

EVALUATION OF EDUCATIONAL STRATEGIES FOR LITTER CONTROL,

by

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CHAPTER I

INTRODUCTION

In the Fall of 1976 the Virginia Division of Litter Control (VDLC) was created to oversee compliance with the Litter Control Act passed earlier that year. Through a comprehensive program called the Virginia Plan, the VDLC began a coordinated effort to control litter in the State of Virginia. One of the major components of the Virginia Plan was the adoption of a K-6 grade elementary school curriculum targeting various principles of solid waste management. The program was called Operation Waste Watch (OWW). A unique aspect of the OWW program was that it was not simply constructed and implemented as are many state programs. The OWW program was implemented in stages along with careful evaluation of the program's effectiveness at each stage. Attempts were made to carefully tailor the program to fit the elementary student population of the State of Virginia and to continually propose and test new versions of the teaching curriculum. The VDLC has been particularly receptive to the incorporation of psychological principles into the program.

Therefore, the present study was commissioned by the VDLC in an attempt to provide further evaluation of the curriculum material and to suggest and evaluate various curriculum modifications.

Specifically, the present study has attempted to provide modifications to the OWW materials which incorporate various principles of Applied Behavioral Analysis. Each of the modifications reflected attempts to encourage elementary school children to consider the problem

of litter in terms of behavior, and to teach them how littering behaviors are controlled by environmental antecedents and response consequences. Students were also encouraged to become behavioral change agents in their home and community.

A second goal of the present study was to provide a comprehensive evaluation of both the standard OWW curriculum package and the specially modified curriculum program. The OWW materials were originally constructed around a pre/post achievement test to be administered by participating teachers. Past OWW evaluations have been centered around the use of this instrument for program evaluation. However the present evaluation has attempted to provide an examination of actual student behavior as well as an assessment of student achievement. The project has attempted to modify several existing behavioral assessment devices for use in elementary classroom situations. Therefore, the study provides a contrast between the more traditional pencil and paper achievement tests measuring student knowledge and techniques assessing actual student behavior.

Background

Problem of Litter

Litter is defined as "misplaced solid waste" (Geller, Winett, & Everett, 1982, p. 48), and we can see the effects of this misplacement all around us along roadsides, public parks, and even far out into the ocean. The problem is not so much with the litter itself but with the inappropriate human behavior which produced it (Keep America Beautiful, Inc., 1970). The term "misplaced" requires further definition. An

object is misplaced only so long as there is a socially sanctioned alternative as to where such items belong. Hence, trash along a highway is considered inappropriate yet the same material placed in a public land fill is considered appropriate. Society decides what constitutes appropriate and inappropriate disposals (Geller, Winett, & Everett, 1982).

The environmental consequences of littering are attracting growing attention across the country for a variety of reasons. Litter is costly, esthetically displeasing, and poses a variety of environmental hazards to man and animal life.

Accumulations of inappropriate waste items in areas deemed by society to be free of litter (e.g., roadways, public recreation zones, etc.) are usually considered to be unattractive. Indeed we spend large sums of money each year cleaning up these areas for just this reason. For example, Keep America Beautiful, Inc. (KAB) has estimated that the nation spends well over one billion dollars a year in collecting litter from public areas and for cleaning private and commercially owned property. The state share alone of the costs to clean our public highway system each year is close to one million dollars per state (Ward, 1975).

Litter poses other more detrimental problems as well as being esthetically displeasing. For example, in a report (by Freeman Advertising Associates, 1977) to the Virginia Division of Litter Control (VDLC) litter was shown to pose four major hazards. Litter can pose a safety hazard to man (especially children) in a variety of ways including injury due to exposed sharp objects (such as broken glass), and due to contact with inappropriately disposed toxins (such as

chemical dumps). Syrek (1975) estimated that in the State of California litter was directly responsible for annual medical costs of three million dollars. Additionally, it is estimated by insurance companies that many accidents each year occur when motorists swerve to avoid debris on the highway.

Litter can also cause a health hazard when left for long periods of time. For example, unattended accumulations of trash often harbor rats, roaches and serve as a breeding ground for flies and mosquitoes. Additionally, decaying organic matter leads to unpleasant odors.

Litter also poses a fire problem when rubbish and other flammable materials are allowed to accumulate. Many house fires are reported each year which have started through spontaneous combustion or through carelessly discarded cigarette butts into trash piles. Fire fighters are often hindered in fighting building fires which have been intensified because of uncollected trash accumulations. Additionally, uncontrolled burning of trash has accounted for at least one-third of all forest fires in this country alone.

Finally, litter is also harmful to animals as well as to man. Each year animals die or are seriously crippled through encounters with inappropriate human waste. Wildlife officers have repeatedly found small animals injured when trying to forage for food in trash piles, animals partially entrapped in food containers (such as tin cans and plastic beer can holders) and animals which have ingested various litter such as pull tabs from drink containers. Hence, according to Freeman & Associates (1977), litter can be far more serious than a simple eyesore.

Geller, et al. (1982) states that on top of the problems mentioned above, litter often wastes energy. That is, it costs us (under most conditions) far more to produce new products from raw material than it does to produce the same product from recycled materials. Additionally, waste items can often directly be converted into energy. For example, much of our waste can be burned to produce alternate sources of electric power.

Hence, the outcome of littering behavior is detrimental in a multifaceted manner. In addition to the problem of simple esthetics, litter does harm to man and animal life and costs us all a great deal of money, both in terms of attempts to avert the problematic behavior and in terms of cleaning up the subsequent results.

Who Contributes to the Problem

Given that litter is the product of inappropriate behavior, an understanding of the characteristics of those who exhibit this behavior would help us to design specific intervention strategies to combat the problem (Geller, 1980; Geller et al., 1982). Unfortunately, the studies in this area do not provide an accurate picture of the demographic characteristics of people who litter. Of the data in this area, the work of Public Opinion Surveys, Inc. (1968) is probably the most often cited. This survey suggested that: (1) males are twice as likely as females to litter, (2) adults between the ages of 21 and 35 are more likely to litter than older adults, (3) people in small communities or rural settings are more likely to litter than people who live in large urban centers, and (4) persons from large households

(i.e., five or more persons) are more likely to litter than people from smaller households. The study however based its findings only on personal reports and not on actual behavioral data. Several studies have suggested that reports of littering may not correspond with actual behavior (Bickman, 1972; Heberlein, Note 1). Therefore these results may not be entirely representative of the population. That is, the results may only describe the characteristics of those who are willing to admit to littering (Geller, 1979; Geller et al., 1982).

Few studies have examined actual behavioral evidence in an attempt to identify who litters. For example, Heberlein (1971) distributed 7,000 flyers to people walking along a city street in Wisconsin. Of the 58 people who subsequently littered their handbill, more were found to be male than female, most were younger and more were found to be single than married. Finnie (1973), on the other hand, observed 272 people who purchased a hot dog from a street vendor in Philadelphia and found that males did not tend to litter the wrapper more than females. He did however, find that people under 18 were more likely to litter the hot dog wrappers than those over 18 years old, and that blacks and blue collar workers were more likely to litter than whites and white collar workers. Both studies, however (i.e., Heberlein, 1971; Finnie, 1973) must be treated with caution in that the number of people littering in each case were extremely small (Geller et al., 1982). Indeed, differences in sex were not found across a series of studies using considerably larger sample sizes (i.e., 18,000 supermarket patrons). For example, Geller, Witmer, and Orebaugh (1976); Geller, Witmer, and Tusso (1977) handed out flyers marked according to sex and found that appropriate

and inappropriate disposals were not significantly related to the patron's sex. Since only one location (i.e., a supermarket) was used in this series of studies, the results may not generalize to other locations and settings (Geller, 1980; Geller et al., 1982).

Hence, there is not enough unequivocal evidence available to adequately define the characteristics of individuals who litter. As summarized by Geller et al. (1982), much of the data is based on self report and may not represent corresponding human behavior. In addition, the empirical research in this area has been hampered by problems of unreliability (due to sample restrictions) or when reliable, has been limited by environmental restrictions such that its generalability is equivocal. Therefore, we simply do not have a clear idea of who litters and who does not. It has been suggested (e.g., Geller et al., 1982) that anyone will litter under the right environmental situation. Hence, our intervention strategies must be designed on a scale broad enough to apply to a variety of populations across a variety of situations.

Large Scale Intervention

This need for large scale intervention was the impetus for the development and growth of one of the most comprehensive litter control programs in the country, which was instigated by Keep America Beautiful, Inc. (KAB). KAB was started in 1953 by a group sponsoring corporations (mostly beverage firms) to focus community attention on the problem of litter. It has been promoted as a nation-wide, nonprofit, nonpartisan public service organization dedicated to stimulating public

involvement (KAB, 1976). During the last 30 years, KAB has sponsored litter programs in 207 U. S. locations as well as in over six other countries, including Australia, Bermuda, Canada, Great Britian, New Zealand, and South Africa (KAB, 1979). Through the years, the KAB organization has promoted educational programs, community workshops, large scale media campaigns, as well as research, all under the proclamation of "People Start Pollution, and People can Stop It" (KAB, 1976). However it was not until 1976 that KAB began its active community involvement through a program called the Clean Community System (CCS).

The CCS program was designed to provide a behavioral approach to the problems of waste management (KAB, 1977). Although the program may not represent a "pure nor optimal behavioral approach to solid waste management," it has been acclaimed as one of the most comprehensive and innovative litter control programs in the world to date (Geller et al., 1982, p. 104). The goal of the CCS program is to solicit total community involvement through the efforts of local businesses, civic groups, community governments and private citizens. In fact, the "structure and dynamics of the current CCS may actually represent the best working model developed so far for organizing reciprocal community efforts toward environment preservation" (Geller et al., 1982, p. 107).

The CCS procedure involves a comprehensive examination of the waste management problems in a particular community and emphasizes specific areas needing change. It also provides for a careful examination of the local ordinances and litter laws and offers methods to

improve community enforcement. The program stresses public awareness through extensive media coverage as well as through beautification projects designed to make various community areas more attractive to the public and thus enhance civic pride. Additionally, the program attempts to improve local physical resources to control litter (such as public waste receptacles and dumpsters) and to update collection equipment and local collection practices. Finally, the CSS program stresses public education through community workshops in civic and public service organizations and in the local school systems. A comprehensive educational curriculum targeting appropriate waste management principles is available from KAB for implementation at the K-6 grade level. The program called Operation Waste in Place has been widely implemented across the country (KAB, 1976).

In return for the communities' adoption of the various CCS goals and a demonstrated commitment to change, the KAB staff provides active support to each CCS community. That is, KAB will furnish the blueprints for the CCS program (in the form of various guides and training manuals and a detailed training workshop for local CCS leaders), consultation throughout the program (in terms of brainstorming activities and advice), and nationwide publicity for the communities' efforts. One of the most useful side effects of the CCS program is that it provides a framework which can be copied by others who wish to establish a collaborative community-wide effort to promote appropriate waste management. For example, it has provided a detailed model by which state agencies can develop similar large-scale programs fine tuned to the needs of their own constituencies. One state which has attempted

to carry out such a program is the State of Virginia.

Specifically, in 1976 the State of Virginia passed the Litter Control Act, which called for the creation of the Division of Litter Control and the enactment of laws increasing penalties for litter law violators (VDLC, 1979). Virginia's Division of Litter Control (VDLC), which functions under the Department of Conservation and Economic Development, was charged with the responsibility to "accomplish effective litter control through a state-developed and coordinated plan of education, control, prevention and elimination" (Virginia Litter Control Act; Sec. 10-198). Over half of the funds for the VDLC are distributed to different localities around the state in the form of grants to finance local anti-litter programs (VDLC, 1979). In order to better assist Virginia communities in setting up effective long-range programs, the VDLC developed a comprehensive organizational plan which could easily be molded to the needs of a particular locality. This organizational package was called the Virginia Plan and was modeled after the CCS program of KAB. Specifically, the VDLC refined and improved the basic CCS procedures in order to provide a more practical approach for the communities of Virginia. The Virginia Plan stressed five major elements, involving: (1) community planning and organization, (2) effective communication (i.e., a state-wide publicity campaign), (3) sustained community cleanup programs, (4) enforcement of litter ordinances, and (5) the development of educational programs in the public school system throughout the State. The overall goal of the Virginia Plan was to "assist communities in developing a comprehensive program which would reduce litter" (VDLC, 1979, p. 1). The plan was

constructed around the idea that people cause litter and that people must be used to reduce it, hence the program emphasized active community involvement from all aspects of society. The plan was also designed to foster long-term efforts of a continuous nature (rather than short-term bursts of energy which soon die out). Emphasis was also placed on a community attempting only what it could carry through to completion successfully. That is, the plan stressed that it was easier to build a program around the successful accomplishment of several small objectives rather than around the overall failure of more global objectives. Hence, communities were encouraged to start only with what could be successfully accomplished (VDLC, 1979).

One of the more creative aspects of the Virginia Plan concerned its educational program and the associated program of ongoing educational evaluation. The educational curriculum was modeled after the Operation Waste in Place curriculum created by KAB and was entitled Operation Waste Watch.

Operation Waste Watch (OWW)

The OWW program was developed around the premise that in order "for a long term reduction of littering behavior to be achieved in Virginia's localities, young people must acquire knowledge of the waste disposal laws and practices . . ." and develop "proper waste disposal habits at an early age . . ." (VDLC, 1979, p. E.1).

The OWW materials were divided into seven sequential learning units for classroom implementation in kindergarten through the sixth grade. Each grade level was supplied with a separate unit designed to address

issues of litter control. Although all of the seven units followed the same general theme (i.e., the instruction of principles of appropriate solid waste management), each unit was designed around a particular goal appropriate to the given grade level. That is, each grade unit addressed a different topic. The topics for each grade level were defined by the Division as follows:

(1) Kindergarten: Natural and Man-made Objects. Students learn to differentiate between natural and man-made material and to identify litter.

(2) Grade One: Waste Out of Place. Students learn to classify material into the classes of waste and useful objects. They also learn proper disposal techniques for their own waste material.

(3) Grade Two: Litter Pollution. Students learn the negative effects of litter.

(4) Grade Three: Trash Trends. Students learn historical changes in consumption and packaging.

(5) Grade Five: Trash Treasures. Students learn methods of recycling and resource recovery.

(6) Grade Six: Community Solutions for Solid Waste Management. Students study local solid waste problems and design a model waste disposal plan (VDLC, 1980, P. iii).

Each of the curriculum units was intended to be used by teachers in a variety of ways, depending on the needs of particular students (VDLC, 1980). Further, the curriculum was designed so that it could be incorporated into ongoing school programs at each grade (e.g., science, social studies and health curricula). The materials stressed an emphasis on language arts, mathematics, and art. The Division deliberately stressed the flexibility of the materials and fully intended that the sequence of the units within the curriculum may be changed to suit the abilities of students at the individual schools

(VDLC, 1979). With each of the grade units, each teacher could also shorten or lengthen the series of activity cards to fit their particular schedule. Hence, the total curriculum package was designed to be global enough and flexible enough to meet the varied needs of the schools throughout Virginia.

The curriculum program was provided to each school as a set of individual grade units. Each of the units contained a teacher instruction guide, film strip-cassette materials, activity cards for class and individual student use, a set of test materials, coloring books or comic books of an anti-litter nature, and a wall poster for class use.

Although the OWW materials were modeled after the Operation Waste in Place program by KAB, all of the grade units (except the sixth grade module) were extensively modified by the Division. For example, the Operation Waste in Place curriculum materials were presented at each grade level in the form of a set of lesson plans. Many of the ideas from these general teacher guides were borrowed by the Division, yet all activities were provided to the teachers on a set of activity cards and all of the curriculum activities were provided in greater detail.

The OWW program also differed from the Waste in Place material in terms of the addition of an extensive audio-visual package for each grade level. No such audio-visual coverage was provided in the Waste in Place materials. In addition, the curriculum format (i.e., the actual content of the different student activities) was changed and updated by the VDLC prior to initial testing (VDLC, 1979). Only the

sixth grade material was carried over from the Operation Waste in Place program without revision. All of the material for the other grade levels was rewritten for the Division by outside consultants.

The curriculum materials were originally designed through the joint collaboration of Old Dominion University (Dr. William Brown) and the Virginia State Department of Education (Dr. Edwin White) in the spring of 1979. The OWW program was then implemented during the 1979-1980 academic year in 35 schools throughout Virginia for evaluation. Initial evaluation of the curriculum program was provided by a team of psychologists at the College of William and Mary (Galano, Nezelek, & Turnbull, 1980). Extensive revisions to the curriculum materials were made by the VDLC following this pilot testing program and the program was targeted for reevaluation during the 1980-1981 academic year. This second evaluation was intended to provide additional information from that available from the first study. That is, the first program evaluation was designed to examine primarily the educational benefits of the curriculum as assessed by student test performance on the objective testing instruments supplied with the curriculum materials. The second evaluation of the OWW program (which forms the basis for the present study) was intended to primarily examine the impact of the curriculum on actual student behavior.

CHAPTER II

REVIEW OF RELATED LITERATURE

Psychological Research on Litter Control

The area of litter control has received more emphasis than any other topic in the area of environmental protection (Nietzel, Winett, MacDonald, & Davidson, 1977; Geller, Winett, & Everett, 1982). Hence, a wealth of information is available from a variety of sources and has been reviewed by a number of authors (e.g., Osborne & Powers, 1976; Robinson, 1976; Nietzel et al., 1977; Brasted, Mann, & Geller, 1979; Cone & Hayes, 1980; Geller, 1980; Geller et al., 1982). Although the research in this area is diverse, it can be easily categorized according to the type of behavioral control strategy applied in each situation (Tuso & Geller, 1976; Nietzel et al., 1977; Geller, 1980; Geller et al., 1982). That is, all of the research reviewed was designed around the implementation of procedures based on the principles of applied behavioral analysis and can be classified as antecedent strategies or consequence strategies.

Applied Behavioral Model

According to the historical review provided by Nietzel et al. (1977), the basic principles of applied behavioral analysis are derived from the generic area of behavior modification which has its conceptual roots in general learning theory (Bandura, 1969) and operant conditioning (Skinner, 1953), as well as taking theoretical support from the fields of experimental and social psychology (Goldstein, Heller, &

Sechrest, 1966). The field has evolved as a scientifically oriented, problem solving discipline aimed at providing a framework for understanding and changing human behavior in real-world, field settings (Nietzel et al., 1977; Geller et al., 1982), rather than stressing formal hypothetico-deductive theory building (Nietzel et al., 1977). That is, the field of applied behavioral analysis has been used primarily to solve problems through an understanding of the relationship between behavior and the surrounding environment. Hence, the basic premise of this behavioral approach is the emphasis on the functional relationship between the environment and human behavior (Fischer & Gochros, 1975). In general, the applied behavioral model is based on three assumptions (Fischer & Gochros, 1975): (1) that environmental variables and behavior can be accurately observed and recorded as objective data, (2) that behavior is primarily under control of the environment, and (3) that changes in environmental variables will lead to corresponding changes in behavior. Hence, as indicated by Geller et al. (1982), "the general approach is to define specifically and objectively the target behaviors which need to be changed . . . and then to manipulate environmental stimuli or events preceding and/or following the target behaviors" in order to influence a subsequent change in the behavior(s) of interest (p. 17). This approach has been referred to as the ABC model of applied behavioral analysis (Skinner, 1953). That is, behavioral change is possible through an understanding of the environmental antecedents which precede the response and the subsequent consequences which result after the response occurrence.

Specifically, antecedents or prompting strategies are stimulus events which precede the occurrence of the target behavior and increase or decrease the probability that the response will occur (Geller, 1980; Geller et al., 1982). In the area of litter control, prompts have been applied in terms of anti-litter messages, slogans and instructions displayed on signs, trash receptacles, and on potential litter items themselves. Specially designed trash cans have also been used to promote litter disposals or to facilitate a particular type of disposal. Other studies have examined the effects of environmental cleanliness on littering behavior, whereas still other research has targeted techniques designed to promote litter pick-up. Hence, various strategies have been used to prompt behaviors leading to a reduction in litter and these strategies can be used alone or in combination with the manipulation of response consequences to gain better control over the target behavior. Consequence strategies represent procedures whereby events following the occurrence of target behaviors are manipulated such that the frequency of the target increases or decreases. Specifically, behavioral consequences can be pleasant and lead to subsequent increases in behavior (i.e., positive reinforcers) or unpleasant and lead to subsequent avoidance attempts (i.e., negative reinforcers) or to actual decreases in a particular target behavior (i.e., punishers). According to Geller et al. (1982), most research in environmental protection has targeted the use of positive reinforcement procedures rather than the use of punishment or negative reinforcement, which is often less cost effective, more difficult to use, and less acceptable to the general public.

A variety of positive reinforcement strategies have been utilized in the area of litter control. For example, monetary rewards, raffle tickets and redeemable coupons have been used along with small cost effective prizes such as badges, toys and trinkets to reinforce a variety of anti-litter behaviors. The combination of such reward strategies (i.e., consequences) with response prompting procedures (i.e., antecedents) has often proved quite successful in influencing people to help combat the problem of litter (Geller et al., 1982)

Antecedent Strategies for Litter Control

Several different types of prompting strategies have been used to promote anti-litter behavior. For example, instructions or written messages have been used as behavioral prompts, as have specially designed trash containers. Environmental cleanliness has also been manipulated to study littering behavior. Finally, special attempts to induce inconvenient behavior such as litter pick-up have also been attempted.

Antecedent instructions. A variety of antecedent studies have examined the effects of written instructions or messages in prompting anti-litter behaviors. For example, Marler (1970) rated for cleanliness the campsites of campers in a National Forest after providing various messages concerning the consequences of litter. Campers were given leaflets bearing several different messages. Some of the leaflets contained information stating that litter could bring them personal harm, others stated that a clean environment would prevent

injuries in general. Leaflets bearing a neutral message describing the non-specific dangers of litter were also dispensed. A final group were given no leaflets and were treated as a control. Marler found that the 90% of the campers given the message emphasizing personal harm left their campsites clean as compared to 72%, 50%, 75% of those receiving the general message, the neutral message, or no message, respectively. Yet 40% of the campers failed to read the leaflets at all, and when given a test on general anti-litter information, the controls answered more questions correctly than did campers under the three message conditions. Although, the more personal message was effective in leading to cleaner campsites, the overall results of Marler's study are equivocal.

Another of the very early attempts to prompt anti-litter behaviors was reported by Heberlein (Note 1) who examined student littering behavior in four social science classes. Subjects were given a brief written message urging campus beautification prior to class. Heberlein then gave each of these students an advertisement flyer at the end of each class and recorded the number of flyers which were subsequently littered. Students receiving the anti-litter message were not found to litter significantly less than students from two other control classes (i.e., classes where no anti-litter message was provided). Geller et al. (1982) has suggested that these disappointing results may have been due to the general nature of the anti-litter message. Indeed, research has demonstrated that specific instructions identifying a particular disposal location are more likely to lead to higher

litter disposals than nonspecific instructions.

For example, in a series of studies, Geller (1973), Geller (1975), Geller, Witmer, & Orebaugh (1976), and Geller, Witmer, & Tusso (1977), varied the written prompts on a variety of disposable items (e.g., paper cups, handbills and leaflets). Geller (1973), in a set of six studies done in three collegiate locations, two movie theaters, and a grocery store, studied the effects of a general prompt (e.g., Please don't litter. Please dispose of properly), and a specific prompt (e.g., Please don't litter. Please dispose in green trash can located at rear of store) on the later disposal of the associated items. Across the six experimental locations, it was found items bearing specific disposal instructions were more often appropriately discarded than items with more general instructions, yet general items were disposed of appropriately more often than items with no disposal instructions.

In related studies by Geller, Witmer, and Orebaugh (1976) and Geller, Witmer, and Tusso (1977), the authors provided grocery store patrons with leaflets containing four different messages. In addition to the two messages used in the earlier study by Geller (1973), two other messages were used, one of which was confrontive and demanding (e.g., You must not litter. You must dispose in green trash can at rear of store.), whereas, the other message informed the customer of the underlying reasoning behind the specific anti-litter request (e.g., Please help us recycle. Please dispose for recycling in green trash can at rear of store.). The dependent variable was the percentage of advertisement leaflets which were appropriately discarded. The results

indicated that all of the messages were somewhat effective in reducing the number of littered handbills. Of the four messages, the recycling plea led to the most appropriate disposals.

Summarizing across this series of research studies, Geller (1980) and Geller et al. (1982) have concluded that many of the failures of earlier prompting studies could be due to the lack of specific disposal instructions and the lack of temporal proximity between the instructions and the expected behavior. In general, these authors conclude that in order to be effective, prompts should have the following characteristics:

- (1) the prompt should be administered in close proximity with the opportunity to provide the associated response, (2) the prompt should specifically state the desired response, (3) the desired response should be relatively convenient, and (4) the prompt should be conveyed in polite nondemanding language. (Geller et al., 1982, P. 65).

The use of large scale antecedent strategies using written anti-litter messages have also been attempted at the community-wide level. For example, Dodge (Note 2), working in a remote Alaskan community, examined the amount of litter left behind by campers in local recreational areas. Dodge's anti-litter messages were disseminated throughout the town on bumper stickers, handbills, information booklets, and through newspaper articles. Following this advertisement campaign, the author found significantly less litter in campsites as compared to prior baseline levels.

An additional study by Schnelle, Gendrich, Beegle, Thomas, and McNess (1980) was also done at a community-wide level and used a local newspaper to prompt a public cleanup campaign. Following an initial

front page story concerning local problems with litter and subsequent daily accounts of the town's cleanup efforts, Schnelle et al. found a 35% average city-wide reduction in ground litter as compared to baseline. This intervention strategy, however, was only effective during the actual newspaper campaign. Follow-up levels of ground litter after the end of the newspaper articles were found to be no higher than those during baseline.

Antecedent strategies in terms of trash can design. The next group of antecedent studies attempted to prompt a reduction in littering behavior through the use of specially decorated and labeled trash receptacles. The earliest of these studies was done by Finnie (1973) in a series of four experiments. For example, working in downtown Philadelphia, Finnie examined the effects of simply increasing the availability of trash cans in four sections of town. Working in areas containing hot dog vendors, Finnie saturated two of the sections with trash cans and removed all the cans from the second two sections and observed the number of people buying hot dogs who subsequently littered their wrappers. Significantly more litter was found in the sections without trash receptacles.

In a similar study, done on two 16-block sections of downtown sidewalk in Richmond, Virginia, Finnie (1973) examined the effects on daily litter counts of three different levels of trash can frequency. That is, trash cans (in this case, large attractive "Peli-cans") were placed on every block, one to a block, or removed completely. Each of these experimental conditions was rotated across the two sections of

sidewalk. As might be expected, the areas assigned the highest trash can density (i.e., one per block) resulted in the highest decline in sidewalk litter as compared to the other two conditions. That is, high can density led to a 17% reduction in litter, whereas low can density (i.e., one can per four blocks) led to only a 6% reduction in sidewalk litter as compared to the no-can control area.

Finnie also demonstrated similar effects along three six mile sections of public highway. On one section of roadway, Finnie placed a large decorated "Peli-can" preceded at a distance of one-quarter mile by a sign advertising the presence of the receptacle. A second section of highway provided only the "Peli-can", whereas in a third section, all trash receptacles were removed. Finnie found little differential effect of the two sign conditions (i.e., sign vs. no sign) on the amount of highway litter. Yet, the presence of a trash receptacle did lead to a 29% reduction in roadside litter when compared to the no-receptacle condition.

The final study by Finnie (1973) provided the first attempt to specifically examine the effects of obtrusive, beautified trash receptacles in relation to ordinary, plain trash containers. The study, which took place in downtown St. Louis, monitored the amount of sidewalk litter across three experimental conditions. A two block section was provided with either an attractive "Clean City Squares" receptacle, which was brightly colored, or a standard grey (55 gallon) oil drum. A third two block area was cleared of all trash containers to serve as a control. All conditions were rotated across each of the two block

areas. The results indicated an overall reduction in litter of 15% when the decorated cans were in place, as compared to areas with no receptacles. Litter reductions of only 3% were obtained in areas with the plain receptacles. Although these results appear substantial, Finnie warns that because the standard receptacles were not provided with lids, some of the trash may have blown back out onto the sidewalks and contaminated the results.

The work of Finnie (1973) has suggested that the proper placement of a sufficient number of trash receptacles can lead to substantial reductions in environmental litter. Finnie's work has, however, been criticized because of methodological problems (Geller, 1980; Geller et al., 1982). A principle weakness in Finnie's research was the failure to provide an estimate of inter-observer reliability in terms of the litter counts or behavior observations. Also, all of the research took place over very short time periods. Yet the research must be credited with laying much of the groundwork for the research that followed.

Another study using beautified trash containers was provided by O'Neill, Blanck, & Joyner (1980), who examined ground litter around the football stadium at Clemson University across three experimental conditions. For one location, O'Neill et al. removed all trash containers in order to provide a control. At a second location, a standard 55 gallon oil drum (painted orange) was used, and in a third area, a specially constructed obtrusive container in the shape of a hat was put into place. The obtrusive container was further constructed to display the words "Thank You" when the lid was depressed

to make a disposal, thus providing a reward (consequence strategy) for appropriate disposals. Although this study typifies a combination of antecedent and consequence strategies, the principle goal of the study was to test the design of an obtrusive trash receptacle. O'Neill et al. found that litter counts in the immediate vicinity of cans were significantly lower than in the similar baseline area. Also, the area in front of the special can was found to be consistently less littered than the area in front of the standard non-obtrusive receptacle. Again, however, this research has also been criticized by Geller et al. (1982) for a lack of reliability checks on the dependent measures and for a lack of long-term investigation.

In an attempt to correct some of the deficits of earlier work, Geller, Brasted, & Mann (1980) examined the effectiveness of highly decorated trash receptacles as compared to ordinary containers in an indoor shopping mall. The study, which took place over a period of 41 weeks, utilized the regular containers already in place as well as two specially constructed receptacles which were designed to look like birds (i.e., one can was designed to resemble a cardinal and the other an eagle). Both of the decorated cans were brightly colored and contained various anti-litter slogans. Using a ABABA paradigm at two of the six trash can sites in the mall, the authors periodically substituted the decorated bird containers for the regular mall receptacles. That is, following a five week baseline with the regular cans, the obtrusive cans were put into place for seven weeks. Followup was provided by a six week reinstatement of the regular cans, which in turn

was followed by a final eight week experimental phase with the decorated cans substituted for the regular containers. The regular cans were returned to their locations for the final 15 weeks of follow-up.

