Report:
The Recycling Awareness
Project, 1994-95:

Service Learning at Three
Portland, Oregon, High Schools

By

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This project was sponsored, in part, by The Portland Educational Network, The Center for Academic Excellence, Portland State University; Cooperative Programs in Urban Environmental Research and Education, Portland State University; The Metropolitan Service District, and The Bureau of Environmental Services, City of Portland, Oregon.
EXECUTIVE SUMMARY:
RECYCLING AWARENESS PROJECT: 1994-95

Introduction
The Recycling Awareness Project is a community-based, service learning experience which uses recycling as a vehicle to bring together students from various levels—college, high school and grade school—in environments where they can learn from each other. The overarching goal of the "Recycling Awareness Project" is to address the problems facing youth and schools which include large classrooms with high student/teacher ratios, low levels of student self-esteem, increased levels of student alienation accompanied by decreased motivation, and a lack of ties to the local community.

In this project, college, high school and grade school youth learn about recycling, waste stream reduction, and energy conservation issues, and teach each other. The purpose of the project is to create a more meaningful educational experience and engage students in their community, producing students with identities as active and involved citizens.

The goals of the Recycling Awareness Project are as follows:
• provide a model of youth in community service learning which enhances educational experience while improving recycling rates in the community;
• demonstrate a method for creating long-term mentoring opportunities integrated into local higher education programs, through college/high school collaborations;
• reduce high school dropout rates;
• develop a curriculum on recycling which can be used by high school teachers;
• increase positive student ties to the local community;
• empower students with a sense of self-efficacy that encourages community involvement.

The Recycling Awareness Project is a cooperative project between Portland State University and Portland Public School District #1J, with support from the Portland Educational Network, the Center for Academic Excellence, Portland State University; the Center for Urban Studies, the Metropolitan Service District (Metro), and the Bureau of Environmental Services, City of Portland. Based on the success of the 1993-94 pilot project at Roosevelt High School, the Recycling Awareness Project was expanded in 1994-95 to include three Portland high schools—Roosevelt, Jefferson, and Grant.

The Recycling Awareness Project consisted of two major components:
• Portland State University Course SOC/USP 399: "Impacting People
**Impacting the Environment: The Social Psychology of Recycling**: which prepares Portland State University students for the “Recycling Awareness Program” at the different high schools.

- The “Recycling Awareness Program”: a six-week, community-based educational class taught by a team of Portland State University students to students at the high school. This class focuses on promoting the involvement of high school youth in local recycling and waste reduction issues in their local neighborhoods.

**Social Psychology of Recycling Class**
The Social Psychology of Recycling class was taught at Portland State University during Fall term, 1994, and Winter and Spring terms, 1995. This class examined how techniques of social influence could be used to positively impact an individual's relationship with the environment, with an emphasis on the area of recycling. The Social Psychology of Recycling course was structured in the same manner as the 1993-94 courses: five weeks of preparation and classroom work at Portland State University, followed by a six week Recycling Awareness Program, conducted at one of the participating high schools for the students in the different science classes.

The Social Psychology of Recycling class included a set of exercises and activities designed to prepare the Portland State University students for their up-coming roles as teachers of the Recycling Awareness Program at the different high schools. The purpose of these activities and exercises was to allow the students to practice the different tasks that they would be teaching the high school students in the Recycling Awareness Program.

The design of the overall Social Psychology of Recycling class, as well as the individual training exercises, was based on specific techniques of social influence and identity building, including: modeling, public commitment, role-identification, cognitive dissonance, self-perception, self-attribution, role-playing, self-persuasion, and self-efficacy.

**The Recycling Awareness Program**
The Recycling Awareness Program was a six week environmental education class, conducted by the Portland State University students for a science class at each of the participating high schools. The Recycling Awareness Program consisted of four elements:

- a series of informational presentations - Made by members of the Portland State University teaching team, topics included: types of materials which can be recycled, and how to prepare them for recycling; a history of recycling, with a local emphasis; the 3 R's: “Reduce, Reuse,
Recycle; “life-cycle of products; packaging/wise consumerism; and waste characterization.

- **field research** - This varied from school to school, depending upon the nature of the community service project. At Roosevelt, teams of students conducted a four-week set of field observations of selected recycling collection systems at the Columbia Villa Housing Development. At Jefferson, student teams conducted observations and collections of set-outs from a school-wide scrap paper collection program.

- **production of recycling videos** - The students in each of the high school science classes produced recycling promotion videos.

- **“kids-teaching-kids”** - A multi-level educational program, where students at one level became the teachers at the next level. The Portland State University program staff taught the college students, who then taught the high school students, who then taught students at elementary schools in the neighborhoods around each of the participating high schools.

In much the same manner as the Social Psychology of Recycling class, the Recycling Awareness Program utilized several innovative teaching techniques:

- **credibility enhancing activities,**
- **use of video to promote: commitment, motivation, role identification, student bonding, and empowerment; and**
- **a program to increase students’ feelings of self-efficacy.**

**Outcomes**
The outcomes associated with the Recycling Awareness Project fall into three areas:

- outcomes related to the different community service projects,
- outcomes related to the different groups of project participants, and
- outcomes related to the development of an ongoing Recycling Awareness Project.

**Outcomes Related to Community Service Projects**

**Recycling at Columbia Villa: Roosevelt High School**
Recycling participation at the Columbia Villa/ Tamarack Housing Development was measured using a “Participation Rating System” developed by the Recycling Education Projects, Center for Urban Studies, at Portland State University. It was primarily a measure of recycling quality. There were two key dimensions to the rating system: 1) the amount of time it took the hauler to rectify the problem, and 2) the volume of recycling materials involved. Depending upon the amount of time needed to rectify the recycling problem, and the amount of volume present, collection systems
were rated on a scale which utilized values from “no stars” (lowest) to “five stars” (highest).

Eight of the nine systems which were monitored and analyzed were previously included in the 1993-94 Recycling Awareness Program at Roosevelt High School. A comparison of the mean collection system ratings from the 1993-94 monitoring and observation program, with the mean ratings obtained in the Fall 1994 monitoring and observation program, indicated the effectiveness of the two-year, intervention program at the Columbia Villa/Tamarack complex. More specifically, this comparison demonstrated that the positive impacts on recycling quality of and level of recycling participation continued over time. While some systems improved more than others, overall the Recycling Awareness Project seemed to be associated with an improvement in recycling at Columbia Villa.

Scrap Paper Collection Program: Jefferson High School
Jefferson High School students from the Science Connections class initially sent out letters to all the classroom teachers inquiring as to whether they would be interested in participating in the upcoming scrap paper collection program. Forty-four teachers expressed interest in participating in the collection program. Of these, thirty-three had scrap paper set-outs collected, weighed, and logged by the high school students during the pilot collection program.

The materials collected in the Jefferson High School scrap paper collection program were divided into two categories based on market standards -- white paper and colored paper. Newsprint was collected separately, and was not included in the reported weights for this program.

While the data only represents the pilot observation and collection program, the implications are significant. Projecting the mean collection rates from the pilot program over a forty week school year would yield 2.93 tons of white paper and 1.25 tons of colored paper. This represents a significant financial reward for Jefferson High School and the district (considering the current high market value of scrap paper), as well as additional savings in waste disposal costs due to the sizable reduction in trash volume.

Outcomes Related to Project Participants
Two different groups of students were positively affected as a result of their participation in the Recycling Awareness Project: the Portland State University students from the Social Psychology of Recycling classes, and the high school students who participated in the Recycling Awareness Program.

Both groups of students were tested immediately before (“pre-program”) and immediately after (“post-program”) participating in either the Social
Psychology of Recycling class or the Recycling Awareness Program. These tests used a series of measures addressing level of recycling information, recycling related behaviors, and role identification to determine the effects of program participation on students.

**Portland State University Students**
The Portland State University students who participated in this program benefited from being part of this service learning project. They received opportunities to conduct field research in a real world environment, not always available to college students. Also, the teaching and mentoring opportunities which developed in the course of conducting the Recycling Awareness Programs at the different high schools, led many of them to become more involved in the community as a result of their experiences.

Combining the data from the Social Psychology of Recycling classes:
- 89% of students showed a post-program increase in level of recycling knowledge
- 100% of students demonstrated an decrease in frequency of enacting negative recycling related behaviors post-program
- 89% of students demonstrated an increase in frequency of enacting reuse-related behaviors post-program
- 63% of students demonstrated an increase in frequency of enacting positive recycling related behaviors post-program, and
- 100% of students showed a post-program increase in level of role identification).

In addition:
- 100% of students showed a post-program increase on at least two of the three role-related measures (i.e. level of knowledge, behaviors, role-identification), while
- 78% of students showed a post-program increase on all three of the role-related measures.

**High School Students**
The students from the science classes at the high schools that participated in the Recycling Awareness Program learned valuable lessons in both recycling and community organization. These student participants showed significant improvement in level of recycling information, frequency of enactment of recycling related behaviors, and level of identification with the role “recycler,” post-program, compared to pre-program.

Combining the data from the three high school classes:
- 89% of students showed a post-program increase in level of recycling knowledge
• 66% of students demonstrated an increase in frequency of enacting positive recycling related behaviors post-program
• 49% of students demonstrated an increase in frequency of enacting reuse-related behaviors post-program
• 45% of students demonstrated a decrease in frequency of enacting negative recycling related behaviors post-program, and
• 74% of students showed a post-program increase in level of role identification

In addition:
• 100% of students showed a post-program increase on at least one of the three role-related measures (i.e. level of knowledge, behaviors, role-identification),
• 91% of students showed a post-program increase on at least two of the three role-related measures, while
• 54% of students showed a post-program increase on all three of the role-related measures

The high school students also benefited from the mentoring relationships that they developed with the Portland State University students. In a series of letters to the Portland State University students, they expressed their feelings of friendship and appreciation.

Outcomes Related to the Development of an Ongoing Recycling Awareness Project
The successful completion of the 1994-95 Recycling Awareness Program at Roosevelt, Jefferson, and Grant High Schools demonstrated that the 1993-94 program could be replicated. The 1995-96 program has been expanded to include science classes from at least four high schools. The greatest single benefit of conducting the original Recycling Awareness Project was the opportunity to incorporate the project into the natural Resources Pathway science curriculum at Roosevelt High School. Now opportunities are presenting themselves to conduct the Recycling Awareness Project at other Portland Public high schools beyond Roosevelt, Jefferson, and Grant. The materials used by the Portland State University class in the 1993-94 and 1994-5 programs have been collected, and organized into a packet of lesson plans so that teachers at Roosevelt, Jefferson, and Grant, as well as other high schools, can continue the Recycling Awareness Program even after the collaborative effort with Portland State University is finished.

