want this near my house!” and “This just shouldn’t be able to throw all this stuff away!” They also asked questions such as, “Why aren’t we recycling more of this stuff?” “Do we recycle the garbage at our school?” and “We should make our school stop throwing all that stuff in here!”

The local county waste management department was very helpful in supplying educational materials. While the materials were developed primarily for use with the general public, most of them were written at a level that could be understood by the students, and one PowerPoint presentation had been developed specifically for use in the schools. Finding other age-appropriate materials that were went into more depth about
the topics to be covered (defining composting, determining the foods that can and cannot be composted, how to maintain a balance between nitrogen and carbon based materials to achieve optimal decomposition, different methods of composting, different types of compost bins, and maintaining the compost bins throughout the collection process) was difficult. While my initial plan was to have students do open research online, this was modified to providing them with specific age-appropriate websites to search, providing articles to read, and in some cases rewriting articles to a more age-appropriate level.

In the first year of the program the students worked in groups with each group doing research and a class presentation on all of the topics. This took much more class time than I had anticipated and was also fairly overwhelming to many of the students. In the second year the instructional method was changed to having students work in groups with each group becoming an expert on one specific topic. Each group presented their information to the rest of the class. As part of their presentation they were required to provide and grade some method of assessment to be sure that their classmates had learned the material. These ranged from quiz bowls, Jeopardy-type games, worksheets, puzzles, and quizzes. This method of instruction was much more successful, taking up less class time overall and leaving students feeling comfortable with the workload.

In the third year, of the project I transferred from teaching 8th grade earth science to teaching 7th grade life and environmental science. I was allowed to take the composting project with me to the new grade. This necessitated several changes to the instructional program. At this point the 7th graders had participated the year before in
separating their food into compostable and noncompostable bins in the cafeteria and as 5th graders had had 8th graders come into their classrooms to educate them about composting. Therefore, they had more knowledge than the students in previous years. Being younger, however, meant that materials had to be found at a lower reading level for some of the students. The change to life and environmental science also expanded the possibilities of topics to be included as part of the composting study, such as the role of bacteria, food chains, decomposers, etc. While this was included somewhat in the instructional program the 2007-08 school year, I am planning to do much more in the future. This issue will be addressed further in chapter five.

**Subproblem four**

The fourth subproblem was to build the compost bins and to educate the staff and student body about the composting system.

During their research the students quickly determined that it was going to be cheaper to build bins rather than purchase prefabricated models. The students considered many factors: cost, durability, mobility in case we needed to move them to a new site, size, and appearance. Ultimately, one of the most important determining factors in the style of bin chosen by the students was that they wanted to learn building techniques using tools.

Preparing for the construction project took a tremendous amount of work, more than I had anticipated. Tasks that had to be done included determining the amounts of materials needed, going to local businesses to purchase them, coordinating with the high
school industrial arts teacher to do the precutting of wood and training his students to
work with the 8th graders, contacting parent volunteers, finding enough classroom space
for all the groups to build their bins at the same time, preparing step-by-step instructions
for supervising adults, preparing instruction sheets for students on how to build the bins,
teaching students to use drills and other tools, and having supplies organized and easily
available on the construction day.

The actual construction day was very successful. In fact, the students completed
the bin construction faster than we had expected and a last-minute activity of watching an
environmental movie had to be added in to fill the time that had been allowed. While the
wood and wire bins they chose were not the cheapest or the most durable option, the
process of building them was an outstanding learning experience for the students and the
bins have held up well over the three years the project has been in progress.

Plans for building the wood and wire compost bin they chose along with
instructions for building other styles of bins considered by the students are included in
Appendix Three

Once the bins were built the 8th graders had to educate the entire school about
how the composting system would work. Establishing a schedule for the 8th grade groups
to visit all of the classrooms proved to be somewhat complicated. Originally it was
planned that students would present to the other classrooms during their science class
with me. However, it was not always possible to schedule presentations with the 4th – 7th
grade classrooms during our science period. Consequently, students had to obtain
permission from other 8th grade teachers to leave their classes to do their presentations. Fortunately the other grade staff was extremely cooperative in letting students leave their classes for this purpose.

Developing the presentations went fairly smoothly. Using the information that they had obtained while initially learning about composting, the 8th grade groups developed presentations for the grade level to which they had been assigned. They first practiced by doing the presentations for their science classes who critiqued them and provided suggestions for improvement. Supervising the students during their presentations also proved to be a challenge. I had initially hoped that either I or the special education teacher or aide who worked with my students would be able to accompany each group when they made their presentation. Scheduling this turned out to be impossible. While every group was able to meet with me to organize just before making their presentations, some of the groups had to make their presentations without a staff member involved in the program accompanying them. To avoid any possible problems, I chose groups that had done the best presentations in the practice round to present during these “solo” time slots. I also chose classroom teachers that I knew would be willing to cooperate on an extra level by critiquing the presentations and getting their assessments back to me afterwards. I met with these teachers ahead of time to give them extra information on what to expect and how to assess the presentations. During the third year of presentations scheduling and supervision was much easier as we only needed to present to five fourth grade classrooms.
While the students were very nervous about going into other classrooms, they did an excellent job and the response from the 4th through 7th grade teachers and students following the presentations was very positive. The students listened closely to the presentations, asked questions, and volunteered to participate. Teachers emailed and stopped by to comment on the excellent quality of the presentations done by my students. Comments from the teachers included, “Thanks for having the students present to our 4th graders. They did a great job! My kids really enjoyed it!” and “They did a GREAT job in my room.” They commented that the younger students enjoyed having the older students come in to work with them. The older students benefited in many ways from presenting to them. In a survey completed by the 7th graders in May 2008, 68% of the students said that they thought their presentations to the fourth graders went pretty well, while 26% said they were very successful. 72% felt that the fourth graders liked their presentations.

Subproblem five

The fifth subproblem is to implement and maintain the composting program.

There were many unexpected challenges met along the way while implementing and maintaining this program. The custodians had always set up the cafeteria for lunch and offered to set up our composting system as well, thus solving the problem of having students leave class to perform this task each day.

Scheduling workers turned out to be much more of a problem than I had anticipated. Students in my study hall volunteered to make daily schedule charts for
students to sign up to work. Initially students signed up for composting jobs during first hour while we took attendance. Students wrote their work times in their agendas as a reminder. The first two students were supposed to come to my room to get the schedule and take it with them to the cafeteria when they went up to work. Unfortunately, they often forgot to do this. If I noticed then I took the schedule up to the cafeteria. If I did not notice, since no schedule was in the cafeteria, students did not know who was supposed to replace them if the next work crew did not show up. The first year we scheduled workers I did not have a science class immediately before lunch. Students were in electives and were scattered in five different classes. If the work chart was not in the cafeteria it was impossible to find all the workers to remind them of their time slots. To remedy this the students decided that as soon as the scheduling was done, someone would take it to the cafeteria immediately. This resulted in someone missing a few minutes of class, but solved the problem. My schedule changed the second year we scheduled workers and the students quickly found that this worked to our advantage. After trying the original sign-up method for a few months, a student suggested that we sign up during third hour right before they went to lunch. The theory was students would be less likely to forget when they were supposed to work. As students came into class they signed up and then took their seats. This created two problems: it caused us to start class a few minutes late and students who were coming from further away in the building were always left signing up last, never getting the slots they wanted. However, the rate of workers forgetting to show up also was reduced dramatically. Our final solution was
that we kept the sign-up time during the period before lunch, but moved the sign-up time to the last five minutes of class allowing all of the students to sign up at once and evenly rotate work slots.