The dependent variable across the experiment was the weight of the contents of each of the cans in the study, which was provided three times per week by two independent counts (to provide an indication of count reliability). The results suggested that the two decorated bird cans were more effective in encouraging litter deposits than were the regular mall containers. In fact, the authors state "that for all but one weight measurement the amount of litter in the two bird cans was higher than any other pair of trash cans" (p. 78).

In a second study provided by Geller et al (1980) at the same indoor shopping mall, the authors examined how trash receptacle design can influence the subsequent use of the container. The emphasis was not primarily on the control of litter but with the inappropriate use of trash receptacles as ashtrays and vice versa. That is, the study attempted to facilitate the appropriate separation of discarded cigarettes and cigars from other types of litter such as bottles and paper cups, through changes in trash can design. Three different configurations of trash can-ashtray proximity were examined. In one condition, a special container was constructed with an ashtray built into the top of the receptacle. In a second condition, the regular mall receptacle and ashtray were used side by side and in a final condition, the mall receptacle and ashtray were separated by a distance of 100 feet.

Over a period of 48 days two independent observers classified the

contents of the ashtrays into appropriate and inappropriate disposals. No counts were recorded until full agreement was reached by both observers. The results indicated the combination of the ashtray and trash container into one unit greatly facilitated the number of appropriate items found in the ashtrays. The ashtray which was separated by a distance of 100 feet from the trash container received the greatest amount of inappropriate disposals.

In summary, the work on antecedent strategies concerned with specially designed and decorated trash containers has shown that obtrusive trash receptacles can indeed prompt a greater number of litter disposals than non-obtrusive containers. However, much of the work in this area has suffered methodological problems and limited time frames. The work by Geller et al. (1980) has been useful in that it has suggested an experimental methodology whereby reliable assessment of dependent measures is possible, and it has shown results consistent with earlier work on obtrusive receptacles, but over a relatively long time frame. Additional research by Geller et al. (1980) has shown that trash receptacles can be especially constructed to prompt specific types of disposal behavior. Hence, again antecedent strategies may be quite useful towards providing a cleaner environment.

Environmental cleanliness as an antecedent strategy. There has been additional research which suggests that people are less likely to litter in areas which are kept clean and that littering is more frequent in areas which are already littered. Therefore, environmental cleanliness itself can also serve as an antecedent strategy for litter control.

One of the earliest studies to examine the notion that litter begets litter was provided by Finnie (1973). Finnie examined the number of people buying hot dogs in two sections of downtown Philadelphia, one of which was already littered with hot dog wrappers, whereas the other was free of litter. The dependent variable was the number of people littering their wrappers. Finnie found that 42% of the people buying hot dogs in areas which were littered inappropriately discarded their wrappers, yet only 25% of the patrons in the clean sections littered their wrappers. This research has also been criticized (Geller, 1980; Geller et al., 1982) for the lack of inter-observer reliability checks. Geller et al. states that the problem is especially critical in this study in that many studies have had difficulty in providing actual observations of littering behavior (Heberlein, Note 1) and that often observers are biased by their own expectancies in a given situation (Rosenthal, 1966).

Instituting a more reliable procedure, Robinson and Frisch (Note 3) examined the effects of environmental cleanliness on littering in a University post office. Specifically, students were given an advertisement flyer upon entering the post office which was free of litter or which had been previously littered with identical student handbills. The dependent variable was a count of the distributed flyers which ended up on the floor of the post office. The results indicated that 71% of the students receiving flyers in the littered condition subsequently added to the litter by dropping their flyer on the floor. Yet when the post office was clean, only 26% of the students dropped the

flyers on the floor.

This study was replicated in a classroom building at the University of Wisconsin (Heberlein, Note 1). Using essentially the same procedure, he found that students were more likely to litter their handbill when the hall had been previously littered with a variety of refuse. Of the students taking handbills, 10% subsequently littered the handbill when the surrounding hallway was full of litter. Only 4% of the students littered their handbill in the clean hallway.

Geller, Witmer and Tusso (1977) found similar results outside of an academic setting. Patrons of a grocery store were given a flyer announcing daily sales items upon entering either a clean environment (i.e., no pre-littered handbills) or a dirty environment (i.e., the store had been pre-littered with 140 handbills). Again, the dependent variable was a count of the number of littered handbills. During the littered conditions the authors reported that 5% of the shoppers littered their handbill, whereas no more than 1% littered the handout during the non-littered condition.

Although the effects of environmental litter on littering behavior have been consistently observed in academic settings and in grocery stores, the results may not generalize to all settings. For example, Crump, Nunes, & Crossman (1977) distributed litter on alternating days throughout two picnic areas in a Utah National Forest. The dependent variable was the amount of ground litter discovered in each of the areas when pre-littered and on days when each of the areas were kept clean. The results were surprising, in that less litter was found

during the litter condition than during the non-littered condition. That is, people were more likely not to litter their surroundings when confronted with a littered environment. In fact, many of the campers were found to clean up a littered picnic area prior to beginning their own outdoor activities.

The glaring disparity between the findings of Crump et al. (1977) and the research of Finnie (1973), Robinson and Frisch (Note 3), Heberlein (Note 1), and Geller, Witmer and Tusso (1977) is not so alarming when one considers the experimental setting. That is, people go to outdoor recreation areas, such as national parks, to appreciate the aesthetics of a rustic, natural setting; an effect which might be greatly diminished by the presence of inappropriate waste products not natural to the setting (Geller et al., 1982). Indeed, Geller et al. concluded that patrons of post offices and grocery stores, pedestrians in busy downtown areas and students in academic classroom settings are not there because of the natural beauty of the surroundings and often may not even notice their littered environment. They would certainly be unlikely to "stop their reinforced behaviors to make the inconvenient response of picking up another person's litter" (p. 75).

Modeling as an antecedent strategy to induce litter pick-up. The final set of antecedent strategies have attempted to influence people to perform the relatively inconvenient task of picking up environmental litter. The intervention strategy most used in these studies is response modeling, yet the results have not been encouraging. Indeed, Geller et al. (1982) has stated that prompting studies alone may not

be effective when the response is inconvenient (as it is with litter pick-up), unless the litter prohibits enjoyment of a natural setting (e.g., Crump et al., 1977) or reward strategies are used to reinforce litter collection.

In an early example by Bickman (1972), students were used to model appropriate anti-litter behavior (e.g., picking up and properly discarding a specially planted soft drink container) and inappropriate behavior (e.g., kicking the container down the sidewalk) in front of passing pedestrians. The dependent variable was the number of pedestrians who stopped and picked up a second piece of planted litter at the same site. The experiment, however, was stopped because none of the subjects attempted to pick up the second littered item. In a second follow-up experiment using planted litter which was more obtrusive (e.g., a knocked over trash container), only about 1% of the passing pedestrians stopped to pick up the contents of the trash container, even though the spilled contents were directly in their path.

Antecedent modeling strategies were somewhat more successful in a series of experiments reported by Geller et al. (1982). For example, in a set of studies which took place on the steps leading to a group of second story motel rooms, four modeling conditions were used. In one condition, two confederates (one acting as the model) accompanied a student (the subject) down the set of stairs. The model simply stopped to pick up one of several specially planted litter items which were arranged on the steps. In another situation, both confederates served as models by stopping to deposit one litter item

apiece into the adjacent container. In a second set of conditions, one of the confederates alone or both confederates together continually picked up litter items as they descended the motel steps. The dependent variable across each of these conditions was the number of subjects who picked up at least one piece of litter. The results indicated that only 10% of the subjects exposed to the confederate who deposited one litter item into the trash container did likewise. Of the subjects witnessing both confederates make single litter deposits, 17% stopped to deposit at least one additional litter item into the container. However, the number of subjects making litter pick-ups in the conditions where either one or both confederates continually picked up the planted items was substantially higher. That is, when one of the models was observed to continue to pick up litter items, 40% of the accompanying subjects joined in to help, yet, when both models continually picked up litter items along the stairs, 63% of the accompanying subjects joined in the cleanup effort.

Modeling was also effectively demonstrated in a study by Jason, Zolik and Matese (1979) which studied the problem of dog feces along Chicago streets and sidewalks. Specifically, dog owners were approached along a 405 foot target area by a researcher who demonstrated the use of a device called a "pooper scooper." The scooper basically consisted of a plastic bag which could be used to collect dog feces. The model showed how feces could be scooped from the ground by using the bag to provide sanitary protection. Each subject so confronted was then provided with a sample of the device. Of the

22 dog owners who were approached during treatment, 63% picked up after their dogs, as compared to only 5% of the subjects who picked up after their animals during baseline.

Hence, there are only a few studies available which have successfully demonstrated techniques to induce people to pick up environmental litter. Geller et al. (1982) concluded that modeling strategies may not be effective in prompting people to commit inconvenient responses such as litter pick-up. However, there are simply too few studies dealing with strategies (modeling or otherwise) to prompt litter pick-up to draw these conclusions; especially in light of the findings of Jason et al. (1979) which showed that people could be prompted to produce a highly undesirable behavior such as picking up and disposing the feces of dogs.

Consequence Strategies for Litter Control

As indicated in the review by Geller et al. (1982), antecedent procedures may not be enough to promote undesirable or inconvenient behaviors such as litter pick-up. As a strictly intuitive example, few of us are willing to pick up loose trash along the street even in the presence of environmental prompts such as public trash containers, signs or local advertising campaigns. Yet, many of us will stop to pick up bottles or aluminum cans which can be returned for monetary rewards. Hence, many studies have attempted to use a combination antecedent prompts and response contingent reinforcement to promote anti-litter behavior.

One of the earliest studies to examine both antecedent and

consequence strategies was provided by Burgess, Clark and Hendee (1971). Indeed, this was the first published study on litter control. The study attempted to demonstrate the superiority of positive reinforcement strategies over other non-successful tactics such as legal fines and threats. The authors used two movie theaters during the afternoon children matinee. The dependent variable in each case was the amount of trash (measured by weight) which was deposited in the theater can after the movies. Following baseline observations, several antecedent conditions were implemented for different matinee performances: (1) doubling the number of theater containers, (2) presenting an anti-litter film before the matinee showing, (3) providing each of the children entering the theater a litter bag along with instructions for its use, and (4) providing each child with a litter bag plus making an announcement during intermission concerning its use. Additionally, two reinforcement strategies were used. For example, patrons in one group were told that the return of a bag of litter would result in a monetary reward of 10¢, whereas another group was told that a bag of litter could be redeemed for a ticket to a special children's movie.

The results can be summarized as follows in terms of the percentage of theater litter found in the trash containers:

1. Baseline - 17.5%
2. Double receptacles - 16%
3. Litter bags alone - 31%
4. Litter bags and announcement during intermission - 57%
5. Litter bags and 10¢ reward - 94%

6. Litter bags and ticket reward - 95%

These data indicated that substantially more deposits were made during the two reinforcement procedures than during the prompting procedures; yet, some of the prompting strategies (i.e., those using litter bags) showed higher deposits when compared to baseline.

An extension of this work was provided by Clark, Burgess and Hendee (1972) in a Washington National Forest. This early study was intended to demonstrate that behavioral strategies could be implemented successfully in field settings. The dependent variable was the number of planted litter items found in various areas throughout the campground. The authors planted 169 pieces of various types of litter through the experimental areas of the campgrounds before both baseline and treatment conditions. Children from seven families were given a 30 gallon plastic trash bag and told to inspect a certain area for litter. Each child was given all day to hunt for litter without additional contact from the staff. The children were told that they would be given a prize when they returned with a used litter bag. Prizes included Smokey the Bear shoulder patches, Junior Forest Ranger badges, Keep Washington Green pins, wooden rulers, or a box of chewing gum. Each child had their choice of prizes.

The results showed that during the four days of treatment the amount of litter was reduced from 169 to 24 items as compared to a reduction of 169 to 64 items during baseline. Approximately 175 pounds of litter was collected for a cost of about three dollars (the cost of 21 patches and badges and one pin). The effects of this type of

intervention are clearly apparent when one considers that the collection of 175 pounds of litter by regular service crews would have cost as much as sixty dollars.

The next study by Kohlenberg and Phillips (1973) studied the effects of a variable-person ratio (VPR) reinforcement schedule on litter disposals at a free admission zoo in Seattle. The VPR schedule of reinforcement (as introduced by Hayes, Johnson, & Cone, 1975) was interesting in that it was a variation of the variable ratio schedule (VR) used in the animal learning laboratories. According to Geller et al. (1982), on a VPR schedule, reinforcers are provided following the single occurrence of a response across a predetermined number of subjects, rather than after a predetermined number of responses by the same subject (as in the VR schedule of reinforcement).

In the Kohlenberg and Phillips study, litter deposits in the only available trash receptacle served as the dependent variable in an ABAB experimental paradigm. Four conditions were implemented. Following an initial baseline period, a sign was used to announce that when coupons were available, deposits to the trash receptacle would result in a free soft drink. During this first reward period, the schedule of reinforcement was shifted from a reward every seven subjects (i.e., VPR 7) to a reward every 10 subjects (i.e., VPR 10) to a reward every 20 subjects (i.e., VPR 20). The next condition involved a modified return to baseline. Here the sign was kept in place, however, no reward coupons were dispensed. The last reinforcement condition involved the antecedent sign and the reinstatement of a VPR 10 schedule

of rewards. The results showed that during baseline conditions, 723 and 2,403 litter deposits were made respectively. However, 4,577 deposits were made during the first reinforcement condition and 6,032 were made in the final reinforcement condition. The results were encouraging, yet the study has been criticized by Geller (1980) and Geller et al. (1982) for being labor intensive. That is, the study required that someone be in attendance to administer the reward schedule.

A study by Powers, Osborne and Anderson (1973) also attempted to demonstrate the effectiveness of consequence procedures in large scale field settings in addition to showing that more cost effective procedures could be used. In this study, the presence of an experimenter was not needed to administer the program. Two unmanned litter stations were set up in an isolated Utah National Forest. Two experimental conditions were implemented. During an antecedent condition, only a sign was provided at each station instructing campers to fill up the provided litter bags and deposit a completed information card in a specially provided card container. During the reinforcement procedures the sign stated that people could choose one of two reinforcement procedures for each returned litter bag. That is, campers could indicate on the provided card whether they wished to receive a 25¢ reward or to have a chance in a \$20 weekly lottery. The small immediate reward or the chance for the larger delayed reward was provided for each bag returned at least two-thirds full of litter. The results indicated that 74% (i.e., 139 bags) of the 187 bags of litter returned during

the experiment were brought back under the conditions of reinforcement. The authors further found that most of the subjects (i.e., 73%) had chosen the lottery rather than the smaller immediate reward of 25¢. A problem with this study is that, unlike the Clark et al. (1972) study, the authors could not determine whether subjects were actually picking up litter. That is, a litter bag could have been filled with the garbage of the individual camper. Also, as suggested by Geller et al. (1982), campers may have simply brought their own garbage from home in order to receive a chance in a \$20 lottery.

In another series of experiments, Chapman and Risley (1974) also attempted to examine cost effective consequence strategies to promote environmental cleanup. Working in a low income Kansas City housing project, the authors used three different strategies to promote neighborhood litter pickup. The authors (1) made verbal appeals to local children leaving school to help clean up the neighborhood by filling up a litter bag, (2) indicated that the children would receive 10¢ for each filled litter bag returned, or (3) indicated that the children would receive from 10¢ to 40¢ for each of the one or two assigned yards that was cleaned to a specified level of cleanliness. The dependent variables were the weight of the collected trash and the amount of litter found in each of 25 randomly selected yards. The results revealed an interesting problem with the "Payment for Litter Bags" technique in that often material found in the returned bags did not come from the ambient neighborhood environment. That is, of the three conditions, the litter bag payments resulted in the most

amount of collected litter. However, an examination of the litter indicated that much of it was collected from inappropriate sources such as the children's homes or from other trash containers. Often, only space-wasting items such as large wads of newspaper were collected so as to fill bags in a minimum of time.

The "Payment for Clean Yards" condition resulted in the most reduction in environmental litter, yet less trash (as measured in pounds) was collected than during the "Payment for Litter Bags" condition. However, again there were problems in that there was little control over what the children did with trash collected from each yard. That is, many of the children may have simply redistributed the litter from the target yards to non-target years, hence, less trash was collected (Geller et al., 1982). Although incentives were effective in promoting the collection of trash and in reducing environmental litter, the problems may have outweighed the positive benefits of the study. In their review of their work, Geller et al. (1982) stated that cost-effective procedures were needed to promote the collection of all types of litter (not just large convenient items) and to insure the proper disposal of the collected waste.

The marked item technique (Hayes, Johnson & Cone, 1975 and LaHart & Bailey, 1975) was designed to address these problems. Specifically, a variety of litter items in a targeted area are specially marked for later identification. Once the contingency has been announced to the participants, prizes are awarded for the collection of these specially tagged items. Since a variety of different items are marked,

all litter must be collected and brought in for examination, which ensures proper disposal of all litter.

The first study to use this technique was provided by LaHart and Bailey (1975). The authors looked at the effects of five different waste management strategies (one of which was a marked item technique) on elementary students during a field trip to a Florida nature trail. Prior to entering the trail, each of five groups of students were exposed to one of the following conditions: (1) prior exposure to a litter control educational curriculum, (2) a statement by the teacher on the problems with litter, (3) a short lecture on the problems with litter, (4) instructions from the teacher to pick up litter, and (5) a marked litter item strategy. In the marked litter item condition, the children were first given a short statement on litter followed by the announcement that a prize would be given to the students returning specially marked items. The dependent variables were the number of items picked up as well as a count of the amount of litter dropped by the students. The results showed that the marked litter item strategy led to a 76% reduction in ground litter, whereas none of the other conditions resulted in litter pick-up. However, several of the other strategies were effective in reducing the amount of litter dropped by the children while on the trail after lunch as compared to the marked item strategy. Specifically, prior education in litter control, the litter control statement and the litter control lecture all led to significant reductions in student littering. The simple instructions to pick up litter and the marked litter technique had little effect on

littering. Hence, it is apparent that littering behavior and litter pick-up may be entirely different behaviors that are effected by different intervention strategies (Tuso & Geller, 1976). Indeed, Geller et al. (1982) has advocated that because of the response specific effects of behavioral control strategies, more complex strategies based on multiple techniques may be needed to adequately combat the problem of environmental litter.

Hayes et al. (1975) used a similar marked item technique for litter control in a federal prison for youthful offenders. Residents were given special privileges or a small monetary reward (25¢) for returning litter bags containing at least one of the specially marked items. The dependent variable was the count of ground litter in three targeted outdoor areas. A multiple baseline design across locations was used where litter counts were made after 17, 22 and 36 successive days. The results indicated that during treatment ground litter across the three sites was reduced by an average of 71% as compared to baseline levels. The problem with the study was again that it required a great deal of experimenter effort to monitor the program and keep it running.

One of the most ingenious variations of the marked litter technique has been recently provided by Bacon-Prue, Blount, Pickering and Drabman (1980). Attempting to use more cost effective procedures, the authors marked selected items with a special paint which was only detectable under ultraviolet light. The paint had an additional propensity of transferring the fluorescent particles to anyone touching

the painted surface. Hence, litter accumulations did not have to be sorted through to find marked items. All that was necessary was to scan the hands of the subject with an ultraviolet light. The study took place in a Mississippi mental retardation facility. Residents of the center were told that during special times anyone bringing in a secretly marked item would receive a \$1.00 prize and a self photograph for each item. The dependent variable was a count of the ground litter in five areas of the facility. The results indicated that an average reduction of 46% was achieved across the five areas as compared to baseline measurements. The study, however, cost only \$50.25 for the 50 days the program was in effect and resulted in the collection of 2,400 gallons of litter. The procedures were estimated to be cheaper than paying two residents to pick up litter and capable of generating up to six times more collected trash.

Additional research has been provided which has continued to look at the effects of antecedent and response strategies to promote the use of litter bags. For example, Baltes and Haywood (1976) used litter bags to help keep a football stadium clean at Penn State University. The study provided litter bags to every third person who entered the stadium prior to the game at four different entrance locations. At one location, the bags were printed with the statement that "Litter can hurt" and "Others will disapprove of your littering," whereas at a second entrance the message was longer and asked people to serve as appropriate models for others and help stop littering. A third group received bags with no messages. Finally, a fourth group

was provided with bags which announced that used bags (containing trash) could be redeemed after the game for a special prize. The dependent variable was the amount of trash remaining in the sections of the stadium where the four conditions were implemented. When compared to a section of the stadium where no litter bags were dispensed, 45% less litter was found across the four areas where bags had been dispensed. However, no differences were found between the four different strategies to promote bag use. A question with this study and others that have been done on distinct populations, such as university students, is the degree of generalizability to other non-similar populations in the community at large.

To examine the effects of antecedent and consequence strategies on a more diverse population, Cope and Geller (Note 4) dispensed litter bags from the drive-through portion of fast-food restaurants in Blacksburg, Virginia. Litter bags, which were supplied by Wendy's, Inc., were dispensed to incoming customers by a special trash receptacle. The container, which was brightly colored, was provided with a large chute facing the line of traffic. Under the chute, a roll of litter bags was provided so that drivers could easily deposit a used bag and acquire a new one. The trash receptacle was placed next to the remote ordering station so that drivers could order their meal and deposit their litter bags without multiple stops.

The dependent variables were the number of bags taken from the receptacle and the number of bags found to be in use in the automobile. Data was collected independently by two observers who were posted at

the remote ordering machine for drive-in customers. Utilizing an ABACA design, two experimental conditions (i.e., an antecedent prompt and a reinforcement strategy) were implemented. During the antecedent condition one of the observers approached the driver and stated, "Hi, just checking to see if you have a litter bag in use today." During the reinforcement condition, a large sign was displayed which stated that a free soft drink would be given for every litter bag found to be in use. Drivers were given a coupon which could be immediately redeemed at the check-out window.

The results showed that the percentage of bags taken during the antecedent condition increased (i.e., a mean of 34%) when compared to baseline (i.e., a mean of 24%) and fell to below baseline levels after the prompt condition was removed. However, the level of bags taken by customers again rose (i.e., a mean of 29%) when the reinforcement condition was implemented.

Even more importantly, the study by Cope and Geller (Note 4) showed that the number of bags being used also rose during each condition. That is, during baseline only a very few bags were observed to be in use (i.e., a mean of 5%), however, this percentage rose when the antecedent strategy was implemented (i.e., a mean of 20%). Following a drop in the percentage of bags being used during a return to baseline conditions, percentages again increased (i.e., a mean of 31%). The study is important because it demonstrates low cost procedures which can be implemented in the community at large. That is, each of the conditions were inexpensive and easy to provide. Indeed, Wendy's

was happy to donate free soft drinks and litter bags in return for the advertisement benefits and the community goodwill resulting from the support of a litter project. The experimental procedures in turn could have been easily implemented by existing restaurant staff or in other community locations.

Discussion of the Psychological Strategies for Litter Control

Although the studies on litter control can be easily grouped according to independent variable in terms of antecedent and consequence strategies, there has been a great deal of diversity across the different studies in terms of the type of data which has been used to evaluate a particular strategy. That is, methodological procedures in assessing litter have often been quite different across the separate studies (Geller et al., 1982).

For example, several authors have examined environmental litter by way of simple counts (e.g., Finnie, 1973; Powers et al., 1973; Chapman & Risley, 1974; LaHart & Bailey, 1975; and Hayes et al., 1975). Yet, few have agreed on exactly what items should be counted in such a strategy. That is, some authors have only counted items bigger or equal to a 1 inch by 1 inch square (Powers et al., 1973; LaHart & Bailey, 1975), whereas, some studies failed to count items smaller than a 2 inch square (Chapman & Risley, 1974). Hayes et al. (1975) and Finnie (1973) included only items bigger than a pack of cigarettes in their highway counts. Several other studies have simply omitted any mention of a size criterion (e.g., Dodge, Note 2; Baltes & Haywood, 1976; and O'Neill et al., 1980).

Hence, any comparison across these studies is difficult in that the operational definition of litter is different across studies. The problem lies in the fact that litter is so diverse that counts can become extremely labor intensive over even short periods of time. For example, it is hard to imagine counting the litter along a public highway without some sort of size criterion. Yet, by not counting small items like cigarette butts or popsickle sticks, we may in fact be missing quite a lot of potential data.

To correct this problem, other types of quantitative procedures have been devised to assess litter. For example, Burgess et al. (1971), Chapman and Risley (1974), and Baltes and Haywood (1976) used measures of weight and Dodge (Note 2) used volume to assess litter. Although this data is easier to obtain and possibly more reliable, there are still problems. As indicated by Geller et al. (1982), the use of this type of dependent variable may be insensitive to small effects of the independent variable. That is, these techniques may only be effective when large amounts of litter are involved (Geller et al., 1982). Further, studies using this type of assessment may also differ from one another according to what is and is not chosen for collection; hence, again across study comparisons are seldom possible.

Other studies have experimentally provided a source of litter which can be monitored in terms of its disposition. This type of study can be used to study environmental cleanup or to examine actual littering behavior. For example, the Clark et al. (1972) experiment

looked at environmental cleanup. A variety of items were especially "planted" into a target environment. Here the authors carefully catalogued and counted each of the "planted" items after the subjects had left the area. Several studies have provided subjects with potential litter items such as handbills and flyers and monitored the disposition of these items throughout the experiment (Heberlein, Note 1; Geller, 1975; Robinson & Frisch, 1975; Geller et al., 1976; and Geller et al., 1977).

Both of these techniques allow for more reliable data collection in that only certain items need be counted. Also, this type of data lends itself well to across study comparisons; again, because of the controlled nature of the items being counted.

Although there have been a variety of methodological procedures used to assess litter, most of the studies have targeted two basic behaviors. That is, research has examined the prevention of litter through the use of trash receptacles or the collection of litter through different clean-up campaigns (Geller et al., 1982).

Two types of behavioral strategies have been applied: antecedent (i.e., prompts) and consequences (e.g., rewards). Antecedent events influence the probability of the desired response prior to its occurrence, whereas, consequences which follow the desired response can influence the probability that the target behavior will reoccur. Of the studies reviewed which applied only antecedent strategies, four major procedures were used, involving: (1) the use of special messages and instructions, (2) the increased availability of trash containers

and the use of different methods to make receptacles more attractive, obtrusive or easier to use, (3) the manipulation of levels of environmental cleanliness, and (4) the use of behavioral models. Of these strategies, the use of instructions, the increase of receptacle frequency, the use of specialized receptacles and the manipulation of the amount of litter in the environment have all been at least somewhat successful in preventing litter. However, there have been only a few studies which have demonstrated successful techniques to promote litter pickup. Most of the studies in this area have used behavioral modeling. With only a few exceptions (e.g., Jason et al., 1979), the research in this area has not been encouraging. Some have stated that consequence strategies are necessary additions in order to promote inconvenient behaviors such as picking up the trash of others (Geller et al., 1982). Yet, much additional research is necessary before we can draw any firm conclusions.

Studies using consequence procedures have successfully applied a variety of different incentives to promote litter pickup in the environment, such as monetary rewards, small toys, and food items. These incentives have been dispensed on a continuous basis (e.g., one prize for each behavior) or have been set up around intermittent schedules of reward such as lotteries. Kohlenberg and Phillips (1973) used a variable-person schedule which provided a prize after the single response of a predetermined number of subjects. The advantage of these intermittent schedules is that they can be more cost effective and they can offer the possibility of larger, more attractive rewards because fewer prizes are dispensed.

Educational Research in Litter Control

Another approach to solving the problem of environmental litter involves educating the general public in regards to the principles of proper waste management. There is a great deal of intuitive appeal to teaching appropriate waste disposal habits and a sense of stewardship in the community at large. Indeed, Osborne and Powers (1980) stated that education is perhaps the "ideal solution to the litter problem" (p. 137). However, an examination of the educational literature revealed that little empirical research has been provided in this area.

In general, education programs can be targeted at the public at large or can be more formally applied in the public school system; both these approaches have been used in other areas of environmental protection. For example, in the area of energy conservation, attempts to educate the general public have been made through the use of posters displaying energy saving tips (Kohlenberg, Phillips, & Proctor, 1976), pamphlets and handbooks defining energy conserving behaviors (e.g., Heberlein, 1975; Winett & Nietzel, 1975) and workshops demonstrating effective energy usage (Geller, 1981). Public education programs have also been recommended as an effective means of promoting water conservation (Fulton, 1979; Weeks, 1979). Further, Aird and Tomera (1977) examined the effects of a specialized water conservation curriculum in the Illinois public school system. The study targeted sixth grade students and found that the special instructional unit was able to produce a significant positive shift in students' "attitudes and values" about water conservation; however, the authors failed to

adequately define the constructs of "attitudes and values."

In the area of community litter control there have been several large scale attempts to educate the public by way of television commercials, public service announcements and public workshops (e.g., Keep America Beautiful, 1976; VDLC, 1979). Indeed, Keep America Beautiful (KAB) and its local and state affiliates have been instrumental in providing anti-litter educational campaigns across the country. Although few of us would fail to recognize Iron Eyes Cody (the crying Indian) as KAB's much advertised symbol and model for a clean environment, few of these techniques have been systematically evaluated as to their success in changing litter related behaviors.

Few studies are available that examine the effects of educational strategies or curriculum programs on littering behavior in school settings. That is, most of the empirical research available has simply applied psychological strategies to public or private school populations. For example, Cone, Parham and Feinstein (Note 5) used two antecedent strategies (i.e., environmental cleanliness and response modeling) to promote anti-littering behavior in young children. Specifically, nursery school children were asked to move art materials (e.g., paper scraps, etc.) from one project table to another. This task, which was performed in close proximity to a trash receptacle, provided a potential source of litter. The dependent variable was the amount of waste paper left on tables and the floor after the art exercise. Students were randomly assigned to four groups in a 2 x 2 factorial comparison. Each group was shown a video tape of either a

clean or dirty classroom environment in which an adult (model) either cleaned or littered the classroom. The results showed that only the model cleaning the room was effective in reducing classroom litter counts as compared to pre-video tape levels. Neither of the cleanliness conditions alone were effective.

As reported in the previous section, the study by LaHart and Bailey (1975) used 43 classes of elementary school students on a field trip to a Florida museum. The study examined the effects of five litter control interventions on litter pickup and the amount of litter dropped along the museum's nature trail. This study is important because two of the strategies applied were educational in nature. That is, one group of students were given prior exposure to various educational materials on litter (in a classroom setting), whereas another received a short lecture at the museum on the problems of environmental litter. However, neither of these methods resulted in an increase in litter pickups, yet both were successful in reducing the amount of litter dropped along the trail.