Conclusions
The most intriguing aspect of the 1994-95 Recycling Awareness Project was the finding that each of the participating high school classes showed the greatest improvement in different areas. The Jefferson class had the highest percentage increase in post-program role-identification scores, the Grant class
showed the greatest positive increase in level of behavioral change, and the Roosevelt class significantly improved in terms of both level of knowledge and level of role identification. Most importantly, each of the high school classes increased their identification with the role “recycler.” As noted earlier, the Jefferson class had the largest increase in mean role identification score. The post-program role-identification percentile score is also significant. After completing the Recycling Awareness Program, the class mean level of identification with the role recycler placed the Grant and Roosevelt classes in them in top one third of all possible scores. It has been shown that individuals who identify with a particular role tend, among other things, to seek out opportunities to engage in behavior congruent with that role (Markus, 1977; Fiske & Taylor, 1991). Therefore, the positive shift in students level of role identification, after completing the Recycling Awareness Program, means they are much more likely to engage in recycling behaviors in the future.

While the project staff was concerned with dealing a series of issues, problems, and concerns associated with the day-to-day coordination of the project, what mattered most to the high school students was the effort of the Portland State students who modeled recycling-related behaviors. The letters from the students in the high school classes emphasized how much they appreciated the Portland State University students taking the time to work with them on this project. This is why an intervention such as the Recycling Awareness Program is so important. By coming in contact with college students of varied backgrounds, some of the “doubting” high school students realize that others have been in similar circumstances and succeeded. They begin to see that college is not beyond their reach. As one Natural Resource Pathway science class student noted, “I probably will never see those Portland State University students again, but I will remember them.”

The Recycling Awareness Project was a successful service learning project. It enriched the educational experiences of the Portland State University, Roosevelt, Jefferson, and Grant High School; and Clarendon, Humboldt, and Irvington Elementary School students; it promoted the recycling program at the Columbia Villa/Tamarack Housing Development, it helped implement the school-wide scrap paper collection program at Jefferson High School, it facilitated high school student involvement in their local neighborhoods, and it strengthened the connection between Portland State University and the North Portland community. This is an example of the kind of community-based learning that is only possible at an urban university such as Portland State.
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I. INTRODUCTION

The Recycling Awareness Project is a community-based, service learning experience which uses recycling as a vehicle to bring together students from various levels -- college, high school and grade school -- in environments where they can learn from each other. The overarching goal of the "Recycling Awareness Project" is to address the problems facing youth and schools which include large classrooms with high student/teacher ratios, low levels of student self-esteem, increased levels of student alienation accompanied by decreased motivation, and a lack of ties to the local community.

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- reduce high school dropout rates;
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• empower students with a sense of self-efficacy that encourages community involvement.

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The Recycling Awareness Project consists of two major components:
• Portland State University Course SOC/USP 399: "Impacting People Impacting the Environment: The Social Psychology of Recycling"; which prepares Portland State University students for the "Recycling Awareness Program" at the different high schools.

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• The "Recycling Awareness Program": a six-week, community-based educational class taught by a team of Portland State University students to students at the high school. This class focuses on promoting the involvement of high school youth in local recycling and waste reduction issues in their local neighborhoods. The Fall, 1994, program was conducted at Roosevelt High School; the Winter, 1995, program at Jefferson High School; and the Spring, 1995, program at Grant High School.

II. SOCIAL PSYCHOLOGY OF RECYCLING CLASS

The Social Psychology of Recycling class was taught at Portland State University during Fall term, 1994, and Winter and Spring terms, 1995. This class examined how techniques of social influence could be used to positively impact an individual's relationship with the environment, with an emphasis on the area of recycling. In addition, Portland State University students were provided with the opportunity to actively participate in field research out in the larger community. NOTE: For a more detailed description of the Social Psychology of Recycling class, please see, "Final Report: The Recycling Awareness Project," (Collier & Stark, 1994).

Course Elements

The Social Psychology of Recycling course was structured in the same manner as the courses taught during the 1993-94 school year: five weeks of preparation and classroom work at Portland State University, followed by a six week Recycling Awareness Program, conducted at one of the participating high schools for the students in the different science classes.
Preparation
The Portland State University students did not have to already be knowledgeable about waste reduction to participate in this class. The Social Psychology of Recycling class included a set of exercises and activities designed to prepare the college students for their up-coming roles as teachers of the Recycling Awareness Program at the different high schools. The purpose of these activities and exercises was to allow the students to practice the different tasks that they would be teaching the high school students in the Recycling Awareness Program.

Administration of a Field Research Instrument
During the first week of the class, each Portland State University student took the Role Measurement Device used in this project (see Appendix i). After a classroom discussion and a review of specific instructions related to this measurement tool, students practiced administering the Role Measurement Device to each other. Over the next three weeks, students reviewed their roles as test givers, in anticipation of their administering the Role Measurement Device to the high school students.

Conducting Field Observations
Each high school program was assigned a community service project, associated with a local recycling-related issue. At Roosevelt, the community service project focused on promoting recycling participation at Columbia Villa, a large Housing Authority of Portland apartment complex located near the school. At Jefferson, the community service project involved designing and implementing a school-wide scrap paper recycling program. Finally, at Grant, the community service project involved organizing a neighborhood-
wide polystyrene foam recycling collection drive. The type of Portland State University student preparation for conducting field observations differed from term to term, depending on the nature of the different community service projects.

In Fall term, during both the fourth and fifth weeks of the preparation period, the Portland State University students conducted two weeks of field observations of the recycling collection systems at the Columbia Villa Housing Development. This was the same setting that would later be utilized with the Roosevelt class. Monitoring forms and a recycling participation rating system developed by the Recycling Education Projects, Center for Urban Studies, at Portland State University were utilized in these observations. The purpose of this exercise was to instruct the class as to the correct techniques for monitoring the quality and amount of recycling set-outs found at a collection system, as well as how to correctly record the field data that they had collected.

In Winter term, the class of Portland State University students learned how to conduct a scrap paper audit — where paper trash is divided into specific recyclable categories and weighed. This was to be the first step in setting up the Jefferson program. Monitoring forms and a classification system developed by the Recycling Education Projects, Center for Urban Studies, at Portland State University were utilized in these observations.

In spring term, preparation for the community service project took a different form. Because there are many different types of plastic products, including several varieties of polystyrene, the emphasis of this segment of the class was
on the identification of the targeted material, polystyrene foam. The Portland State University class first went to the Southeast Community Recycling Collection Center to learn about the different types of plastics recycled in the Portland area. Then the class took a field trip to tour the Marko Foam Company in Wilsonville, Oregon. This company specializes in making new products out of recycled polystyrene foam. The purpose of these trips was to clarify what polystyrene foam “is” and “is not” so that the college students could effectively direct the teams of high school students at Grant.

Information Presentations

During the first week of the Social Psychology of Recycling class, students were presented with a list of recycling related topics, each of which was briefly described by the project director. Students then selected the topics which were to serve as the basis for their “information presentations” to the students in the science classes at the different high schools. The selected presentation topics included:
- Types of materials which can be recycled, and how to prepare them for recycling;
- History of recycling, with a local emphasis;
- The 3 R’s: Reduce, Reuse, Recycle;
- “Life and Death” history of products: an analysis of all the different raw materials utilized and waste products generated in the course of producing everyday items;
- Packaging/Wise Consumerism;
- Waste characterization: what is thrown away; how individuals can reduce the amount of garbage that they generate;
- Language materials (i.e. recycling information for non-English speakers)
- Composting and vermiculture;
- How to conduct a scrap paper audit (Jefferson only);
- Plastics: differences in composition and usage; which types are recyclable in the City of Portland (Grant only).
Each Portland State University student researched one presentation topic. The students were provided with the opportunity to practice presenting their recycling information for the high school classes several times during the five week preparation period. The practice process was designed to increase the different presenters’ self-confidence and delivery, as well as improving the class’s overall level of recycling knowledge.

**Video Production**

During each Social Psychology of Recycling class, the Portland State University students developed their own five-minute video on recycling, geared to the high school audience. They brainstormed ideas, developed a visual sequence of shots, wrote a script, prepared cue cards and props, rehearsed, and acted as talent in the video. This was important experience because the members of the Portland State University class subsequently led groups of high school students as they produced their own recycling videos.

Members of the Social Psychology of Recycling class received instruction on the “behind the scenes” work necessary to produce a successful video project. By referring to the recent class video experience, the project director demonstrated to the class how their perceived “free choice” of video topic, visual sequence, and script had been influenced, facilitated, and redirected (when necessary) by the class instructors. Students were then shown techniques for how to achieve these same results in order to keep their high school student groups realistic and “on track.”
Small Group Processes
A key design feature of the Recycling Awareness Program, was an emphasis on working in small groups with the students in the high school science classes. The plan called for teams of two or three of Portland State University students to lead each group of five to eight high school students. It was proposed that this structure would facilitate mentoring opportunities, as well as higher levels of one-on-one student interactions. Several class sessions during the preparation period were devoted to leadership and teamwork techniques, including discussions of how to deal with potential problem situations. In addition, the Portland State University students were instructed in some basic self-presentation techniques in order to make the best possible impression when the class visited the different high schools.

Classroom Work
The classroom emphasis of the Social Psychology of Recycling class was on understanding the various aspects of "waste" and on techniques of "social influence". Two texts were utilized:

1. *Wasting Away*, Lynch, Kevin (1990): a philosophical overview of issues relating to waste and waste-stream reduction, including recycling; and


The material in the Lynch text gave students, regardless of their recycling-related background, some new perspectives on the issues of waste. The Cialdini text discussed techniques that were used in the Recycling Awareness
Project -- commitment, consistency, modeling, self-perception, and the "foot-in-the-door" technique. One part of the final exam asked students to apply one or more of these social influence techniques in to the promotion of recycling.

Discussion

Several innovative techniques, initially developed in the 1993-94 courses, were also utilized in the 1994-95 Social Psychology of Recycling classes, including: "stair step of credibility," modeling, commitment, role-identification, cognitive dissonance, self-perception, self-attribution, role-playing, self-persuasion, and self-efficacy. These are discussed in "Final Report: The Recycling Awareness Project," (Collier & Stark, 1994).