Most of the students had lunch, recess, and study hall during the work slots so they were not missing class. With five sections of science, it worked out that each student worked for ten minutes one day per week. Most students preferred to work during study hall so they did not have to miss any lunch or recess time, so we rotated these positions around in order to let everyone periodically have the choice time slots. However, some students were in band during study hall and the band director understandably found it disruptive to have students leaving in the middle of class to compost. The original solution was that band students only composted during their recess or lunch period. The band students soon complained that it wasn’t fair that they always had to miss part of their only free time in the day while the other students got to actually “get out of study hall and miss part of class to work.” I spoke to the band director (who was very cooperative) who agreed to let his students do their composting jobs either at the very beginning or the very end of the band period twice a month.

There were also problems with students not showing up or staying in the cafeteria longer than they were supposed to. Study hall teachers were legitimately concerned that students were missing class when they weren’t supposed to and had no idea when the students were supposed to be working. And indeed, while most students were honest, there were a few who tried to take advantage of the situation by skipping part of class. To
solve this problem I initially emailed the schedule daily to the study hall teachers during my planning time. However, when my planning time was switched to the afternoon, there was no time for me to do this before lunch. Our teaching team met and decided that students would write their work time in a specific spot of their agendas in ink and would show them to me for verification as they left the room. This served as their pass to miss part of study hall. While at first I thought this would create a nuisance for me, it actually turned out to work quite well as it gave me the opportunity not only to check their composting times, but also to make sure they had written their science assignment down as well.

Middle school students can be forgetful so there was never a week that someone did not forget to show up for their work time. This resulted in the workers on duty having to stay extra time until the following crew arrived. During recess and lunch it was relatively easy to find the missing workers, but during study hall it was not. The students developed two solutions for this problem. The first was to add a spot on the schedule for students to put the initials of their study hall teacher so that they would know where to find them. The second was to create a penalty that “fit the crime” for late workers. If they were late and someone had to work extra time to cover their shift, the next week they had to work their own shift as well as the shift of the person who had covered for them in their absence. While forgetfulness still occurred, these student solutions helped reduce the problem.

Even without composting, the time in which students empty their trays tends to be
somewhat chaotic. While the students who get their lunches first tend to empty them earlier, there are usually anywhere from 40 to 50 students who all line up at once to empty their trays, and they are in a hurry to either get out to recess or to leave to get to class without being tardy. Add taking the time to now separate trash, particularly in the first few weeks when it was new and they didn’t know what they were doing, and the stage was set for a real traffic jam. Fortunately, I had watched the cafeteria prior to starting the program and arranged to be in there the first week to help with the traffic flow. A number of my students volunteered to work extra shifts during the first two weeks. We walked amongst the tables and as students finished eating we asked them to empty their trays then rather than waiting until the last minute. We explained that it would get them out of the cafeteria more quickly. The first few days some students were reluctant to cooperate, but as they experienced the longer wait in line they became more willing to empty their trays as soon as they were done eating. After the first two weeks the student body got used to the program and it was no longer necessary to have students serve on what they called “patrol duty.”

The rush to get out of the cafeteria quickly also created problems in getting students to slow down and separate their trash. I quickly understood why the kitchen supervisor was concerned about her missing silverware. Students had a tendency to dump the entire contents of their trays into the garbage, even though they were supposed to be separating unopened milk cartons, silverware, food, and remaining garbage. During their classroom presentations my students had explained which foods could be composted
and which could not. They also had members of their audience act out emptying their
trays, adding the step of separating the compostable food from the rest of their food
waste. Up in the cafeteria this was easier said than done. On the first day of composting
in the cafeteria the student workers immediately discovered that most people did not
remember which foods to compost and which to throw in the garbage. They also found
that those students in a particular hurry did not want to wait and find out. Needless to
say, the food was not all sorted properly that day. The eighth graders were very
frustrated, but found a solution. As each new group arrived in the cafeteria for lunch, one
of the workers on duty would blow a whistle to get their attention and then announce
which foods were to be composted that day. After a few weeks of doing this, they
decided to switch over to posting a sign listing the compostable foods of the day. After
the first two months of composting we found that this was no longer necessary. Students
were throwing away food in the proper receptacles without even looking at the signs.

Taking the compostable garbage outside turned out to be quite simple. The
custodians supplied us with a rubber garbage can on wheels so the students merely had to
wheel it out the door, across the blacktop, and over to the bins. Pulling it on the grass
was a bit tricky, but not too difficult. After experimenting with different methods they
found it was most efficient to tip the entire garbage can over onto the compost pile and
have one student pull the can off while the other held onto the bag. They then lifted up
the bottom of the bag emptying the contents onto the pile. A shovel was kept out to
scoop up any food that didn’t make it onto the pile. They next took leaves and/or rotted
hay to cover up the food. On the way back into the school they threw the garbage bag into the dumpster. After dropping off the garbage can in the kitchen, they washed their hands and returned to class. There were those students who were sloppy about doing this, but the students policed themselves quite well. If a crew was sloppy one day, the crew working the following day noticed this, let me know, and they were sent back out to clean up.

Once a month each science class went outside to turn the compost. Students immediately discovered the importance of properly mixing the “green” nitrogen containing food waste with the “brown” carbon loaded leaves and rotted hay. Improperly mixed compost has a terrible odor. Given the volume of food we were composting, it tended to have a somewhat offensive smell even when mixed properly. The students found several solutions for this problem. They sucked on strong peppermint or spearmint candy, chewed gum, put a dab of peppermint or spearmint extract under their nose, or wore bandanas. Usually after five or ten minutes of work they got used to the smell and it no longer bothered them.

In addition to the smell we encountered several other problems with turning the compost. The first was that pitchforks worked much better than shovels. Unfortunately, we only had two pitchforks and everyone else had shovels. This was solved by adding pitchforks to my science budget so that we had a dozen of them the following year.

Another problem arose from tracking the garbage on our shoes into the building, creating a mess on the floor and bringing in the garbage smell. We first tried wiping our
feet more carefully and using brushes to get out the extra waste. This was both messy and ineffective. One day as we were getting our equipment out of the storage shed a student spotted the boots used for our stream study and asked, "Why can’t we wear those when we compost? We can just hose them off when we’re done!" While it took about ten extra minutes to do this, it was time well spent and solved the problem.