Hence, with the exception of LaHart and Bailey (1975), there have been no studies that have attempted to design and implement school-based educational programs for litter control. Indeed, even in the LaHart and Bailey study the design of the educational materials and the litter lecture were not the primary focus of the research. Most of the litter control studies have simply used school populations for exposure to a variety of non-educational strategies.

Educational Evaluation

As stated in the previous section, empirical studies which evaluate the effects of school educational programs for litter control are virtually nonexistent. Hence, an examination of existing evaluation methodology is difficult. Indeed, educational evaluation is rare throughout the more general area of environmental protection. Often educational strategies are imbedded in larger community programs making attempts to evaluate the specific effects due to education almost impossible. Finally, of the research that is available in educational evaluation, serious methodological concerns can be raised.

In the area of water conservation two studies were reviewed which attempted to evaluate the effects of an educational curriculum. As stated in the previous section, the study by Aird and Tomera (1977) used a pretest/posttest procedure to assess the impact of an educational curriculum unit on the "attitudes" and "values" of sixth grade students in Illinois. The findings suggested a positive shift in both student "attitudes" and "values" following the curriculum unit.

In another study on water conservation, Birch (Note 6) also attempted to measure the impact of an instructional program on the knowledge and attitudes of 843 seventh grade students in public schools in Roanoke, Virginia. Specifically, the educational curriculum consisted of a variety of components including: (1) a 30-page student activity booklet which contained several take-home assignments designed to give students actual experience with the different conservation strategies, (2) a set of two slide presentations and their associated

narrative scripts, and (3) a 16 mm cartoon film which highlighted a variety of conservation strategies. Two dependent variables were assessed. Student knowledge was measured through the use of a pre/post multiple choice test, whereas student attitudes was operationalized as the number of favorable or unfavorable responses to various conservation related statements before and after the implementation of the curriculum unit. The results indicated significant positive shifts in student attitudes and knowledge following three months exposure to the educational materials.

Hence, there are in general only a few studies outside the field of litter control that have attempted to evaluate the effects of an educational curriculum. Within the field of litter control, however, there have been even fewer programs that attempt to evaluate the effectiveness of educational strategies.

As mentioned earlier, KAB, Inc. has designed and distributed a comprehensive educational program (i.e., Operation Waste in Place) as part of their Clean Community System (CCS) campaign. Although the curriculum package provides a pre/post instrument to measure student knowledge, little effort has been made to provide for a specific analysis of the curriculum materials.

A highly similar program was adopted by the State of Virginia. That is, as part of the Virginia Plan, the Virginia Division of Litter Control (VDLC) modified the Operation Waste in Place materials to fit the individual needs of the State. However, one of the more creative aspects of this educational program (i.e., Operation Waste Watch) was

that extensive attempts were made to provide a comprehensive evaluation of the curriculum materials. For example, Galano, Nezlek and Turnbull (1980) provided the initial assessment of the Operation Waste Watch Program (OWW). Specifically, the study was intended to provide: (1) an assessment of the psychometric properties of the various testing materials included with the OWW program, (2) an evaluation of the program's effectiveness in terms of raising the level of student awareness and knowledge about waste management, and (3) an assessment of teacher reactions to the curriculum program. The study was based on the results of pilot testing of the OWW curriculum (grades K-6) in 22 participating schools throughout the State of Virginia. During the evaluation, 1,658 students were exposed to the curriculum materials.

In terms of program success, the results were quite encouraging, in spite of rather serious psychometric problems with the pre/posttest instruments (Galano et al., 1980). For six of the seven grades (i.e., K-2 and 4-6 grades), exposure to the OWW materials led to significantly higher posttest performance in terms of knowledge and awareness about waste management as compared to pre-curriculum scores on an alternate form of the test instrument.

In general, the psychometric properties of the test instruments used to assess the students' knowledge and awareness was poor. Specifically, alternate form reliability was found to be low across the seven grade levels, and the pretest and posttest instruments were found to significantly differ from one another at several grade levels in terms of difficulty level. The authors concluded that the items across

all grade levels were basically too easy and were not consistently difficult across all the tests. In conclusion, Galano et al. (1980) state that although these psychometric properties "do not preclude the detection of changes in levels of performance, they do not facilitate such detection" (p. 61).

Finally, in regards to the teacher evaluation, the curriculum materials were found to be quite acceptable to the teachers, who, for the most part, felt that the OWW program addressed an important issue. Most of the teachers were found to be willing to reteach the material.

A problem which premeates each of these evaluation studies is that they all focus primarily on the assessment of attitudes and/or knowledge, and not on actual behavior. There is an extensive amount of evidence that programs that demonstrate attitudinal changes may not change actual behavior (Aizen & Fishbein, 1978; Wicker, 1979). Indeed, practical attitude measures may simply be too complex to apply in field settings (Hendee, 1971). Further, several authors have concluded that the relationship between knowledge, attitudes and behavior is also far from clear (Abelson, 1972; Hendee, 1972; Ramsey & Rickson, 1976; Burrus-Bammel, 1978). Here again the findings suggest that the situation may be more complex than a simple linear relationship between knowledge, attitudes and behaviors (Ramsey & Rickson, 1976).

In the area of litter control, several studies have encountered the discrepancy between attitudes and actual behavior (Bickman, 1972; Heberlein, Note 1; Robinson & Frisch, Note 3). Interviewing pedestrians who walked by planted litter items (i.e., a crumpled up news-

paper), Bickman (1972) found that most believed that people should pick up litter. Although only 8 people (out of 506) picked up the litter, 486 responded positively to the question concerning litter pick-up. Additionally, Heberlein (Note 1) and Robinson and Frisch (Note 3) provided handbills to individuals in a university classroom building and post office respectively and found no clear relationship between attitudes on littering and actual littering behavior in either those subjects who did or did not litter their handbill. For example, those individuals who later indicated on a questionnaire that litter was a serious problem were not less likely to litter than those who felt that litter was only a slight problem.

Hence, evaluation studies which are based on inventories of attitudes or knowledge may not be accurately reflecting changes in actual behaviors. Indeed, it has been found that people often act in ways divergent from what they have indicated on questionnaires or other inventories (e.g., Wicker, 1971; Bickman, 1972; Deutscher, 1973). Therefore, Geller et al. (1982) has concluded that "we are convinced that behavioral science holds the answers . . ." (p. 17). We must begin to evaluate actual behaviors as well as attitudes and knowledge if we are to discover whether or not a given strategy or program is effective.

Statement of the Problem

Although the area of litter control is the most studied area of environmental protection, very few psychological studies have taken

place with children or in educational settings such as public schools. Even more alarming is the almost total absence of research designed to apply psychological principles to the development of educational curriculum programs. An examination of the psychological and educational literature in environmental protection did reveal some evidence of work applied to the large scale education of the public. However, the research applied to education in school settings was quite limited in all the areas of environmental protection. In litter control only a few studies have been provided and only one was directed at the implementation of specially designed educational curriculum materials.

Due to the overall lack of studies dealing with educational curriculum, very few examples of evaluation attempts were discovered. Indeed, only three evaluation studies were reviewed that dealt with topics related to environmental protection. Only one was provided in the area of litter control. Further, all of these studies failed to examine actual student behaviors but rather chose to monitor changes in attitudes and knowledge.

To begin to fill the void on educational programs in litter control, Keep America Beautiful and its State affiliates have begun, as part of the Clean Community System, to implement specialized educational programs for litter control. One creative example was provided by the State of Virginia through the efforts of its Division of Litter Control. One aspect of the Virginia Plan was the emphasis on litter education in the public school system. The educational program called Operation Waste Watch (OWW) was unique because of the heavy emphasis

placed on program evaluation. Indeed, from the start, ongoing evaluation was a major goal for the program.

The present study represented the second large scale attempt to evaluate the OWW material in schools around the State. As discussed earlier, the study by Galano, Nezlek and Turnbull (1980) provided the first major assessment of the OWW program by examining student achievement (on pencil and paper instruments) and teacher reactions to the curriculum materials. Principle emphasis was placed on the psychometric properties of the assessment indicators (i.e., the pencil and paper test instrument). The goals of the present study were as follows:

1. The present study attempted to examine the curriculum materials and to provide modifications which incorporated various principles of applied behavioral analysis. Specifically, the modifications reflected attempts to instruct children in various principles of contingency management so that they might become behavioral change agents for litter control in their homes and community.

2. The study also attempted to provide a comprehensive evaluation of both the standard OWW curriculum and the modified curriculum materials. In order to augment the findings from earlier evaluations, an extensive emphasis was placed on assessing changes in student behaviors.

3. The study also attempted to assess changes in the beliefs and opinions of the participating teachers concerning the problems of

litter, as well as to obtain feedback concerning the various components of the OWW curriculum.

Specifically, program success was evaluated in regards to the following hypotheses:

1. The standard curriculum materials would lead to increased levels of posttest student awareness of waste management principles when compared to pre-treatment observations.
2. The modified teaching curriculum would also be effective in increasing posttest levels of student awareness when compared to pre-treatment observations.
3. As compared to the standard curriculum, the modified teaching curriculum could be more effective, at posttesting, in increasing student awareness.
4. The modified curriculum would be more effective in maintaining student awareness over time (i.e., during followup) as compared to the standard curriculum.
5. The standard curriculum materials would lead to increased levels of teacher awareness of waste management principles.
6. The modified curriculum materials would lead to increased levels of teacher awareness.
7. The modified teaching package would be more effective in increasing posttest levels of teacher awareness of waste management problems than the standard material.
8. The modified teaching package would be more effective in maintaining teacher awareness during followup than the standard package.

CHAPTER III

METHODOLOGY

Method

Subjects and Setting

The study was conducted in the public school systems of two counties surrounding Blacksburg, Virginia. Subjects were first, fourth, and sixth grade students attending 14 Roanoke and 5 Giles County elementary schools during the fall and winter of the 1980-81 academic year. A total of 37 classes were selected from the 19 schools agreeing to participate in the project (see Table 1 for a list of schools, their associated teachers, and class sizes). Of the 813 students making up

Insert Table 1 about here

the total subject sample, 245 were first graders, 346 were fourth graders, and 222 were sixth graders. Individual class sizes ranged from 15 to 28 students.

School and teacher selection. Participating schools were solicited in a similar manner in both Roanoke and Giles County, in that initial authorization for the project was first obtained from the Superintendent of Public Schools (see Appendix A for letters of permission). Each of these officials was provided with an outline of the project and a letter of introduction from the Virginia Division of Litter Control (a copy of this authorization is provided in Appendix B). In Giles County the superintendent approached the school

Table 1

Schools, Teachers, and Students Participating in OWW

Schools	Grade 1	# Students	Grade 4	# Students	Grade 6	# Students
<u>Roanoke County</u>						
Back Creek	Hicks	24	Brown	22	-	-
Back Creek			Viskup	24		
Burlington	-	-	Frazier	23	-	-
Conehurst	-	-	-	-	Kessler	23
East Salem	Carlton	18	Miles	21	Rohrbaugh	24
East Vinton	Dickerson	17	Hogan	24	-	-
Glen Cove	-	-	Goodwin	15	Goodwin	28
Green Valley	Wagner	17	Abbitt	22	-	-
Hardy Road	Hurst	23	-	-	-	-
Mason's Cove	-	-	Neighbors	19	Long	22
Mount Pleasant	Duffey	17	Shores	22	-	-
Oak Grove	Williams	22	Shifenelli	26	-	-
Penn Forest	Burks	20	Draper	23	-	-
West Salem	Andrew	24	Shuler	18	Sanders	22
William Byrd Int.	-	-	-	-	Edwards	27
<u>Giles County</u>						
King Johnson	-	-	-	-	Albert	25
Macy McClagherty	Whitehead*	20	Peters	20	-	-
Narrows	-	-	Tripp	22	Dowell	25
Pembroke	Jamison	21	Morton	18	McCall	26
Rich Creek	Evans	22	Bogges	27	-	-

*Dropped out of study due to illness.

principals. However, in Roanoke County, each individual principal was visited by two members of the research team to secure school cooperation. (Letters of permission from these administrators can be found in Appendix A.) Each of the principals in both counties were provided with a comprehensive explanation of the proposed project along with a preliminary copy of the Operation Waste Watch (OWW) curriculum material for each grade level. Due to extensive curriculum requirements already mandated in the Virginia public school systems, all of the administrators were encouraged to discuss the project and its required time parameters with their first, fourth, and sixth grade teachers prior to deciding whether to participate. As a result, 13 Roanoke and 4 Giles County schools requested that they not be included in the project because of national testing schedules and previous teacher commitments to other projects. Hence, all of the consenting schools in both counties had academic schedules which allowed the time needed to adequately teach the curriculum material.

Additionally, each school provided a list of teachers at each of the three grade levels (i.e., one, four, and six) who were interested in the project and who expressed a willingness to teach the OWW material. Class selections at each school were thus made up of only those faculty members who had volunteered to implement the teaching program and to allow class time for the various assessment measures.

Teaching Material

The teaching curriculum used in the present study was taken from the OWW program currently provided by the Virginia Division of Litter

Control (VDLC) (a sample consisting of the curriculum material for the first, fourth, and sixth grades can be found in Appendix C). The OWW program was based on the Waste in Place curriculum developed by Keep America Beautiful, Inc., and contained teaching material for kindergarten through grade six. Each of the learning units addressed the area of litter control and solid waste management; however, the curriculum material targeted different subgoals at each of the seven different grade levels. For example, at the first grade level students were taught to classify objects into the dichotomous categories of "waste" and "useful." At the fourth grade level, students examined changes which could be made in home waste disposal habits to reduce the amount of solid waste and litter. Finally, at the sixth grade level, children studied the solid waste problems of their own locality and designed a model waste disposal plan for an imaginary community.

These subgoals were conveyed by a set of activity cards at the individual and class level for each age group. Individual activity cards (IACs) were tailored for small groups or individual students, whereas the class activity cards (CACs) were designed to be used by the class as a whole.

Various audiovisual aids were also provided at each grade level. Specifically, each grade level received an appropriate set of comic or coloring books, a filmstrip and cassette introduction to the curriculum material, as well as a 20" x 24" antilitter poster. All supplemental material was designed to augment the theme for each grade level and to be used in conjunction with the teaching curriculum.

Experimental Conditions

All classes used in the project were randomly assigned to one of nine treatment conditions (six experimental and three control). The nine groups (as summarized in Table 2) resulted in a 3 Grade (First, Fourth, Sixth) x 3 Curriculum Condition (Standard, Modified, Control) between-groups factorial design.

Insert Table 2 about here

As indicated in Table 2, 12 schools contained first grade classes, 16 schools contained fourth grade classes, and 9 facilities contained sixth grade classes. Alternately, 12 schools contained classes assigned a standard curriculum package, 13 contained classes exposed to the modified version of the standard curriculum, and 12 schools contained classes which were given no curriculum package until after the evaluation period was completed.

Three of the seven grades (K-6) targeted by the OWW program were selected to serve as a representative sample for evaluation. Selection was based on the desire to represent the entire grade spectrum. Hence, grades one, four, and six were chosen for study.

The original teaching materials offered in the Standard OWW Curriculum program were implemented according to the VDLC procedures, except that the program was taught in a shortened format. That is, the VDLC has indicated that certain activity cards make up the "core" of the curriculum program and should not be left out. The remaining cards were considered optional. In the present study, only the core cards

Table 2

School Assignments by Grade and Curriculum

Condition	1st	4th	6th
Standard	Macy McClaugherty Mount Pleasant East Salem Oak Grove	Hardy Road Back Creek Mount Pleasant East Salem Macy McClaugherty	East Salem Pembroke West Salem
Modified OWW Curriculum	Penn Forest East Vinton Back Creek Pembroke	Mason's Cove Oak Grove Narrows Penn Forest Pembroke West Salem	Glen Cove Narrows Conehurst
Control	Green Valley West Salem Hardy Road Rich Creek	Burlington Rich Creek Glen Cove East Vinton Green Valley	King Johnson William Byrd Mason's Cove

were used in order to save instruction time.

The modified curriculum condition (the materials for which can be found in Appendix D) resulted from changes to the basic OWW curriculum package through modifications to the student activity cards. Basically, the modified material focused on the teaching of behavioral control principles designed to promote appropriate antilitter behavior. Through this behavioral curriculum, the children were taught to be behavioral change agents for litter control in their home and community.

Four individual and four class activity cards were modified to reflect behavioral principles in each grade. However, at the sixth grade level no modifications were made to the class activity cards (CACs) because of the type of activities involved. That is, the CAC package for the sixth grade involved a simulation game designed to encourage the understanding of how a large community manages its solid waste. All of the activities were carefully coordinated and did not lend themselves to modification without changing the entire CAC unit.

Specifically, within the Modified Curriculum package, cards 2, 8, 9, and 11 for the first grade, cards 4, 5, 6, and 7 for the fourth grade, and cards 1, 2, 5, and 8 for the sixth grade, Individual Activity Cards (IACs) were changed to reflect behavioral principles. Cards 1, 5, 6, and 8 for the first grade, and cards 1, 7, 9, and 10 for the fourth grade CACs were also modified. For each grade, the cards were modified to reflect three basic ideas. That is, students were: (1) encouraged to think about litter in terms of their own

behavior and the behaviors of others, (2) taught to understand how littering (as a behavior) was controlled through antecedent environmental cues and behavioral consequences, and (3) taught how to use the basic principles of contingency management to modify the behaviors of others. The primary focus was placed on teaching the children to praise appropriate antilittering behaviors of others.

The control groups included subjects at each age level who did not receive an educational program until the conclusion of the project. These no-treatment controls were given only the pre-, post-, and follow-up testing procedures.

Each of the nine groups was assessed across three repeated exposures to the assessment indices in a pre-curriculum phase, a post-curriculum phase, and a three-month follow-up phase. The result was a 3 Grade (First vs. Fourth vs. Sixth) x 3 Curriculum Condition (Standard vs. Modified vs. Control) x 3 Phase (Pre vs. Post vs. Follow-up) mixed factorial design.

Procedure

Each school was visited on three separate occasions in order to collect pretreatment, posttreatment, and follow-up data. Because of the number of school visits and the heavy workloads traditionally imposed on elementary school faculty, attempts were made to coordinate each team visit with school personnel well in advance and to minimize the actual workload on the teachers. The major concern was to make the addition of extra teaching duties as trouble free as possible and to ensure that the data collection activities did not conflict with school

routines.

Pre-experimental contact with school principals. Following the selection of target schools and the assignment of classes to treatment groups, each of the 19 principals were contacted by way of the telephone by the team member scheduled to visit their facility. Each of these administrators were given a detailed description of the actual data collection tasks, along with a tentative schedule as to when the school would be visited. The purpose of this pre-briefing was to allow the school officials opportunity to notify the teaching staff as to when the collectors would be at the facility and to work out collection schedules which would least interrupt school activities. For example, no school visits were scheduled on days that might be inconvenient for the teachers (e.g., national testing dates, routine school-wide hearing clinics, etc.). In addition, all of the principals were given a special telephone number by which they could contact the project staff if any problems arose regarding the research at their facility. Finally, all of the school administrators were asked not to institute any special cleaning or trash collection activities prior to (or during) the evaluation period.

Pre-experimental contact with target teachers. Prior to the start of the program, all of the participating teachers were also contacted via the telephone. As with the principals, each teacher received a detailed description of the data-gathering procedures along with a time schedule outlining these activities. Each of the teachers was asked not to alter their class activities or daily routines during

data collection. They were also asked to inform their classes that there would be visitors present throughout the year, but not to divulge the nature of the visits. (Most teachers simply described team members as student teachers.)

The teachers' daily class schedules were also obtained during this initial contact. More specifically, each teacher was asked to indicate the time his/her class took its lunch schedule, the duration of the lunch period, the route used to and from the cafeteria, and how long the class would remain in the classroom following lunch. All information from this initial telephone contact was recorded on a special data sheet which was used to fine tune the times that each class was visited (see Appendix E for a copy of this data sheet). Additionally, all teachers were asked to provide times during the day when they could be contacted without disrupting their class schedule. Each of the teachers was informed that she/he would receive a telephone call from the research team one week prior to any data collection activities. They were also given the hotline telephone number to be used if problems developed.

Experimental data collection. On each of three school visits, the research team checked in with the school administration prior to collecting any data. Any additional questions by the principal were answered at this time. Also, any other needed information (e.g., cleaning schedules, holiday vacation dates, school demographic information, etc.) pertinent to data collection activities was obtained during this meeting.

The assessment procedures used at each of the schools were grouped under four major categories (i.e., Environment Survey, Student Behavioral Assessment, Student Achievement Testing, and Teacher Assessment). Data pertinent to most of these areas were obtained on three separate occasions using the same basic procedure on each occasion.

1. Survey of the environment. Because research has demonstrated a strong relationship between littering behavior and the amount of surrounding ambient litter, various environmental litter assessments were obtained. Each school was assessed as to the type and condition of the neighborhood in which it was located and the amount of litter found in and around the school area.

For example, a neighborhood and school analysis was completed at each location in order to gather information pertaining to environmental conditions and appearance (a copy of this assessment questionnaire is found in Appendix F). Specifically, each school was assessed as to its age, general appearance and overall amount of litter. Detailed janitorial schedules were also obtained at this time along with staff estimates as to areas most plagued with litter. Additionally, information regarding the type of neighborhood (i.e., rural or urban) surrounding the school and its general appearance was recorded and the estimated average neighborhood income was obtained for each school location.

An additional assessment procedure in this category provided detailed information as to the actual amount of litter present at each school location. Prior to visiting the individual target classes, the

amount of ambient litter was assessed both outside and inside the school facility. For the outside, each observation team (consisting of at least two people) walked around the outside perimeter of the building and independently recorded the number of inappropriately disposed waste items. Each of the two observers separately counted items which exceeded the size of a bottle cap and were within a 20 foot perimeter of the building. The two observers counted and recorded items independently on the first trip around the building. That is, neither observer informed the other of their tally of litter items until after each count was completed. Upon completing the separate counts, the observers then walked around the building a second time and counted items together. On the consensus count, no item was recorded unless the two observers agreed that it met the criterion for inclusion. Both the two separate counts and the final consensus count were recorded on a special data sheet (see Appendix G).

Litter counts were also made in a similar manner for the school restroom areas inside the building. At each school, the bathrooms used by the target classes were determined and only these facilities were examined for litter. Two team members visited each restroom and independently counted and recorded the separate pieces of litter. Any waste item found on the restroom floor (or in window sills, or behind radiators, or within toilet stalls) was counted by each observer. After the separate counts were recorded, the two observers examined the restroom together and recorded a consensus count. That is, both observers had to agree that an item was misplaced (i.e., litter) before

the item was recorded. Again, both the separate counts and the consensus count were recorded on the data sheet for each restroom.

2. Student behavior assessment. In order to obtain a more direct measure of the effectiveness of the OWW program, attempts were made to study actual litter-relevant behavior. Specifically, three procedures were implemented: (a) an objective evaluation of indigenous classroom litter (Classroom Litter Count), (b) an assessment of the disposition of specially planted classroom litter items (Planted Classroom Litter), and (c) an examination of behavior resulting from elementary students given a potential source of litter (Student Handouts).

Each of the visits were scheduled to coincide with the time that the particular target class went to lunch. The behavioral assessments began only after the class had left the room and the teacher had been briefed as to the data collection procedures.

The first of these assessments involved determining the amount of room litter for each of the target classes. However, since no simple litter count could be accurately used across different room dimensions and class sizes, various demographic characteristics for each class were first obtained. Each room was measured (length and width) and its area (in square feet) was determined and recorded on a special data sheet along with the number of children in class for that day (a copy of this litter assessment form is provided in Appendix H). Additionally, a rough outline map was completed showing the schematic layout for each student area (also in Appendix H). Each map noted the location of architectural features such as the placement of doors and

windows as well as the disposition of furniture (i.e., student desks, work areas, etc.).

Finally, once the room demographics were recorded, an actual litter count was made by the observation team. Any item which had been inappropriately discarded was counted and categorized according to its general type (i.e., crumpled or torn up material versus discarded items which were intact) and the location where it was discovered (e.g., on the floor, on the teacher's desk, on the top of a cabinet, etc.). No material which could easily be associated with ongoing class projects was recorded. Further, all counts were conducted in a similar manner to the environmental litter assessments. That is, litter items were first counted and recorded separately by two data collectors. Following the separate counts, the two observers examined the room together and recorded a final consensus count for each room (i.e., they came to an agreement on what should and should not be recorded as room litter). For example, in each room the two observers would first examine the room separately and record their independent counts. Immediately following the separate counts, the two observers would re-examine the room together, coming to an agreement on each item prior to recording a final consensus count for room litter.

The second behavioral indicator involved planting specially marked litter items around the classroom while the students were still out of the room for lunch and recording their subsequent location at the end of the school day. Specifically, after the litter in each class had been categorized and recorded, ten marked litter items (i.e., crumpled

up white 8 1/2" x 11" typing paper) were planted in four different areas throughout the room. Three of the items were randomly placed on the floor adjacent to the student's desks, three of the items were placed on the desks themselves, three were planted at random throughout the class on public table space, and one item was placed on the floor directly next to the class trash container. Each litter item was marked in the lower left-hand corner as to where it was planted in the class. For example, floor items were marked with a "F", whereas items placed on the children's private desk space were marked with "Pr."

The final student behavior assessment was implemented after the classroom had been prelittered and was carried out as the students were leaving the lunchroom area. Specifically, one of the data collectors was stationed at the lunchroom exit while the remaining team members stood at points in the hallway where the children could be easily observed. The lunchroom observer simply handed each target child leaving the cafeteria a 8 1/2" x 11" pre-wet (soapy) towelette called a "Baby Wet One" (supplied by Sterling Drug, Inc.). The children were told that the towelettes were being tested as part of a school health project being conducted in their area. The number of handouts taken and refused were recorded on the data sheet depicted in Appendix H. After the children had returned to their classroom, the halls (and restrooms when necessary) were examined and the number of inappropriate disposals were recorded. Half of the target classrooms had the opportunity to dispose of the towelettes in a hall trash can.

For these children a trash receptacle was conveniently located along their route back to the classroom; however, for the other 50% of the target classrooms, all of the hall trash cans were removed before they started back to the classroom.

Each teacher was contacted before returning to his/her class and again reminded not to prompt the children in any way in terms of what they should do with the planted litter items or the remaining towle-ettes. It was also determined at this time as to what time the children would leave the classroom at the end of the day.

To avoid further student distractions, the research team waited until each target class had departed for the day before re-entering the classroom. At that time, each of the planted litter items and towelettes were located (when possible) and their final disposition recorded. Also, any relevant teacher comments concerning the children's behavior were obtained and recorded.

In addition, on the pretest visit, each teacher scheduled to teach one of the two curriculum versions was given a complete curriculum package, a set of pre- and posttest questions and answer sheets, two copies of the Litter Awareness Questionnaire (LAQ), a Teacher Evaluation Questionnaire (TEQ), and a return envelope. Each teacher was given detailed instructions as to how to complete each of the requirements along with an item checklist which summarized these requirements. (A copy of the Teachers' Checklist is provided in Appendix I). The control teachers, however, were given only the assessment material at the pretest visit. A standard curriculum program was later provided

to each of these participants during the final follow-up visit.

3. Student achievement testing. The test material provided to each of the teachers was based on the test questions supplied at each grade level by the Virginia Division of Litter Control in the original OWW curriculum. Two different forms of this test material were provided. That is, all teachers administering the standard teaching package and those who were designated to control groups received the original OWW testing materials. (A copy of this material is provided in Appendix J.) However, the teachers who were assigned to teach the modified curriculum package were supplied with an extended version of the basic testing material. (The revised test material is provided in Appendix K.) The modified tests included three new items at both the fourth and sixth grade level, designed to assess understanding of the behavioral principles demonstrated in the modified curriculum materials. No modifications were made to the first grade materials in that they were believed to adequately assess the curriculum material in their original form.

Teachers were given a detailed explanation of test procedures and an administration schedule. Each teacher was asked to administer the test on three occasions; once immediately prior to the instruction period, again immediately following completion of the program, and again three months later.

4. Teacher assessments. All of the participating school faculty were asked to complete a Litter Awareness Questionnaire (LAQ), a copy of which is provided in Appendix L. This instrument attempted to

assess the teacher's sensitivity and awareness of litter related issues, and to provide an additional assessment of environmental litter and litter related student behaviors in and around the target classes. By using the LAQ as a pre, post, and follow-up program assessment, information concerning the teacher's prior litter related opinions and attitudes could be examined, as well as any changes in these views subsequent to the program.

Following the administration of the teaching program, all of the teachers (i.e., those who taught a curriculum package) were asked to complete a Teachers Evaluation Questionnaire (TEQ) which was supplied by the Virginia Division of Litter Control. The TEQ (a copy of which is provided in Appendix M) was a 28 item instrument designed to allow participating teachers to supply feedback as to the adequacy and effectiveness of the OWW curriculum material. The TEQ was designed to provide information as to how well the curriculum material fit its intended audience and to demonstrate how well the program was actually administered.

Finally, in an attempt to keep track of how many activities were actually taught (and on what schedule), all teachers receiving a curriculum were asked to keep records as to when a card was taught and how much class time was required per activity card. The teachers were told that this information along with the completed posttest questions and LAQ would be collected five weeks from the time a particular teacher gave the pretest. This time interval was based on estimates by the Virginia Division of Litter Control as to how long it should

take to teach the curriculum material.

In conclusion, all teachers were given enough testing material during the pretest visit to complete pre and postcurriculum testing. Each teacher was told that the pre scores should be sent back (via a self-addressed and stamped envelope) to the research team along with a completed LAQ as soon as all students were tested. Teachers were also told that the research team would return in five weeks and that follow-up testing materials would be provided at that time. Correspondingly, on the second school visit these materials were provided and all posttest materials, LAQs, and TEQs were collected. Information relevant to how long a teacher had needed to teach the material and what cards were used was also collected on the second visit. On the third trip to each school, all follow-up information was collected, all control teachers were supplied with a standard curriculum package, and any questions by the teachers were answered.

Design

Each of the nine possible combinations of the two between-group factors (i.e., Grade and Curriculum Condition) was assessed across three repeated exposures to the assessment indices in a pretreatment phase, a posttreatment phase, and in a three-month follow-up phase. This is essentially a Baseline, Treatment, and Follow-up design whereby measurements were taken on the same individuals and environments before treatment (i.e., administration of the curriculum), immediately after treatment, and three months following treatment. The result was a 3 Grade (First, Fourth, Sixth) x 3 Curriculum (Standard, Modified,

Control) x 3 Phase (Pre, Post, Follow-up) mixed factorial design. Three basic dependent measures were examined according to this design.