There were two area of significant difference, relating to the Social Psychology of Recycling class, between the 1993-94 courses and the 1994-95 courses. The first area is associated with the increase in scope of the project from one high school in 1993-94 to three high schools in 1994-95. Because the project, as conducted, was slightly different from one school to another, each term’s project will be discussed separately. The second difference concerns the level of video documentation and support.

As noted in the report to the Portland Educational Network on the 1993-94 program (Collier, 1994), video played an important role in the overall success of the project -- both in terms of program documentation and as a social influence mechanism. Unfortunately, due to budget constraints, the level of video support, provided by the Portland Education Network video production staff, decreased significantly.
The result of this lack of support was felt in two areas. First, there is an absence of video documentation of the 1994-95 class activities, both at Portland State and at Roosevelt, except for that which the project director was able to provide himself. Second, several of the social influence-related outcomes of the use of video in the Recycling Awareness Program at Roosevelt did not occur with the same "power" during the 1994-95 program.

During the 1993-94 program, the presence of the video camera in the classroom positively impacted the behavior of the high school students, who became comfortable expressing themselves while the camera was "on them." This was not the case with the 1994-95 programs, because the camera was not present except to film the class videos and field trips. An example of this effect occurred in the Fall term class at Roosevelt High School. During the class celebration, when approached by the project director in an effort to get students to express their evaluations of the Recycling Awareness Program on videotape, several students became very self-conscious and would only give their evaluations (which were positive) off camera.

Measurement Device (See Appendix I for a copy of Device)
A questionnaire was administered to the Portland State University students at the beginning ("pre-program") and end ("post-program") of the Social Psychology of Recycling course.

The device had three main sections.

1) The "Items" section is the basis for two measures: 1) a "general" level of recycling information, indicated by the number of potentially recyclable items the student was able to identify and 2) a program
specific level of recycling information, the number of recyclable items emphasized in the program the student was able to identify.

2) The "Actions" section is the basis for three scales -- positive recycling-related, negative-recycling related, and reuse-related actions -- used to assess degree of post-program behavioral change;

3) The "Importance" section is the basis for a measure of the subject's level of identification with the role, "recycler." A "total role identification score" on this measure, which is directly taken from Callero's (1985, 1992) measure of the importance of the role "blood donor," is obtained by summing a student's responses to all five questions.

Course Impacts on Students

The population directly impacted by the Social Psychology of Recycling courses was the participating Portland State University students. As noted early, each term's Social Psychology of Recycling class differed slightly from each other. Therefore student-related impacts associated with each course will be discussed separately.

Fall term 1994

A major issue in the Fall term, 1994, Social Psychology of Recycling class concerned the commitment and performance of the Portland State University students who participated in the course. Several students were highly committed to the program, and it was largely through their efforts that the program was successful. However several other students were not responsible in terms of having their work completed on time or of attendance both at Portland State and during the Recycling Awareness Program at
Roosevelt. This detracted from the effect of the Social Psychology of Recycling class in several ways.

First, relationships among the Portland State University students did not develop during the Fall, 1994 class in the same way they did during the previous courses. Since the class component at Roosevelt High School depended on students working together and supporting each other, when the irresponsible students were not properly prepared, they not only let down the high school students, but their fellow Portland State University students as well. Also, when the non-performing students did not adequately research and prepare their informational presentation, not only did they waste the opportunity to prepare for the Roosevelt class, they also deprived the other Portland State students of access to the recycling information that was supposed to be covered in their assigned presentations. When the irresponsible Portland State students stopped attending the community-service classes at Roosevelt High School, they further let the overall program down. The remaining students, along with the faculty, had to make up for their absences by taking more responsibility for conducting the small group exercises. Unfortunately, the size of the Roosevelt class made this very difficult with a reduced number of Portland State University students. This also undermined another part of the Recycling Awareness Program, which focused on trying to encourage high school students to not dropout and to continue attending their classes. When the Roosevelt High School students saw the Portland State University students “skipping” class, they received the message that, while the college students were verbally encouraging them to stay in school, they couldn’t be bothered following through with this behavior themselves. The lack of attendance by certain Portland State
students forced the project director and student assistant to assume leadership roles in the small groups at Roosevelt High School, thus severely limiting their ability to document the classroom activities as they occurred.

Finally, due to the loss of several Portland State University students, the data set from the Fall term, 1994, Social Psychology of Recycling class, is incomplete. This prevents a realistic assessment of the effects of participating in the Fall, 1994 service-learning class on Portland State University students.

Even with the difficulties associated with the Social Psychology of Recycling course, the over-all effect of the Fall 1994 Recycling Awareness Program on the Roosevelt High School students was very positive.

Winter Term 1995
Portland State University students who participated in the Winter term Social Psychology of Recycling class showed significant improvement in terms of level of recycling knowledge, recycling-related behaviors, and level of role identification.

Measures of Level of Recycling Information
Two different measures of level of recycling information were developed. The first measure identified the number of correct potentially recyclable items a student recalled.
Table 1: Winter 1995 Portland State University Students’ Recall of Recyclable items

“How many different recyclable items can you think of?”

<table>
<thead>
<tr>
<th>pre-program mean #</th>
<th>post-program mean #</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>items</td>
<td>items</td>
<td></td>
</tr>
<tr>
<td>8.25</td>
<td>11.25</td>
<td>36.4%</td>
</tr>
</tbody>
</table>

n=4

The second measure of level of recycling information identified the number of correct potentially recyclable “core” items a student recalled. “Core” items refer to the ten (10) items emphasized in the City of Portland’s recycling collection programs (i.e. newspaper, cardboard, magazines, clear glass, green glass, brown glass, tin, aluminum, plastic milk jugs, and motor oil). In addition, the Winter term, 1995, program at Jefferson High School emphasized white and colored scrap paper. The Portland State University students showed significant increases in the mean number of core items recalled post-program, as compared to pre-program.

Table 2: Winter 1995 Portland State University Students’ Recall of Core Recyclable items

“How many different core recyclable items can you think of?”

<table>
<thead>
<tr>
<th>pre-program mean # core</th>
<th>post-program mean # core</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>items</td>
<td>items</td>
<td></td>
</tr>
<tr>
<td>4.5</td>
<td>9.25</td>
<td>106%</td>
</tr>
</tbody>
</table>

n=4

The change in the Portland State University students’ mean scores on this measure is particularly interesting, because it shows that even students with high general levels of recycling knowledge acquire usable recycling-related knowledge by participating in this project.
Measures of Recycling-related Behaviors

Students were presented with a list of 12 recycling-related behaviors, which fell into three general categories -- negative recycling-related behaviors, positive recycling-related behaviors, and reuse-related behaviors. They were asked to indicate the frequency ("regularly," "occasionally," or "never") with which they engaged in each behavior over the previous 6 week period. Three scales were developed from this data:

1) a negative recycling-related behaviors scale consisting of three questions -- one associated with vandalism, one with littering, and one with throwing recyclables out with the garbage;

2) a reuse behavior scale consisting of three questions -- one of which dealt with the recycling of used motor oil, and

3) a positive recycling-related behaviors scale consisting of six questions -- one general question, one question about buying recycled products, and four questions, each dealing with how to recycle different materials.

All of the behavioral changes noted among the Winter 1995 Portland State University students was positive. At least one student improved on each of the measures; and 75% of the class increased their scores on the positive recycling-related behavior scale post-program.

Measures of level of Role Identification

Students were presented with 5 questions concerning the personal importance of recycling, which were scored on a 9-point Likert scale (from "strongly disagree" to "strongly agree"). These items were taken directly from Callero’s (1985, 1992) measure of the importance of the role "blood donor."
A "total role identification score" was obtained by summing a student's responses to all five questions. The Winter 1995 Portland State University students showed marked increases in level of role identification, with the pro-social role recycler, over the course of the Recycling Awareness Project.

Table 3: Winter 1995 Portland State University Students Change in Level of Role Identification. (controlling for subjects reporting maximum possible score pre-program)

<table>
<thead>
<tr>
<th>Maximum total role identification score = 45</th>
</tr>
</thead>
<tbody>
<tr>
<td>pre-program mean score</td>
</tr>
<tr>
<td>34.75</td>
</tr>
</tbody>
</table>

The astonishingly high post-program mean role identification score ("44.25" out of a possible "45") indicates that the participating in the Recycling Awareness Project had a tremendous impact on the Portland State University class. The students in the Winter 1995 class came to see themselves as committed recyclers at the end of this project.

Spring Term 1995

Portland State University students who participated in the Spring term Social Psychology of Recycling class also showed noticeable improvement in terms of level of recycling knowledge, recycling-related behaviors, and level of role identification.

Measures of Level of Recycling Information

As noted earlier, two different measures of level of recycling information were developed. The first measure identified the number of correct potentially recyclable items a student recalled.
Table 4: Spring 1995 Portland State University Students’ Recall of Recyclable items

“How many different recyclable items can you think of?”

<table>
<thead>
<tr>
<th>pre-program mean # items</th>
<th>post-program mean # items</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.8</td>
<td>9.6</td>
<td>23%</td>
</tr>
</tbody>
</table>

n=5

The second measure of level of recycling information identified the number of correct potentially recyclable “core” items a student recalled. “Core” items refer to the ten(10) items emphasized in the City of Portland’s recycling collection programs (i.e. newspaper, cardboard, magazines, clear glass, green glass, brown glass, tin, aluminum, plastic milk jugs, and motor oil). In addition, the Spring term, 1995, program at Grant High School emphasized plastic recycling. The Portland State University students showed significant increases in the mean number of core items recalled post-program, as compared to pre-program.

Table 5: Spring 1995 Portland State University Students’ Recall of Core Recyclable items

“How many different core recyclable items can you think of?”

<table>
<thead>
<tr>
<th>pre-program mean # core items</th>
<th>post-program mean # core items</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.4</td>
<td>7.6</td>
<td>42.6%</td>
</tr>
</tbody>
</table>

n=5

As noted in the discussion of the Winter 1995 project, the significant change in the Portland State University students’ mean scores on this measure shows that even students with high general levels of recycling knowledge acquire usable recycling-related knowledge by participating in this project.
Measures of Recycling-related Behaviors

The Portland State University students in the Spring 1995 class made significant behavioral improvement on all three scales. All of the class members improved their scores on the positive recycling-related and negative recycling-related behavior scales post-program, while 80% improved in terms of reuse behaviors.

Measures of level of Role Identification

The Spring 1995 Portland State University students showed marked increases in level of role identification, with the pro-social role recycler, over the course of the Recycling Awareness Project.