Throwing the wrong things into the compost garbage was a problem throughout the project, and continued to be as of May 2008. While it has been significantly reduced, it still occurs. The student workers were quickly armed with tongs to retrieve items such as milk cartons and napkins, but many of them find this part of the job "just too nasty" and let the wrong trash slip through. The problem was what to do about the noncompostable items such as silverware, plastic fruit cups, napkins, milk cartons, etc. that slipped past the workers and made their way into the pile. Picking these out with the pitchforks and shovels did not always work, and pulling them out by hand was very unpleasant, even after we purchased work gloves to wear while composting. During the first year of turning the piles we did try to remove all of this garbage although some of it went unnoticed and remained in the mix. This actually turned out to be the clue that lead to our solution. After letting the compost piles sit all summer, my new class in the fall set upon the task of emptying the bins and screening the compost. During this process they came across milk cartons, plastic, silverware, etc. At this point, however, these items were in compost that had become mostly soil as opposed to lying in rotting food. We also noticed that there were no napkins. They had decomposed with the food. It was
immediately decided that while we would continue to remove as much garbage from the compost as possible using shovels and pitchforks, we would no longer pull out these items by hand during the school year. Rather, we would wait until the fall when nature had done a more complete job decomposing the food and making the garbage retrieval much less unpleasant.

One other major problem was location. As it turned out after the first year, our original location was not an ideal spot after all. While being near my classroom made daily supervision easier for me, it was near another teacher’s windows and she did not like looking out at compost bins. It also created an obstruction to one of the Frisbee golf goals. Instead of calling me at home to solve this problem, the summer work crew moved all of the bins to an area near the woods approximately two hundred yards from the school. I came in early August to check the bins only to find them all gone. After searching the building for someone who knew what had happened, I learned the bins’ new location, which I immediately realized was going to be impossible to use. It would be virtually impossible for students to transfer the garbage from the kitchen to a spot that far away. I met with the principal and we found a new site behind the storage shed where our equipment was stored. Our first project in the fall turned out not to be just emptying the bins and screening the contents, but moving it all back to the new site. We first attempted doing this with five gallon pails, but quickly discovered that this method was going to take a very long time and be a tremendous amount of work. The solution was to bring in my pickup truck, shovel the contents into the bed, drive it across the field to the
new site, and have the students empty it there. Once the bins and compost were moved, the new site turned out to work as well, if not better than the original site. It was closer to the equipment and also did not require pulling the garbage can across much grassy area.

Weather created a variety of problems. If it was raining students got wet taking the compost out to the bins. Rain ponchos used for science class took care of that situation. We have not been able to get our compost hot enough to avoid freezing in the winter. Once the freeze occurs we have found that we can continue our normal routine with the exception of turning it at the end of each month. As the weather warms, the compost thaws and continues decomposing and we can resume turning the piles. Snow piled up in front of the bins so we found it necessary to shovel paths after each snowfall. However, during the 2007-08 school year we were unable to keep up with the heavy and frequent snowfalls experienced in our county, and eventually stopped composting altogether from the last week in January until the second week of March. Interestingly enough, the students had done such a good job teaching the students to compost in the cafeteria, we actually had to train the student body not to compost at the beginning of this hiatus!

**Subproblem six**

The sixth subproblem is to determine the impact of the composting program on food waste reduction and disposal at Parkside School.

It was the original goal of this project to weigh the amount of composted food waste every day. This did not happen for a number of reasons. In order to take the food
waste outside to the compost bins students already were arriving five to ten minutes late
to their fifth hour class. Taking time to weigh the compost would have made them even
later and I did not want to further impose on teachers who were cooperating with the
program. Weighing the compost was also more difficult than we had anticipated. We
attempted holding just the garbage bag full or food waste and holding the entire garbage
bin. Neither method was very successful as students had trouble holding the bag while at
the same time standing on the scale. We did not have a scale that would successfully hold
either the garbage bin or just the bag without someone holding it. After attempting a
variety of methods, we found that it was easiest and most efficient to weigh the food
waste halfway through the lunch hour, put that food waste aside, and then weigh the rest
of the food waste at the end of the hour. This method was still time consuming and
doubled the number of garbage bags used. Therefore we decided to weigh the food waste
for one month at the end of the school year. We felt that at this time students would have
fully mastered throwing away their food properly and it would give the best reflection of
how much food was actually being composted.

Students weighed the compostable food waste during the last two weeks of April
and the first two weeks of May (see Appendix I for complete data). The daily average
weight of food composted was 44.3 pounds. Food was composted for 122 days resulting
in a total of 5,404 pounds of food composted during the 2007-08 school y
CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

Getting Started

This project has shown that composting on a school-wide scale can be done very effectively. It does take planning and organization, particularly in the initial stages, but once the program is implemented it is relatively simple to maintain and operate. While the initial cost of our program was approximately $1,000 to purchase the materials to build the compost bins, this could have been done much more cheaply by using wooden pallets that are usually available at no cost from a variety of businesses or simply by using a pile method. It is also necessary to have shovels and pitchforks for turning the compost. If you plan to take the step of screening the compost then it will be necessary to build or buy equipment to do this. One advantage of the type of bins my students chose was that a panel could be taken from the bin to use for this purpose. Although not essential, having work gloves and galoshes made the job less messy and eliminated the problem of tracking in garbage.

Including the entire staff in the planning of the project was very important in the success of the program. The kitchen staff must support a composting program for it to be successful. While it is not terribly invasive, the program does directly impact kitchen operations regarding waste disposal. In most cases it is also going to be essential to have the cooperation of the custodial staff. In our district the custodians are the people who set up the garbage cans in the cafeteria and take the waste that does not go down the garbage
disposal outside. If students forget to show up to duty and the garbage bin is left sitting in the cafeteria the responsibility for emptying it falls on the custodial staff. Teachers are going to be impacted as well. In the first year the entire student body is going to have to be taught the procedure for disposing their food waste. We found it most effective to send the students running the program into the other classrooms to do this, which necessitated the other teachers giving up their own instructional time for our presentations. During the year in which a healthy snack was being served in the classrooms, it was necessary for those teachers to allow their students to compost their snacks in the bucket in their room. This may not sound like a problem, but there were several teachers who did not want these buckets sitting in their rooms because they were afraid it would create a bad smell and attract insects and rodents. In order to get them to cooperate with us we had to assure them (and then make sure we followed through on our promise every day) that we would remove the buckets from their rooms as soon as the students were finished disposing of their snack waste. From the earliest planning stages and throughout the entire project, custodians, kitchen staff, and teachers have always been consulted for suggestions, concerns, and advice. I periodically send emails to the entire staff thanking them for their cooperation and reminding them to let me know if they had any problems with any aspect of the program. At the end of each year I’ve given a box of doughnuts to the kitchen and custodial staff as a thank you for their assistance.
Scheduling

Depending on the structure of the school day, scheduling may be become a very challenging issue in establishing the composting program. In our case, most of my students had recess, lunch, and study hall during the daily composting time. Even then, it was necessary to make sure that the study hall teachers knew when their students needed to work in the cafeteria. Many of the students had choir, band, speech, and special group activities scheduled once or twice a week during this time and they had to be reminded to sign up to work on composting during a time that did not overlap those activities. Band students did not have any study hall time and was mentioned earlier, a plan had to be developed to work around that issue. If our schedule were to change so that students had a class rather than a study hall right after lunch it would be necessary for some students to miss about 15 minutes of class time once a week. While this is certainly possible as we already do this for band, choir, academic intervention, and speech lessons, it would be one more interruption in what has become an increasingly fragmented day. With the pressures created by No Child Left Behind and the resulting testing, every teacher is feeling the pressure to cover the state and national standards. Finding time within science class to learn about composting, develop presentations, solve problems when they arose, and go out and turn the compost every month was a challenge. In order to do this I found it necessary to infuse these subjects into my existing curriculum. As an earth science teacher we made it a part of our soil and water studies. As a life science teacher we infused it into our study of the impact of water quality on local pond and stream life, and
next year will expand it to other areas. I believe that it would be possible to infuse a composting project into virtually any subject area, but I do think that this step would be necessary in order to have the time to implement the program.