Student behavior assessment. The first of these assessments was made up of four specific subcomponents. For example, the Classroom Litter Count provided an assessment of indigenous classroom litter as determined by the amount of total room litter, litter per child (i.e., total litter count per room divided by the number of students), litter per square footage (i.e., total litter count per room divided by total ft^2), and litter per room density (i.e., total litter count per room divided by the class population over the area of the room). The count of Planted Classroom Litter provided an assessment of actual waste management behavior in terms of the appropriate and inappropriate disposal of litter items planted in the class environment. Specifically, the number of planted litter items in each of the four room locations (i.e., floor items, desk items, items planted on public table areas, and the item planted adjacent to the class trash container) was examined according to their final disposition at the end of the day. Finally, the Student Handout litter count involved the assessment of the number of "Wet Ones" appropriately and inappropriately discarded by the students during the school day.

Student achievement testing. The second dependent variable concerned the students' knowledge and basic understanding of the concepts of proper waste handling. This assessment objective was provided by a written (multiple choice) test instrument which was designed to assess information relevant to that particular set of unit objectives for

each of the three age categories.

Teacher assessment. The third critical measure (i.e., the LAQ) was provided by the participating teachers. This assessment attempted to examine the teachers' sensitivity to the overall problem of litter and the degree to which litter was a problem for the students in their particular class.

Two other supplemental assessment categories were also examined. One concerned the assessment of the amount of litter present in the immediate school area. Specifically, the number of litter items outside the school was counted and the data recorded in terms of the total number of items found (that were larger than a bottle cap) and the number of items found per school population (i.e., the total count divided by the number of students enrolled). Also recorded for each school was the number of litter items discovered in the restrooms associated with the target population. Additional amplifying information was provided in terms of neighborhood and school analysis. This assessment provided subjective ratings of the amount of litter found within the school and surrounding area, the economic characteristics of the surrounding area, and the degree of physical proximity of the surrounding area to the school.

The other supplemental assessment concerned the evaluation of the curriculum materials by the participating teachers (i.e., the TEQ). Each of the teachers who taught the curriculum package (standard or modified version) were asked to complete an evaluation questionnaire concerning the relevance of the materials to their classes.

Specifically, this evaluation instrument, which was designed and supplied by the Virginia Division of Litter Control, was intended to assess the usefulness of the specific curriculum materials, the difficulty and meaningfulness of the particular individual and class activities, and the degree of student mastery of the different curriculum objectives.

CHAPTER IV

RESULTS

The evaluation of the OWW curriculum materials was based on the assessment of responses made by both teachers and their associated students before, immediately after, and three months following the administration of the program. Specifically, the evaluation centered around the examination of two sources of student data. One involved the assessment of the amount and type of indigenous litter found in the classroom, the disposition of specially planted litter items, and the disposition of disposable paper towels which had been provided to each student following lunch. Additional student data was also obtained from a more traditional assessment instrument. That is, student test performance was examined through a pencil and paper test designed to assess knowledge and understanding of the various curriculum principles at each of the three grade levels.

Evaluation of the OWW material was also based on the assessment of the participating teachers. An examination of the teachers' sensitivity to various litter related issues and their own assessment of the student's behavior was provided through the repeated administration of the Litter Analysis Questionnaire (i.e., Pre, Post, and Follow-up). Additionally, the teachers were asked to complete an evaluation instrument (following their curriculum presentation) which was especially designed to examine the relative usefulness of their individual curriculum units.

An attempt was also made to provide a detailed examination of the

school environment in which each program was evaluated. That is, teachers and staff at each facility were asked to respond to questions regarding the amount of ambient litter and the general appearance of the school and its surrounding neighborhood. Further information was provided in terms of an actual litter assessment at locations both inside and outside the school facility.

Finally, in addition to these assessments, the basic demographic characteristics of the student and teacher population was examined. The primary source for all demographics and environmental information was the school faculty. In instances where teachers' responses were unavailable or inappropriate, the information was obtained from the school principal. When this latter source of data is provided, such will be noted.

Demographic Characteristics

Teachers. Of the original 37 teachers, one first grade (standard teaching program) was forced to withdraw from the project during pre-testing due to illness. Hence, the project was completed with a total of 36 participating teachers. Table 3 summarizes the demographic characteristics of the project faculty. It can be seen that most of the teachers were female (i.e., 81.6%) and were between the age of 26 and 45 (i.e., 69.4%). Over 75% (i.e., 77.8%) of the participating faculty had six or more years of teaching experience, whereas about 22% (i.e., 22.2%) had less than five years of experience.

Insert Table 3 about here

Table 3
Teacher Demographics

		Frequency	Percent
Sex	Male	5	13.89
	Female	31	86.11
Age	Under 25	5	13.89
	26-45	25	69.44
	46-55	4	11.11
	56 and over	2	5.56
Years Teaching	Under 1	1	2.78
	1 to 5	7	19.44
	6 to 10	18	50.00
	Over 10	10	27.78

Students. Twenty first-grade students were dropped from the original sample of 833 because, as stated above, their teacher could not continue the program. Table 4 shows the percentage of male and female students for each curriculum group and each grade level. These results indicate that among the 813 students, there was an equal balance between the proportion of males and females in each group. That is, only two groups (i.e., the Modified - 1st grade and the Standard - 6th grade) showed more than a 10% difference between the proportion of participating male and female students.

Insert Table 4 about here

Table 5 summarizes the racial characteristics of the students in the Standard and Modified groups at each age level. It can be seen that there was a higher proportion of Caucasian subjects in each group. That is, in each sample the proportion of Caucasian students exceeded the proportion of Blacks and others by at least 80%.

Insert Table 5 about here

Table 6 shows the student's socioeconomic status for each of the two curriculum conditions at each grade level. All information pertaining to the student's socioeconomic background was provided by the teachers on the TEQ. It is evident from the overall results that most of the classes (i.e., 54.17%) represented mixed or mid-level (i.e., 29.17%) socioeconomic backgrounds. Only two of the groups contained

Table 4
Mean Percent Male and Female Students

Grade	Sex	Standard	Modified	Control
1	Male	46.70	58.80	51.80
	Female	53.30	41.20	48.20
4	Male	52.40	49.90	50.00
	Female	47.60	50.10	50.00
6	Male	56.00	54.50	48.40
	Female	44.00	45.40	51.60

Table 5
 Mean Percent Caucasian, Black and Other

Grade	Race	Condition	
		Standard	Modified
1	Caucasian	92.00	97.50
	Black	8.00	1.25
	Other	0.00	1.25
4	Caucasian	97.20	98.50
	Black	2.80	.57
	Other	0.00	.71
6	Caucasian	100.00	91.50
	Black	0.00	8.50
	Other	0.00	0.00

students of low or high socioeconomic status (i.e., the standard - 1st grade and the modified - 4th grade).

Insert Table 6 about here

Environmental Litter Assessment

Data from both the surrounding neighborhood and the immediate school environment were obtained from two basic sources: (1) the Neighborhood and School Analysis Questionnaire (NSAQ), and (2) the Litter Awareness Questionnaire (LAQ). The first of these sources was obtained by the data collection team through visual inspection of the area and discussions with the school principals, whereas the latter information was obtained from the teacher's pretest responses to specially designated LAQ items. Additional information concerning the amount of litter found at each school was obtained by the data collection team through actual litter counts.

Neighborhood environment. Table 7 summarizes the data obtained from each of the four NSAQ neighborhood items for both Giles and Roanoke Counties. In an attempt to ensure reliable data collection, each of the items represent the consensus rating (on a five-point scale) of two of the data collectors. An examination of these results across the two County areas revealed several basic differences. For example, the Giles County schools were judged to be in areas rated as more rural and representing lower income levels than the areas encompassing Roanoke County schools. In terms of general appearance, the

Table 6

Mean Percent

Student Socioeconomic Status

Socioeconomic Status	1st Grade		4th Grade		6th Grade		Total Mean for all Groups
	Standard	Modified	Standard	Modified	Standard	Modified	
Low				28.57%			8.33%
Medium	66.67%		20.00%	14.29%	66.67%	50.00%	29.17%
High	33.33%			14.29%			8.33%
Mixed		100.00%	80.00%	42.86%	33.33%	50.00%	54.17%

Giles County neighborhoods were also rated as somewhat more rundown than those in Roanoke County. Additionally, the Giles County locations were judged to be more littered than those in the Roanoke area.

Insert Table 7 about here

Additional information concerning the amount of litter in each area was obtained from the participating teachers. Table 8 shows the teachers' assessment of the litter problem in their particular area. It can be seen that most of the teachers in Giles County (i.e., 77.78%) and in Roanoke County (i.e., 72.00%) felt that litter was a problem in their area. In particular, Giles County was more often thought to have a litter problem than Roanoke County. The majority of the teachers (i.e., about 56.00%) in both groups rated the litter problem (see item 13 in Table 8) as "moderately" severe. However, more of the Giles County teachers (i.e., 11.11%) rated the problem as "very severe" than did their counterparts in Roanoke County (i.e., 4.00%). Also, the teachers in Roanoke County were more likely (i.e., 40.00%) to rate the intensity of the litter problem in their area as "slight" than those in Giles County (i.e., 33.33%). Hence, there is some evidence to indicate that Giles County may be more plagued with litter than the Roanoke area.

Insert Table 8 about here

Table 7

Mean Rankings on Neighborhood Assessment Items

<u>Type of Surrounding Neighborhood</u> ¹		1	2	3	4	5	
Rural	Giles		1.80				Urban
	Roanoke			3.46			
<u>Average Neighborhood Income</u> ²		1	2	3	4	5	
High	Giles			3.50			Low
	Roanoke		3.11				
<u>General Neighborhood Appearance</u> ³		1	2	3	4	5	
Well Kept	Giles		2.40				Run Down
	Roanoke		2.22				
<u>Amount of Neighborhood Litter</u> ⁴		1	2	3	4	5	
Clean	Giles		2.33				Littered
	Roanoke		1.89				

Neighborhood and School Analysis Questionnaire Items

¹What type of neighborhood (1 mile radius) surrounds the school?

²What is the average income of the people in the neighborhood?

³What is the general appearance of the neighborhood?

⁴How littered is the neighborhood surrounding the school?

Table 8

Teacher Assessment of Community Litter Problem

Litter Analysis Questionnaire Item	County	Response					
		Yes		No		Don't Know	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
13. Do you believe that there is a litter problem in your community?	Giles	7	77.78	2	22.22	0	0.00
	Roanoke	18	72.00	3	12.00	4	16.00

		Very		Moderately		Slightly		No Problem	
		Fre-	Per-	Fre-	Per-	Fre-	Per-	Fre-	Per-
		quency	cent	quency	cent	quency	cent	quency	cent
14. How severe is the litter problem in your community?	Giles	1	11.11	5	55.56	3	33.33	0	0.00
	Roanoke	1	4.00	14	56.00	10	40.00	0	0.00

School environment. Table 9 shows the basic characteristics for the schools in each county area with regard to the age of the building, the number of elementary students and the number of trash receptacles at each location. It is evident that the Giles County schools were basically older and served fewer students than did the schools in Roanoke County. Additionally, the number of litter receptacles in both areas were low, both inside and outside the buildings.

Insert Table 9 about here

Table 10 summarizes the data obtained from the two NSAQ school items for both county areas. Again, the items represent a consensus rating (on a five point scale) among two members of the data collection team. It can be seen that the Giles County schools were judged to be more rundown than those in Roanoke County. The schools in the Giles County area were also rated as being more littered than those in Roanoke County. These results follow the same pattern as the neighborhood data. That is, both the schools and their surrounding environments in the Giles County area appeared to be less well kept and more littered than their Roanoke counterparts.

Insert Table 10 about here

Additional information on the litter problem at each school was again obtained from the teacher's responses to specific items on the Litter Analysis Questionnaire (LAQ). Table 11 shows the teacher's

Table 9
Basic School Characteristics

	Giles	Roanoke
Mean age of building	44.60 yrs.	33.15 yrs.
Mean number of elementary students per building	394.80	445.79
Mean number of trash receptacles	2.0* (inside) 2.0 (outside)	1.83* (inside) 1.91 (outside)

*Does not include class trash containers.

Table 10

Mean Rankings on School Assessment Items

General School Appearance¹

		1	2	3	4	5	
Well	Giles				3.40		Run Down
Kept	Roanoke		1.70				

Amount of School Litter²

		1	2	3	4	5	
Clean	Giles				3.90		Litt- ered
	Roanoke		1.81				

Neighborhood and School Analysis Questionnaire Items

¹What is the overall school appearance?

²How littered is the school environment?

assessment of the litter problem at schools in each county area. It is evident that a greater percentage of the Giles County teachers (i.e., 55.56%) felt that there were litter problems in their school than the teachers in Roanoke County (i.e., 44.44%). Again, this data supports the contention that the litter problem is more pronounced in the Giles County area. However, when asked to actually rate the severity of the school litter situation (see item 18 in Table 11), a higher percentage of the Giles County teachers (i.e., 77.78%) indicated litter to be only a slight problem. Of the teachers who believed the litter problem to be of moderate severity, a greater percentage were from the Roanoke County schools (i.e., 29.63%) than from the schools in Giles County (i.e., 22.22%).

Insert Table 11 about here

Further, when asked about the actual amount of litter in their schools (see item 7 in Table 11), a higher percentage of the teachers in Giles County (i.e., 88.89%) saw their environment as only slightly littered than those in Roanoke County (i.e., 59.26%). Also, the percentage of the teachers who felt their environment was moderately littered was lower in Giles County (i.e., 11.11%) than in Roanoke County (i.e., 37.04%). Hence, even though more of the Giles County faculty members believed that there was a litter problem at their school, they were more likely to perceive the problem as slight than their Roanoke counterparts.

Additionally, each of the teachers were asked to designate the

Table 11

Teacher Assessment of School Litter Problem

Litter Analysis Questionnaire Item	County	Response					
		Yes		No		Don't Know	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
17. Do you believe that there is a litter problem in your school?	Giles	5	55.56	4	44.44	0	0.00
	Roanoke	12	44.44	11	40.74	4	14.81

		Very		Moderately		Slightly		No Problem	
		Fre- quency	Per- cent	Fre- quency	Per- cent	Fre- quency	Per- cent	Fre- quency	Per- cent
18. How severe is the litter problem in your school?	Giles	0	0.00	2	22.22	7	77.78	0	0.00
	Roanoke	0	0.00	8	29.63	15	55.56	4	14.81

		Very		Moderately		Slightly		No Problem	
		Fre- quency	Per- cent	Fre- quency	Per- cent	Fre- quency	Per- cent	Fre- quency	Per- cent
7. In your opinion how littered is your school environment.	Giles	0	0.00	1	11.11	8	88.89	0	0.00
	Roanoke	0	0.00	10	37.04	16	59.26	1	3.70

areas most likely to be littered and to indicate the most likely cause of litter at their particular facility. Table 12 shows the proportion of teachers who indicated a particular area as likely to accumulate litter. It is evident that a greater percentage of the teachers in each county found the school restrooms (i.e., 55.56% in Giles and 59.25% in Roanoke) and outside grounds (i.e., 77.78% in Giles and 55.56% in Roanoke) to be areas with a high concentration of litter. However, there were some major differences between the two county areas. For example, a greater percentage of teachers in Roanoke County (i.e., 33.33%) than in Giles County (i.e., 11.11%) found the class coatroom area to be likely to accumulate litter. Also, the outside playgrounds were more often found littered by Roanoke faculty (i.e., 51.85%) than the teachers in the Giles County area (i.e., 22.22%).

Insert Table 12 about here

Additionally, all the teachers were asked to indicate the major contributing problems that lead to litter accumulations at their school. Table 13 summarizes the proportion of teachers who selected each problem area as relevant to their facility. It is evident in both counties that most of the faculty (i.e., 66.7% in Giles County and 85.2% in Roanoke County) believed that the major cause of litter was due to the inappropriate disposal habits of students. However, there were some inter-county differences. For example, inappropriate trash receptacle placement was more often mentioned as a problem by the teachers in Roanoke County (i.e., 18.5%) than in Giles County

Table 12

Teacher's Assessment of School Areas Most Likely
to be Littered

	County	School Location										
		Walk ways	Hall ways	Bath room	Lunch room	Stairs	Coat room	Class room	Cafe	Grounds	Aud. Gym	Play Ground
Frequency	Giles	1	1	5	1	1	1	5	1	7	-	2
Percent		11.11	11.11	55.56	11.11	11.11	11.11	55.56	11.11	77.78	-	22.22
Frequency	Roanoke	2	2	15	9	1	9	16	6	15	-	14
Percent		7.40	7.40	55.56	33.33	3.70	33.33	59.25	22.22	55.55	-	51.95

(i.e., 11.1%). Although not mentioned by the Giles County faculty, several teachers in Roanoke County (i.e., 7.4%) in both cases found poor janitorial services and staff disposal habits to be a problem at their schools.

Insert Table 13 about here

School litter count: Interobserver reliability. Table 14 summarizes the interobserver reliabilities for both the outside and inside litter counts. It can be seen that estimates of reliability were provided for 49.12% of the outside observations, 63.16% of the male restroom observations and 57.90% of the female restroom observations

Insert Table 14 about here

Looking first at the outside count, it can be seen that the two sets of independent observations were highly correlated (i.e., $r = 96.77$). The high reliability is, in this case, somewhat deceptive in that the observers never obtained exactly the same count. Because of the diversity of items found around the schools (e.g., broken glass, popsickle sticks, partially blown up wads of bubble gum, etc.) and because of the difficult terrain (e.g., dense undergrowth, barricaded areas, and heavy accumulations of fallen leaves), observers were often hampered in their ability to adequately identify and examine the littered areas around the schools. Agreement between the two independent counts to within (plus or minus) 50 items was obtained for 78.57%

Table 13

Teacher's Assessment of the Problems Causing School Litter

Problem	Giles County		Roanoke County	
	Frequency	Percent	Frequency	Percent
Inappropriately placed receptacles	1	11.10	5	18.50
Poor janitorial collection practices	0	0.00	2	7.40
Poor disposal habits by staff	0	0.00	2	7.40
Poor disposal habits by students	6	66.70	23	85.20
Other	2	22.20	6	22.20

Table 14

Interobserver Reliability for Environmental Litter Counts

Outside

Total No. of Counts	No. of Counts with 2 Obser.	Percent Counts with 2 Obser.	Correlation Coefficient	Number with Perfect Agreement	Percent with Perfect Agreement	Number within 30 Items	Percent within 30 Items	Number within 50 Items	Percent within 50 Items
57	28	49.12	96.77	0	0	20	71.42	22	78.57

Inside

	Total No. of Counts	No. of Counts with 2 Obser.	Percent Counts with 2 Obser.	Correlation Coefficient	Number with Perfect Agreement	Percent with Perfect Agreement	Number within 1 Item	Percent within 1 Item	Number within 2 Items	Percent within 2 Items	Number within 3 Items	Percent within 3 Items
Male	57	36	63.16	94.32	28	77.78	30	83.33	32	88.89	33	91.67
Female	57	33	57.90	99.64	27	81.82	28	84.85	30	90.91	31	93.94

of the observations. Therefore, since the percent of agreement between the two independent observations was somewhat low, all outside litter observations were reported in terms of the consensus count at each location. That is, only the data which represented the complete agreement of the two observers was reported.

On the inside restroom counts the level of perfect observer agreement was 77.78% in the male restrooms and 81.82% in the female restrooms. Interobserver agreement to within (plus or minus) three items was obtained on 91.7% of the male and on 93.94% of the female restrooms. With the inside counts the conditions were far more favorable to accurate observations in that there were fewer items in less diverse environments. All inside restroom litter counts were also reported in terms of the consensus observation at each location.

Insert Table 15 about here

School litter count: Outside observations. Table 15 shows the number of litter items found at schools within each of the two county areas across the three experimental phases (i.e., Pre, Post, and Follow-up). An initial examination of this data indicated that more litter was found around Giles County schools than around schools in Roanoke County. However, a simple count of litter around each school facility did not provide comparable data between the different schools. As shown in Table 15, each of the schools varied in terms of student population. Therefore, the number of items found was divided by the number of students at each facility. Figure 1 shows the mean litter

Table 15
Outside Litter Count*

County/School	No. of Students	No. of Litter Items			Litter Per Student		
		Pre	Post	FU	Pre	Post	FU
<u>Giles</u>							
King Johnson	214	580	663	482	2.71	3.10	2.25
Macy McClaugherty	545	90	289	85	.17	.53	.16
Narrows	630	583	785	397	.93	1.25	.63
Pembroke	438	190	447	820	.43	1.02	1.87
Rich Creek	147	231	347	214	1.57	2.36	1.46
<u>Roanoke</u>							
Back Creek	172	61	68	47	.36	.40	.27
Burlington	503	32	76	85	.06	.15	.17
Conehurst	370	312	247	120	.84	.67	.32
East Salem	553	83	135	133	.15	.24	.24
East Vinton	568	406	394	202	.71	.69	.36
Glen Cove	704	81	85	207	.12	.12	.29
Green Valley	392	222	172	259	.57	.44	.66
Hardy Road	727	277	380	128	.38	.52	.18
Mason's Cove	251	154	295	174	.61	1.18	.69
Mount Pleasant	410	125	397	180	.31	.97	.44
Oak Grove	451	101	96	211	.22	.21	.47
Penn Forest	575	175	158	424	.30	.28	.74
West Salem	381	49	376	414	.13	.99	1.08
William Byrd	184	464	141	432	2.52	.77	2.35
Mean Giles	394.80	334.80	560.20	399.60	1.16	1.65	1.27
Mean Roanoke	445.79	181.57	215.71	215.42	.52	.55	.59

* As indicated by consensus count by two observers.

per student data for each county across the three experimental phases. It can be seen that more litter was found around the Giles County schools than around the schools in Roanoke County across all phases of the experiment. The data further indicated that the schools in Giles County showed a marked increase in the amount of litter found during the second school visit (i.e., posttest phase), whereas the Roanoke County schools showed stable levels across all three phases.

Insert Figure 1 about here

School litter count: Inside observations. Table 16 shows the mean number of waste items found in the school restrooms for each county area. It can be seen that in Giles County more items were found in the female restrooms than in the male restrooms during both the pre and post assessment phases. During the follow-up period, more items were found in the male restrooms. In Roanoke County, however, the number of items found in the male restrooms exceeded the number found in female facilities during the first two assessment phases, yet in the follow-up period, more waste items were found in the female restrooms. The data also indicated for each overall county a similar pattern of results across the three experimental phases. That is, the overall mean number of items found in Giles County increased during the post assessment phase and remained at this level during the follow-up period. The same pattern was observed in Roanoke County except that the number of items found increased substantially during the follow-up assessment period. Hence, in both counties there was

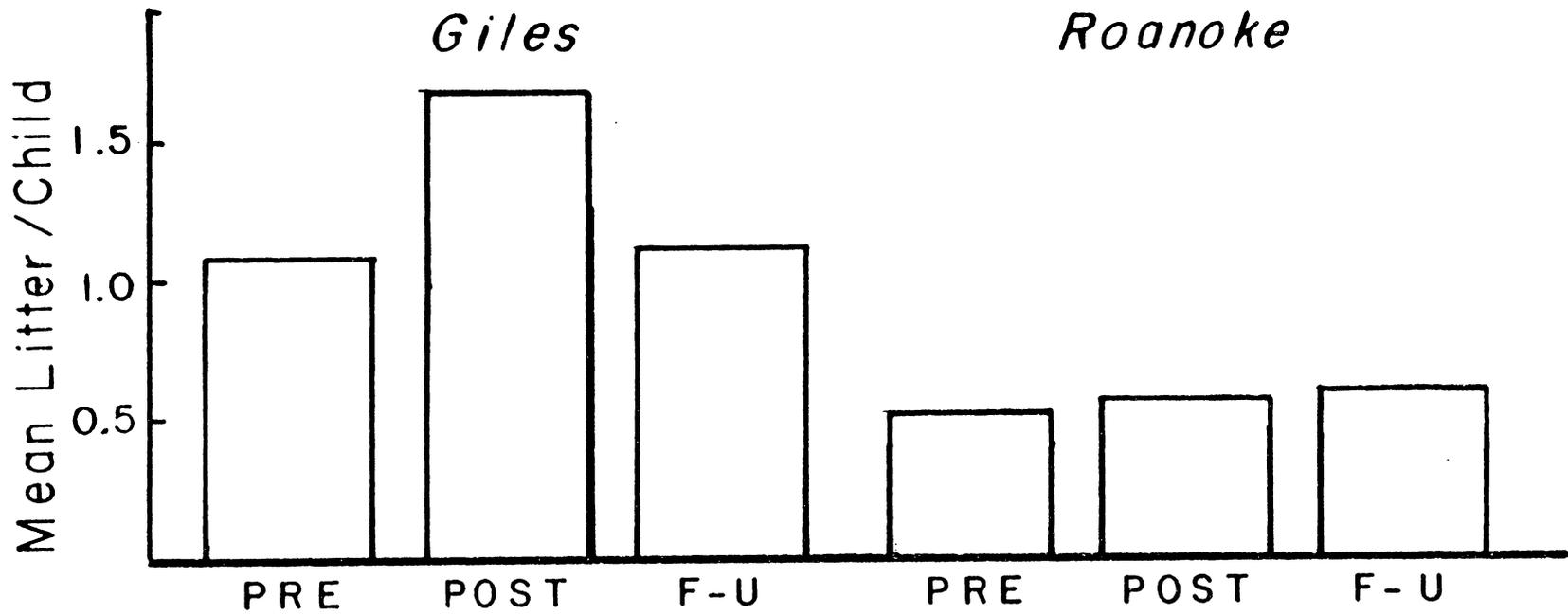


Figure 1. Mean number of litter items per student in Giles and Roanoke Counties.

evidence that the students tended to produce less litter in the rest-room areas during the first part of the school year than during the latter part of the year.

Insert Table 16 about here

Student Behavior Assessment

Interobserver reliability. Table 17 summarizes the interobserver reliabilities for the classroom litter count. It can be seen that estimates of reliability were provided for 72.22% of the crumbled or torn up items and for 56.48% of the intact items. For the crumbled items, the level of observer agreement was 65.39%; whereas, for the intact items, the level of agreement was 88.52%. However, interobserver agreement within three items (i.e., the two counts disagreed by no more than three items) was 88.46% for crumbled items and 98.36% for intact items. Hence, it is evident that items which were torn up were harder to count and produced more observer discrepancies than items which were discarded intact.

Insert Table 17 about here

Classroom litter count. Immediately after making their separate counts, the two data collectors compiled a consensus count of all crumbled and intact items as well as a total consensus count (i.e., the sum of the crumbled and intact items) for each class. Each item was recorded only when both observers agreed that the item was discarded

Table 16
 Mean Number of Restroom Items*

County	Restroom	Pre	Post	Follow-up
Giles	Male	3.80	4.20	7.00
	Female	6.40	7.20	4.25
	Overall	5.10	5.70	5.63
Roanoke	Male	3.00	4.50	6.00
	Female	2.71	2.42	6.93
	Overall	2.86	3.46	6.46

*As indicated by consensus count from two observers.

Table 17

Interobserver Reliability for Classroom Litter Counts

	Total No. of Counts	No. of Counts with 2 Obser.	Percent Counts with 2 Obser.	Correlation Coefficient	Number with Perfect Agreement	Percent with Perfect Agreement	Number within 1 Item	Percent within 1 Item	Number within 2 Items	Percent within 2 Items	Number within 3 Items	Percent within 3 Items
Crumpled	108	78	72.22	98.45	51	65.39	60	76.92	63	80.77	69	88.46
Intact	108	61	56.48	95.88	54	88.52	58	95.08	59	96.72	60	98.36

inappropriately. Table 18 shows the mean consensus count for crumbled and intact items found for each grade and curriculum condition across the three experimental phases. Low mean values for each group indicated a lower amount of litter counted in each class and therefore represented a higher awareness index of appropriate waste management. Separate 3 Grade (First, Fourth, Sixth) x 3 Curriculum Condition (Standard, Modified, Control) x 3 Phase (Pre, Post, Follow-up) ANOVAs on the crumbled and intact item counts revealed no significant main effects and no significant interactions, all p s $>.08$. Also shown in Table 18 is the total mean consensus for each condition.

Insert Table 18 about here

An additional 3 Grade (First, Fourth, Sixth) x 3 Curriculum Condition (Standard, Modified, Control) x 3 Phase (Pre, Post, Follow-up) ANOVA on the total number of room items revealed no significant main effects and no significant interactions, all p s $>.10$. An examination of this data (as shown graphically in Figure 2) revealed that often the actual pattern of student behavior was directly opposite to the predictions. That is, all of the curriculum groups (except for the Grade One Standard and Behavioral classes) actually increased in the amount of room litter found immediately following the teaching program (rather than decreased as predicted in Hypotheses One and Two). However, the degree of increase during post curriculum assessment was slight and overall did not demonstrate the rather drastic increases shown by the no curriculum groups. That is, there was some indication

Table 18

Mean Number of Classroom Litter Items

Condition	Variable	Pre	Post	FU
<u>1st Grade</u>				
Standard	Mean Crumpled	30.50	13.00	13.33
	Mean Intact	2.00	11.67	.67
	Mean Total	21.67	15.67	14.00
Modified	Mean Crumpled	22.75	18.00	33.25
	Mean Intact	1.00	.67	2.00
	Mean Total	23.50	18.50	35.25
Control	Mean Crumpled	8.25	19.33	7.75
	Mean Intact	2.00	7.33	2.00
	Mean Total	8.75	20.00	9.75
<u>4th Grade</u>				
Standard	Mean Crumpled	7.75	10.50	13.25
	Mean Intact	3.80	9.00	2.00
	Mean Total	12.20	12.40	23.40
Modified	Mean Crumpled	7.67	17.00	11.67
	Mean Intact	1.25	5.00	5.00
	Mean Total	8.50	18.67	12.27
Control	Mean Crumpled	8.20	17.50	21.80
	Mean Intact	2.00	3.50	1.20
	Mean Total	9.00	15.40	22.20
<u>6th Grade</u>				
Standard	Mean Crumpled	12.67	33.00	14.74
	Mean Intact	4.33	1.50	1.00
	Mean Total	12.75	17.25	15.75
Modified	Mean Crumpled	7.50	13.00	25.00
	Mean Intact	1.00	0.00	0.00
	Mean Total	9.50	13.00	25.00
Control	Mean Crumpled	21.67	38.00	22.67
	Mean Intact	1.00	11.00	1.00
	Mean Total	22.00	41.67	23.67

(in line with the predictions of Hypotheses One and Two) that the curriculum groups may have been effective in retarding a general trend across all schools for the classes to become progressively more littered toward mid-year. This trend was further supported by the data shown in Figure 1. That is, the overall amount of school litter showed a drastic post curriculum increase in Giles County and a slight increase in Roanoke County, which again indicated that there may be a general trend for the schools to become more littered toward the middle of the academic year. Hence, the evidence shown in Figure 2 may indeed indicate that there was some effect for the curriculum program; however, since the overall ANOVA failed to show a significant main effect of Curriculum Condition or for any of the associated higher order interactions, these results can only be seen as suggestive of possible effects.