Table 6: Spring 1995 Portland State University Students Change in Level of Role Identification

<table>
<thead>
<tr>
<th>Maximum total role identification score = 45</th>
</tr>
</thead>
<tbody>
<tr>
<td>pre-program mean score</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>32</td>
</tr>
</tbody>
</table>

n = 5

Though not as high as that of the Winter 1995 class, the Spring 1995 class high post-program mean role identification score ("39.6" out of a possible "45") indicates that the participating in the Recycling Awareness Project had a tremendous impact on the Portland State University class. The students in the Spring 1995 class also came to see themselves as committed recyclers at the end of this project.
Summary of Course Impacts on Students

Combining the data from the Winter and Spring 1995 Social Psychology of Recycling classes yields the following summaries of Portland State University student impacts.

Level of knowledge

- 89% of students showed a post-program increase in level of recycling knowledge
- 89% of students showed a post-program increase in level of core-item (emphasized in program) recycling knowledge

Recycling-related behaviors (controlling for subjects showing no behavior change but operating a maximum pro-social level pre-program)

- 100% of students demonstrated an decrease in frequency of enacting negative recycling related behaviors post-program
- 89% of students demonstrated an increase in frequency of enacting reuse-related behaviors post-program
- 63% of students demonstrated an increase in frequency of enacting positive recycling related behaviors post-program

Role Identification (controlling for subjects showing no change but operating a maximum level pre-program)

- 100% of students showed a post-program increase in level of role identification)
Total (controlling for subjects showing no change but operating a maximum level pre-program)
- 100% of students showed a post-program increase on at least one of the three role-related measures (i.e. level of knowledge, behaviors, role-identification)
- 100% of students showed a post-program increase on at least two of the three role-related measures
- 78% of students showed a post-program increase on all three of the role-related measures

III. RECYCLING AWARENESS PROGRAM

The "Social Psychology of Recycling" courses at Portland State University, conducted during Fall term, 1994, and Winter and Spring terms, 1995, prepared the team of college students for teaching the Recycling Awareness Program at Roosevelt, Jefferson, and Grant High Schools.

Program Components

The Recycling Awareness Program, at each of the participating high schools, had four main parts:
- Information presentations;
- Field research;
- Production of recycling videos; and
- Kids teaching kids.

Information Presentations:

As noted earlier, Portland State University students made informational presentations to the high school science classes on a variety of recycling and waste stream reduction-related topics. Topics included:
- Types of materials which can be recycled, and how to properly prepare them;
- History of recycling, with a local emphasis;
- The 3 R’s: Reduce, Reuse, Recycle;
- “Life and Death” history of products: an analysis of the raw materials used and waste products generated in the course of producing everyday items;
- Packaging/Wise Consumerism;
- Waste characterization: what is thrown away; how individuals can reduce the amount of garbage that they generate;
- Language materials (i.e. recycling information for non-English speakers)

Field research

The teaching team of college students initially modeled the data collection procedures for the class of high school students in the classroom. At Roosevelt, they demonstrated the correct techniques for monitoring the quality and amount of recycling set-outs found at a collection system, as well as how to correctly record the field data that they have collected. At Jefferson, they conducted a scrap paper audit, and showed the high school students how to log the field data on the data forms.*

Next, the classes at the different high schools were broken into smaller “monitoring groups,” each accompanied by several members of the teaching team. At Roosevelt, the class was then transported to the Columbia Villa Housing development, which is located approximately five minutes from

* Due to difficulties coordinating the polystyrene foam recycling drive with the collection schedule of the manufacturing company which was to use the collected materials, the community service project at Grant High School was not conducted. It was postponed until Winter 1995-96 when it could be combined with more extensive publicity and linked to merchants holiday sales of large items typically packaged in polystyrene foam. Therefore the field research component was not part of the Spring, 1995, program at Grant.
Roosevelt High School. Once at the complex, each monitoring group collected data on designated recycling collection systems at different locations throughout the complex. Using portable scales, the students weighed recycling containers for different types of recyclables and assessed the sites for proper usage and participation.

At Jefferson, each measurement team was responsible for two of the four floors of classroom. During the first part of the collection program, the students visited each participating classroom, leaving two collection boxes -- one for white paper and one for colored paper. Then once or twice a week, the high school measurement teams went back to each classroom, emptying the scrap paper collection boxes, weighing the collected paper, and entering the amounts in the field logs.

The field research component allowed for several learning opportunities. First, the high school students were trained in methods of data gathering and analysis in a real life setting. Second, they experienced the group process while working in the field. Finally, the students learned, first-hand, about some of the issues that a community must address in order to conduct a successful recycling program.

Production of recycling videos
As mentioned earlier, the college students produced a 5-minute pro-recycling video which was geared to the high school audience. It served as an introduction for the high school students to the topic of recycling, and also started them thinking about what they would do if given the chance to make their own recycling video. The students in each participating high school
class were divided into work groups of six to eight members. Eventually, each of the these smaller, work groups developed a short video promoting recycling.

The process of making videos in small groups ensured participation of all students and enhanced the opportunities for individual mentoring. In the small group sessions, students worked in a format which gave each of them an individual responsibility to help in a team effort. The college students assisted the small groups of high schoolers in producing their own recycling videos.

The high school students participated in brainstorming to create a concept for their videos; then they developed a rough script. All ideas and suggestions were validated as students took turns writing down what was said. The high school students used information they received from the teaching team’s presentations to develop their ideas into video form. They gave each other feedback as the script was developed.

The groups then worked together in creating costumes and gathering props. Each group rehearsed their final script over several class meetings, and then were filmed. Each students’ part in the final video production underscored their individual importance to the group. Everyone had a role in developing the video, and everyone had a spoken part in it as well. During this entire process, the identity of each high school student as a recycler was being reinforced, culminating in their individual statements to the camera at the end of the video: “My name is _____, and I recycle!”
A video producer filmed the videos and edited them into the finished products, using background music chosen by the students. The groups of high school students used these videos in their subsequent presentations to the grade school students. At the end of the class celebration, each student was given a copy of their group’s video.

"Kids teaching kids"

"Kids teaching kids" was an approach to learning that is different and exciting. Students of various levels taught each other after receiving training and information on the subject of recycling. The teaching team of college students were presented information on recycling by the Portland State University instructors. They then were assigned topics upon which to base their information presentations. Next the students were required to research their particular topics. They were then given the opportunity to practice presenting their topics to each other in preparation for their presentations to the high school students. In this way, it was planned that they would all receive extensive information on recycling issues prior to going to the different high schools.

Then, as part of the Recycling Awareness Program at Roosevelt, each member of the teaching team gave her/his presentation, and provided the class with a handout related to the topic being covered. The Portland State University students went from being "students" to now being "teachers."

As noted above, the field research section of the high school class worked the same way. After learning how to conduct monitoring and observations
themselves as a class, the teaching team instructed the high school students about measurement of recyclables collected at the housing development.

The video production process followed the same plan -- first the team of college students learned, then they taught the high school class. However here the process had an additional step.

Upon completion of the videos and preparation for presentations, the entire science class from each high school went to a local grade school. The Roosevelt class went to Clarendon Elementary School, which serviced the children who live in Columbia Villa and the surrounding areas. The Jefferson class visited Humboldt Elementary School, which is only two blocks from the high school. The Grant class went to Irvington Elementary School, where many of the high school students had attended when they were younger.

This is where the high school students became the teachers. Members of the different small groups spoke to third, fourth and fifth graders about recycling, and showed the videos they made. They also provided interactive opportunities to involve the younger students in the presentation, and left them with handouts to reinforce their new identities as recyclers.

Celebration

At the end of the "Recycling Awareness Program," the contributions of the high school students in promoting recycling in the community were acknowledged in a "celebration" at each school. All the participants from
each term's program--high school and college students, and faculty--joined together for a celebration of the success of the program.

Local merchants donated food and beverages for the post-program parties. The celebrations stayed consistent with the theme of the program by only using either products packaged in recyclable containers, or those whose wastes could be composted.

The celebrations completed the circle. Not only did the students feel that they had impacted the community through their recycling promoting actions; they also realized that the community appreciated and acknowledged their efforts.

**Recycling Awareness Program Techniques**

Several innovative techniques were utilized in the Recycling Awareness Program that warranted further discussion.

"Stair step of Credibility"

The Recycling Awareness Program continued the multi-level teaching activity originally initiated by the Social Psychology of Recycling class. In the same way that the teaching team of Portland State University students were seen as more effective recycling message sources for the high school students because of their high level of credibility, the high school students were more effective message sources for the elementary school students. Once the students from the different high school science classes learned enough about recycling to be seen as "experts" in any one recycling-related area, the fact that they were closer in age to the elementary school students made them more
trustworthy, and therefore more credible. From the perspective of an elementary school student, there is little distinction to be made between a college student and a parent -- they're both old.

One of the goals of education is the socialization of students into taking on prosocial, community-involved roles, and other forms of attitude change. An intervention such as the Recycling Awareness Program, which was designed to facilitate the development of credible message sources based on age and background similarity, compliments other approaches to improving persuasion such as interventions which focus on message channels or media.

The Use of Video
The Recycling Awareness Program utilized video in several innovative ways.

commitment
Just as in the Social Psychology of Recycling class, at the end of the different Roosevelt class video projects, each student looked into the camera and said “My name is ______ and I recycle.” This was designed to increase student commitment to “acting like” a recycler.

role-identification
The role-identification program component, described in the section on the Social Psychology of Recycling in the report on the 1993-94 project (Collier & Stark, 1994), was also utilized in the Recycling Awareness Program. The high school students' positive evaluation of the Portland State University student group leaders who were also modeling role-related behavior served to further
increase the high school students' identification with the pro-social role, "recycler."

**empowerment**
The process of developing the videos was designed to allow the high school students the maximum amount of freedom in determining what they are going to use for a topic in the video, which visual images are used, dialogue selection, costume creation, and choice of music. Even though the group leaders subtly directed the video so that it fell within certain guidelines, the students made the final decisions. Just as in the other aspect of course design, where students on one level were turned into teachers on the next level, the amount of control that students felt when conducted these successful projects empowered them. The feelings of being in control of what happens to them in what is typically a "no-control" area (i.e. school), motivated the kids to continue with the class.

**bonding instrument**
The use of "hip" music in the Portland State University video served to let the high school students know that, as opposed to your parents, the college students were "with it." Both groups listened to the same music. It served as a common ground. The high school students then brought in their own favorite music to use in the video, and at the same time, tried to impress the college students with how "hip" their musical taste is. Similar taste in music, as well as an interest in music videos, served as an initial bond between the Portland State University class and the high school students, which then made conducting the rest of the class easier.
Self-Efficacy

Whether or not people chose to undertake particular actions, attempt to perform certain tasks, or strive to meet certain goals depended on whether or not they believed they would be successful in performing those actions (Bandura, 1986). In time, the participating high school students realized that their efforts impacted the local community.