**Student Ownership**

One key to the success of our composting program was that from the beginning, the students felt that it was *their* project. Parkside School strongly encourages teachers to involve their students in community service projects and the students are eager to do something that they see as worthwhile rather than something that is viewed as contrived (in our case a good example would be picking up litter). While I suggested the project, it was the students who determined which bins to build, where to put them, how to collect the food waste in the cafeteria, and how to solve problems as they arose. Students wrote letters to parents and local businesses asking for their support. They answered the phone and collected the information to schedule lawn raking for Make a Difference Day. They wrote the articles and took the pictures for the newspaper article explaining our project. 78% of the students said that they would participate in this program even if they were not required to, and many of them asked if they could continue to participate in composting when they were in 8th grade. It is my firm belief that this statistic is that high specifically because the students were the ones who developed and executed the composting program.

**Benefits Beyond Composting**

While the original intent of this project was to implement a school-wide
composting program, it accomplished that and much more. Almost immediately the project helped bring together many members of the community. Raking yards throughout the county on Make a Difference Day was planned as a means to collect leaves for our carbon supply and involve students in community service. More importantly, it resulted in uniting many people in a common cause. Parents, and in some cases, whole families, worked with their children to rake yards. Senior citizens and disabled community members saw a side of 8th graders that for many of them was new and refreshingly positive. The community was impressed to see that both students and staff were willing to give up a Saturday to “make a difference.” We received thank you notes and students reported that they received compliments, even being recognized from the pulpit during some church services. I received a number of positive comments throughout the year from a variety of community members. Store owners and community members worked with students to calculate and purchase the supplies needed to build the compost bins. Many of them donated materials and equipment. Teachers from Parkside and the high school, administrators, parents, and high school students worked together to build the compost bins. Students met with the cafeteria and custodial staff to plan parts of the project. They met with teachers to schedule presentations. Students went into classrooms to teach the rest of the student body about the project. While 48% of the students felt nervous and 17% were embarrassed about going into the classrooms to make their presentations, 49% of them said afterwards that they felt proud and 60% said that they were doing something worthwhile. 55% said that they had been nervous before the
presentation but felt good about it once it was over. 72% felt that the younger students had enjoyed the presentations. (Appendix IV).

The composting project let students be decision makers. They planned the program and found solutions to problems that arose. During the first year of the program, the students were extremely disappointed when they were told that they were not going to be able to have the student body compost the food in the cafeteria. But after the initial shock, instead of giving up they immediately asked, “Isn’t there something we can do?” and found a solution. When crew members did not show up to work, the students found solutions to remind workers to get there and set consequences for future offenses. Students experimented with different methods for signing up for and posting work schedules.

This project allowed middle school students to become leaders. 67% of them said that they liked getting to be in charge of the program for the whole school. They learned that being in charge was fun, but that it was also work. One student wrote “I learned that there is a lot of responsibility to do this job,” while another said, “It was very hard telling people where the food goes.” Occasional frustration was exemplified by the comment, “Nobody likes to cooperate” and “I learned that you can’t make some people care even when they should.” They developed strategies for getting people to cooperate with them in the cafeteria. Comments included, “I have to be a little more patient,” “People don’t listen very well so you have to be nice about it,” and “That if you want people to compost you have to take them away and explain it to them.” In answer to what they learned, one
student simply wrote “teamwork.”

In a community where the majority of students come from low income homes and many of them struggle academically, this program instilled a sense of pride and worth. Many of our students do not see much hope in their future. They feel powerless as a result of their circumstances. This project empowered them, giving them the realization that they could accomplish something big. 81% of the students said that they felt they were doing something worthwhile (Appendix IV). Students repeatedly said that it felt good to make a difference and they realized that they could change things. They wrote about being proud of what they had accomplished and the sense of empowerment in being able to accomplish something of this magnitude. This program made students much more aware not only of how the environment works, but of their role in maintaining a healthy planet. 91% of the students said that this project either had some or a lot of effect on the environment. Students began to internalize their locus of control. They made comments such as, “I can have pride in saving the earth and landfills,” “I feel like if I do this more it could save the environment,” “We know we can handle it and help,” and “I learned that we are causing something to happen to this earth and we can fix it.”

Rather than discussing environmental issues in the abstract, the composting project was something real and tangible. After visiting the water treatment plant, students made comments about being careful about what they put down their drains at home. Students began composting at home. They told me they were more careful about
what they threw away. One student wrote, "I feel like an environmentalist."

**Extensions**

There are a number of extensions that are planned after the completion of the part of this program associated with my Master's Degree in 2008. The Cornell University Waste Management website has many activities which can be infused into a life science curriculum. I hope to do a study of invertebrates and microorganisms in a compost pile. The lab technician at our water treatment plant has offered to provide us with bacteria samples to examine. Because this is an agricultural community, the compost will serve as a link to studying biowaste management with particularly emphasis on farm waste.

After three years of doing this program I have been asked how long I plan to continue it. I always answer, "Forever." Now that the students have been participating in separating their cafeteria garbage for several years, training them to run the program is relatively simple. Students now view separating their cafeteria garbage as routine and it is only the fourth graders who are new to our building each year that need any instruction in what to do. The program now operates in a way that will be very easy for another teacher to step in and take it over when I no longer teach here. Because the students think it is an important venture, they will want to keep it going. I had sixth graders asking in the spring, "Do we get to run the composting project with you next year?"

While I view it as important that this project has accomplished preventing over two and a half tons of food waste from going to a landfill or down the garbage disposal and on to the water treatment plant, this project has accomplished much more than that.
It has developed leadership skills, enhanced self-esteem and student pride, created environmental awareness, and empowered students to know that they can make a difference. The value of this project can be summed up in one of my student’s answers to the question, “What is the most important thing you’ve learned from participating in this project?” The answer?

“Everything matters.”