Insert Figure 2 about here

The simple examination of the number of litter items within a classroom does not allow for between classroom comparisons unless all the classrooms monitored have the same physical dimensions (e.g., area) and have the same number of students. In order to account for these differences, the total litter count for each class was divided by the number of enrolled students, the room area (in ft^2) and an estimate of the class density (i.e., the number of students divided by the class area in ft^2). Table 19 shows the mean litter per child, litter per class area, and litter per class density for each grade and curriculum

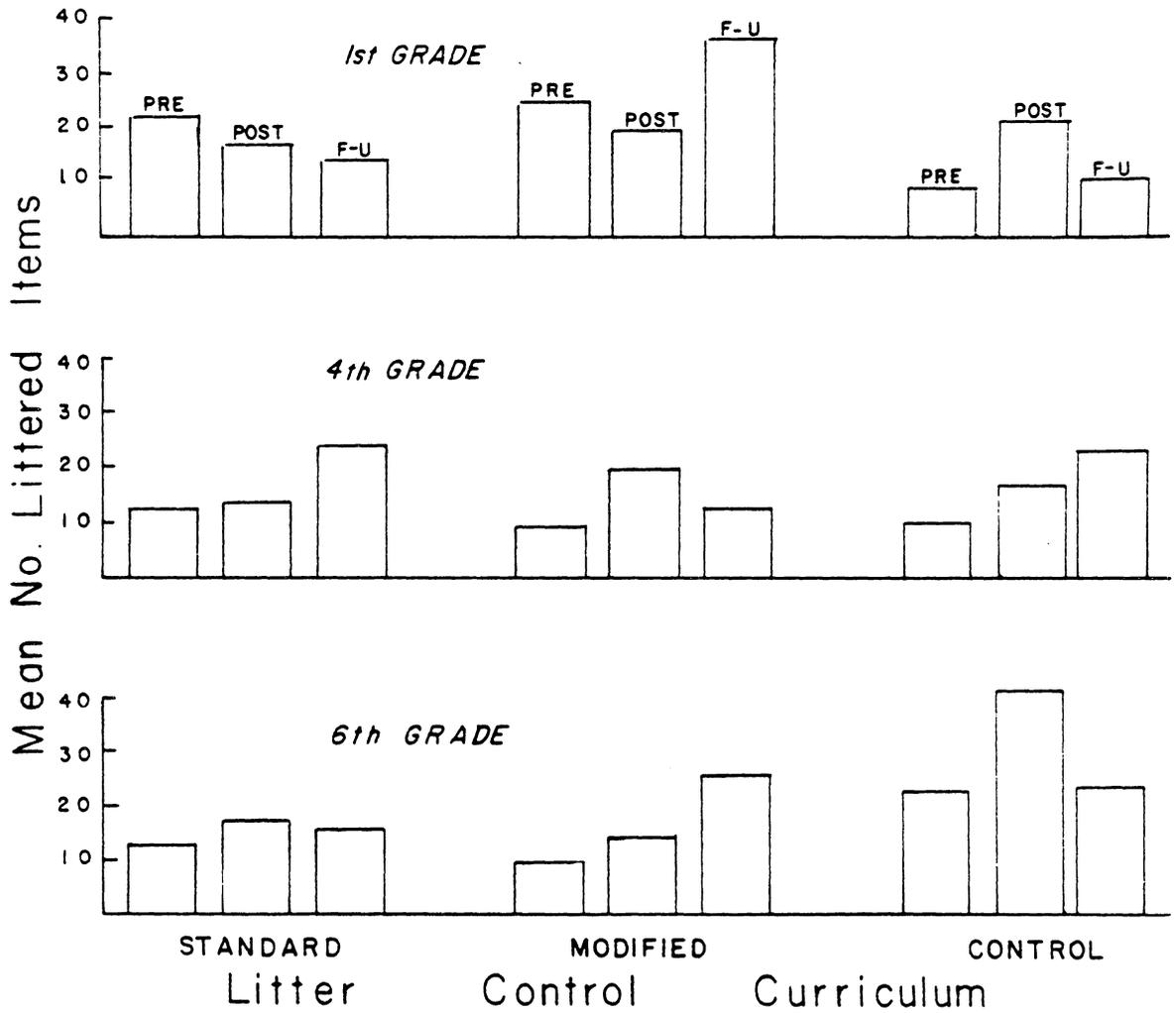


Figure 2. Mean number of all classroom litter items.

condition across the three experimental phases. An examination of each of these table values reflects the same basic pattern as discussed for the total litter count. Additionally, three separate 3 Grade (First, Fourth, Sixth) x 3 Curriculum Condition (Standard, Behavioral, Control) x 3 Phases (Pre, Post, Follow-up) ANOVAs on the amount of litter per child, litter per class area, and litter per class density revealed no significant main effects and no significant interactions, all p s $>.15$.

Insert Table 19 about here

In summary, the predictions made in Hypotheses One through Four were not statistically supported in terms of the classroom litter counts. That is, examination of individual litter counts (i.e., crumpled and intact items, total litter count, and total litter count as adjusted by the number of students, size of the room and room density) revealed no statistical support for the notion that student awareness of waste management principles was higher following the implementation of either of the two curriculum programs nor that there were statistically differential effects between the two programs.

Insert Table 20 about here

Planted classroom litter. The second behavioral assessment involved planting specially marked litter items around the classroom while the students were still out to lunch and recording their subsequent location at the end of the school day. Ten marked litter items

Table 19

Mean Litter Per Child, Litter Per Square Foot,
and Litter Per Density*

		Variable	Pre	Post	FU
1st Grade	Standard	Litter/Child	1.15	.76	.70
		Litter/Sq. Ft.	.03	.02	.02
		Litter/Density	814.39	606.53	490.77
	Modified	Litter/Child	1.15	.92	1.54
		Litter/Sq. Ft.	.034	.03	.05
		Litter/Density	816.61	643.50	1055.28
	Control	Litter/Child	.58	.57	1.07
		Litter/Sq. Ft.	.02	.02	.01
		Litter/Density	414.36	408.20	371.26
4th Grade	Standard	Litter/Child	.58	.57	1.07
		Litter/Sq. Ft.	.02	.02	.03
		Litter/Density	414.36	408.20	728.03
	Modified	Litter/Child	.43	.58	.54
		Litter/Sq. Ft.	.01	.02	.02
		Litter/Density	319.36	433.87	368.25
	Control	Litter/Child	.43	.72	1.16
		Litter/Sq. Ft.	.01	.02	.03
		Litter/Density	301.62	525.56	812.86
6th Grade	Standard	Litter/Child	.62	.19	.31
		Litter/Sq. Ft.	.02	.01	.01
		Litter/Density	424.45	117.70	220.50
	Modified	Litter/Child	.41	.57	1.13
		Litter/Sq. Ft.	.02	.03	.053
		Litter/Density	243.71	331.75	562.86
	Control	Litter/Child	.95	1.78	1.13
		Litter/Sq. Ft.	.04	.07	.04
		Litter/Density	561.17	1028.07	651.71

*The number of students divided by the class area in ft.²

Table 20

Proportion of Appropriate Planted Litter Disposals

Curriculum and Grade	*	Floor Items			Desk Items			Public Items			Item Near Can		
		Pre	Post	FU	Pre	Post	FU	Pre	Post	FU	Pre	Post	FU
Standard													
1st	n	3	6	5	5	6	4	3	5	6	1	1	3
	%	33.0	66.7	55.6	55.6	66.7	44.4	33.3	55.6	66.7	33.3	33.3	100.0
4th	n	4	10	12	8	14	13	4	9	9	1	5	5
	%	26.7	67.0	80.0	53.0	93.0	86.7	26.7	60.0	60.0	20.0	100.0	100.0
6th	n	6	8	9	7	7	11	7	8	9	2	3	4
	%	66.1	88.9	75.0	77.8	77.8	91.7	66.7	88.9	75.0	66.7	100.0	100.0
Modified													
1st	n	8	7	7	9	10	7	4	5	7	1	4	1
	%	66.7	58.3	58.3	75.0	83.0	58.3	33.0	41.7	58.3	25.0	100.0	25.0
4th	n	9	8	8	7	12	8	5	4	3	3	5	4
	%	60.0	53.3	53.3	46.7	80.0	53.3	33.0	26.7	20.0	60.0	100.0	80.0
6th	n	7	8	4	6	6	5	6	6	4	2	1	1
	%	66.7	88.9	44.4	66.7	66.7	55.6	66.7	66.7	44.4	66.7	33.0	33.0
Control													
1st	n	5	8	6	7	8	9	4	4	8	3	3	4
	%	41.7	66.7	50.0	58.3	66.7	75.0	33.0	33.0	66.7	25.0	75.0	100.0
4th	n	14	14	14	13	16	15	4	12	14	3	5	5
	%	77.8	77.8	77.8	72.2	88.9	83.3	22.2	66.7	77.8	50.0	83.3	83.3
6th	n	-	3	6	2	3	5	-	1	4	1	1	1
	%	-	50.0	100.0	33.0	50.0	83.3	-	16.7	66.7	50.0	50.0	50.0

*n = Frequency of appropriate disposals

% = Percent of appropriate disposals

(i.e., crumpled typing paper) were placed in four different areas throughout the room. Three items were randomly placed on the floor adjacent to the students' desks, three of the items were placed on the desks themselves, three were planted at random throughout the class on public table space, and one item was placed directly next to the class trash container.

The proportion of appropriate disposals (i.e., those made in the class receptacle) is shown in Table 20 for each of the four original item locations (i.e., floor items, desk items, public items, and items placed near the class waste container). To ease the visual inspection of these results, the data pertaining to each type of item is also presented graphically in Figures 3-6. Each of the four different types of litter items were analyzed separately and are summarized below.

1. Planted floor items. The proportion of floor items found in the class receptacle as well as the proportion of items found in other room locations is shown in Figure 3. It can immediately be seen that all of the planted floor items could not be recovered in all of the classes. That is, in many cases the planted items were removed from their original locations, yet they could not be located within the classroom. Further inspection of the remaining data revealed that in most cases the planted items were either left on the floor or placed in the trash receptacle. Few items across the study were moved to other room locations.

Insert Figure 3 about here

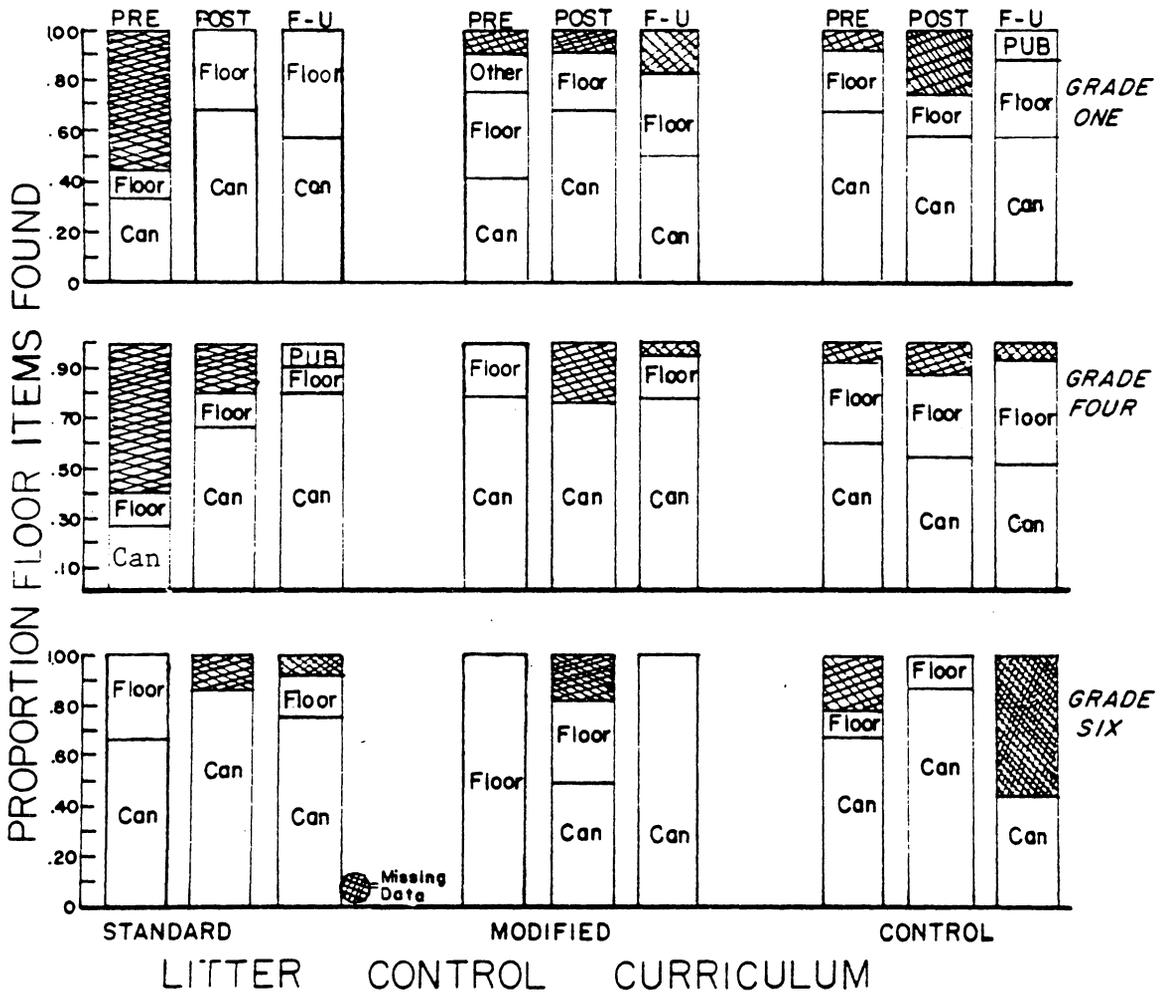


Figure 3. Proportion of planted floor items found according to location.

Figure 4 shows the proportion of items which were disposed of appropriately (i.e., placed in the class receptacle) and inappropriately, as well as the proportion of items which could not be located. High proportions of appropriate disposals indicated that students were more likely to move the items from the floor to the waste receptacle rather than to other room locations. Therefore, the number of appropriate disposals was used as a representation of the level of awareness of appropriate waste management principles. However, a 3 Grade (First, Fourth, Sixth) x 3 Curriculum Condition (Standard, Modified, Control) x 3 Phase (Pre, Post, Follow-up) ANOVA on the number of appropriate litter disposals (i.e., disposals in the class can) revealed no significant main effect and no significant interactions, all p s $>.08$.

An examination of Figure 3 does show several interesting trends. For example, as predicted in Hypothesis One, the proportion of appropriate disposals increased during the Post Curriculum phase for all three grade levels. Furthermore, two of the modified groups (i.e., Grades One and Six) also increased the number of appropriate disposals as indicated in Hypothesis Two.

There was little evidence that the students in the Modified group exceeded those in the Standard group in terms of the number of appropriate disposals during the Post Curriculum phase (as predicted in Hypothesis Four) or during the Follow-up phase (as predicted in Hypothesis Four). Finally, only two of the groups (i.e., Grade Six - Modified and Grade One - Modified) failed to exceed (or at least equal) their corresponding no Curriculum control groups during either the

Post or Follow-up phases.

Insert Figure 4 about here

2. Planted desk items. The proportion of desk items found in the class trash can and other room locations is shown in Figure 4. Again, it can be seen that many of the items planted on student desks were not discovered at the end of the day. Additionally, many of the planted litter items were discarded in inappropriate locations. That is, items were often simply moved from the student's desk to the floor or other unacceptable locations around the room. A 3 Grade (First, Fourth, Sixth) x 3 Curriculum Condition (Standard, Modified, Control) x 3 Phase (Pre, Post, Follow-up) ANOVA on the number of appropriate litter disposals revealed a significant main effect for experimental phase, $F(2, 54) = 3.27, p < .05$. No other main effect or interactions were found to be significant, all $p_s > .40$. The mean number of appropriate disposals for each phase were as follows: Pre (1.81), Post (2.31), and Follow-up (2.14). Post hoc analyses using Duncan's Multiple Range Statistic indicated that the students across all groups were more likely to dispose of the planted desk items during the Post Test phase of the experiment than during Follow-up, $p < .05$. Interpretation of these findings, however, was virtually impossible in that the means presented above reflect the combined performance of both experimental and control students across all grade levels. Therefore, due to the lack of significant higher order interactions, little information of practical importance could be gained from these results.

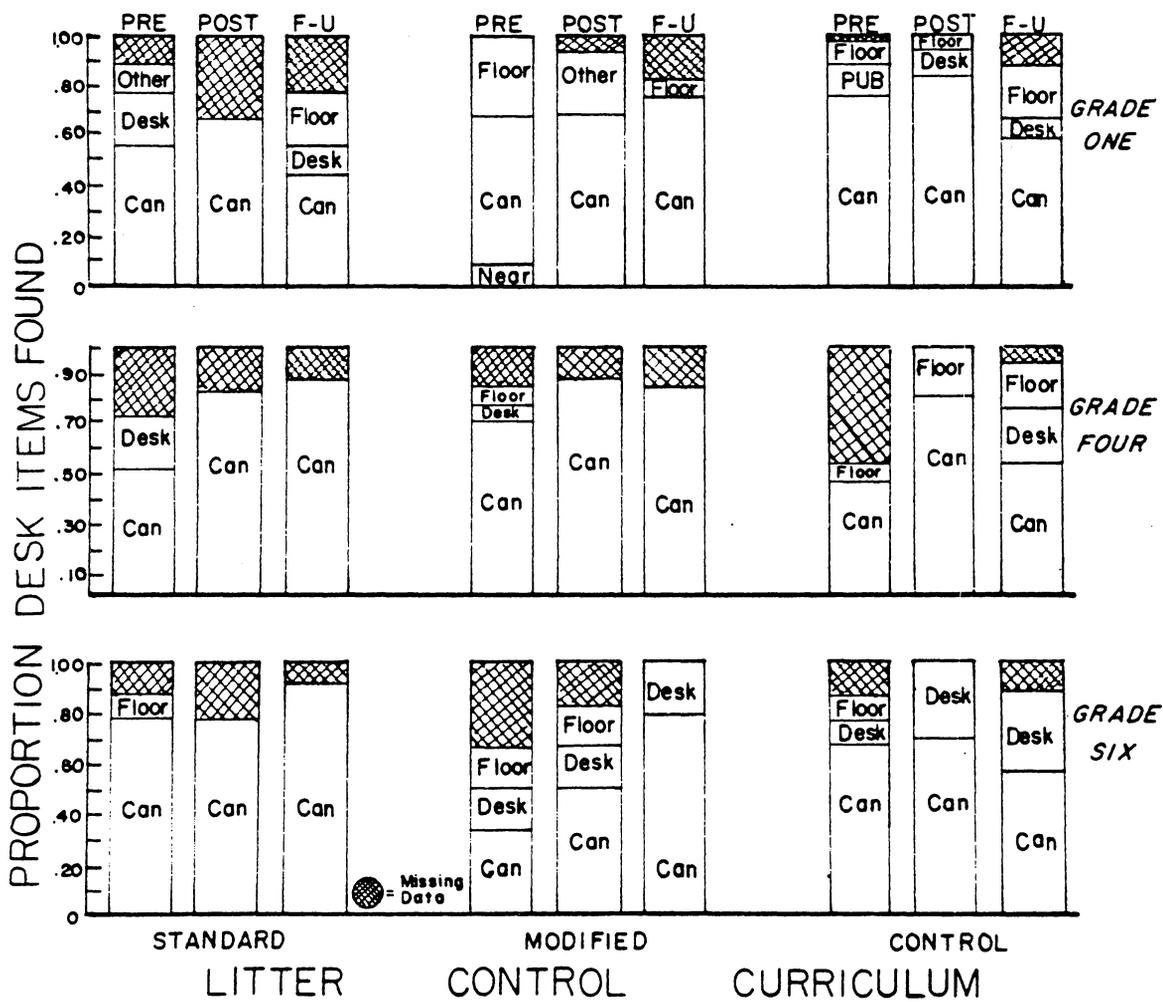


Figure 4. Proportion of planted desk items found according to location.

However, an examination of Figure 6 again shows evidence of several important trends. For example, the proportion of appropriate litter disposals increased following the implementation of the standard curriculum package (as predicted in Hypothesis One) for two of the grade levels (i.e., First and Fourth). Additionally, students receiving the Modified version of the teaching program also showed increases immediately following the implementation of the program for all grades (as predicted in Hypothesis Two). The predictions of Hypotheses Three and Four were largely unsupported. That is, the Modified groups showed little superiority over the Standard groups during the post curriculum phase or during follow-up. Neither of the experimental groups substantially surpassed the performance of the control groups at post testing. However, both groups did exceed (i.e., with the exception of Grade One, Follow-up students) the control groups during Follow-up assessment.

Given these indications, the data suggest that there were increases in student awareness in both curriculum groups, yet these increases were no more prominent during the Post Curriculum phase than for the No Curriculum controls. Only during Follow-up did the data suggest the superiority of the two curriculum groups.

Insert Figure 5 about here

3. Planted public items. Figure 5 shows the proportion of public items found in the class receptacle and other room locations. As with the other types of planted litter, many of the items placed on public

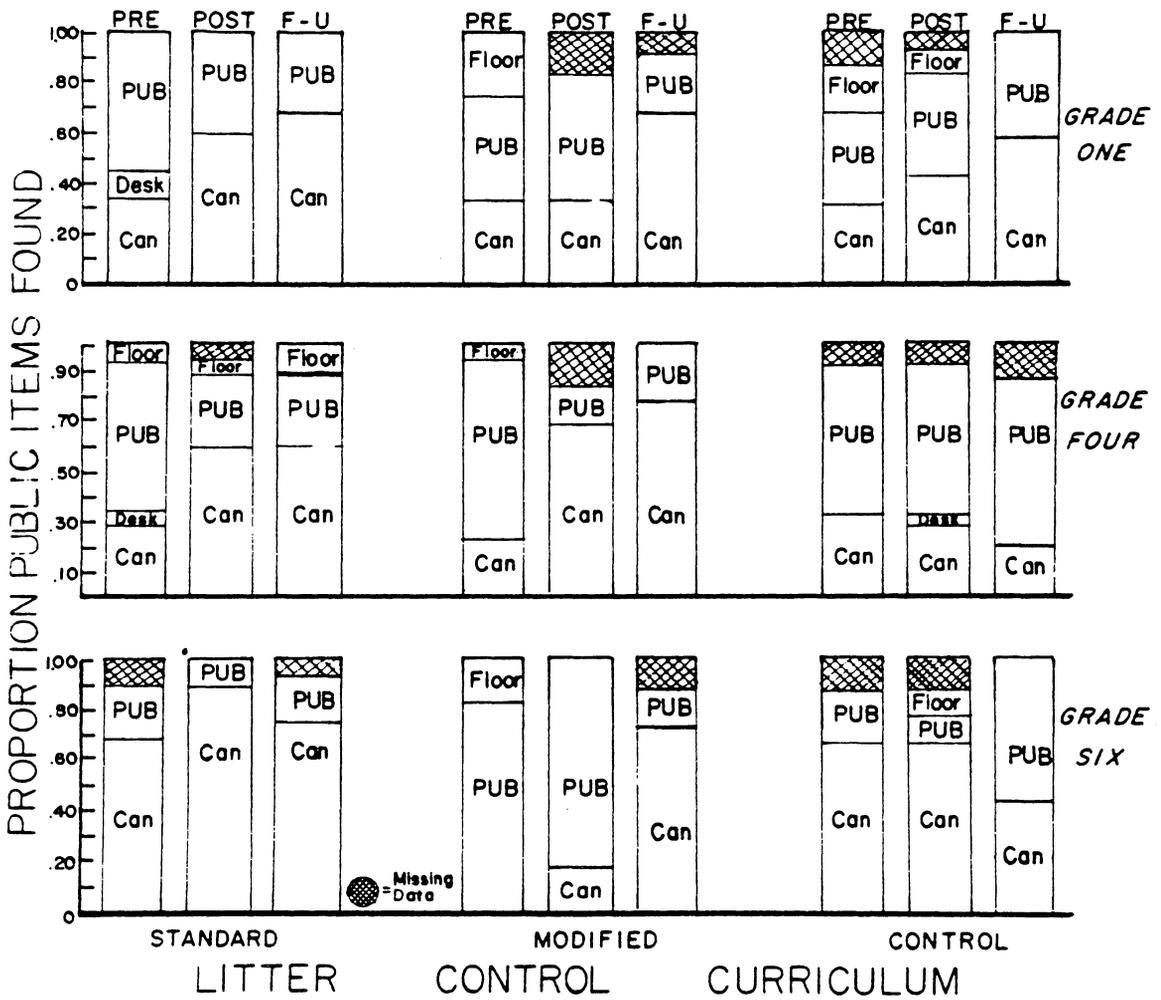


Figure 5. Proportion of planted public items found according to location.

work areas could not be located at the end of the day. Also, many of the items were moved to locations other than the trash receptacle (e.g., the floor and private desks). A 3 Grade (First, Fourth, Sixth) x 3 Curriculum Condition (Standard, Modified, Control) x 3 Phase (Pre, Post, Follow-up) ANOVA on the number of appropriate disposals again revealed a significant main effect for Phase, $F(2,54) = 5.75$, $p < .01$. No other significant main effects or interactions were found, all $ps > .11$. The mean number of appropriate litter disposals for each of the three phases were as follows: Pre (1.08), Post (1.59), and Follow-up (1.81). Additional analysis of this data using Duncan's Multiple Range test showed a significantly greater number of appropriate disposals during Follow-up as compared to the Pre curriculum, $p < .05$. Appropriate disposals during Follow-up were not significantly higher than during the Post curriculum phase, nor was there a critical difference between the number of items appropriately discarded during the Post curriculum phase and those discarded properly during pretesting. Hence, there was a tendency across all Grade and Curriculum groups for the number of appropriate disposals to increase systematically across phases. Yet these results lend little support to the current hypothesis in that it was difficult to statistically isolate the separate effects of Grade and Curriculum Condition.

As shown in Figure 5, several trends are apparent for both curriculum groups. For example, both the Standard and Modified groups tended to support the predictions of Hypotheses One and Two in that each of these groups showed an increase in appropriate litter disposals

following the curriculum program. Only the Modified Fourth grade group showed a higher level of appropriate litter disposals than their Standard curriculum counterparts during Post testing and Follow-up (as predicted in Hypotheses Three and Four). However, only two of the Modified groups (i.e., at the First and Sixth grade level) failed to surpass the performance of the No Curriculum Control groups during the Post or Follow-up phases.

Hence, the data indicate that the implementation of a waste management curriculum was immediately followed by an increase in the number of proper litter disposals for both the Standard and Modified groups. However, only the students receiving the Modified teaching program consistently (i.e., across all Grade levels) showed a continued increase during follow-up. Finally, both the Standard and Modified groups were shown to have more appropriate disposals than the corresponding No Curriculum Control groups. However, there were no systematic differences between the individual curriculum groups themselves.

4. Items planted near the class receptacle. Figure 6 shows the proportion of the items placed near the class waste container which were found in that container and in other locations around the room. It can again be seen that many items could not be accounted for even though each item was placed directly next to a trash receptacle. As before, a 3 Grade (First, Fourth, Sixth) x 3 Curriculum Condition (Standard, Modified, Control) x 3 Phase (Pre, Post, Follow-up) ANOVA on the number of disposals to the class container revealed a significant main effect for phase, $F(2,54) = 3.47$, $p < .05$. No other

significant main effects or interactions were found. The mean number of disposals for each phase were as follows: Pre (.56), Post (.81), and Follow-up (.78). Post hoc analysis using Duncan's Multiple Range statistics showed a significantly greater number of correct disposals during the Post testing and Follow-up phases than during the Pre curriculum phase, $p < .05$. However, without support from significant higher order interactions, these results were virtually impossible to interpret statistically.

Insert Figure 6 about here

Additional interpretation of this data is hindered by the fact that the number of data points represented only one planted litter item in each class. That is, only one item was placed near the room receptacle in each class. Hence, the group percentages in each case were more sensitive to small changes in the data, and therefore are not as representative as results based on more data points for each class.