Field work provided Roosevelt students with the opportunity to positively impact recycling participation in a local public housing development -- Columbia Villa. Students collected data that measured the amount of recycling that was occurring at the complex. This data was provided to the Housing Authority supervisor at the Columbia Villa/Tamarack Housing Development, as feedback on the previous month's recycling efforts.

The Housing Authority supervisor indicated to the project director that overall levels of recycling quality and participation at the complex had improved over the past year. The work of the Roosevelt students who participated in the 1993-94 program contributed to this improvement. This allowed the current group of Roosevelt students to gain a first hand understanding of how their field research could increase the recycling participation rates over time. This led to increased motivation to stay active in the community for the Roosevelt High School students.

Prior to the Winter, 1995, Recycling Awareness Program, Jefferson was the only Portland high school that did not have a scrap paper recycling program in place. This was due to a prior problem with arson in the school which had since been remedied. Not only did the Jefferson science class, working with
the school's environmental club, initiate and implement the school-wide scrap paper recycling program, this program was selected as one of eight, state-wide "Excellence in School Recycling" programs. As a result of this selection, the class was recognized in the media and received a $1000 award from the Weyerhaeuser Forest Products Company. The public recognition, as well as the financial reward, demonstrated to the Jefferson students that their efforts to promote recycling in their own "community" (i.e. Jefferson High School) did make a difference.

**Measurement Device** (See Appendix I for a copy of Device)

The same questionnaire used with the Portland State University students was administered to the high school program participants at two separate occasions:

* "t-1" -- at the beginning of the "Recycling Awareness Program"
* "t-2" -- at the end of the Recycling Awareness Program.

**IV. RECYCLING AWARENESS PROGRAM OUTCOMES**

Outcomes of this program need to be considered in two different areas:

- those relating to the community service projects, and
- those associated with the youth participants in the Recycling Awareness Program.

**Outcomes related to Community Service Projects**

Two community service projects were completed as part of the 1994-95 Recycling Awareness Project -- the Columbia Villa recycling promotion project and the Jefferson High School scrap paper collection program.
Columbia Villa Recycling Promotion: Roosevelt High School

A sub-set of the 35 recycling collection systems at Columbia Villa were targeted for the monitoring and observation program with the Roosevelt students as part of the Fall 1994 Recycling Awareness Program. 9 adjacent collection systems (slightly more than 25% of the total number) were included in the field observations. Eight (8) of these systems were the same ones targeted for monitoring and observation as part of the 1993-94 program at Roosevelt High School.

Participation Rating System  (Collier, et. al, 1993)

Recycling participation was defined as:

1) the generation of recyclable items, and

2) the proper preparation and separation of recyclables.

The participation rating system utilized in this study was primarily a measure of recycling quality. There are two key dimensions to the rating system:

1) the amount of time it would take the hauler to rectify the problem, and

2) the volume of recycling materials involved.

The rating system utilizes valued from “no stars” (lowest) to “five stars” (highest):

no stars: site with potential recyclable materials so contaminated that the hauler must return them to the source for further preparation and separation.

one star: required more than 10 minutes of hauler time to rectify situation.

two star: required 5 to 10 minutes of hauler time to rectify.
three star: required less than 5 minutes of hauler time to rectify.
four stars: no contamination; low to medium volume.
five stars: no contamination; high volume.

Collection System Ratings

Eight of the nine systems which were monitored and analyzed were previously included in the 1993-94 Recycling Awareness Program at Roosevelt High School. A comparison of the mean collection system ratings from the 1993-94 monitoring and observation program, with the mean ratings obtained in the Fall 1994 monitoring and observation program, indicated the effectiveness of the two-year, intervention program at the Columbia Villa/Tamarack complex. More specifically, this comparison demonstrated that the positive impacts on recycling quality of and level of recycling participation continued over time.

Table 7: Recycling Participation Ratings for selected collection systems at Columbia Villa

<table>
<thead>
<tr>
<th></th>
<th>pre-intervention mean rating 93-94</th>
<th>post-intervention mean rating 93-94</th>
<th>post-intervention mean rating Fall 94</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.56 stars</td>
<td>2.78 stars</td>
<td>2.88 stars</td>
</tr>
</tbody>
</table>

n=9

An examination of the monitoring and observation data for each collection system included in the both the 1993-94 and Fall 1994 Recycling Awareness Program at Roosevelt High School indicates that the improvement in mean Recycling Participation ratings was not merely due to a large increase in one or two collection system, but instead reflected an overall trend towards improvement.
Table 8: Comparison of 1993-94 and Fall 1994 Mean Recycling Participation Ratings for Specific Collection Systems

<table>
<thead>
<tr>
<th>collection system</th>
<th>1993-94 mean recycling participation rating</th>
<th>1993-94 mean recycling participation rating</th>
<th>direction/amount change</th>
</tr>
</thead>
<tbody>
<tr>
<td>9423 Woolsey</td>
<td>not included</td>
<td>3.5 stars</td>
<td>---</td>
</tr>
<tr>
<td>9435 Woolsey</td>
<td>2.5 stars</td>
<td>3 stars</td>
<td>+ .5 star</td>
</tr>
<tr>
<td>9440 Woolsey</td>
<td>2.85 stars</td>
<td>3.25 stars</td>
<td>+ .4 star</td>
</tr>
<tr>
<td>9417 Trenton</td>
<td>2.7 stars</td>
<td>3.15 stars</td>
<td>+ .45 star</td>
</tr>
<tr>
<td>9523 Woolsey</td>
<td>2.2 stars</td>
<td>3 stars</td>
<td>+ .8 star</td>
</tr>
<tr>
<td>9532 Woolsey</td>
<td>1.8 stars</td>
<td>2.67 stars</td>
<td>+ .87 star</td>
</tr>
<tr>
<td>9554 Woolsey</td>
<td>2 stars</td>
<td>2 stars</td>
<td>no change</td>
</tr>
<tr>
<td>9561 Woolsey</td>
<td>3 stars</td>
<td>3 stars</td>
<td>no change</td>
</tr>
<tr>
<td>9636 Woolsey</td>
<td>1 star</td>
<td>2.33 stars</td>
<td>+1.3 stars</td>
</tr>
</tbody>
</table>

Of the eight collection systems included in both monitoring and observation programs:

• 6 systems increased in the quality of recycling set-outs; four of these also showed a substantial increase in the amount of certain materials collected.
• 2 systems stayed the same in terms of level of quality: one average, one good.

While some systems improved more than others, overall the Recycling Awareness Program seemed to be associated with an improvement in recycling at Columbia Villa.

School Scrap Paper Collection Program: Jefferson High School

Jefferson High School students from the Science Connections class initially sent out letters to all the classroom teachers inquiring as to whether they would be interested in participating in the upcoming scrap paper collection program. Forty-four teachers expressed interest in participating in the collection program. Of these, thirty-three had scrap paper set-outs collected, weighed, and logged by the high school students during the pilot collection
program. The pilot collection program was conducted during the first two weeks of March by teams of students from the Science Connections class, under the supervision of the Portland State University teaching team. At the end of the pilot program, the Jefferson students continued their weekly scrap paper collection, assisted by students from the environmental club.

Scrap Paper Summary

The materials collected in the Jefferson High School scrap paper collection program were divided into two categories based on market standards -- white paper and colored paper. "White paper" consisted of computer, copy, and white notebook paper -- materials with a higher market value. "Colored paper" consisted of all other kinds of papers. Newsprint was collected separately, and was not included in the reported weights for this program.

Table 9: Total Scrap Paper Collected, Pilot Program, Jefferson High School

<table>
<thead>
<tr>
<th>Date</th>
<th>white paper</th>
<th>mixed paper</th>
<th>Total weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-1</td>
<td>235.5</td>
<td>62</td>
<td>297.5</td>
</tr>
<tr>
<td>3-8</td>
<td>58.3</td>
<td>63.4</td>
<td>121.7</td>
</tr>
<tr>
<td>Total</td>
<td>293.8</td>
<td>125.4</td>
<td>419.2</td>
</tr>
<tr>
<td>Mean</td>
<td>146.9</td>
<td>62.7</td>
<td>209.6</td>
</tr>
</tbody>
</table>

While this data only represents the two week pilot program, the implications are significant. Projecting the mean collection rates over a forty week school year would yield 2.93 tons of white paper and 1.25 tons of colored paper. This represents a significant financial reward for Jefferson High School and the district (considering the current high market value of scrap paper), as well as additional savings in waste disposal costs due to the sizable reduction in trash volume.
Youth-Related Outcomes

The students from the Roosevelt, Jefferson, and Grant science classes were tested immediately before ("pre-program") and immediately after ("post-program") participating in the Recycling Awareness Program. These tests used a series of measures addressing level of recycling information, recycling related behaviors, and role identification to determine the effects of program participation on students.

Measures of Level of Recycling Information

Two different measures of level of recycling information were developed. The first measure identified the number of correct potentially recyclable items a student recalled.

Roosevelt High School: Fall 1994

The Roosevelt High School students showed significant increases in the mean number of items recalled post-program, as compared to pre-program.

Table 10: Roosevelt Students’ Recall of Recyclable items

“How many different recyclable items can you think of?”

<table>
<thead>
<tr>
<th>pre-program mean # items</th>
<th>post-program mean # items</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.36</td>
<td>9.00</td>
<td>42%</td>
</tr>
</tbody>
</table>

n=18
For subjects with low levels of pre-intervention recycling information (5 or less total items), the effect of participating in the Recycling Awareness Program was even more striking:

Table 11: Roosevelt Students with Low Levels of Pre-intervention Recycling Information Recall of Recyclable items

<table>
<thead>
<tr>
<th>“How many different recyclable items can you think of?”</th>
<th>pre-program mean # items</th>
<th>post-program mean # items</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.5</td>
<td>8.25</td>
<td>83.33%</td>
</tr>
</tbody>
</table>

The second measure of level of recycling information identified the number of correct potentially recyclable “core” items a student recalled. “Core” items refer to the ten (10) items emphasized in the City of Portland’s recycling collection programs (i.e. newspaper, cardboard, magazines, clear glass, green glass, brown glass, tin, aluminum, plastic milk jugs, and motor oil). The Roosevelt High School students showed significant increases in the mean number of core items recalled post-program, as compared to pre-program.