**Research Recommendations**

If this program were to be repeated there are a number of changes in research technique that I would recommend. While I did informally collect anecdotal data prior to beginning the project, it would have been more beneficial to formally collect pre-project information to compare to the data that I collected at the end. Pre-project questions to be asked would include: how many students throughout the school can define composting, how many students and staff members currently compost at home, how many of them feel they can make an impact on improving the environment, how many of them are currently involved in activities to help the environment. While post-project data was collected from the students running the project, I did not do a post-project survey of either the staff or of the rest of the student body. Did they learn from the project? Did it change their behaviors? Would they like to see the project continued? This would be useful information. A pre and post survey of parents also would have been useful. Again, while I have anecdotal data, formal data would have been a better indicator. Did students talk to the parents about composting or other environmental issues before the
project began? Did this increase throughout the school year as the students participated in the program? Did students ask parents to start composting or recycling, and in the event that the family already was doing this, did the students take on a more active role at home as they learned about it at school?

While this project includes some components of issue investigation and action, it does essentially follow a case study approach. The project was not chosen by the students, but rather was presented to them by the teacher. Students did investigate the issue and implement an action plan, but on a more limited basis than would it would be in a full issue investigation and action program. Ramsey and Hungerford (2001) have found that while students do learn a great deal from case study approaches, the incidence of the project actually making changes in long-term behavior is not as great. Therefore, another area of research might include surveying the students several years after the project ended to see if they had continued to maintain an interest in environmental issues and action.

One of the initial questions of the kitchen supervisor was to see if composting would reduce the amount of food students threw away. We did not address this in the project. In the future it would be an excellent component to include and would be easily accomplished by weighing the food thrown out prior to the implementation of the project, and then compare that to the amount of food waste that was being produced at the end of a year of composting.

Finally, there was no control group for this project. Although I did consider doing this, ultimately I chose not to. Part of my reasoning was based on logistics. It would
have been virtually impossible to have half the students in each grade compost while the other half did not. I also considered having only half of my students participate in implementing the composting project. Again, I chose not to do this. Part of my reasoning was again based on logistics. Having a control group would have necessitated writing two different lesson plans for my classes, one for the composters and one for the control group. Developing the composting program was in itself very time consuming, and I simply did not have time to write a separate set of plans for the control group. More importantly, I wanted to include all of the students. It would have been very difficult for me to say to some students, “Yes, you get to do the project” while turning down others who wanted to participate, essentially leaving them out of what they viewed as doing something special. Middle school students tend to take things personally, and excluding some of them could have impacted how they felt about both my class and me. Creating a control group also would have created political problems as some parents would have complained that their children did or did not get to participate in the project. Consequently, I chose in the end to sacrifice the collection of certain data in exchange for being able to involved the entire school in the project.
References Cited


http://www.gdrc.org/uem/ee/tbilisi.html


APPENDIX I

WEIGHT OF FOOD COLLECTED

APRIL

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**MAY**

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<tr>
<td>44 lbs</td>
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<td>46 lbs</td>
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Total collected in 20 days: 886 lbs. or 44.3 lbs. per day

Compost was collected 122 days

Total collected: 5,404.6 lb
APPENDIX II

TRAFFIC FLOW FOR
COMPOSTING IN THE CAFETERIA

KITCHEN COUNTER IN WINDOW AREA

Meat, bones, big pieces of cheese still go here

silverware

Worker #2

COMPOST

Food scraps that don’t go in the (food you can compost)

Worker #1

Milk containers, napkins

garbage

garbage

Unopened milk cartons

START HER
APPENDIX III

WORKERS SCHEDULE POSTER

CAFETERIA SCHEDULE FOR
MONDAY, OCT. 5, DAY 3

<table>
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11:10 Take work schedule to cafeteria with you

12:40 Take compost outside and return garbage can
APPENDIX IV

WHAT I’VE LEARNED ABOUT COMPOSTING THIS YEAR

SURVEY RESULTS

The purpose of this survey is to find out what you’ve learned about composting this year. IT IS NOT A TEST AND YOU DO NOT HAVE TO PUT YOUR NAME ON HERE. It is just a way for me to help improve the program in the future.

1. How much did you know about composting at the beginning of the school year?
   - 14% nothing
   - 49% had heard of it but didn’t know much about it
   - 15% I had heard of it and had a very good idea of what it was
   - 10% I had a strong understanding of what composting was

2. How did knowing that you were going to teach the fourth graders about composting affect your attitude in learning about composting yourself?
   - 14% not at all
   - 54% a little bit
   - 52% a lot

3. Do you think your composting presentation to the fourth graders was successful?
   - 0% no
   - 6% a little
   - 68% it went pretty well
   - 26% it was very successful

4. Check any of the things that applied to how you felt about the presentations to the fourth graders:
   - 48% nervous
   - 49% proud
   - 17% embarrassed
   - 60% like I was doing something worthwhile
   - 5% like I was doing something that was a waste of time
   - 72% the fourth graders seemed to like it
   - 15% the fourth graders seemed bored or disinterested
   - 42% I liked doing it
   - 55% I was nervous, but once it was over I felt good about it
   - 5% I did not like doing the presentations

5. Working with the compost is smelly and messy. Was it worth putting up with the
smell and the mess in order to compost the food instead of sending it to the landfill or the water treatment plant?

87% yes because: comments follow survey results  
13% no because comments follow survey results

6. How did you feel about getting to run this program?  
Check any of the things that apply to you.  
67% I liked getting to be in charge of the program for the whole school  
10% I did not like getting to be in charge of the program for the whole school  
81% I think I was doing something helpful  
3% I do not think I was doing something helpful  
63% I liked getting out of study hall to compost  
15% I did not like getting out of study hall to compost  
51% I did not mind having to miss lunch or recess time to compost  
31% I did not like having to miss lunch or recess time to compost  
40% I liked getting to work with the compost outside

7. Would you help with the composting program if you did not have to? Choose one statement to complete.  
78% I would help even if I didn’t have to because ____________________________  
(comments follow survey results)  
22% I would not help if I didn’t have to because ____________________________  
(comments follow survey results)

8. What is the most important thing you’ve learned this year from participating in the composting project? ____________________________  
A list of comments for this question follows the survey results

9. How much of an impact do you think this project has on the environment?  
1% none  
8% a little  
30% some  
61% a lot

10. Has this project changed how you feel you can take a part in taking care of the environment?  
85% Yes, because ____________________________ (comments follow survey results)  
15% No, because ____________________________ (comments follow survey results)
POSITIVE COMMENTS FROM QUESTION NUMBER 5
(was the composting project worthwhile)