The results (as presented in Figure 6) indicated the following behavioral trends. Two of the age groups that received the Standard curriculum (i.e., Grades Four and Six) showed an increase in the number of appropriate disposals immediately following the implementation of the program (as predicted in Hypothesis One), yet only one of the groups (i.e., Grade Four) that received the Modified curriculum package showed an increase (as suggested in Hypothesis Two). The Standard groups showed, across all grades, an increase during

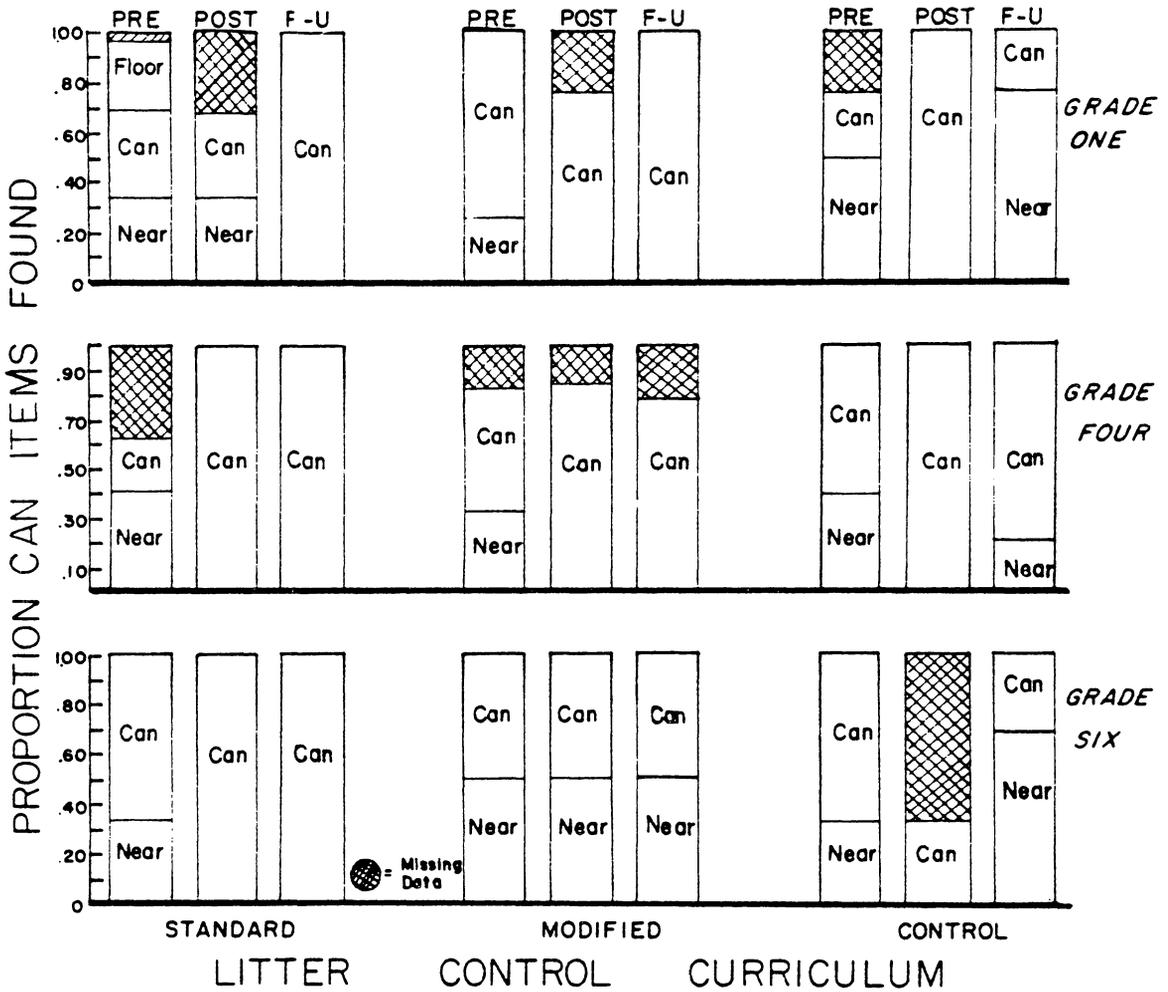


Figure 6. Proportion of planted items near the class receptacle found according to location.

Follow-up. There was no consistent evidence that the students receiving the Modified curriculum surpassed the performance of those students getting the Standard material during the Post test, nor during the Follow-up test phase (as suggested in Hypotheses Three and Four). Finally, only during Follow-up did the two groups that received a teaching curriculum systematically surpass the performance of the no curriculum controls.

Therefore, the data indicate tentative support for the first hypothesis in terms of two of the grade levels. All other predictions received minimal support in terms of these data.

In summary, the predictions made in Hypotheses One through Four were not statistically supported in terms of the planted litter procedures. However, tentative support for some of these predictions was found through an examination of the basic behavioral trends. That is, directionally the data do tend to support some of the hypotheses. Yet, these results cannot be considered statistically reliable or meaningfully different from evidence derived purely by chance.

Across the four different locations (i.e., floor, desk, public space, and near the receptacle) Hypotheses One and Two received the most support. That is, both curriculum packages tended to increase awareness of appropriate waste management principles as measured by the number of receptacle disposals during the Post curriculum phase. However, little support was gained for the notion that the Modified groups should surpass the performance of the Standard groups (i.e., Hypotheses Three and Four), although both curriculum groups

consistently out performed their no curriculum counterparts.

Student handouts ("Baby Wet Ones"). In addition to checking the location of the planted litter items at the end of the class day, the data collectors also determined the disposition of the towelettes dispensed following lunch, both inside the class and in other areas along the children's return route from lunch. The data was examined in terms of the number of appropriate handout disposals. However, several acceptable disposal sites were possible. For example, deposits in restroom containers, hall receptacles, and in the classroom waste container were all considered appropriate disposals. Hence, the data shown in Table 21 represents a combination of the proportion of items deposited in the restroom, hall, and class containers. Separate analysis of the appropriate hall disposals was not included due to the small number of these deposits. That is, of the 1,341 handouts dispensed to classes with access to a hall receptacle (i.e., 22 classes or 61.11%), only 59 (i.e., .04%) of them were appropriately placed in the provided container. Table 21 shows that of the 2,247 students observed to leave the lunchroom, 2,203 (i.e., 98%) of them took the offered handouts.

Insert Table 21 about here

Insert Figure 7 about here

Table 21

Proportion of Appropriate Wet-One Disposals

		Pre					Post					Follow-up				
Condition	Grade	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Standard	1st	51	57	89.47	32	62.75	61	62	98.38	39	63.93	57	59	96.61	33	57.89
	4th	106	103	97.57	66	62.26	103	112	91.96	76	73.79	104	109	95.41	74	71.15
	6th	67	62	92.54	48	71.64	62	62	100.00	49	79.03	96	96	100.00	46	47.92
Modified	1st	83	85	97.65	32	38.55	87	87	100.00	23	26.44	84	85	98.82	20	23.81
	4th	109	109	100.00	43	39.45	105	108	97.22	78	74.29	105	106	99.06	67	63.81
	6th	64	68	94.12	32	50.00	66	66	100.00	43	65.15	61	63	96.83	35	57.38
Control	1st	80	83	96.39	45	56.25	82	82	100.00	34	41.46	85	86	98.83	24	28.24
	4th	118	121	97.52	84	71.19	117	119	98.32	82	70.08	127	127	100.00	96	75.59
	6th	40	46	86.96	23	57.50	43	44	97.73	29	67.44	40	40	100.00	31	77.50

1. Number of Wet-Ones taken.
2. Number of children counted at lunchroom.
3. Percent taking Wet-Ones.
4. Number of appropriate disposals.
5. Percent appropriate disposals.

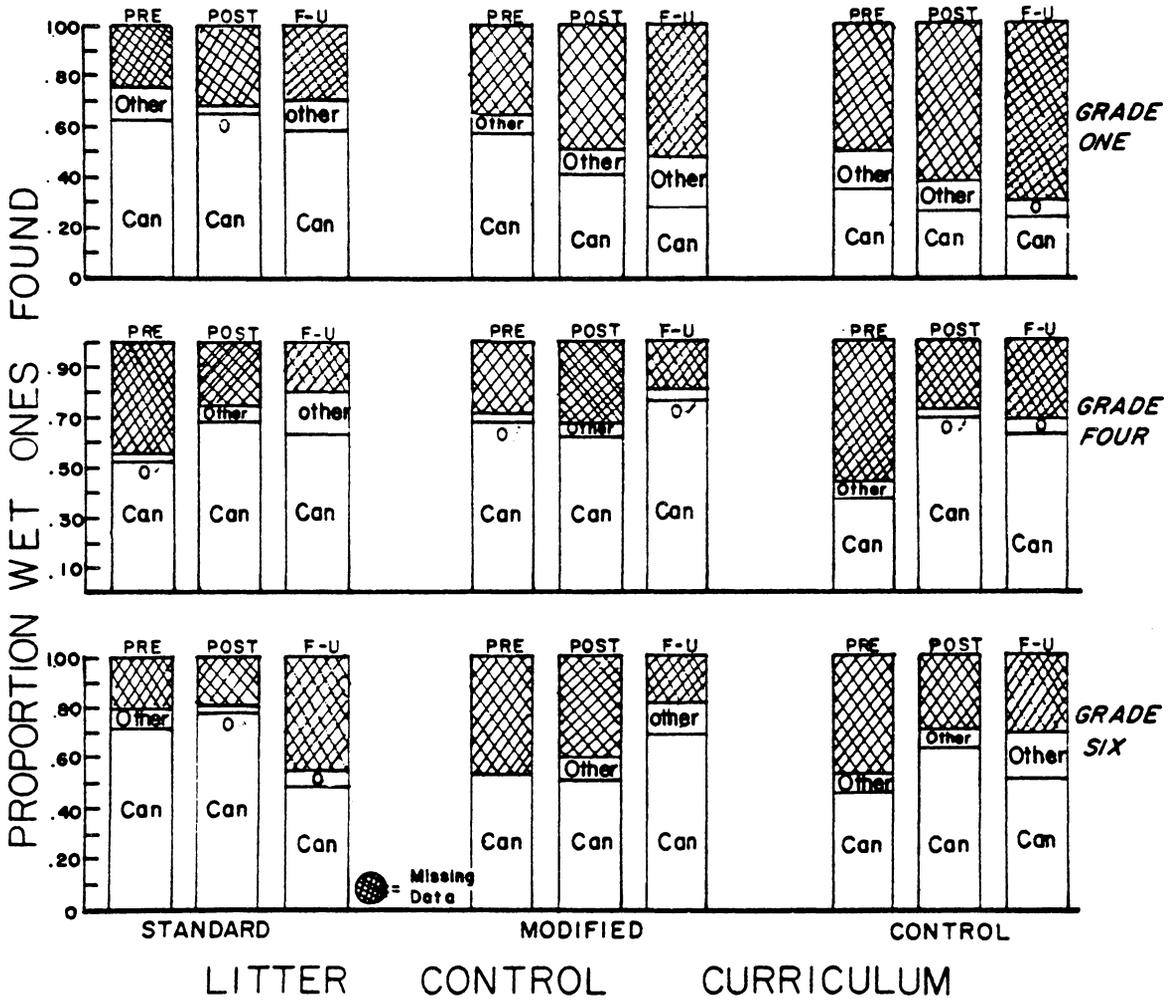


Figure 7. Proportion of student handouts found according to location.

Further, Figure 7 shows the proportion of handouts found in the three receptacle locations (i.e., appropriate disposals) as well as the proportion of items found in other room locations. As with the planted items, it can be seen that a large proportion of the items dispensed could not be located at the end of the day. Specifically, more problems were encountered in attempting to recover the towelettes than with any of the planted litter items. Hence, these items may have held a special appeal for children in these age groups.

Again, high percentages of appropriate litter disposals were indicative of an increased awareness of appropriate waste management principles. A 3 Grade (First, Fourth, Sixth) x 3 Curriculum Condition (Standard, Modified, Control) x 3 Phase (Pre, Post, Follow-up) ANOVA on the number of appropriate handout disposals revealed a significant main effect for grade, $F(2,29) = 7.18, p < .01$. No other main effects nor interactions were found to be significant, all $ps > .06$. The mean number of appropriate disposals for each of the grade levels were as follows: First (8.56), Fourth (13.90), and Sixth (14.07). Post hoc examination of these results using Duncan's Multiple Range statistic indicated that the First grade groups appropriately discarded fewer items than either the Fourth or Sixth grade groups (which were not statistically different from one another), $p < .05$. However, as before, interpretation of these results was difficult in that it was impossible to statistically isolate the separate effects of Curriculum Condition and Phase without the advantage of significant higher order effects.

Examination of the data presented in Figure 7 also provides

little evidence of any important trends which would lend tentative support to the current hypotheses. Each of the groups exhibited a relatively high proportion of appropriate disposals during the Pre Curriculum phase of the evaluation, hence further gains might have been difficult to obtain. Yet the standard groups did exhibit a slight increase in the proportion of appropriate disposals immediately following the program. However, this increase was either very small (as it was for the First Grade Standard Group) or it could not be separated from a corresponding increase in the rate of appropriate disposals by the associated control groups (as for the Fourth and Sixth Grade Standard groups). No other support for the hypothesis was evident.

Student Achievement Testing

Final subject population. Of the 813 students participating in the project, 252 (i.e., 31.00%) were not included in the final analysis. Table 22 shows the number of students dropped from each group. As mentioned earlier, one entire class was eliminated because the original participating teacher failed to return to school due to illness. Additionally, prior to the analysis, the data set was further reduced in order to balance the number of students across the three experimental phases. That is, each subject was included for analysis only if scores were available for all three test administrations. Therefore, a total of 561 students were used for the following analysis.

Insert Table 22 about here

Table 22

Sample Sizes for Student Achievement Tests

Condition	Grade	Number Eliminated*	Number Retained		
			Pre	Post	Follow-up
Standard	1st	15	50	50	50
	4th	9	80	80	80
	6th	12	79	79	79
Modified	1st	20	69	69	69
	4th	58	74	74	74
	6th	13	37	37	37
Control	1st	37	54	54	54
	4th	48	77	77	77
	6th	40	41	41	41

*All students not having 3 sets (i.e., Pre, Post, and Follow-up) of test scores were eliminated from the analysis.

Total Number of Students Tested = 561
 Percent Students Tested = 69%
 Number of Students Eliminated = 252
 Percent Students Eliminated = 31%
 Total Sample Size = 813

Test results. Each of the student achievement tests were scored by computer and a total score in terms of the number of correct responses was recorded for each subject. Subsequently, a 3 Grade (First, Fourth, Sixth) x 3 Curriculum Condition (Standard, Modified, Control) x 3 Phase (Pre, Post, Follow-up) ANOVA of the student test scores revealed a significant main effect for grade, $F(2,552) = 4.37, p < .05$, curriculum condition, $F(2,552) = 130.93, p < .001$ and phase, $F(2,1104) = 277.01, p < .001$. Further, the following significant interactions were also found: Grade x Curriculum, $F(4, 5520) = 20.03, p < .001$, Grade x Phase, $F(4, 1104) = 23.65, p < .001$, Curriculum x Phase, $F(4, 1104) = 49.40, p < .001$, and Grade x Curriculum x Phase, $F(8,1104) = 5.95, p < .001$.

Insert Table 23 about here

Given that each of the main effects and interactions were significant, these results were interpreted from the standpoint of the highest order interaction (i.e., Grade x Curriculum x Phase). The mean number of correct student responses for each of the 27 individual groups is shown in Table 23. Further analysis of these data was obtained with a modified version of Duncan's Multiple Range statistic (as found in the SAS user's guide, 1979) to examine all possible group comparisons. These relationships are illustrated in Figure 8 which graphically shows the mean number of correct responses for each group across the three experimental phases.

Table 23

Mean Number of Correct Test Responses
for Each Group Across the Three Experimental Phases

Condition	Grade	Pre	Post	Follow-up
Standard	1st	10.30	11.72	11.58
	4th	9.91	14.05	13.30
	6th	9.06	14.01	12.30
Modified	1st	10.39	11.48	12.12
	4th	10.70	15.54	14.69
	6th	9.16	12.70	12.43
Control	1st	10.28	10.82	9.35
	4th	7.97	8.51	8.61
	6th	8.80	9.10	8.85

Insert Figure 8 about here

It can be seen that student test performance at each grade level statistically improved following the administration of either the standard or modified curriculum program, $p_s < .05$. These findings directly supported the predictions made in Hypotheses One and Two respectively. That is, the Posttest level of student awareness was significantly higher following the presentation of both curriculum programs. Also for all grades, this improvement statistically surpassed the performance of the No curriculum controls, $p_s < .05$.

Hypothesis Three, which predicted higher levels of student awareness following the modified program during the Post curriculum phase, was only partially supported across the three grade levels. That is, only the Fourth Grade-Modified group obtained test scores which were statistically superior to their Standard curriculum counterparts, $p < .05$. There were no significant differences in test performance between the two curriculum groups at the First Grade levels, whereas at the Sixth Grade level the Standard groups scored significantly better than the Modified group, $p < .05$ (in direct opposition to Hypothesis Three).

For the Standard groups during Follow-up, performance showed a general decrease across the three grade levels, however, it never fell within the range established during the Pre curriculum phase. That is, at each grade level the student's Follow-up test scores were statistically superior to their performance during the Pre curriculum phase,

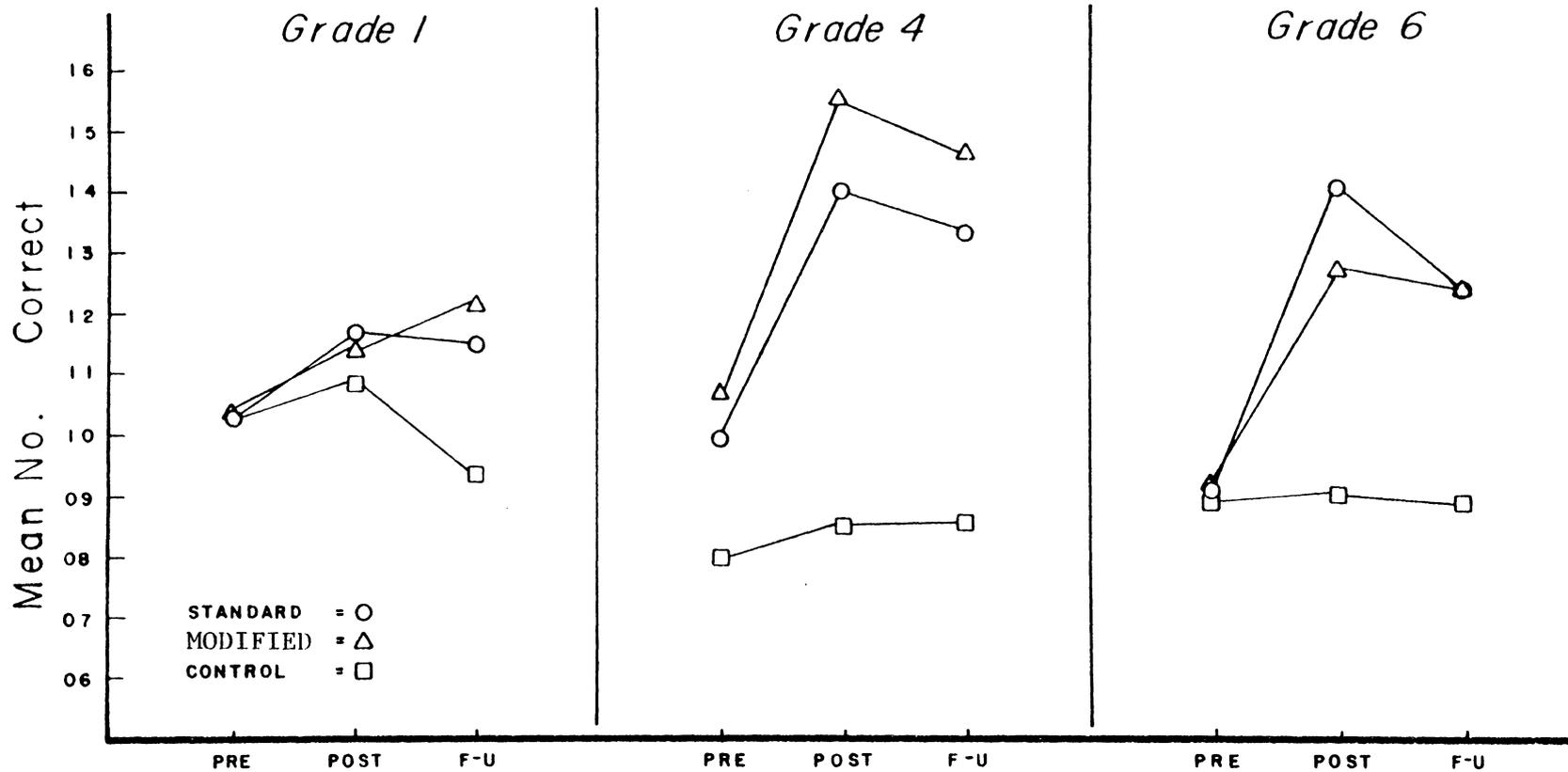


Figure 8. Mean number of correct student responses for each group across the three experimental phases.

$p_s < .05$. Hence, there was evidence that the students did maintain an awareness of the principles provided in the Standard curriculum at Follow-up. Two of the modified groups also decreased during Follow-up (i.e., Grade Four and Six); yet again Follow-up test performance was statistically superior to performance during the Pre curriculum phase, $p_s < .05$.

Hypothesis Four predicted that students exposed to the Modified curriculum would demonstrate a higher awareness of waste management principles at Follow-up than would their Standard curriculum counterparts. Statistical support for this hypothesis was found only for the Fourth Grade students, $p < .05$. That is, the two curriculum groups were not found to be statistically different from each other at the First and Sixth Grade levels. However, for the First grade, students exposed to the Modified curriculum did perform better than their Standard curriculum counterparts, yet the difference was not found to be statistically reliable at the $p = .05$ level. Hence, the data from this group can only be considered suggestive of a possible trend in the hypothesized direction. Additionally, the performance at Follow-up of the students in the Modified groups also showed a significant decline for the Fourth and Sixth grades, $p < .05$. However, as with the Standard groups, the Follow-up performance for the Modified groups (at all Grade levels) was statistically superior to their performance during the Pre curriculum phase, $p_s < .05$. Hence, again there was evidence that the students did maintain an awareness over time (i.e., three months) of the curriculum principles.

In summary, the test results showed that both of the curriculum programs (i.e., Standard and Modified) were effective in yielding immediate increases in student test performance. That is, the curriculum did increase student awareness of appropriate waste management principles on a short term basis. Furthermore, this increase was still apparent three months after the curriculum program when compared to performance during the Pre curriculum phase. Hence, there was some evidence that student knowledge was maintained over the three-month period such that it was still significantly superior to Pre curriculum levels.

Teacher Assessment

Litter Analysis Questionnaire (LAQ). The LAQ was administered to each teacher on three occasions (i.e., during the Pre, Post, and Follow-up curriculum phases). However, not all of the teachers returned all three of the questionnaires. Table 24 shows the number of teachers returning the LAQ at each phase. It can be seen that all of the teachers completed the first set of questionnaires (although two only provided demographic information), but several of the teachers failed to return additional questionnaires during the Post and Follow-up curriculum phases.

Insert Table 24 about here

The analysis of this information was based on the statistical examination of items seven and 10 through 24 (see Appendix L for a

Table 24
Number of Teachers Completing the LAQ

Condition	Grade	Pre	Post	Follow-up
Standard	1	2	2	2
	4	5	5	5
	6	5	4	2
Modified	1	4	4	4
	4	6	6	6
	6	1	1	1
Control	1	5	3	2
	4	5	3	5
	6	3	3	3
Total		36	31	30

copy of this questionnaire). All other items pertained to demographic information or required more than one response per question. Three of the target items (i.e., items 13, 17, and 18) were limited in terms of the type of response considered for analysis. That is, to prevent problems in scaling, only the responses of "yes" and "no" were recorded, items which were responded to by "I don't know" were eliminated.

Further, each of the target responses in all three phases were transformed into Z scores to correct for differences in the number of multiple choices available across different items (i.e., the number of response choices ranged from 2 to 5 across the 16 target items).

Insert Table 25 about here

The transformed scores across the three experimental phases were subjected to a principle axis Factor Analysis in order to determine the clusters of correlating items. That is, items that were answered in a similar fashion were grouped into sets which differed in response patterns from items clustered into other sets. Following a varimax rotation of the 16 item factor matrix, five basic factors were retained. These factors are listed in Table 25 in order of the amount of variance explained by each set of items. Hence, each factor was ranked in accordance to how much variance of the total 16 item matrix was accounted for by each particular set of items. For each factor the LAQ items which received the highest factor loading (i.e., any item receiving a factor loading above $\pm .40$) were selected. All 16 items were included in at least one of the clusters.

Table 25
Rotated LAQ Factor Pattern

	Factor Pattern				
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Q7	0.44170	0.03432	0.01614	-0.29800	-0.46334
Q10	-0.19733	0.02116	0.00783	-0.16443	0.74649
Q11	0.19608	0.04533	-0.02983	0.83187	0.05535
Q12	-0.06489	-0.02609	0.14799	0.75090	-0.14965
Q13	0.77448	0.05252	0.10123	0.09141	-0.20092
Q14	0.80498	-0.10994	0.03682	-0.20546	-0.02050
Q15	0.55656	0.26109	-0.07849	-0.08893	0.45580
Q16	0.63485	-0.04136	-0.25452	0.29386	0.34024
Q17	0.73711	0.12131	-0.22671	0.12978	-0.21129
Q18	0.85313	-0.25547	-0.08831	0.10808	-0.08765
Q19	0.26809	-0.77674	0.03873	-0.04911	0.17267
Q20	0.06324	0.55523	0.31515	-0.48164	0.05573
Q21	0.23218	0.74768	-0.01450	0.02805	0.32144
Q22	-0.10738	0.43259	-0.45145	-0.00569	-0.04797
Q23	-0.03756	-0.06016	0.78641	0.00929	-0.02860
Q24	-0.19481	0.13619	0.82033	0.05958	-0.03133
Percent of Variance Accounted For	23.05	11.56	11.01	11.15	8.46

Insert Table 26 about here

Table 26 shows the questions which were included in each of the five factors. It can be seen that the different clusters of items can be grouped under two basic categories. The first general category was supported by three factors (i.e., Factors 1, 3, and 5) all of which contained items which reflected expressions of the teacher's sensitivity to various litter related issues. Specifically, Factor 1 contained items which examined the degree of problem awareness on the part of the teachers, whereas Factor 3 reflected the degree to which the teachers were willing to personally interact when confronted with the inappropriate waste disposal behaviors of others. Factor 5 measured the teacher's opinion of the janitorial service at their particular school.

The second general category was supported by two factors (i.e., Factors 2 and 4), which contained items that demonstrated the teachers' opinions of their students behavior and items which assessed the personal opinions of the teachers themselves. Specifically, Factor 2 contained items which examined the teachers' opinion of whether or not the problem of litter could be solved. Factor 4 contained items which examined the teachers' perceptions of student littering behavior.

Since the items in each factor were grouped according to a common theme, a total factor score was obtained for each set of items by adding the transformed teacher responses for all items within a given factor. The five factor scores for each teacher were thus analyzed

Table 26

LAQ Factor Identification and Degree of Importance

Cluster Name	Importance	Item
1. <u>Teacher Awareness of Litter Problem</u>	<u>23.05%</u>	7. In your opinion, how littered is your school environment? 13. Do you believe that there is a litter problem in your community? 14. How severe is the litter problem in your community? 15. How much responsibility do you feel for getting others to reduce litter? 16. Is litter a safety or health problem? 17. Do you believe that there is a litter problem in your school? 18. How severe is the litter problem in your school?
2. <u>Perceived Ability to Effect Problem</u>	<u>11.56%</u>	19. Do you feel that you can do anything to improve the environmental conditions surrounding your school? 20. Do your students exhibit an awareness of litter through their behavior? 21. Do you think an educational-awareness program for children concerning proper waste disposal would prove effective? 22. How would you feel if you littered?
3. <u>Teacher Interaction</u>	<u>11.01%</u>	23. When you see a stranger litter, what do you do? 24. When you see a friend litter, what do you do?
4. <u>Student Litter</u>	<u>11.15%</u>	11. Generally, how littered is your classroom at the end of the day? 12. To what extent do the children in your class litter?
5. <u>Teacher Rating of Janitorial Service</u>	<u>8.46%</u>	10. How do you rate the school janitorial service?

separately.

Insert Table 27 about here

Table 27 shows the mean factor score for each of the five factors as grouped according to Grade and Curriculum condition across each of the experimental phases. Separate 3 Grade (First, Fourth, Sixth) x 3 Curriculum Condition (Standard, Modified, Control) x 3 Phase (Pre, Post, Follow-up) ANOVAs on the factor scores for Factors 1, 3, and 5 (i.e., the teacher's opinion of litter related issues) revealed no significant main effects and no significant interactions for Factor 5, all p s >0.23 . A significant main effect for Curriculum Condition was revealed for Factor 1, $F(2,25) = 5.70$, $p < .01$. The mean factor scores for each condition were as follows: Standard (2.49), Modified (-2.02), and Control (-0.57). Here higher scores indicate an increased awareness of the litter problem on the part of the teachers. However, the data cannot be adequately interpreted, due to the absence of higher order interactions. That is, the above means represent factor scores which have been collapsed across the different grade levels and across the different experimental phases. Therefore, it was not possible to statistically isolate the specific effects of a curriculum program.

Further, a significant main effect for Curriculum Condition was also found for Factor 3, $F(2,25) = 4.59$, $p < .05$. The mean factor scores for each Curriculum Condition were as follows: Standard (-0.76), Modified (0.88), and Control (-0.04). Further interpretation

Table 27

Mean LAQ Factor Score for Each Group Across Three Experimental Phases

Condition	Grade	Pre					Post					Follow-up				
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Standard	1	*	*	*	*	*	2.43	-0.54	-1.98	0.60	0.12	-0.13	-0.02	-1.60	-2.50	0.86
	4	1.10	0.55	-0.78	-0.34	-0.62	2.48	-1.53	0.30	0.81	-0.48	-1.99	-1.59	0.95	-1.00	0.12
	6	3.79	2.68	-0.60	-0.33	0.12	5.31	0.71	-2.08	2.05	0.12	7.55	3.25	-0.93	0.33	-1.37
Modified	1	-2.98	-0.13	1.03	1.09	-0.87	-1.68	-1.15	0.87	1.09	-0.38	-4.05	0.27	0.32	0.60	0.11
	4	-0.40	0.24	1.03	-0.82	1.11	-3.13	-1.33	1.47	0.03	0.12	0.11	-0.82	1.47	-0.70	0.12
	6	1.47	1.25	-0.93	-0.33	-1.37	-3.60	-0.67	1.48	-0.33	0.12	-4.90	1.55	-1.98	0.33	-1.37
Control	1	0.98	-0.32	0.57	-0.92	-0.48	1.57	0.09	-0.40	-0.35	-0.62	6.52	-0.25	-1.45	-0.33	0.12
	4	-0.67	-2.32	-1.28	0.62	0.12	-3.57	0.06	0.34	-0.01	0.12	-0.79	0.39	0.34	0.01	0.12
	6	-3.32	2.86	1.47	0.36	0.86	-4.82	0.81	-1.37	0.13	1.11	1.97	-0.40	0.95	-0.37	0.86

*Both teachers in this group completed only the demographic information on the pre curriculum LAQ.

was precluded by the absence of significant higher order interactions.

Additionally, separate 3 Grade (First, Fourth, Sixth) x 3 Curriculum Condition (Standard, Modified, Control) x 3 Phase (Pre, Post, Follow-up) ANOVAs on the factor scores for Factor 4 (the teacher's opinions of student behavior) and Factor 2 (the teacher's perceived ability to effect the problem of litter) revealed no significant main effects and no significant interactions, all p s $>.07$.

For Factors 1, 3, and 5, Hypotheses Five through Eight were therefore not statistically supported. That is, there was no indication that the teachers' awareness of waste management was enhanced following the implementation of the Standard curriculum program (i.e., Hypothesis Five) or the Modified program (i.e., Hypothesis Six). Those teachers assigned to the Modified curriculum did not show increased levels of awareness (as measured by Factors 1, 3, and 5) when compared to their Standard curriculum counterparts during Posttesting (as predicted in Hypothesis Seven) or during Follow-up (as predicted in Hypothesis Eight).