Table 12: Roosevelt Students’ Recall of Core Recyclable items

<table>
<thead>
<tr>
<th>“How many different core recyclable items can you think of?”</th>
<th>pre-program mean # core items</th>
<th>post-program mean # core items</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.5</td>
<td>7.4</td>
<td>64%</td>
</tr>
</tbody>
</table>

For subjects with low levels of pre-intervention recycling information (4 or less core items), the effect of participating in the Recycling Awareness Program was particularly dramatic:
Table 13: Roosevelt Students with Low Levels of Pre-intervention Recycling Information Recall of Core Recyclable items

"How many different core recyclable items can you think of?"

<table>
<thead>
<tr>
<th></th>
<th>pre-program mean # items</th>
<th>post-program mean # items</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=10</td>
<td>3.4</td>
<td>6.4</td>
<td>88.24%</td>
</tr>
</tbody>
</table>

While the entire Natural Resources Pathway science class's mean number of items increased significantly post-program, certain individual students recorded gains of in excess of 100%. Five students, 26% of the class, demonstrated 100% or greater increases in number of total potential recycling items recalled post-program. Six students, 32% of the class, demonstrated 100% or greater increases in number of core recycling items recalled post-program.

Jefferson High School: Winter 1995

The Jefferson High School students showed significant increases in the mean number of items recalled post-program, as compared to pre-program.

Table 14: Jefferson Students' Recall of Recyclable items

"How many different recyclable items can you think of?"

<table>
<thead>
<tr>
<th></th>
<th>pre-program mean # items</th>
<th>post-program mean # items</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=8</td>
<td>6.70</td>
<td>9.43</td>
<td>41%</td>
</tr>
</tbody>
</table>

For subjects with low levels of pre-intervention recycling information (6 or less total items), the effect of participating in the Recycling Awareness Program was even more striking:
Table 15: Jefferson Students with Low Levels of Pre-intervention Recycling Information Recall of Recyclable items

“How many different recyclable items can you think of?”

<table>
<thead>
<tr>
<th></th>
<th>pre-program mean # items</th>
<th>post-program mean # items</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5.25</td>
<td>9.25</td>
<td>76.20%</td>
</tr>
<tr>
<td>n=4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The second measure of level of recycling information identified the number of correct potentially recyclable “core” items a student recalled. “Core” items refer to the ten(10) items emphasized in the City of Portland’s recycling collection programs (i.e. newspaper, cardboard, magazines, clear glass, green glass, brown glass, tin, aluminum, plastic milk jugs, and motor oil). The Jefferson High School students showed significant increases in the mean number of core items recalled post-program, as compared to pre-program.

Table 16: Jefferson Students’ Recall of Core Recyclable items

“How many different core recyclable items can you think of?”

<table>
<thead>
<tr>
<th></th>
<th>pre-program mean # core items</th>
<th>post-program mean # core items</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.7</td>
<td>6.57</td>
<td>40%</td>
</tr>
<tr>
<td>n=8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For subjects with low levels of pre-intervention recycling information (5 or less core items), the effect of participating in the Recycling Awareness Program was particularly dramatic.

Table 17: Jefferson Students with Low Levels of Pre-intervention Recycling Information Recall of Core Recyclable items

“How many different core recyclable items can you think of?”

<table>
<thead>
<tr>
<th></th>
<th>pre-program mean # items</th>
<th>post-program mean # items</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.75</td>
<td>7.25</td>
<td>93.00%</td>
</tr>
<tr>
<td>n=4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Grant High School: Spring 1995

The Grant High School students also showed significant increases in the mean number of items recalled post-program, as compared to pre-program.

Table 18: Grant Students’ Recall of Recyclable items

“How many different recyclable items can you think of?”

<table>
<thead>
<tr>
<th></th>
<th>pre-program mean #</th>
<th>post-program mean #</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>items</td>
<td>6.82</td>
<td>10.09</td>
<td>48%</td>
</tr>
</tbody>
</table>

n=11

For subjects with low levels of pre-intervention recycling information (6 or less total items), the effect of participating in the Recycling Awareness Program was more only slightly more significant:

Table 19: Grant Students with Low Levels of Pre-intervention Recycling Information Recall of Recyclable items

“How many different recyclable items can you think of?”

<table>
<thead>
<tr>
<th></th>
<th>pre-program mean #</th>
<th>post-program mean #</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>items</td>
<td>5.83</td>
<td>9.00</td>
<td>54.40%</td>
</tr>
</tbody>
</table>

n=6

The second measure of level of recycling information identified the number of correct potentially recyclable “core” items a student recalled. “Core” items refer to the ten(10) items emphasized in the City of Portland’s recycling collection programs (i.e. newspaper, cardboard, magazines, clear glass, green glass, brown glass, tin, aluminum, plastic milk jugs, and motor oil). Plastic was included in the core group items for the Grant class due to the emphasis placed on identification and recycling of different types of plastics in this program. The Grant High School students showed significant increases in the mean number of core items recalled post-program, as compared to pre-program.
Table 20: Grant Students’ Recall of Core Recyclable items

"How many different core recyclable items can you think of?"

<table>
<thead>
<tr>
<th>pre-program mean # core items</th>
<th>post-program mean # core items</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.00</td>
<td>6.09</td>
<td>52%</td>
</tr>
</tbody>
</table>

n=11

For subjects with low levels of pre-intervention recycling information (4 or less core items), the effect of participating in the Recycling Awareness Program was significantly more noticeable.

Table 21: Grant Students with Low Levels of Pre-intervention Recycling Information Recall of Core Recyclable items

"How many different core recyclable items can you think of?"

<table>
<thead>
<tr>
<th>pre-program mean # items</th>
<th>post-program mean # items</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.67</td>
<td>6.22</td>
<td>69.50%</td>
</tr>
</tbody>
</table>

n=9

Measures of Recycling-related Behaviors

Students were presented with a list of 12 recycling-related behaviors, which fell into three general categories -- negative recycling-related behaviors, positive recycling-related behaviors, and reuse-related behaviors. They were asked to indicate the frequency ("regularly," "occasionally," or "never") with which they engaged in each behavior over the previous 6 week period. Three scales were developed from this data: a positive recycling-related behavior scale, a negative recycling-related behavior scale, and a reuse scale. Note: The Recycling Awareness Program lasted 6 weeks, so that the post-program
measure reflects the student's behavior during the period she/he was participating in the program.

When analyzing this data, there are at least two areas of interest:
1) those students whose behaviors change post-program, and
2) those students whose behavior did not change because they were already optimally engaging in the action in question (e.g. "regularly" engaging in positive behaviors; "never" engaging in negative ones.)

Roosevelt High School: Fall 1994
The Roosevelt High School class showed significant improvement on both the positive recycling-related behaviors and reuse scales.

Table 22: Roosevelt High School students post-program behavioral change (positive recycling-related scale)

<table>
<thead>
<tr>
<th>% subjects w/higher score post-program</th>
<th>% subjects w/lower score post-program</th>
<th>% subjects w/no change</th>
</tr>
</thead>
<tbody>
<tr>
<td>61%</td>
<td>28%</td>
<td>11%</td>
</tr>
<tr>
<td>n=18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 23: Roosevelt High School students post-program behavioral change (reuse scale)

<table>
<thead>
<tr>
<th>% subjects w/higher score post-program</th>
<th>% subjects w/lower score post-program</th>
<th>% subjects w/no change</th>
</tr>
</thead>
<tbody>
<tr>
<td>56%</td>
<td>11%</td>
<td>33%</td>
</tr>
<tr>
<td>n=18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Roosevelt High School class also showed significant changes post-program in terms of specific positive recycling behaviors. An example of a
type of “positive recycling behavior” addressed the issue of newspaper recycling.

Table 24: Roosevelt Students’ Behavioral Improvement: Newspapers

“In the last six weeks, how frequently have you put newspapers into a recycling collection container?”

<table>
<thead>
<tr>
<th>% post-program improvement</th>
<th>% “no change” but operating at optimal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>52.63%</td>
<td>21.10%</td>
</tr>
</tbody>
</table>

Another area of behavioral change had to do with negative recycling-related actions. After participating in the Recycling Awareness Program, the Roosevelt students reported a substantial decrease in the enactment of specific negative behavior. One example of negative recycling-related behavior had to do with vandalism.

Table 25: Roosevelt Students’ Behavioral Improvement: Vandalism

“In the last six weeks, how frequently have you smashed a glass bottle in the street?”

<table>
<thead>
<tr>
<th>% post-program improvement</th>
<th>% “no change” but operating at optimal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.79%</td>
<td>63.18%</td>
</tr>
</tbody>
</table>

The class also showed improvement in several specific behaviors relating to the “reuse” of materials.

Table 26: Roosevelt Students’ Behavioral Improvement: Reuse of Glass

“In the last six weeks, how frequently have you saved a jar to reuse it?”

<table>
<thead>
<tr>
<th>% post-program improvement</th>
<th>% “no change” but operating at optimal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>31.58%</td>
<td>42.11%</td>
</tr>
</tbody>
</table>
It should be noted that a change in behavior relating to “oil recycling” was particularly significant, because the disastrous consequences for the environment associated with the irresponsible dumping of used motor oil.

Table 27: Roosevelt Students’ Post-program Change in Oil Recycling Behavior
(Note: among those reporting ever having engaged in the behavior)

“In the last six weeks, how frequently have you saved used motor oil in a plastic jug for recycling? “

<table>
<thead>
<tr>
<th>% post-program improvement</th>
<th>% “no change” but operating at optimal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>62.50%</td>
<td>12.50%</td>
</tr>
</tbody>
</table>

n=8

In the past, used oil which was poured into sewers or storm drains, was found to flow directly into rivers and streams where it was responsible for the death of many fish.

Jefferson High School: Winter 1995

The Jefferson High School class showed significant improvement on the positive recycling-related behavior scale.

Table 28 : Jefferson High School students post-program behavioral change (positive recycling-related scale)

<table>
<thead>
<tr>
<th>% subjects w/higher score post-program</th>
<th>% subjects w/lower score post-program</th>
<th>% subjects w/no change</th>
</tr>
</thead>
<tbody>
<tr>
<td>80%</td>
<td>10%</td>
<td>10%</td>
</tr>
</tbody>
</table>

n=6

The Jefferson high School class also showed significant changes post-program in terms of specific positive recycling behaviors. An example of a type of “positive recycling behavior” addressed the issue of the proper preparation of materials for recycling.
Table 29: Jefferson Students’ Behavioral Improvement: Tin Cans

“In the last six weeks, how frequently have you cut the ends off of a can (so it can be recycled)?”