It helps our environment for future generations (this or a very similar statement was repeated 12 times)
Then it will be used for growing food
You have to take it and not be wasteful
So we don’t send it to the water treatment plant and it would help us to help the environment
Some water got clean because of it
It saves junk from going to the dump or water treatment plant
It was doing a good thing to do
I knew I was doing something good
That was a good thing to do
You are doing something good for the earth
It won’t be put in landfills and we could use it for fertilizing
It makes very rich soil to grow pretty flowers
It helps beautiful plants grow and less garbage
After composting I learned more about saving the environment
Then there would be less pollution to the air and the landfill
I like the smell
I love the smell
It is worth the smell and mess to do something good for the environment
Just by doing these little things we help our earth greatly
It would help the earth where we live in and it would help us
It helps us with water and it takes less time for the people who clean the water
It would take care of the water and animals can get clean water
It saves the earth
It helps the earth
It helps out the world
We need to save the earth!
It helps save our planet in the long run
It helps our planet
It was worthwhile and it is not polluting the air
The our water would not be dirty and the air is cleaner
Otherwise the landfills will overflow
Landfills are filling up fast and it makes a difference
We saved tons of stuff and the landfill will be proud of us
It saves energy and space in landfills
We save stuff from going to a landfill and being wasted
That way we won’t have garbage everywhere
It’s better than to have it on the landfills
It would have hurt the earth in a landfill
You are making the compost into very good soil and you save space in the landfill
The landfills are just filling up
We can reuse it for our soil
It’s a way better use of the garbage than sending it to the landfill where it’s just going to pile up
It helps us save more room and help the area
It didn’t pollute the earth
It helps keep the earth more clean
It helped our planet
We’re helping the earth
It can help the environment and it was fun because you can get out of study hall
It is worthwhile. I want to help our earth
I don’t want our world to become destroyed because of wasting things or not recycling
You change things around you and you make a big difference to the environment
It helped people understand that even just a little bit of change helps
We save the environment and help us live longer on this planet
Now I feel good that I did something helpful
After we did it I felt good because we were saving the planet
It is helping the environment and we learned something worthwhile
While I was helping out with it I know it was helping the environment
It was a lot of fun. It’s cool to help the environment
I like to do something for our community
So we don’t have food floating in the water
Sometimes it was funny and very entertaining although it was gross
I like to compost and now I’m doing it at home
I’ve always wanted to help and now I’ve helped a lot more

NEGATIVE COMMENTS FROM QUESTION NUMBER 5
(was the composting project worthwhile)

I don’t really care about it
It was gross and I didn’t like doing it outside. I don’t mind standing in the cafeteria.
It really smelled
It was gross and I had to reach into the garbage and pick something out
I don’t see how it helped at all
Because we could have just sent it to the landfill
It was a waste of time
Nobody cares about it
I don’t care
After every compost was over I didn’t feel good
It smelled really bad and really disgusting

POSITIVE COMMENTS FROM QUESTION NUMBER 6
(I would help if I didn’t have to)

It is fun to get a little more time to hang out with friends
It wasn’t that hard
I would feel needed
It was fun
It is good to help the environment and to save the fishies
It is very beneficial to our environment
It would be helping the environment
It is for the environment
I think it would be fun and I would learn
It’s good for our environment
It’s fun
It is fun and helps nature and the environment
It is a good deed and you could get a good consequence
I think that it would be nice to help out with the environment
I could get out of recess and it was nice but the outside part
We would be doing something good for our earth
It helps us and the animals
It helps the world and you would have a cleaner life
It saves the earth
It’s fun
It gets me out of study hall
We need to save the earth!!!!!
I can help animals by not making landfills
It is good for the earth
It is kinda cool being able to leave class
It is helpful
It will help the environment
It is fun
I like to do things that will save the earth
I would make a difference in the environment
Composting is important because the landfills are overflowing fast
It would make the environment better by recycling the food
I can have pride in saving the earth and landfills
I would want to be part of something good
I care about the earth and don’t want it to go to waste
It was fun
I think that it is important because it saved lots of stuff
It helps the world become rich with flowers
I think the world needs a change for the better
It would be something good to do
It would still be a help and I would be proud of myself
It is important to recycle
I would want to save the landfills
It is better for the environment
I want to make a difference
It’s kinda fun and you can save the earth
It will be fun and can see everybody else like other grades
It’s only ten minutes and helpful
After doing it I know it was a cool experience
I am helping the environment
It is a very good matter
I had fun doing this
I would like getting something to do
I probably wouldn’t have anything else to do and it wouldn’t hurt
It is fun and helps the environment
I want to do something for the environment
It is very nice to help out
I would be able to miss study hall and I have the time
It helps the earth by composting so I would do that to help it
It was a lot of fun
It’s a good program to do
Then I would have something to do when I didn’t have any homework
If I can do it with a friend it can be fun
I would be doing a good thing and that makes me feel good
I’m helping out and I want to do something good that I would feel proud of
NEGATIVE COMMENTS FROM QUESTION NUMBER 6
(I would not help if I didn’t have to)

It’s nasty
I always have a lot of homework to do and things to take care of
I don’t want to
I don’t like the smell and other things like that
I have better things to do even though composting is pretty important
I wouldn’t have wasted my time learning about it so I wouldn’t have to listen to things about it
Because I hate the smell and it looks nasty
It’s smelly and it stinks
Well I didn’t know much about it. I just thought it was gross. I didn’t know how much it helped us
I think it is a waste of time
The younger kids should do what we had to
I miss recess and study hall
I’d rather do something else
It is a waste of time
It takes your time to do other work
I think that if we had signs they should know where to put them
I don’t want to mess with smelly rotten food
I don’t like composting

HAS THIS PROJECT CHANGED HOW YOU FEEL YOU CAN TAKE A PART IN TAKING CARE OF THE ENVIRONMENT?

YES, BECAUSE . . .

It is hard not to help
Now I know that anything is possible
We need to save what we have because when it’s gone, it’s gone
After doing this I felt really good like we are making a difference
So we don’t have to go in a landfill
I love fishing and if people don’t help the environment I can’t catch fish
Now I know what grows food
I think I have helped to take care of the environment
I think I made a big impact on the environment
It would help our earth be better
Now we don’t use as much food
I think that everyone who can help with the environment the most they can
We will lower the air pollution and make the landfills smaller
Composting is an easy way of putting your part in to help
It’s fun
Not making more landfills
It is fun
Composting saves trees which makes more oxygen
I know I can help
It made me see we throw trash every day
It was a great project
I want to help a lot more
Now I know I can help the environment
I know that I can help the environment
It cleans the air
The landfill will decrease its growing rate
It will stop putting stuff in landfills
It lets me want to do more for the earth
I compost at home
I want to have a nice clean environment
It is very important to keep your environment clean
The compost is very helpful for growing plants and it is simple to do
I am glad that I help the earth
It helps the earth
It showed me what not to do
You can add nutrients to the soil to help other things live
It’s taking care of animals and us and what we eat
It has taught me another way to take care of the environment
Because you helped out the school part in it
It really does make a difference
Now I know that we are living in a planet that is quickly depleting
Because it is important to people and the wilderness
Now I will put food in the right garbage
I learned I have to take care of our earth because we affect the future
Now I know an easy way to grow flowers and other plants
It’s good
You actually work to get stuff done
So then animals can eat
I didn’t know you could do this to help the environment
It is easy to compost and composting does so much
It feels good helping the environment
You make better soil for the environment
I’m helping my world and people around me
I did not know anything about it so I was afraid of doing it. I think it was fun.
I feel like if I do this more it could save the environment
I learned that we are causing something to happen to this earth and we can fix it
Composting is easy and now I know how to do it
I know how to compost a little better
It helps the earth
Every little bit of compost counts and it saves a lot
Knowing I’m helping the earth makes me want to do more
It makes you feel good about doing something good
I want my kids to have a good place to live
I know that there are even things I can do to help
We know we can handle it and help
We got to feel like what it is like to change
Now I’m more of an environmentalist than I was before
It’s taught me that we need to make a difference and I have

HAS THIS PROJECT CHANGED HOW YOU FEEL YOU CAN TAKE A PART IN TAKING CARE OF THE ENVIRONMENT?