Factor 4 (which measured the teachers' opinion of student littering behavior) was intended as an additional method of assessing the effects of the two curriculum programs on actual student behavior. No additional support for Hypotheses One through Four was provided.

Teacher Evaluation

Curriculum teaching parameters. As a means of assessing the effectiveness of the Operation Waste Watch (OWW) program, the teachers were asked to document their progress through the curriculum materials

both in terms of time parameters and in terms of a detailed critique of the program's effectiveness and relevancy. Hence, throughout the curriculum material the teachers were asked to document exactly when an activity was begun and completed and to indicate which activities were and were not used during the program.

Teachers in the Standard curriculum groups were asked to teach only the core activity cards. The core cards were those items deemed by the Virginia Division of Litter Control (VDLC) to be essential to the curriculum material. Hence, the Standard teachers were told that it was highly important to implement all of the core cards. For the Modified groups, only the core materials were modified, hence the teachers in these groups were only given these cards. Therefore, the teachers in the Modified groups were simply asked to teach all of the materials.

Table 28 shows the actual number of cards which were taught during the curriculum program. It is evident that some of the teachers did not comply with the original instructions. Specifically, only 10 of the teachers taught all of the Individual Activity Cards (IACs) and only 7 taught all of the Class Activity Cards (CACs). However, on the average, 87.20% of the IACs and 66.26% of the CACs were administered to the students across all of the participating teachers.

Insert Table 28 about here

Additionally, each teacher was asked to record the dates on which she/he taught each of the curriculum units and to record the time it

Table 28

Number of Activity Cards Taught

Teacher	Grade	Condition	No. IAC Taught	Percent IAC Taught	No. CAC Taught	Percent CAC Taught
<u>Giles Co.</u>						
Peters	4	S	5/7	71.43	7/11	63.64
Tripp	4	M	7/7	100.00	6/11	54.55
Dowell	6	M	9/11	81.82	0/12	0.00
Jamison	1	M	12/12	100.00	8/8	100.00
Morton	4	M	7/7	100.00	11/11	100.00
McCall	6	S	10/11	90.01	12/12	100.00
<u>Roanoke Co.</u>						
Hicks	1	M	4/12	33.33	5/8	62.50
Brown	4	S	7/7	100.00	8/11	72.73
Viskup	4	S	7/7	100.00	9/11	81.00
Kessler	6	M	8/11	72.73	0/12	0.00
Carlton	1	S	9/12	75.00	6/8	75.00
Miles	4	S	*/7	*	*/11	*
Rohrbaugh	6	S	11/11	100.00	2/12	16.67
Dickerson	1	M	12/12	100.00	8/8	100.00
Goodwin	6	S	*/11	*	*/12	*
Neighbors	4	M	6/7	85.71	7/11	63.64
Duffey	1	S	9/12	75.00	8/8	100.00
Shores	4	S	7/7	100.00	11/11	100.00
Williams	1	S	10/12	83.33	7/8	87.50
Shifenelle	4	M	7/7	100.00	10/11	90.91
Burks	1	M	11/12	91.97	8/8	100.00
Draper	4	M	5/7	71.43	0/11	0.00
Shuler	4	M	6/7	85.71	7/11	63.64
Sanders	6	S	12/12	100.00	2/8	25.00

*Teacher did not provide information.

Note: M = Modified Curriculum Program; S = Standard Curriculum Program.

took to complete the various activities. Table 29 shows the total number of days and the amount of class time needed to complete the curriculum materials. It can be seen that not all of the teachers complied with the original instructions. For example, 7 of the teachers failed to provide adequate information on the number of days it took to complete the IACs and CACs. However, on the average, the individual activities were completed in 9.1 days and the class activities were completed in 8.1 days. More specifically, the average first grade teacher completed the IACs in 12.1 days and the CACs in 8.3 days. The average fourth grade teacher finished the IACs in 6.2 days and the CACs in 7.4 days, whereas the average sixth grade teacher took 8.0 days to complete the IACs and 10.0 days to complete the CACs.

Insert Table 29 about here

Further, nine of the teachers failed to specify the amount of time it took to teach the IACs and CACs. Across the remaining teachers, an average of 3 hours and 2 minutes of class time was spent completing the IACs, whereas the CACs took an average of 2 hours and 24 minutes to complete. Again, the average first grade teacher used 2 hours and 37 minutes of class time teaching the IACs and 2 hours and 7 minutes teaching the CACs. The average instruction time for the fourth grade teachers was 2 hours and 53 minutes for the IACs and 3 hours and 1 minute for the CACs. Finally, the average sixth grade teacher completed the IACs in 3 hours and 52 minutes. However, none

Table 29

Dates and Times Activity Cards Were Taught

Teacher	Grade	Condition	Date Started		Date Completed		No. Days Taught		Total Class Time	
			IAC	CAC	IAC	CAC	IAC	CAC	IAC	CAC
<u>Giles Co.</u>										
Peters	4	S	12-01-80	12-25-80	01-16-81	01-16-81	5	6	2:55	3:00
Tripp	4	M	12-01-80	01-05-81	12-19-81	01-13-81	*	6	**	**
Dowell	6	M	11-25-80	*	12-20-81	*	9	*	3:01	*
Jamison	1	M	11-12-80	11-12-80	12-09-81	01-19-81	12	8	3:30	3:45
Morton	4	M	01-15-81	01-05-81	01-23-81	01-23-81	**	**	**	**
McCall	6	S	11-31-80	01-05-81	01-19-81	01-19-81	11	10	3:40	*
<u>Roanoke Co.</u>										
Hicks	1	M	12-01-80	01-04-81	01-20-81	01-19-81	11	8	2:37	1:03
Brown	4	S	12-01-80	12-01-80	01-15-81	01-15-81	**	**	**	**
Viskup	4	S	12-01-80	12-01-80	01-15-81	01-15-81	**	**	**	**
Kessler	6	M	12-15-80	*	01-16-81	*	8	*	5:30	*
Carlton	1	S	12-08-80	12-15-80	01-22-81	01-22-81	9	11	3:05	3:10
Miles	4	S	12-03-80	12-03-80	01-22-81	01-22-81	**	**	**	**
Rohrbaugh	6	S	11-25-80	11-25-80	01-16-81	01-16-81	**	**	**	**
Dickerson	1	M	01-05-81	01-19-81	01-19-81	01-23-81	12	8	2:10	1:50
Goodwin	6	S	12-05-80	12-05-80	01-09-81	01-09-81	4	*	**	*
Neighbors	4	M	01-19-81	01-27-81	01-26-81	02-11-81	6	7	3:50	4:00
Duffey	1	S	01-05-81	12-18-80	01-23-81	01-23-81	16	8	3:05	1:45
Shores	4	S	12-15-80	12-15-80	01-23-81	01-23-81	**	**	**	**
Williams	1	S	12-22-80	12-22-80	01-23-81	01-23-81	14	7	**	2:25
Shifenelli	4	M	01-19-81	01-19-81	01-21-81	01-21-81	7	11	1:10	1:10
Burks	1	M	01-05-81	01-05-81	02-06-81	02-03-81	11	8	1:10	0:55
Draper	4	M	12-12-80	*	01-06-81	*	6	*	4:00	*
Shuler	4	M	12-02-80	12-09-80	12-08-80	12-17-80	6	7	2:30	3:15
Sanders	6	S	11-24-80	11-24-80	01-19-81	01-19-81	**	**	3:15	**
Means							9:06	8:00	3:02	2:24

*Class Activity Card not used.

**Teacher did not provide information.

of the sixth grade teachers recorded the amount of time spent teaching the CACs.

Curriculum evaluation. Following the administration of the teaching program, all of the teachers (i.e., those who taught a curriculum package) were asked to complete a Teacher Evaluation Questionnaire (TEQ) which was supplied by the Virginia Division of Litter Control. The TEQ (a copy of which is provided in Appendix M) was a 28-item instrument designed to allow participating teachers to supply feedback as to the adequacy and effectiveness of the OWW curriculum material. Specifically, the instrument was intended to assess the usefulness of the individual curriculum materials, the difficulty and meaningfulness of the particular individual and class activities, and the degree of student mastery of the different curriculum objectives. The TEQ, which was made up of six major sections, was given in the same format to all teachers across each of the curriculum conditions and for each of the three grade levels.

Section I: The Problem and Attitudes Toward Operation Waste Watch. The first section of the TEQ was intended to assess the teachers' attitudes on the problem of litter in their community and in their school environment. The two major questions in this area are summarized in Table 30. Looking at the first question in this section, it was found that most of the teachers at each grade level believed that there was a problem with litter in their community. That is, 71.43% of the first grade teachers, 100.00% of the fourth grade teachers, and 83.34% of the sixth grade teachers responded with

a mean scale value of 2.5 or greater on a five-point scale.

Insert Table 30 about here

It is evident from the second major question in this section that the majority of the participants strongly believed that their students should be exposed in school to the concepts of proper waste handling. That is, 71.43% of the first grade teachers, 73.43% of the fourth grade teachers, and 50.00% of the sixth grade teachers rated the need for this type of training as "very important" for their students.

Finally, each of the teachers was asked to delineate the most frequent causes of litter in their community. Of the six teachers responding to this item, all mentioned that rural and roadside waste stemming from overflowing public containers caused the most serious litter problem. All of the teachers expressed the need for more frequent disposals of public dumpsters.

Section II: The Operation Waste Watch Curriculum. The second section (which is summarized in Table 31) contained eight major questions which examined the usefulness, the degree of difficulty, and the level of mastery of the OWW curriculum. Specifically, Items 6 through 10 provided an assessment of the curriculum difficulty and meaningfulness to the students at each grade level. Most of the teachers tended to rate the curriculum materials as being "very" meaningful to their students. Specifically, 85.71% of the first grade teachers, 80.00% of the fourth grade teachers, and 50.00% of the sixth grade teachers responded to Item 6 with a mean scale value of 4.5 or higher on a

Table 30

Proportion of Teacher Responses to TEQ Items 1 and 3

1st Grade

Question	Response						
	No Problem	1	2	3	4	5	Serious Problem
1.							
Frequency			3	2	1	1	
Percent			42.86	28.57	14.29	14.29	
3.	Not Important	1	2	3	4	5	Very Important
Frequency				2		5	
Percent				28.57		71.43	

4th Grade

Question	Response						
	No Problem	1	2	3	4	5	Serious Problem
1.							
Frequency			3	8			
Percent			27.27	72.73			
3.	Not Important	1	2	3	4	5	Very Important
Frequency				1	2	8	
Percent				9.09	18.18	72.73	

Table 30 (Continued)

6th Grade

Question	Response						Serious Problem
	No Problem	1	2	3	4	5	
1.							
Frequency			4	1	1		
Percent			66.67	16.67	16.67		
3.	Not Important	1	2	3	4	5	Very Important
Frequency		1		1	1	3	
Percent		16.67		16.67	16.67	50.00	

1. To what extent is littering a problem in your community?
3. Is it important for children to learn in school about the proper handling of solid waste?

five-point scale ranging from "not meaningful" (i.e., 1) to "very meaningful" (i.e., 5).

Insert Table 31 about here

On Item 8, most of the teachers felt the difficulty level of the curriculum in general was appropriate to their students. That is, 57.14% of the first grade teachers, 72.72% of the fourth grade teachers, and 80.00% of the sixth grade teachers felt the curriculum was "right on target" for their classes. Additionally, on Item 9 the teachers were asked to rate the difficulty level of the various vocabulary items used throughout the curriculum. Again, most of the teachers believed that the difficulty level was appropriate to their age groups. Of the teachers responding, 71.45% at the first grade level, 63.64% at the fourth grade level, and 83% at the sixth grade level felt the vocabulary items were "right on target." Item 10 also examined the use of vocabulary items in terms of whether or not the teachers needed to pull vocabulary concepts from the curriculum materials in order to give their students an adequate background for the unit. The data indicated no clear pattern of responses across the three grade levels. That is, the responses were basically split across the five choice items for each grade.

Finally, each teacher was asked (in Item 7) whether or not the ideas presented in the OWW package were provided in other school curriculum material. Apparently, many of the teachers were undecided on this item. Specifically, 42.86% of the first grade teachers, 81.82% of

Table 31

Proportion of Teacher Responses to TEQ Items 6 - 13

1st Grade

Question	Response						
	Not Meaningful	1	2	3	4	5	Very Meaningful
6.							
Frequency				1	4	2	
Percent				14.29	57.14	28.57	
7.	Not at All	1	2	3	4	5	Almost Totally
Frequency			3	3	1		
Percent			12.86	42.86	14.29		
8.	Too Easy	1	2	3	4	5	Too Difficult
Frequency				4	3		
Percent				57.14	42.86		
9.	Too Easy	1	2	3	4	5	Too Difficult
Frequency				5	2		
Percent				71.43	28.57		
10.	Almost Never	1	2	3	4	5	Almost Always
Frequency		2		2	2	1	
Percent		28.57		28.57	28.57	14.29	

Table 31 (Continued)

Question	Response						
11.	Poorly	1	2	3	4	5	Very Well
Frequency				1	2	4	
Percent				14.29	28.57	57.14	
12.	No Increase	1	2	3	4	5	Great Increase
Frequency					4	3	
Percent					57.14	42.86	
13.	Not Helpful	1	2	3	4	5	Very Helpful
Frequency			2	2	1	2	
Percent			28.57	28.57	14.29	28.57	

4th Grade

Question	Response						
6.	Not Meaningful	1	2	3	4	5	Very Meaningful
Frequency			1	1	7	1	
Percent			10.00	10.00	70.00	10.00	
7.	Not at All	1	2	3	4	5	Almost Totally
Frequency			1	9	1		
Percent			9.09	81.82	9.09		

Table 31 (Continued)

Question	Response						
	Too Easy	1	2	3	4	5	Too Difficult
8.	Too Easy	1	2	3	4	5	Too Difficult
Frequency				8	2	1	
Percent				72.73	18.18	9.09	
9.	Too Easy	1	2	3	4	5	Too Difficult
Frequency			1	7	1	2	
Percent			9.09	63.64	9.09	18.18	
10.	Almost Never	1	2	3	4	5	Almost Always
Frequency			3	2	2	4	
Percent			27.27	18.18	18.18	36.36	
11.	Poorly	1	2	3	4	5	Very Well
Frequency				5	2	2	
Percent				55.56	22.22	22.22	
12.	No Increase	1	2	3	4	5	Great Increase
Frequency			1	4	5	1	
Percent			9.09	36.36	45.45	9.09	

Table 31 (Continued)

Question	Response						
	Not Helpful	1	2	3	4	5	Very Helpful
13.							
Frequency				4	5	2	
Percent				36.36	45.45	18.18	

6th Grade

Question	Response						
	Not Meaningful	1	2	3	4	5	Very Meaningful
6.							
Frequency				3		3	
Percent				50.00		50.00	
7.	Not at All	1	2	3	4	5	Almost Totally
Frequency			3	3	1		
Percent			50.00	33.33	16.67		
8.	Too Easy	1	2	3	4	5	Too Difficult
Frequency				4		1	
Percent				80.00		20.00	
9.	Too Easy	1	2	3	4	5	Too Difficult
Frequency				5		1	
Percent				83.33		16.67	

Table 31 (Continued)

Question	Response						
	Almost Never	1	2	3	4	5	Almost Always
10.	Almost Never	1	2	3	4	5	Almost Always
Frequency			3	1	1	1	
Percent			50.00	16.67	16.67	16.67	
11.	Poorly	1	2	3	4	5	Very Well
Frequency				1	5		
Percent				16.67	83.33		
12.	No Increase	1	2	3	4	5	Great Increase
Frequency			1		3	2	
Percent			16.67		50.00	33.33	
13.	Not Helpful	1	2	3	4	5	Very Helpful
Frequency				1	2	1	
Percent				20.00	40.00	20.00	

6. Do you think the subject matter was meaningful to your students?
7. Do other curriculum materials at your school present many of the same ideas?
8. How would you rate the difficulty level of the unit ideas for your students?
9. Is the vocabulary in this unit on the correct grade level?
10. Did you need to pull vocabulary or concepts from the Operation Waste Watch units to give your students the proper background for your grade level unit?
11. How well did the students do, on the whole, in reaching the objectives of the unit?
12. Test results aside, in your opinion, did the unit significantly increase your student's knowledge of the subject matter?
13. Did the tests help you plan and evaluate your unit?

of the fourth grade teachers, and 33.33% of the sixth grade teachers responded to this item with a scale value of three on a five-point scale ranging from "no additional coverage" to "almost total coverage" in other curriculum. For the first and sixth grades, there was some evidence that the teachers tended to view the OWW concepts as unique. That is, 42.86% of the first grade teachers and 50.00% of the sixth grade teachers responded with a scale value of two or more, which indicated that the materials were not likely to contain information which was redundant with other school programs.

Items 11 through 13 provided an assessment of how well the students had mastered the objectives of the program in the opinion of their teachers. Most of the teachers at the first grade level (i.e., 57.14%) and at the sixth grade level (i.e., 83.33%) indicated (on Item 11) that their students did "very well" in terms of reaching the objectives of the unit materials. Several of the teachers, however, indicated that some of the objectives were difficult for the students to grasp. Specifically, two of the first grade teachers indicated that their students had problems with the distinction between natural and man-made items. One of these teachers also felt that the terms "natural" and "recycled" were particularly difficult for her class. At the fourth grade level, three of the teachers had problems explaining the concept of organic waste. No specific comments were made at the sixth grade level.

Subjectively, most of the teachers believed that the program was effective in increasing student knowledge of the related subject

matter (as shown in Item 12). All of the first grade teachers responded with a mean scale value of 4.5 or higher on a five-point scale ranging from "no increase" to "great increase" in student knowledge. The fourth and sixth grade teachers were more split in their responses, and no clear pattern could be detected. Further, the teachers' responses to Item 13 were also widely distributed across the five scale items at each grade level. No clear patterns were apparent from these results; hence, further interpretation was difficult.

Finally, the teachers were asked to rate (again on a five-point scale) the value of the individual curriculum materials. Table 32 shows the mean teacher rating for each of the curriculum components. Across the three grade levels, most of the materials were rated as "very useful" or "moderately useful."

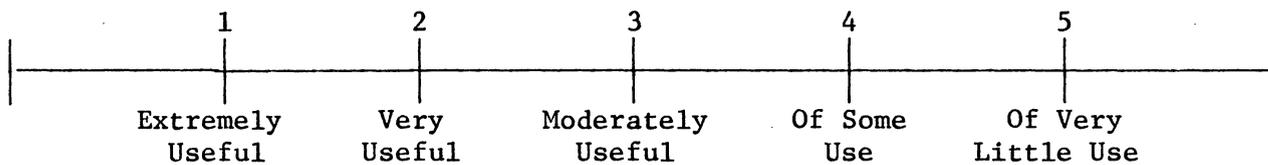
Insert Table 32 about here

The teachers were also asked in an open ended question to indicate any other additional materials which could be added to the curriculum package. At the first grade level, several of the teachers indicated the need for more posters and film strips, simple litter puzzles, teaching pictures, and punch-out pictures which do not have to be obtained from magazines, which were in scarce supply for some students. At the fourth grade level, some of the teachers requested a local map, more creative activities such as songs and art projects, anti-litter badges (or buttons), and more wall posters showing where litter is strewn. Also, two of the teachers requested more duplicating

Table 32

Mean Teacher Ratings of Curriculum Material

Grade	Filmstrip	Cassette	Teacher's Guide	IAC	CAC	Comic Coloring Books	Poster	Pre Test	Post Test
1	2.57	2.57	1.71	2.17	1.71	2.00	2.33	2.57	2.43
4	2.00	2.00	1.55	2.09	2.27	3.09	3.30	2.11	1.89
6	1.83	1.83	2.33	2.67	3.33	3.20	3.80	2.67	2.50



masters and transparencies. Duplicating masters were also requested at the sixth grade level, along with more posters and filmstrips.

Section III: Students, Attitudes, and Impact. The third section of the TEQ was intended to assess the impact of the program on the students and to examine their attitudes toward the curriculum material. Table 33 shows the teacher responses to the three items in this section. In general, most of the students across the study were quite interested in the litter curriculum. That is, 100.00% of the teachers at the first and sixth grade levels and 90.91% of the teachers at the fourth grade level responded to Item 14 with a scale value of at least 3 on a five-point scale which ranged from "not interested" to "very interested." Item 15 assessed the degree of behavioral change during the curriculum period in terms of littering. At the first grade level, 71.43% of the teachers detected a decrease in the amount of student littering behavior. Also, 45.45% of the fourth grade teachers and 33.33% of the sixth grade teachers detected a significant decrease in the amount of student littering.

Insert Table 33 about here

Additionally, Item 16 assessed the degree of student impact on parental attitudes toward solid waste management. For the first grade groups, 40.00% of the teachers believed that their students had at least some impact on their parents; whereas, for the sixth grade group, only 25.00% felt that there was a positive impact and 50.00% were basically undecided. However, in the fourth grade groups, 44.44%

Table 33

Proportion of Teacher Responses to TEQ Items 14 - 16

1st Grade

Question	Responses						
14.	Not Interested	1	2	3	4	5	Very Interested
Frequency					4	3	
Percent					57.14	42.86	
15.	No Decrease	1	2	3	4	5	Significant Decrease
Frequency			1	1	3	2	
Percent			14.29	14.29	42.86	28.57	
16.	No Impact	1	2	3	4	5	Major Impact
Frequency			1	2	2		
Percent			20.00	40.00	40.00		

4th Grade

Question	Responses						
14.	Not Interested	1	2	3	4	5	Very Interested
Frequency			1	2	6	2	
Percent			9.09	18.18	54.55	18.18	

Table 33 (Continued)

Question	Responses						
15.	No Decrease	1	2	3	4	5	Significant Decrease
Frequency			2	4	4	1	
Percent			18.18	36.36	36.36	9.09	
16.	No Impact	1	2	3	4	5	Major Impact
Frequency			4	4	1		
Percent			44.44	44.44	11.11		

6th Grade

Question	Responses						
14.	Not Interested	1	2	3	4	5	Very Interested
Frequency				2	2	2	
Percent				33.33	33.33	33.33	
15.	No Decrease	1	2	3	4	5	Significant Decrease
Frequency			3	1	2		
Percent			50.00	16.67	33.33		

Table 33 (Continued)

Question	Responses						
16.	No Impact	1	2	3	4	5	Major Impact
Frequency		1		2	1		
Percent		25.00		50.00	25.00		

14. Do you think most of the students were interested in the ideas presented?
15. Did you notice a decrease in littering among your students as the unit progressed?
16. Did the children have an impact on their parents' attitudes toward littering and solid waste disposal?

of the teachers felt that there was no parental impact and 44.44% were undecided.

Section IV: Evaluation of OWW Materials. The fourth section of the TEQ assessed the teachers' opinions of the different curriculum materials. Table 34 shows the teacher responses to the four major items in this section. From the responses to Item 18, it was evident that most of the teachers used the filmstrip as an introduction to the curriculum program. An examination of the data indicated that 66.66% of the first grade teachers and 100.00% of the fourth and sixth grade teachers responded to this item in a positive manner, indicating that the filmstrip was an excellent way to start the curriculum program.

Insert Table 34 about here

Next, the teachers were asked in Item 17 to rate the clarity of the curriculum instruction. Most of the teachers found all of the instructions to be clear and relatively easy to understand. Specifically, 88.33% of the first grade teachers, 72.72% of the fourth grade teachers, and 66.67% of the sixth grade teachers felt that the materials were well explained. Additionally, as shown in Item 19, most of the teachers had little difficulty assembling the materials needed to teach the curriculum program. That is, all of the teachers at the first grade level, 80.00% of the teachers at the fourth grade level, and 66.67% of the teachers at the sixth grade level indicated that they had no major difficulties accumulating the teaching materials. Also, as indicated in Item 20, only a few of the teachers

Table 34

Proportion of Teacher Responses to TEQ Items 17 - 20

1st Grade

Question	Responses						
17.	Difficult	1	2	3	4	5	Clear
Frequency				1	2	3	
Percent				16.67	33.33	50.00	
18.	Not at All	1	2	3	4	5	Excellent Way
Frequency				2	2	2	
Percent				33.33	33.33	33.33	
19.	Difficulty	1	2	3	4	5	No Difficulty
Frequency					3	3	
Percent					50.00	50.00	
20.	Not at All	1	2	3	4	5	Very Much
Frequency		4	1		1		
Percent		66.67	16.67		16.67		

Table 34 (Continued)

4th Grade

Question	Responses						
17.	Difficult	1	2	3	4	5	Clear
Frequency			1	2	3	5	
Percent			9.09	18.18	27.27	45.45	
18.	Not at All	1	2	3	4	5	Excellent Way
Frequency					5	6	
Percent					45.45	54.55	
19.	Difficulty	1	2	3	4	5	No Difficulty
Frequency			1	1	4	4	
Percent			10.00	10.00	40.00	40.00	
20.	Not at All	1	2	3	4	5	Very Much
Frequency		10					
Percent		100.00					

Table 34 (Continued)

6th Grade

Question	Responses						
		1	2	3	4	5	
17.	Difficult	1	2	3	4	5	Clear
Frequency			1	1	1	3	
Percent			16.67	16.67	16.67	50.00	
18.	Not at All	1	2	3	4	5	Excellent Way
Frequency						6	
Percent						100.00	
19.	Difficulty	1	2	3	4	5	No Difficulty
Frequency				2	3	1	
Percent				33.33	50.00	16.67	
20.	Not at All	1	2	3	4	5	Very Much
Frequency		5			1		
Percent		83.34			16.67		

17. Were the directions for the unit clear and easy to follow?
18. Do you feel that showing the filmstrip was a good way to introduce this unit?
19. Did you have any difficulty assembling materials to use with this unit?
20. Did you need assistance from other adults in teaching the unit or in conducting the activities?

needed outside assistance from other adults in teaching the OWW curriculum. Specifically, 83.43% of the first and sixth grade teachers and 100.00% of the fourth grade teachers taught the curriculum without outside assistance.

However, many of the faculty indicated that they used supplemental materials in teaching the curriculum program. For example, several teachers obtained access to "county litter films." Two of the films used most often were "Litter, Litter Everywhere" and "The Litterbug and the Litter Monster." Also, two of the teachers used the film cassette entitled "Let's Find the Pollution Solution." Many of the teachers went to magazines and science books for pictures, and one of the teachers used McDonald's Litter Pack as a supplement to the regular curriculum materials. Several of the teachers made up their own games and two used additional litter quizzes throughout the program.

Section V: Individual Activity Cards. The fifth section of the TEQ assessed the teachers' opinions of the Individual Activity Cards (IACs). Each of the teachers in both the Standard and Modified curriculum conditions were asked to rate on a seven-point scale the degree of usefulness of each of the IACs. Since the two curriculum packages differed in terms of the curriculum cards, the ratings from teachers in the standard groups were separated from those in the modified groups. The results obtained from the teachers who were assigned to the Standard curriculum condition are discussed first.

Table 35 shows the proportion of teachers rating each of the Standard IACs across the three different grade levels. Among the

first grade teachers, three of the cards were rated as being "not helpful" (i.e., Cards 2, 3, and 6). Specifically, Cards 2 and 3 required the students to bring magazines from home and cut out various pictures during class. The single teacher who had difficulty with these cards indicated that many of the children did not have access to magazines at home and that several simply forgot to bring the materials into school. Card 6 required the students to examine their room for waste objects and deposit these items into a trash container. Again, a single teacher had problems with this item in that the activity was found to be highly repetitious and boring for the class. Additionally, several teachers who did not rate a particular item indicated that they had decided not to use that item. For example, none of the teachers used Card 18, which examined how long certain types of items will last before rotting away. Two of the teachers felt this item to be repetitious, hence they did not use it with their classes. Further, one of the teachers did not use Cards 1, 6, 9, and 12 because she also felt that they were redundant to the other curriculum cards.

Insert Table 35 about here

Among the fourth grade teachers, only one of the cards (i.e., Card 6) was rated as being less than "moderately helpful." Card 6 was an extension of Card 5. The single teacher who had problems with this activity indicated that she had used only Card 5. Again, one of the teachers failed to rate two of the items which were not used in class. That is, one of the teachers indicated that she had eliminated Cards 4

Table 35

Teacher Rating of the Degree of Usefulness for
the Standard Individual Activity Cards

1st Grade

Card #		Not Helpful 1	2	3	4	5	6	Helpful 7
1	Frequency Percent						1 50.00	1 50.00
2	Frequency Percent		1 33.33			1 33.33	1 33.33	
3	Frequency Percent		1 33.33				2 66.67	
4	Frequency Percent						1 33.33	2 66.67
5	Frequency Percent						2 66.67	1 33.33
6	Frequency Percent		1 50.00					1 50.00
9	Frequency Percent						2 100.00	
11	Frequency Percent			2 66.67				1 33.33
12	Frequency Percent			1 50.00	1 50.00			
16	Frequency Percent			1 50.00		1 50.00		
17	Frequency Percent						1 50.00	1 50.00
18	Frequency Percent							

Table 35 (Continued)

4th Grade								
Card #		Not Helpful 1	2	3	4	5	6	Helpful 7
1	Frequency Percent				2 50.00		1 25.00	1 25.00
2	Frequency Percent				1 25.00		2 50.00	1 25.00
4	Frequency Percent						1 33.33	2 66.67
5	Frequency Percent						1 33.33	2 66.67
6	Frequency Percent						2 66.67	1 33.33
7	Frequency Percent			1 50.00		1 50.00		
8	Frequency Percent				1 50.00			1 50.00

6th Grade								
Card #		Not Helpful 1	2	3	4	5	6	Helpful 7
1	Frequency Percent			1 25.00	1 25.00		1 25.00	1 25.00
2	Frequency Percent			1 25.00		1 25.00	1 25.00	1 25.00
4	Frequency Percent		1 25.00	1 25.00		1 25.00	1 25.00	

Table 35 (Continued)

Card #		Not Helpful 1	2	3	4	5	6	Helpful 7
5	Frequency Percent			1 50.00			1 50.00	
9	Frequency Percent			1 33.33			1 33.33	1 33.33
12	Frequency Percent			1 50.00	1 50.00			
13	Frequency Percent			1 25.00			2 50.00	1 25.00
14	Frequency Percent			1 25.00			2 50.00	1 25.00
15	Frequency Percent			1 25.00			1 50.00	2 25.00
16	Frequency Percent			1 33.33			1 33.33	1 33.33
17	Frequency Percent							

and 5; however, no justification or rating was provided.