<table>
<thead>
<tr>
<th>% post-program improvement</th>
<th>% “no change” but operating at optimal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>50.00%</td>
<td>00.00%</td>
</tr>
</tbody>
</table>

Another area of behavioral change had to do with negative recycling-related actions. After participating in the Recycling Awareness Program, the Jefferson students reported a substantial decrease in the enactment of specific negative behaviors. One example of negative recycling-related behavior had to do with vandalism.

Table 30: Jefferson Students’ Behavioral Improvement: Vandalism

“In the last six weeks, how frequently have you smashed a glass bottle in the street?”

<table>
<thead>
<tr>
<th>% post-program improvement</th>
<th>% “no change” but operating at optimal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.33%</td>
<td>50.00%</td>
</tr>
</tbody>
</table>

Grant High School: Spring 1995

The Grant High School class showed significant improvement on all three of the behavior scales.

Table 31: Grant High School students post-program behavioral change (positive recycling-related scale)

<table>
<thead>
<tr>
<th>% subjects w/higher score post-program</th>
<th>% subjects w/lower score post-program</th>
<th>% subjects w/no change</th>
</tr>
</thead>
<tbody>
<tr>
<td>73%</td>
<td>0%</td>
<td>27%</td>
</tr>
</tbody>
</table>

n=11
Table 32: Grant High School students post-program behavioral change (reuse scale)

<table>
<thead>
<tr>
<th>% subjects w/higher score post-program</th>
<th>% subjects w/lower score post-program</th>
<th>% subjects w/no change</th>
</tr>
</thead>
<tbody>
<tr>
<td>64%</td>
<td>9%</td>
<td>27%</td>
</tr>
</tbody>
</table>

n=11

Table 33: Grant High School students post-program behavioral change (negative recycling-related scale)

<table>
<thead>
<tr>
<th>% subjects w/higher score post-program</th>
<th>% subjects w/lower score post-program</th>
<th>% subjects w/no change</th>
</tr>
</thead>
<tbody>
<tr>
<td>73%</td>
<td>27%</td>
<td>9%</td>
</tr>
</tbody>
</table>

n=11

The tremendous impact of the Recycling Awareness Program on the behaviors of the Grant students is noticeable when responses to specific questions are examined. For example, one of negative recycling-related behavior was associated with vandalism, and a second with littering.

Table 34: Grant Students’ Behavioral Improvement: Vandalism

“In the last six weeks, how frequently have you smashed a glass bottle in the street?”

<table>
<thead>
<tr>
<th>% post-program improvement</th>
<th>% “no change” but operating at optimal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>27.3%</td>
<td>72.7%</td>
</tr>
</tbody>
</table>

n=11

Table 35: Grant Students’ Behavioral Improvement: Littering

“In the last six weeks, how frequently have thrown empty paper cups or food wrappers on the ground?”

<table>
<thead>
<tr>
<th>% post-program improvement</th>
<th>% “no change” but operating at optimal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>54.55%</td>
<td>27.3%</td>
</tr>
</tbody>
</table>

n=11
Of the 9 students who reported engaging in some form of negative recycling-related behavior pre-program, 8 (89%) demonstrated behavioral improvement.

The same pattern of significant program impact can be found when specific reuse-related behaviors are examined. As noted earlier, a change in behavior relating to “oil reuse/recycling” was particularly significant, because the disastrous consequences for the environment associated with the irresponsible dumping of used motor oil.

Table 36: Grant Students’ Post-program Change in Oil Recycling Behavior (Note: among those reporting ever having engaged in the behavior)

“In the last six weeks, how frequently have you saved used motor oil in a plastic jug for recycling?”

<table>
<thead>
<tr>
<th>% post-program improvement</th>
<th>% “no change” but operating at optimal level</th>
</tr>
</thead>
<tbody>
<tr>
<td>71.42%</td>
<td>14.29%</td>
</tr>
</tbody>
</table>

n=7

Of the 10 students who reported engaging in less than an optimal level of reuse-related behavior pre-program, 7 (70%) demonstrated behavioral improvement.

Measures of level of Role Identification

Students were presented with 5 questions concerning the personal importance of recycling, which were scored on a 9-point Likert scale (from “strongly disagree” to “strongly agree”). These items were taken directly from Callero’s (1985, 1992) measure of the importance of the role “blood donor.” A “total role identification score” was obtained by summing a student’s responses to all five questions.
Roosevelt High School: Fall 1994

The Roosevelt High School students showed marked increases in level of role identification, with the pro-social role recycler, over the course of the Recycling Awareness Program.

Table 37: Roosevelt Students Change in Level of Role Identification

Maximum total role identification score = 45

<table>
<thead>
<tr>
<th>pre-program mean score</th>
<th>post-program mean score</th>
<th>% increase</th>
<th>pre-program percentile</th>
<th>post-program percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>30</td>
<td>25%</td>
<td>53.33%</td>
<td>66.67%</td>
</tr>
</tbody>
</table>

\(n = 18\)

Several interesting tendencies were noted in the classes responses to specific role-identification questions. For example, more than half of the Roosevelt High School students indicated they thought more about recycling at the end of the Recycling Awareness Program than before they participated. More than 68% of the same class stated they would experience a greater sense of loss if they were "forced to give up recycling" after participating in the program than before. The Roosevelt High School students also acknowledged that participating in the program clarified their feelings about recycling.

While each question in the section on students' perceptions of the importance of the role recycler tapped a different dimension of role identification, the most revealing information about the effects of participating in the Recycling Awareness Program on student identification with the role "recycler" came from a direct question.
Table 38: Change in Roosevelt Students’ Level of Identification with role “Recycler” (single question)

(Do you agree or disagree with the statement) “Recycling is an important part of who I am”?

<table>
<thead>
<tr>
<th>mean score pre-program (range 1 - 9)</th>
<th>mean score post-program (range 1 - 9)</th>
<th>% greater agreement w/ statement post-program</th>
<th>% greater disagreement w/ statement post-program</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.37</td>
<td>5.58</td>
<td>68.42%</td>
<td>15.79%</td>
</tr>
</tbody>
</table>

n=18

Jefferson High School: Winter 1995

The Jefferson High School students also showed marked increases in level of role identification, with the pro-social role recycler, over the course of the Recycling Awareness Program.

Table 39: Jefferson Students Change in Level of Role Identification

Maximum total role identification score = 45

<table>
<thead>
<tr>
<th>pre-program mean score</th>
<th>post-program mean score</th>
<th>% increase</th>
<th>pre-program percentile</th>
<th>post-program percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.83</td>
<td>25</td>
<td>26.1%</td>
<td>44.07%</td>
<td>55.56%</td>
</tr>
</tbody>
</table>

n = 6

It is interesting to note that even though the pre-program mean role identification score for the Jefferson class was lower than that of the classes from the other two participating high schools, the percentage improvement in post-program role identification scores was the greatest. This indicates that the Recycling Awareness Program is effective in increasing student identification with the role recycler, even if those students’ initial identification with the role is relatively low.
As noted earlier, some of the most revealing information about the effects of participating in the Recycling Awareness Program on student identification with the role "recycler" came from a direct question.

Table 40: Change in Jefferson Students’ Level of Identification with role “Recycler” (single question)

(Do you agree or disagree with the statement) “Recycling is an important part of who I am”?

<table>
<thead>
<tr>
<th>mean score pre-program (range 1 - 9)</th>
<th>mean score post-program (range 1 - 9)</th>
<th>% greater agreement w/statement post-program</th>
<th>% greater disagreement w/statement post-program</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.17</td>
<td>3.67</td>
<td>50.00%</td>
<td>16.7%</td>
</tr>
</tbody>
</table>

n=6

Grant High School: Spring 1995

The Grant High School students showed marked increases in level of role identification, with the pro-social role recycler, over the course of the Recycling Awareness Program.

Table 41: Grant Students Change in Level of Role Identification

Maximum total role identification score = 45

<table>
<thead>
<tr>
<th>pre-program mean score</th>
<th>post-program mean score</th>
<th>% increase percentile</th>
<th>pre-program percentile</th>
<th>post-program percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>27.55</td>
<td>30.91</td>
<td>12.2%</td>
<td>61.22%</td>
<td>68.69%</td>
</tr>
</tbody>
</table>

n = 11

Following a pattern directly opposite that of the Jefferson class, The Grant High School class had the highest pre-program mean role identification score and the smallest post-program increase.
Several interesting tendencies were noted in the class’s responses to specific role-identification questions. For example, more than half of the Grant High School students indicated they thought more about recycling at the end of the Recycling Awareness Program than before they participated. The Grant High School students also acknowledged that participating in the program clarified their feelings about recycling.

As with the two earlier classes, some of the most revealing information about the effects of participating in the Recycling Awareness Program on student identification with the role “recycler” came from a direct question.

Table 42: Change in Grant Students’ Level of Identification with role “Recycler” (single question)

(Do you agree or disagree with the statement) “Recycling is an important part of who I am”?

<table>
<thead>
<tr>
<th>mean score pre-program (range 1 - 9)</th>
<th>mean score post-program (range 1 - 9)</th>
<th>% greater agreement w/statement post-program</th>
<th>% greater disagreement w/statement post-program</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.67</td>
<td>6.09</td>
<td>54.55%</td>
<td>27.27%</td>
</tr>
</tbody>
</table>

Summary of Youth-Related Outcomes

In this section, we have examined the effects of participation in the Recycling Awareness Program on the Roosevelt, Jefferson, and Grant High School students. Three groups of measures were utilized -- a set addressing level of recycling information, a set concerning recycling related behaviors, and a series of questions relating to degree of role identification. Each group of measures substantiated the claim that being part of the Recycling Awareness Program had a positive effect on likelihood of the participating students
taking on the pro-social role, "recycler." Combining the data from the three high school classes yields the following summaries.

**Level of knowledge**
- 89% of students showed a post-program increase in level of recycling knowledge
- 83% of students showed a post-program increase in level of core-item (emphasized in program) recycling knowledge

**Recycling-related behaviors** (controlling for subjects showing no behavior change but operating a maximum pro-social level pre-program)
- 66% of students demonstrated an increase in frequency of enacting positive recycling related behaviors post-program
- 49% of students demonstrated an increase in frequency of enacting reuse-related behaviors post-program
- 45% of students demonstrated an decrease in frequency of enacting negative recycling related behaviors post-program

**Role Identification**
- 74% of students showed a post-program increase in level of role identification

**Total**
- 100% of students showed a post-program increase on at least one of the three role-related measures (i.e. level of knowledge, behaviors, role-identification)
• 91% of students showed a post-program increase on at least two of the three role-related measures
• 54% of students showed a post-program increase on all three of the role-related measures

It is interesting that of the each of the high school classes showed the greatest improvement in different areas. The Jefferson class had the highest percentage increase in post-program role-identification scores, the Grant class showed the greatest positive increase in level of behavioral change, and the Roosevelt class significantly improved in terms of both level of knowledge and level of role identification.