NO, BECAUSE . . .

It was boring
I don’t really care about small projects, only big ones
It’s a group of people that changes it
We didn’t
Not everyone is going so it won’t help
I do it at home
We already compost at home
I already helped out the environment
I do this at home
I already know a lot about the environment

WHAT IS THE MOST IMPORTANT THING YOU’VE LEARNED THIS YEAR FROM PARTICIPATING IN THE COMPOSTING PROJECT?

That there is a lot of people that don’t really like the school food
People do not like hot lunch
People don’t listen very well so you have to be nice about it
Nobody likes to cooperate
People don’t always listen well and some are very kind ask you where their food needs to go. It was more work than I thought and kids don’t listen to you when you tell them to do something. It was very hard telling people where the food goes. I learned that a lot of people try to help out a lot more. I have to be a little more patient. I’ve learned people don’t like to listen to what they are told to do. It is sad some of the 8th graders did that. I learned you have to be patient for the people throwing out their trash. I didn’t learn anything about the environment but I learned that you can’t make some people care even when they should. I learned that there is a lot of responsibility to do this job. Teamwork. I learned that it is important to do just the little things for our earth. If we start doing it maybe the world will. It takes a lot of work. That you are helping. It can help if a lot of people do it. I’ve learned this takes care of the environment. That compost is a good fertilizer. That garbage makes soil. That science is awesome. Not to put food in the wrong garbage. That by composting you can make a big change. It’s a good source of protein for the land. That you can’t always do what you want to. Sometimes if you do or don’t like step outside and help out the world including you. That composting can be fun or can be nasty. That I can make a difference by the environment. Always compost. It helps. My most important thing I learned was don’t let go of the garbage can outside or the compost will go all over. That you can’t compost certain things. It helps the air. Composting is good and it helps the environment. That if you add up the food we composted it ends up to be a lot and it is very helpful to the environment. I learned that a whole lot of people don’t eat most of their food. That if you want people to compost you have to take them away and explain it to them.
That some kids felt embarrassed when they had to pick the garbage out of the garbage and some just ignore it.

That in order to get used to the smell of the compost you have to forget that it smells really bad.

You can create fertilizer from composting.

It helps make plants grow and it makes the food useful.

I learned now that meat can’t be composted.

I learned about how to compost.

Things not to throw away.

Helping with the environment.

I learned I can make a difference and hope to keep helping the environment.

It helps protect the environment and make more flowers.

That you really have to pay attention when the kids are scraping because sometimes they mess up.

I learned I can make a difference just by composting.

I learned to compost because I’ve never done it before.

I learned that even a little can make a big difference.

I learned how much waste of food goes to the landfill.

That compost turns into soil that you can use later, too.

Composting is fun and easy so anyone can do it.

That one person could help extremely.

That we produce a lot of garbage.

Where food goes.

That some people do this for fun and to help.

It saves our environment and be used as fertilizer. It won’t go to a landfill.

It helps the environment.

More smelly than I thought.

I learned it was saving money.

You have to put biodegradable food only in the bucket.

That you can’t mix stuff together.

That it helps the environment.

That it smells.

To help the environment and keep fish safe.

We should compost.

That it is important to compost because it helps the earth be less polluted.

We helped the earth by making more soil.

That it is good for the environment.

Taking care of the environment is fun.

I learned that composting is good for the environment.

That to make a better place to live we have to work and put trash away.

That we composted huge amounts of garbage and that we’re helping.
That we are taking care of the environment
That you shouldn’t run with the compost over a bump and it will tip over so you would have to clean up the mess

A lot of people threw away the good stuff!
That something we can do now will help us in the long run
A lot
Composting is making a difference
That people can make a difference by doing so little
I learned that I could help the earth
Everything matters
Every little bit of garbage counts
Because every little bit can change the world
APPENDIX V

COMPOST BIN DESIGNS
Wood and Wire Compost Bin

This portable bin provides a convenient way to compost yard materials. It fits well in small spaces and may be used either as a holding bin or as a portable turning unit. To turn the pile, harvest finished compost or build a new pile, simply undo the latches, pull the sides apart and move it. When turning the pile, transfer the existing composting materials into the empty bin at its new location.

Cost: Less than $100 to build using new materials, less if recycled materials are used.

Capacity: Holds 1 cu yd or 8 to 10 30 gal bags of yard materials

Materials:
- 4 12-foot cedar or non-arSENIC pressure treated 2x4s
- 12 ft ½" hardware cloth, 36" wide
- 100 1½" galvanized No. 8 wood screws
- 4 3" galvanized butt door hinges
- 150 poultry wire staples or power stapler
- 1 10 oz. tube exterior wood adhesive
- 4 large hook and eye gate latches

Tools:
- Hand saw and chisel, radial arm saw with dado blade, circular saw or table saw
- Hammer
- Screwdriver
- Tin snips
- Caulking gun
- Pencil
- Small carpenter's square
- Eye and ear protection

Construction Details:
Cut each 12 foot 2x4 into four 3 foot long pieces.
Cut a ¾" deep and 3 ¼" wide section out of each end for a total of 32 lap cuts.

If using handsaw and chisel, cut ¾" down at the 3¼ inch line at A in diagram to right. Then cut a deep groove into the end of the board at B in the diagram. Place a thick wood chisel in the end of groove and split the wood with a hammer to the 3½" cut.

If using a radial arm saw, circular saw or table saw, set blade depth to ¾" and make multiple passes until the whole 3 ¼" section is removed.

Make four 3-foot square frames from the lap jointed 2x4s. Put enough construction adhesive to fill the gaps when the lap joints are screwed together. Fasten each joint with five screws.
Cut the hardware cloth with tin snips into four 3-foot square sections. Bend the edges of the cloth back over 1" for strength. Lay one onto each of the four frames center and tack each corner with a poultry wire staple. Hammer a staple every 4" along all four edges of the hardware cloth. Try to tension the cloth so it will not sag when filled with compost.

Connect each pair of frames together with two hinges, so the wire is on the inside of the bin, as shown below.

Then put the hook and eye gate latches on the other ends so that the sections latch together.

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Revised 2/2004 by Kathy Powell, SHWEC Adjunct Faculty

For More Information, Contact Your County Extension Agent or SHWEC

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Wooden Pallet Compost Bin

Wooden pallets can make an inexpensive and durable compost bin. The bin can be used as a holding or turning unit. Used pallets are often available from local businesses, manufacturers or landfills.