The post-program role-identification percentile score is particularly significant. After completing the Recycling Awareness Program, both the Roosevelt and Grant classes’ mean level of identification with the role recycler placed in them in top one third of all possible scores. It has been shown that individuals who identify with a particular role tend, among other things, to seek out opportunities to engage in behavior congruent with that role (Markus, 1977; Fiske & Taylor, 1991). Therefore, the positive shift in students level of role identification, after completing the Recycling Awareness Program, means they are much more likely to engage in recycling behaviors in the future.

V. Conclusions: Recycling Awareness Program
The Recycling Awareness Program met all of it’s originally stated goals:
1) to provide a model of youth in community service learning which enhances educational experience while improving recycling rates in the community. The high school students’ scores on the measures of recycling information, recycling-related behaviors, and level of role identification support the program assertion that this was a positive educational experience. Community recycling participation was facilitated in several ways. First, all three high schools’ “kids-teaching-kids” presentations in the elementary schools improved the level of recycling-related knowledge among a key target population – i.e. the younger children who typically are the ones assigned the job of taking out the trash. Second, the Roosevelt students contributed to increased recycling quality and participation at the Columbia Villa Housing Development. Using the “Participation Rating System,” described earlier, the average participation rating score for all the monitored collection systems during the Fall 1994 Recycling Awareness Program was 2.88 stars. This demonstrates positive impacts of the 1993-94 Recycling Awareness Program not only did not “drop off” but actually improved over time. While some systems improved more than others, overall the Recycling Awareness Program seems to be associated with an improvement in recycling at Columbia Villa. Third, the Jefferson class implemented a school-wide scrap paper collection program that could result in as much as four tons of paper being removed from the school’s waste stream. This program should also result in a financial benefit for the school and the district, due to the significant market value of the collected paper.
2) to demonstrate a method for creating long-term mentoring opportunities integrated into local higher education programs, through college/high school collaborations. This is the second year that the Portland State University/Portland Public School District #1J partnership was able to conduct this successful program. The program is scheduled to be expanded into even more Portland Public high schools over the next three years. By the 1997-98 school year, the Recycling Awareness Project will be active in all eleven Portland high schools. While a prime emphasis of this program was educating the high school students about recycling and waste stream reduction, mentoring and relationship-building was also important. Excerpts from letters, written by the high school students to the Portland State University students, substantiate this:

- “Recycling has opened my eyes toward the world a lot wider than what it was. Recycling is a big step for me...Now I’m on my mom and dad to start recycling in the house”
- “At first I thought that the recycle project was going to be a waste of my time, but when the project was almost over my feeling about the recycle project had changed. Now I can say that I like to recycle and it will be a part of my life and (my) children’s lives.”
- “I learned how to become a better person to my community...”
- “I found out how much better recycling helps the earth. It makes you feel better about yourself.”
- “I just wanted to thank you all so very much for taking your time to teach us about recycling.”
- “I learned a lot more about recycling during this project than I knew before.”
• "The little kids at the elementary school looked up to me for one of the first times in my life..."
• "I didn’t really take time to recycle and when you came I started to take it serious."
• "When they (Portland State University students) first came here I thought some of them wouldn’t recycle (I’m just going to recycle because I’m in this class). I was wrong. They really like to recycle and they wanted us to start recycling too."
• "I met new people and found out what we had in common and what we didn’t have in common ... our differences."
• "The Portland State University students taught us, then we made a video and taught some other students at Humboldt. Thanks a lot. We recycled our knowledge over again."
• "I probably will never see those Portland State University students again, but I will remember them."

3) **to reduce high school dropout rates:** While it is too early to accurately access the impact of this program on student drop out rates, discussions with the three high school science teachers, indicated that their students’ attendance rate, during the period of the Recycling Awareness Programs, was higher than usual for these classes, and higher than the over-all school average.

4) **to develop a curriculum on recycling which can be used by high school teachers:** The materials used in the 1993-94, and 1994-5 Recycling Awareness Programs have been collected, and are currently being organized into a packet of lesson plans so that teachers at Roosevelt,
Jefferson, Grant and other high schools can continue the Recycling Awareness Program even if the collaborative effort with Portland State University is not continued.

5) **to increase positive student ties to the local community:** The Recycling Awareness Program helped make the students from the participating high schools more visible in the community. Residents of the Columbia Villa/Tamarack Housing Development became aware of the monitoring and observation crews of Roosevelt High School students working at the recycling collection systems in the complex. The Grant High School class has already established working relationships with local businesses, The Northwest Polystyrene Recycling Council, and The Marko Foam Company in preparation for the 1995-96 community service project -- a neighborhood-wide polystyrene foam collection drive. By taking their recycling promotional videos to the different elementary schools to show the younger children, the high school students became teachers themselves, sharing the lessons on recycling and waste stream reduction they had learned from the Portland State University students. When several local businesses donated food for the end-of-class celebration at each of the high schools, this was an acknowledgment of the contribution of the high school students, and let them know their community appreciated their efforts.

6) **to empower students with a sense of self-efficacy that encourages community involvement.** The high school students discovered that the things they did during the Recycling Awareness Program actually
made a difference in the world outside of their high school. The data on the levels of recycling quality and participation at Columbia Villa collected by the Roosevelt class, has contributed to promoting the recycling collection program at that complex. The Jefferson students received school, city, and state-wide recognition for their scrap paper collection program, as well as the “Excellence in Recycling” award from the Weyerhaeuser Wood Products Company. Making the recycling promotional videos provided a vehicle for teaching younger children about recycling. As one Roosevelt student noted, “the film making was my favorite activity. It was one time we could physically do things instead of writing things.” Research has shown that many individuals need to feel that their actions will make “a difference” before they are willing to undertake actions, such as getting involved in their community (Bandura, 1986). The Recycling Awareness Program provided these feelings of self-efficacy. The increase in level of identification with the role recycler, at the completion of the Recycling Awareness Program, indicates that the high school students are also likely to continue to engage in these pro-social behaviors in the future.

As it enters its third year of existence, the Recycling Awareness Project continues to be a successful service learning project. The positive program outcomes, noted in the final report on the 1993-94 Project (Collier, 1994), have been maintained by the 1994-95 Recycling Awareness Project. It enriched the educational experiences of the Portland State University, Roosevelt, Jefferson and Grant High Schools; and Clarendon, Humboldt, and Irvington Elementary Schools students; it promoted the recycling program at the
Columbia Villa/Tamarack Housing Development, it expedited the implementation of the school-wide scrap paper collection program at Jefferson, it facilitated high school student involvement in their local neighborhood, and it strengthened the connection between Portland State University and the North Portland community. Special thanks should go to the Portland Educational Network, the Center for Academic Excellence, Coordinated Programs in Urban Environmental Research and Education, the Center for Urban Studies, and Portland State University for their continued support. This project is an example of the kind of community-based learning that is only possible at an urban university such as Portland State.
Bibliography


Appendix
Appendix i

RECYCLING AWARENESS PROGRAM QUESTIONNAIRE

SUBJECT #: ___________ DATE: ___________

In this questionnaire, we are asking people a few questions about RECYCLING. All responses will be confidential. There are no "right" or "wrong" answers.

I. ITEMS

1) Think about a person who recycles. A person who is an active recycler could recycle many different items. How Many Different Recyclable Items Can You Think Of? (List Them Below)

A) ________________________________
B) ________________________________
C) ________________________________
D) ________________________________
E) ________________________________
F) ________________________________
G) ________________________________
H) ________________________________
I) ________________________________
J) ________________________________
II. ACTIONS

Below is a list of different "Actions". Place A Mark In the Column that Best Describes YOUR Actions During the Last 6 Weeks.

<table>
<thead>
<tr>
<th>never</th>
<th>occasionally</th>
<th>regularly</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

2) cut the ends off and crushed tin cans
3) reused grocery bags
4) smashed a glass bottle in the street
5) put newspapers into a recycling collection container
6) bundled up cardboard to be recycled
7) saved a jar in order to reuse it
8) saved used motor oil in a plastic jug for recycling
9) thrown out plastic milk jugs with the rest of the trash
10) collected returnable cans and bottles for deposit money
11) purchased a product made of 100% recycled materials
12) thrown empty paper cups or food wrappers on the ground
13) recycled anything in a recycling collection system
III. IMPORTANCE

INDICATE HOW MUCH YOU "AGREE" OR DISAGREE" WITH EACH OF THE FOLLOWING STATEMENTS.

14) Recycling is something I rarely even think about.

<table>
<thead>
<tr>
<th>strongly agree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>9------8------7------6------5------4------3------2------1</td>
<td></td>
</tr>
</tbody>
</table>

15) I would feel a loss if I were forced to give up recycling.

<table>
<thead>
<tr>
<th>strongly agree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>9------8------7------6------5------4------3------2------1</td>
<td></td>
</tr>
</tbody>
</table>

16) I really don't have any clear feelings about recycling.

<table>
<thead>
<tr>
<th>strongly agree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>9------8------7------6------5------4------3------2------1</td>
<td></td>
</tr>
</tbody>
</table>

17) For me, being a recycler means more than just reducing the amount of trash I throw away.

<table>
<thead>
<tr>
<th>strongly agree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>9------8------7------6------5------4------3------2------1</td>
<td></td>
</tr>
</tbody>
</table>

18) Recycling is an important part of who I am.

<table>
<thead>
<tr>
<th>strongly agree</th>
<th>strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>9------8------7------6------5------4------3------2------1</td>
<td></td>
</tr>
</tbody>
</table>
19) DO YOU HAVE ACCESS TO A RECYCLING SYSTEM - EITHER
YELLOW BINS OR AN APARTMENT COLLECTION SYSTEM?
yes ______   no ______

20) MALE _____   FEMALE _____

21) WHY DID YOU SIGN UP FOR THIS CLASS?

-----------------------------------------------------------------------
-----------------------------------------------------------------------
-----------------------------------------------------------------------
-----------------------------------------------------------------------

THANK YOU FOR YOUR PARTICIPATION.