**Cost:** Less than $30

**Capacity:** Holds 1 cu yd or 8 to 10 30 gal bags of yard materials

**Materials:**
- 4 wooden pallets (5 if want a bottom for bin), sized to make a four-sided container at least 3 feet x 3 feet x 3 feet
- 8 large hook and eye gate latches (boll latches, rope or bailing wire are also options)

**Tools:**
- Level
- Shovel
- Work gloves

**Construction Details:**
1. Level ground at location where pallet bin will sit.

2. Connect four pallets with hooks and eyes or bolt latches to make a four-sided bin at least 3 feet x 3 feet x 3 feet. The bin is then ready to use. To turn the pile, unhook the sides, set up pallets next to existing pile and transfer compost materials to the empty pallet bin. The pallets can also be tied or wired together.

3. (Optional) A fifth pallet may be used as a base to allow more air to get into the pile and to increase the stability of the bin. However, this base pallet will decompose faster than the sides and make turning the bottom of the pile more difficult.

**Revised 2/2004 by Kathy Powell, SHWEC Adjunct Faculty.**

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**SHWEC at** [http://www.uwex.edu/ces/shwec](http://www.uwex.edu/ces/shwec)

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Concrete-Block Compost Bin(s)

Concrete block can be used to make a 1, 2 or 3-bin compost unit. Block bins are durable, require few tools and can handle large amounts of yard materials. Growing vines around the outside of the bin(s) can soften the industrial appearance of this bin. These plans are for a 1 or 3-bin unit. To make a 2-bin unit, leave off section #3 of the 3-bin unit.

Block bins can be used as turning or holding bins. Turning will make compost much faster. There are two ways to use the 3 bin unit as a turning bins. One is to build a compost pile in one end section, transfer materials to the middle and then transfer again to third section. A second method is to build two compost piles, one in each end section. Transfer materials from one section to the middle section and back to original end section. Repeat process for the pile in the other end section.

<table>
<thead>
<tr>
<th></th>
<th>1-Bin</th>
<th>3-Bin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost:</strong></td>
<td>&lt;$60</td>
<td>&lt;$110</td>
</tr>
<tr>
<td><strong>Capacity:</strong></td>
<td>Holds 10-12 30 gal bags of yard materials</td>
<td>Holds 30-38 30 gal bags of yard materials</td>
</tr>
<tr>
<td><strong>Materials:</strong></td>
<td>38 concrete blocks (8&quot; wide) 5 metal posts (4 ft. long)</td>
<td>86 concrete blocks (8&quot; wide) 4 half concrete blocks (8&quot; wide) 11 metal posts (4 ft. long) chisel work gloves, level, shovel and hammer or mallet</td>
</tr>
</tbody>
</table>

Half blocks can be purchased or split from full blocks. The illustration (right) shows a full concrete block with a central slit between the holes that makes it easy to split into two half blocks. Score each side of the block in the plane of the slit with a chisel. Then use the chisel and a hammer to split the block along the score.

**Construction Details:**

1. Select bin site and level ground. Place concrete blocks on ground as shown in the illustration (reverse side of page). Use 11 blocks for 1 bin unit. Use 25 blocks for 3 bin unit. Leave about ½ inch between each block to let in air.
2. Add a second layer of blocks, staggering them to increase stability.  
   **Note** placement of 2 half blocks in 3 bin unit.

3. Add a third layer of blocks, again staggering them to increase stability.

4. Add the last or top layer, staggering the blocks.  
   **Note** placement of 2 half blocks in 3 bin unit.

5. To make the unit more stable, drive metal posts through the holes in the blocks as shown in diagram on front page.

3-bin ground layer of concrete blocks

Website: www.nraes.org

*Updated 2/2004 by Kathy Powell, SHWEC Adjunct Faculty*

For More Information, Contact Your County Extension Agent or SHWEC

SHWEC at [http://www.uwex.edu/ces/shwec](http://www.uwex.edu/ces/shwec)
Wire Mesh Compost Bin

Wire mesh composting bins are inexpensive, easy to assemble and hold a large volume of yard materials. Hardware cloth wire is recommended to provide a sturdy bin that holds its shape. This bin can be used as a holding or turning unit. To turn, undo the latches or ties, set the bin up next to the pile and transfer the composting material into the empty bin. Stakes can be added for additional stability, but this will make it harder to turn the bin and harvest finished compost.

**Cost:** <$25

**Capacity:** holds 1 cu yd or 8-10 30 gal bags of yard materials

**Materials:**
- 12 ½ ft of 36" wide ½" hardware cloth
- 4 metal or plastic clips or wire ties
- 3-4 four ft metal posts (optional)

**Tools**
- Heavy-duty wire or tin snips
- Pliers
- Hammer
- Metal file
- Work gloves
- Level

**Construction Details:**
Roll out and cut 12-½ ft of hardware cloth. Snip the ends off of the hardware cloth close to a cross wire. Then file down the sharp edges to make it easy to clip together and eliminate snagging hands. Bend hardware cloth into a circle and lap the ends of the fencing over each other. Attach clips or ties and set bin in level place. (Optional – place metal stakes evenly around the inside edge of the bin and hammer stakes in place.)

Revised 2/2004 by Kathy Powell, SHWEC Adjunct Faculty

Other References: The Master Composter Program sponsored by Seattle Tilth Assoc and Seattle Solid Waste Utility, WA

For More Information, Contact Your County Extension Agent or SHWEC

SHWEC at [http://www.uwec.edu/ees/shwec](http://www.uwec.edu/ees/shwec)
Can Composter

A can composter is an inexpensive way to compost yard materials or food wastes in a limited space. Check with local officials to be sure food waste composting is permitted in your community.

**Cost:**  
< $25

**Capacity:**  
< 1 30 gal bag of yard materials & kitchen scraps

**Materials:**
- can with cover
- food wastes or green garden materials (nitrogen)
- straw, shredded paper, leaves, or other dried plant material (carbon) — No glossy papers
- coarse untreated sawdust or wood chips
- bricks or cement blocks (optional)
- drill
- pitch fork, shovel, or compost turner
- work gloves

**Construction Details:**
1. Drill three rows of holes 4 to 6 inches apart around sides of the can. Then drill several holes in lid and bottom of trash can. The holes allow air movement and provide drainage of excess moisture.
2. (Optional) Place can on the cement blocks or bricks to increase air circulation.
3. Place 2-3” of sawdust, straw, or wood chips in the bottom of the can to absorb excess moisture and improve drainage. Layer 1/3 nitrogen materials with 2/3 carbon materials (do not just use only wood chips or sawdust for carbon source as this carbon is not readily available to compost microbes). Top layer should be carbon to control odors and pests.
4. Finished Compost ready in 6-12 months, sooner if materials are turned and kept damp.

**Revised 2/2004 by Kathy Powell, SHWEC Adjunct Faculty**


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SHWEC at [http://www.uwex.edu/ees/shwec](http://www.uwex.edu/ees/shwec)
COMPOST BIN BASICS

Bin, Heap or Trench?
Both work!
Bins are:
• more attractive
• use vertical space better
• more organized

Bins should:
• Size ... Approx. 3 x 3 to 5 x 5 ft
• Near Water Source
• Convenient site to house or garden
• Sun or Shade
• Space to turn
• 2 ft from building