At the sixth grade level, all of the cards except Card 12, which was not rated at all, were rated by at least one of the teachers as being less than "moderately helpful." Card 3, which required the student to separate and count lunchroom waste, was specified by two of the teachers as being a particular problem. Yet again, the teachers failed to comment on the specific nature of the problems with this activity. In fact, none of the teachers at this grade level indicated any specific comments concerning the individual student activities.

Next, the responses of the teachers who were assigned to the modified curriculum condition were examined. Table 36 summarizes the proportion of teachers rating each of the modified IACs across the three different grade levels. For the first grade curriculum materials, Cards 2, 8, 9, and 11 were especially modified to reflect various behavioral principles. None of these cards were rated by any of the teachers as being less than "moderately helpful." Rather, most of the teachers felt these activities were "helpful." Additionally, none of the other standard items were rated as being "not helpful," and none of the cards (i.e., standard or modified) received any specific teacher comments.

Insert Table 36 about here

Cards 4, 5, 6, and 7 contained the behavioral modifications for the fourth grade curriculum materials. None of these cards were rated by the teachers as being less than "moderately helpful." However, two

Table 36

Teacher Rating of the Degree of Usefulness for
the Modified Individual Activity Cards

1st Grade								
Card #		Not Helpful 1	2	3	4	5	6	Helpful 7
1	Frequency Percent					2 66.67	1 33.33	
2	Frequency Percent				1 33.33	1 33.33	1 33.33	
3	Frequency Percent				2 66.67			1 33.33
4	Frequency Percent					1 33.33	2 66.67	
5	Frequency Percent				1 33.33	1 33.33	1 33.33	
6	Frequency Percent						2 100.00	
7	Frequency Percent						2 66.67	1 33.33
8	Frequency Percent					1 33.33	2 66.67	
9	Frequency Percent						2 66.67	1 33.33
10	Frequency Percent						2 66.67	1 33.33
11	Frequency Percent						2 66.67	1 33.33
12	Frequency Percent						1 33.33	2 66.67

Table 36 (Continued)

4th Grade

Card #		Not Helpful 1	2	3	4	5	6	Helpful 7
1	Frequency Percent		1 16.67		2 33.33		2 33.33	1 16.67
2	Frequency Percent				2 33.33	2 33.33	1 16.67	1 16.67
3	Frequency Percent			1 16.67	1 16.67	2 33.33	1 16.67	1 16.67
4	Frequency Percent				2 33.33	1 16.67	2 33.33	1 16.67
5	Frequency Percent				1 16.67	1 16.67	2 33.33	2 33.33
6	Frequency Percent					2 40.00	2 40.00	1 20.00
7	Frequency Percent					2 50.00		2 50.00

6th Grade

Card #		Not Helpful 1	2	3	4	5	6	Helpful 7
1	Frequency Percent					1 50.00	1 50.00	
2	Frequency Percent				1 50.00		1 50.00	
3	Frequency Percent				1 50.00			1 50.00

Table 36 (Continued)

Card #		Not Helpful 1	2	3	4	5	6	Helpful 7
4	Frequency Percent				1 50.00		1 50.00	
5	Frequency Percent					2 100.00		
6	Frequency Percent		1 50.00				1 50.00	
7	Frequency Percent							1 100.00
8	Frequency Percent		1 50.00				1 50.00	
9	Frequency Percent						1 100.00	
10	Frequency Percent						1 100.00	
11	Frequency Percent						1 100.00	

of the standard activities were rated as being "not helpful" (i.e., Cards 1 and 3). Card 1 concerned taking the roles of other people in various situations. Two of the teachers stated that their students had trouble understanding this activity. Card 3 (which was the same activity as that in Card 4 of the standard curriculum) required the students to think about and make up various norms. However, no specific comments were made as to why this activity might have generated problems for the students. The only specific teacher comments at the fourth grade level were entirely positive. That is, several of the teachers indicated that they liked the IACs, and one stated that she "liked them better than the CACs." Finally, one teacher liked the materials but felt that the program would have worked better for her class if it had been administered during the spring.

At the Sixth Grade level, Cards 1, 2, 5, and 8 were modified to reflect the given behavioral principles. Only one of these cards was rated as being less than "moderately helpful." That is, Card 8, which concerned what to say and do when confronted with someone who litters, was not used by one of the teachers. Here, the teacher indicated that this card was basically uninteresting to his students and was not completed. Additionally, one of the standard items (i.e., Card 6, which contained the same material as the standard Card 9) was also not used by this particular sixth grade teacher. Again, the teacher felt that this did not maintain the interest of the class. No other comments concerning any of the activities were given by the teachers.

Section VI: Class Activity Cards. The final section of the TEQ examined the teachers' reactions to the Class Activity Cards (CACs). As with the IACs, the teachers were asked to rate the CACs on a seven-point scale. Also, the two curriculum groups (i.e., Standard and Modified) were again presented separately with the results obtained from teachers in the Standard curriculum groups presented first.

Table 37 shows the proportion of teachers rating each of the Standard CACs for each of the three grade levels. For the first grade, only a few of the teachers rated the different class activities. Two of the items (i.e., Cards 2 and 7) were rated, each by a single teacher, as being less than "moderately helpful." Specifically, Card 2 concerned the distinction between useful and waste objects in the classroom. Here, the teacher indicated that this material was basically uninteresting to her class. Card 7 concerned the reuse of discarded waste objects; however, no reason was given as to why this topic might have caused class problems.

Insert Table 37 about here

Among the fourth grade teachers, two of the cards (i.e., 3 and 4) were rated as being less than "moderately helpful" by two teachers. Cards 3 and 4 both required the students to hide all of their family waste cans but one so that they could monitor the accumulation of inorganic waste materials in the home. Both of the teachers who assigned a low rating to these cards indicated that most of the students could not secure home cooperation in completing these activities. An

Table 37
Teacher Rating of the Degree of Usefulness for
the Standard Class Activity Cards

1st Grade								
Card #		Not Helpful 1	2	3	4	5	6	Helpful 7
1	Frequency Percent				1 50.00			1 50.00
2	Frequency Percent		1 50.00			1 50.00		
3	Frequency Percent					1 50.00	1 50.00	
4	Frequency Percent						1 50.00	1 50.00
5	Frequency Percent					1 50.00	1 50.00	
6	Frequency Percent					1 50.00		
7	Frequency Percent			1 50.00	1 50.00			
8	Frequency Percent				2 100.00			

Table 37 (Continued)

4th Grade

Card #		Not Helpful 1	2	3	4	5	6	Helpful 7
1	Frequency Percent						3 75.00	1 25.00
2	Frequency Percent						3 75.00	1 25.00
3	Frequency Percent			1 25.00			1 25.00	2 50.00
4	Frequency Percent			1 25.00			1 25.00	2 50.00
5	Frequency Percent						1 50.00	1 50.00
8	Frequency Percent					1 25.00	1 25.00	2 50.00
9	Frequency Percent							
10	Frequency Percent				1 33.33	1 33.33		1 33.33
11	Frequency Percent							
12	Frequency Percent						1 100.00	
17	Frequency Percent						1 100.00	

Table 37 (Continued)

6th Grade

Card #		Not Helpful 1	2	3	4	5	6	Helpful 7
1	Frequency Percent			1 33.33		1 33.33	1 33.33	
2	Frequency Percent			1 50.00			1 50.00	
3	Frequency Percent							
4	Frequency Percent							
5	Frequency Percent							
6	Frequency Percent							
7	Frequency Percent							
8	Frequency Percent							
9	Frequency Percent			1 50.00			1 50.00	
10	Frequency Percent							
11	Frequency Percent							
12	Frequency Percent							

additional teacher who did not rate any of the activities indicated that she also did not use these two cards because of problems in getting home cooperation.

Further, several of the other teachers did not rate various cards because they failed to use them in class. Specifically, three of the teachers indicated that they did not use Cards 9, 10, and 11, which required the acquisition of a large map of the local area, as well as a local field trip. One of these teachers mentioned that her class could not secure a map, and another teacher indicated that the weather precluded any outside field trips.

At the sixth grade level, only three of the cards (i.e., 1, 2, and 9) were reviewed by the participating teachers, and each of these were rated by at least one of the teachers as being less than "moderately helpful." Cards 1 and 2 both required the students to discuss the concepts of proper waste management, whereas Card 9 concerned a simulated city council meeting where the students practiced making appropriate waste management decisions. However, no specific comments were provided by the teachers regarding these cards. Finally, one of the sixth grade teachers (who only rated the first two cards) indicated that he did not have enough class time to adequately complete the remaining cards. Another teacher indicated that he did not use any of the CACs because of time restrictions. No other teacher comments were available.

The responses of the teachers in the Modified curriculum group were not found to be drastically different from their Standard

curriculum counterparts. Table 38 summarizes the proportion of teachers who rated the Modified CACs at each grade level. For the first grade curriculum materials, Cards 1, 5, 6, and 8 were modified to reflect the same type of behavioral orientation used in the modified IACs. None of the teachers who reviewed these cards rated them to be less than "moderately helpful." That is, most of the teachers felt that these particular cards were helpful in class. The teachers indicated that the other four standard class activities (i.e., Cards 2, 3, 4, and 7) were also helpful. Further, none of the teachers indicated that any of the activities were eliminated, nor did any of the teachers provide any other comments on any of the cards.

Insert Table 38 about here

Of the CACs used at the fourth grade level, Cards 1, 7, 9, and 10 were modified to reflect a behavioral orientation. Again, none of the behavioral activities were rated to be less than "moderately helpful" to the teachers. However, three of the five responding teachers rated the first card as "moderately helpful." Specifically, Card 1 required the students to consider the behavioral distinctions between good and bad habits. Again, no specific teacher comments were available that indicated why this activity was rated by the majority of the teachers as only "moderately helpful."

Of the remaining seven standard activities (i.e., Cards 2, 3, 4, 5, 6, 8, and 11), only Card 11 was rated as being less than "moderately helpful" by one of the teachers. Card 11 concerned how the student's

Table 38

Teacher Rating of the Degree of Usefulness for
the Modified Class Activity Cards

1st Grade

Card #		Not Helpful 1	2	3	4	5	6	Helpful 7
1	Frequency Percent				1 25.00		1 25.00	2 50.00
2	Frequency Percent						4 100.00	
3	Frequency Percent					1 25.00	2 50.00	1 25.00
4	Frequency Percent				1 25.00	1 25.00	2 50.00	
5	Frequency Percent					2 50.00	2 50.00	
6	Frequency Percent				1 25.00		3 75.00	
7	Frequency Percent						3 75.00	1 25.00
8	Frequency Percent						3 75.00	1 25.00
9	Frequency Percent							
10	Frequency Percent							
11	Frequency Percent							
12	Frequency Percent							

Table 38 (Continued)

4th Grade

Card #		Not Helpful 1	2	3	4	5	6	Helpful 7
1	Frequency Percent				3 60.00		1 20.00	1 20.00
2	Frequency Percent				2 40.00	1 20.00	1 20.00	1 20.00
3	Frequency Percent						1 50.00	1 50.00
4	Frequency Percent						1 50.00	1 50.00
5	Frequency Percent						1 50.00	1 50.00
6	Frequency Percent				1 25.00		2 50.00	1 25.00
7	Frequency Percent						1 25.00	3 50.00
8	Frequency Percent				2 40.00		2 40.00	1 20.00
9	Frequency Percent				1 20.00	1 20.00	2 40.00	1 20.00
10	Frequency Percent				1 25.00		2 50.00	1 25.00
11	Frequency Percent			1 25.00		1 25.00	1 25.00	1 25.00
12	Frequency Percent							

Table 38 (Continued)

6th Grade*

Card #		Not Helpful 1	2	3	4	5	6	Helpful 7
1	Frequency Percent							
2	Frequency Percent							
3	Frequency Percent							
4	Frequency Percent							
5	Frequency Percent							
6	Frequency Percent							
7	Frequency Percent							
8	Frequency Percent							
9	Frequency Percent							
10	Frequency Percent							
11	Frequency Percent							
12	Frequency Percent							

*No response

family disposed of its weekly trash and required the class to design a system to improve home waste disposal habits. Here, the teacher indicated that she was reluctant to enter into the family life of her students and was thus "not happy with the card."

In general, the only other comments by the fourth grade teachers concerned the time of year that the curriculum was taught. That is, one of the teachers indicated that due to the winter season, her students were somewhat restricted in how much they could do on some of the outside activities. No other comments were available.

Due to the nature of the sixth grade CACs, none of these materials were modified. That is, the CACs provided to the sixth grade teachers in the Modified group were the same items that were used in the Standard sixth grade groups. However, none of the teachers in this group provided ratings or comments on any of the CACs.

Following the evaluation of the CACs, each of the teachers was asked several final questions. For example, each of the teachers in both groups (i.e., Standard and Modified) was asked for additional suggestions for improving the curriculum program. Two of the responding first grade teachers felt that the OWW curriculum goals should be integrated into current school curriculum (i.e., reading, science, or health). Also, one of the first grade teachers felt that the program took up too much class time from other scheduled school activities, whereas another felt that the program should best be taught in the spring when the weather was not as harsh. The concern with

restricted time parameters and the need to better integrate the curriculum into existing school programs was echoed by the fourth grade teachers. Two of the teachers indicated that the curriculum could be easily integrated into the environmental and natural resources programs at the fourth grade level. Also, two of the teachers indicated that the schedule in most elementary schools was already overcrowded and that there simply was not enough time to teach a new, separate curriculum.

Further, at the Sixth grade level, the same basic problems as seen by the fourth grade teachers were described by several of the sixth grade faculty. Two of the sixth grade teachers indicated that the curriculum should be integrated into the school science program and not used as a separate unit, whereas another felt that the lack of class time in general made the use of new curriculum materials almost impossible.

Finally, each of the teachers were asked if they would teach the curriculum again. Table 39 shows the proportion of teachers who indicated that they would be willing to teach the OWW curriculum material again. Across all grades, 41.67% of the teachers were reluctant to teach the curriculum again and an additional 45.83% were undecided. Four of the first grade teachers indicated that their reluctance was based on the lack of time during the school year to teach extra materials. One of these teachers indicated that the core cards should be shortened, and two others felt the whole program should be shortened.

Insert Table 39 about here

Seven of the fourth grade teachers also indicated that the program's length would preclude them from teaching it again. For example, two of the teachers suggested that the program should be shortened to two weeks. Further, four of the fourth grade teachers were very happy with the program and enjoyed teaching it, yet all of them indicated that it should be much shorter. Finally, one of the teachers felt that the concepts of "habits" and "norms" were overstressed throughout the fourth grade package.

One of the sixth grade teachers was quite optimistic about the program and indicated that now that she knew what the program entailed, she could better plan for next year. However, the other two responding sixth grade teachers were quite opposed to teaching the program again. For example, one of the teachers felt that the OWW program greatly interfered with his regular curriculum. Further, he indicated that had he known the amount of time that it would take, he would never have originally consented to teach the material. The second teacher felt that the program did not fit the reading or attention level of sixth grade students and that the "Tech personnel" did little to adapt the materials to his particular class.

Table 39
 Proportion of Teachers Willing
 to Teach the OWW Curriculum for a Second Time

Grade		Response				
		Definitely Would Teach Again 1	2	Undecided 3	4	Definitely Would Not Teach Again 5
1	Frequency	-	3	2	1	1
	Percent		42.86	28.57	14.29	14.29
4	Frequency	-	3	8	-	-
	Percent		27.27	72.73		
6	Frequency	-	4	1	1	-
	Percent		66.67	16.67	16.67	

CHAPTER V

DISCUSSION AND CONCLUSIONS

Environmental Litter Assessment

One of the factors that may influence student littering behavior is the amount of ambient litter in the school. That is, as stated in Chapter II, research has shown that littering behavior can be under control of a number of environmental cues, including the presence or absence of environmental litter (see Geller, Winett & Everett, 1982 for review). Hence, the present study attempted to monitor the amount of litter in the surrounding area and within the immediate school area for each target location.

Neighborhood assessment. The surrounding neighborhoods of schools in both Giles and Roanoke Counties were found to be moderately well kept and tended to be relatively free of high accumulations of litter. In general, the areas in Giles County were more often rated as rural and were judged to have higher accumulations of litter. Although the differences were not pronounced, this evidence is in agreement with the data provided by Public Opinion Surveys, Inc., which found that rural areas are more likely to contain litter. This pattern of results was also present at each of the individual target schools.

School assessment. Schools in Giles County were found to be on the average older and less well kept than their Roanoke counterparts. In general, the Giles County schools were judged to have a more littered appearance than those in Roanoke County. However, these subjective appraisals were quite likely influenced by the generally poor

upkeep of the Giles County schools. When the teachers were asked to judge the severity of the school litter problems, the Giles County teachers were more likely to rate the problem as less severe than those in Roanoke County. Hence, in terms of subjective judgment, both schools had a litter problem. More litter was apparent at the less well kept schools in Giles County and teachers in Giles County were less concerned and aware of the problem. Teachers in both areas felt that the litter problems were due to inappropriate student disposal habits.

School litter count. Actual litter counts outside of schools in each county again reflected the same basic pattern. That is, both county areas had a litter problem around the target schools, yet more litter was observed in Giles County schools than at Roanoke County schools. Also, the rate of littering was stable in Roanoke County schools, whereas it was unstable throughout the year in Giles County schools. That is, the level of outside litter increased during mid-year at the Giles County schools and remained stable throughout the year in Roanoke County. Inside litter counts in both male and female restrooms were roughly equivalent in both county areas.

Conclusions. In general, both county areas were found to have a litter problem in and around the selected target schools. Litter assessments (both subjective and objective) showed that Giles County schools appeared to be more littered than the schools in Roanoke County. In terms of the present evaluation, no school in either county was found to be free of litter. Alternatively, litter levels in both

counties were not so high that special cleanup campaigns by the school staff were attempted. Hence, each of the target schools was deemed to be an acceptable location to target an educational curriculum on litter control.

Across the study levels of school litter did not fluctuate in accordance with the implementation of the curriculum program. That is, litter levels did not decrease following the implementation of the program. Indeed, this outcome was not expected for several reasons. Only three classes (at most) were examined in each of the schools, which might not be enough to generate changes in schoolwide litter even if the program was completely successful. No attempts were made to isolate litter counts to areas frequented only by the target classes. Indeed, there were no areas used only by a single class. Also, no attempts were made to clean up an area after litter counts were obtained as would be necessary to show changes across the three different counts (i.e., during the Pre, Post, and Follow-up phases). Severe time restraints precluded cleaning the school campus following the litter counts. However, the present method was deemed acceptable as a way to reflect the amount of normal school litter present throughout the evaluation. No attempts were made to incorporate this data into the experimental framework in the form of a dependent variable.

Student Behavior Assessment

In an attempt to examine more than pencil and paper assessments of litter knowledge and attitudes, the present study examined three types of student behavior. Actual litter accumulations in the class-

rooms, the disposition of specially planted littered items, and the disposition of specially provided paper towels were monitored across the study. Overall, little statistical evidence was found which would indicate program success in terms of student behavior.

Although each of the techniques used (i.e., the litter counts and special planted litter procedures) were based on methods common to other studies, they were especially designed for implementation in school settings and for use with young children. Because there was little experimental research available in school settings that targeted litter control, most of the behavioral assessments were first attempts. Hence, many problems with the given assessment strategies were encountered and deserve further discussion.

Classroom litter count. An examination of the total consensus counts revealed no statistically reliable evidence that litter levels decreased following the program. Although there is no direct evidence which supports the hypotheses that student awareness would be higher following the implementation of the Standard curriculum (i.e., Hypothesis One) or the Modified curriculum (i.e., Hypothesis Two), there was at least some evidence indicating that the students were acting in accordance with the curriculum principles. That is, even though many of the groups were found to be producing more litter following the curriculum, this increase was slight when compared to the no treatment controls. That is, there may have been a tendency in each of the classes for normal litter levels to fluctuate at different times of the year. There was evidence that litter levels increased at midyear (as

shown in Figure 1). Further, discussions with various target teachers tended to support this notion. During the middle part of the school year, most classes were making preparations for Christmas decorations before the holiday season and dismantling them after the holidays. When compared to Fall and Spring, the potential for litter may have been quite high during this period. Therefore, even if the program was highly successful, indications of its success may have been decreased because of the unusually high levels of littering during the post curriculum phase.

Another possible problem with the classroom litter count was also revealed in subsequent discussions with the teachers. The litter counts made in each room concerned all discarded items regardless of their actual size. However, many of the teachers considered only large items to be litter. That is, there seemed to be an underlying feeling with the teachers that small items were not important because they would be swept out by the janitor at the end of the day. Since the problem was probably constant throughout the three assessment phases, it was not felt to have contributed to the lack of results. However, if this belief was somehow transmitted to the children, all such litter counts would reveal relatively high amounts of litter. That is, even if the curriculum was effective, litter counts might not be expected to drop to zero. Indeed, one of the teachers was quite proud of how clean her room was, yet the litter count was found to be quite high. Future application of this technique should attempt to ensure that class norms as to what is considered litter are compatible with a total count of

room litter. That is, attempts should be made to inform teachers and students that all items improperly discarded are litter, not just the larger items.

Planted classroom litter. A separate analysis of variance on the number of appropriate disposals for each of the four planted litter locations (i.e., floor, desk, public areas, and areas next to class trash container) revealed little which would reliably indicate the success of the curriculum program. However, an examination of the data revealed several trends which did tend to support some of the hypotheses. Primarily, across each of the four planted items the students receiving the Standard curriculum showed more litter awareness (in terms of appropriately disposing the planted items) following the curriculum program (i.e., in support of Hypothesis One). In general, the Modified curriculum program was equally successful in increasing appropriate disposals as indicated in Hypothesis Two. However, no support could be found for the notion that the Modified curriculum would lead to superior performance during the Post curriculum phase (i.e., Hypothesis Three) or during Follow-up (i.e., Hypothesis Four). Finally, appropriate disposals for all of the planted items were generally higher in the two curriculum groups (i.e., Standard and Modified) than in the no curriculum control groups.

One of the problems that became apparent while implementing this set of procedures was that the students began to associate the presence of crumpled up (clean) white typing paper with the appearance of the collection team. Indeed, one child was overheard by a teacher to say,

"Oh the litter people are here again . . . they left these [planted items] under my desk." The problem which stemmed from this recognition was the students' reluctance to disturb material foreign to their classroom that was obviously left by an adult. This concern among the children was repeatedly reported by the teachers and may have depressed the number of appropriate disposals during the Post and Follow-up curriculum phases. The effects of this student concern were not believed to have been constant across the study but to have increased with repeated contacts with the research team.

The fact that the planted items might have been obtrusive and conspicuous was further supported by the fact that many of the items could not be accounted for at the end of each day. That is, across each of the four planted litter items, many of the items were found to be missing from the room. The teachers indicated that since white (clean) typing paper was a foreign (i.e., nonfamiliar) classroom item, that the planted items were often carefully unfolded and kept in the students' personal desk space. Teachers from each of the three age groups indicated that this was a problem.

Therefore, future applications of this technique might benefit by allowing the teachers to carefully plant classroom consistent items at times which do not correspond with the site visit of the research team. The use of only easily recognized items that were foreign to the class environment and the distribution of these items on days in which the data collection team was on campus may have encouraged the students to withhold the behaviors of interest due to an awareness that some adult project was in effect.

Student handouts. The analysis of variance on the number of appropriate disposals again revealed little indication of the program's successful effect on student behavior. An examination of the data further revealed little that would support the present hypotheses in the way of behavioral trends.

Of the behavioral assessments implemented in the present study, the use of the "Baby Wet Ones" was perhaps the most initiatively appealing. The technique was a modification of the procedures implemented by Heberlein (Note 1), Geller (1975), Robinson and Frisch (1975), Geller, Witmer, and Orebaugh (1976), and Geller, Witmer, and Tuso (1977). Rather than give out handbills, flyers, paper cups, etc., the present study chose to provide wet paper towels as a source of potential litter. Objects used in earlier studies were deemed inappropriate for use with elementary age children. Indeed, few items can be distributed to elementary school students for a variety of reasons. For example, the Virginia Division of Litter Control suggests as one of its Operation Waste Watch activity cards (i.e., Grade One, IAC 5) the distribution of crackers wrapped in cellophane along with the monitoring of the disposition of the wrapper. The problem is that most school systems will not consider the disposition of food which does not meet certain nutritional standards. In addition, the purchase of crackers on a scale large enough to meet the needs of the present evaluation would not be cost effective. Candy bars were rejected on similar grounds, as were other types of wrapped candy and chewing gum.

The item which was finally decided on again carried a great deal of initiative appeal. "Baby Wet Ones" are specially designed, pre-

moistened paper towels designed for use with small infants. The towels are nontoxic, and are packed in a relatively germ free container; hence, the school systems in Roanoke and Giles County readily granted their permission to use these items. Since the towels were to be distributed after lunch while most students were on the way to the restroom to wash up, an excuse was readily available as to why they were being dispensed. Finally, since the "Baby Wet Ones" were actually wet, it was believed that the children could do little with the towels other than dispose of them. That is, towels placed in one's pockets would lead to stains, while towels placed in pocketbooks would disturb the other contents because of the excessive moisture.

The problems which resulted stemmed from a drastic underestimation of the inventive powers of young children. As indicated in the previous Results section (see Chapter IV), many of the dispensed towels could not be accounted for at the end of the day. A glance at Figure 8 will indicate the severity of the problem. Apparently these items held a special appeal for the students.

As with the planted items, the "Baby Wet Ones" were dispensed by adults foreign to the school environment. Hence, the towels may have had special significance for the children in that many refused to throw them away. Upon speaking to the teachers, it was learned that students would keep the towel to wash their hands and face, to clean their desks, to clean the teacher's desk, to clean the blackboards, to throw at one another, to put down the shirt or dress of their neighbors, or to take home to their families. The point is that the wet paper towels

were apparently of considerable worth to children in these age groups, and many students never even considered throwing them away.

For future applications of this technique, it is recommended that the disposition of towels be monitored over an extended period of time (perhaps a period of two to three days) so that towels which are kept for other uses might eventually be counted. That is, the towels will eventually dry out; also, the novelty will likely wear out and the towel may then be discarded. This technique may ensure that more data is collected.

Another problem encountered with this procedure was revealed by the high initial rates of appropriate disposals during the Pre curriculum phase. That is, most students were found to appropriately dispose of the towels or to simply keep them; very few children littered the towels throughout the evaluation. The obvious problem here was that even without the curriculum program, students were already acting in an appropriate manner in terms of disposing of the towels. Even those students who were unexpectedly keeping the towels were not littering them. Hence, there was little inappropriate behavior which could be changed.

In retrospect, this failure to litter is not surprising given the standard rules of conduct within most elementary schools. Students were rigidly controlled by the teachers whenever they left the classroom setting. That is, the students (in all three grades) were encouraged to remain quiet, orderly and to walk in single file. These procedures were in force as the students left the lunchroom. In many

cases the students lined up inside the lunchroom and then walked in an orderly fashion back to the restroom and class. Students were always monitored closely by teachers or teacher aids.

Most students who received "Baby Wet Ones" were unsure as to their purpose and simply held the towels until entering the class. Given the attempts to maintain order and quiet in the halls, it is not surprising that the students were reluctant to drop the towels along the way. It is interesting to note that on one of the few occasions where students were observed to litter the towels, the behavior occurred in the absence of supervision. One of the target classes was routed along an outside path while returning to their class when the normal inside hall corridor was being waxed. When the teacher (who was at the head of the line) entered the classroom building, student order at the end of the line virtually vanished. As these children were cutting up, several towels were littered.

Hence, future use of this technique should be restricted to situations when the children are relatively free from adult supervision. For example, paper towels could be distributed when the students go to the playground, park, or other outdoor activity where the teacher's level of control is reduced. It is simply not reasonable to expect elementary school children to provide inappropriate behaviors (i.e., littering) within close proximity to an adult who might object.

Conclusion. The behavioral assessments used in the present study failed to statistically support the conclusion that the educational curriculum (either Modified or Standard) was effective in changing

student behavior. The beneficial effects of the OWW program should not be altogether ruled out for several reasons. Although the present results failed to provide evidence which was statistically acceptable, much of the data was directionally in line with the first two hypotheses. That is, an examination of the behavioral trends tended to support the notion that both the Standard (Hypothesis One) and Modified (Hypothesis Two) curriculum were effective in increasing anti-litter behavior (with the exception of the results of the "Baby Wet One" data). There was almost no evidence which would suggest the relative superiority of the Modified curriculum as compared to the Standard curriculum.

Although there are problems in assuming a direct relationship between knowledge and behavior (e.g., Heberlein, Note 1; Robinson & Frisch, Note 3), the fact that the student achievement tests indicated program success must be considered when interpreting the lack of findings of the behavioral measures. This point is especially well taken when one examines the positive trends which resulted from some of the student Behavior Assessments. It is difficult to state that the program was unsuccessful based solely on the evidence of the behavioral indicators. Given the fact that each of the methods used was modified to fit situations to which they had not previously been applied, the behavioral assessment indicators may not have been sensitive enough to register changes due to the implementation of the program. That is, the notion that the behavioral indicators may not have been able to accurately reflect changes due to the curriculum cannot be ruled out.

Student Achievement Testing

The results of the achievement testing were found to statistically support the notion that the Standard (i.e., Hypothesis One) and Modified (i.e., Hypothesis Two) curriculum programs were successful in increasing test performance. However, little support was provided which would indicate the relative superiority of the Modified curriculum as compared to the Standard curriculum during the Post curriculum phase (i.e., Hypothesis Three) or during Follow-up (i.e., Hypothesis Four). Only for the Fourth Grade was performance for the Modified groups superior to that of the Standard groups in both the Post and Follow-up curriculum phases.

This data may not be completely unequivocal and several points bear further discussion. Earlier versions of the Operation Waste Watch curriculum used a different set of test instruments. The evaluation by Galano, Nezlek, and Turnbull (1977) found the general psychometric properties of the test instruments to be poor. Specifically, the tests were too easy, had an inconsistent level of difficulty across tests, and were found to be low on alternate forms reliability. Based on this data, the present test instruments were lengthened and an attempt was made to increase the level of difficulty across all of the tests. Also, the same test form was used across the three assessment phases at the request of the Virginia Division of Litter Control (VDLC).

Although an examination of the psychometric properties of the test instruments is outside the scope of the present project, a brief discussion concerning the decision to use repeated administrations of

identical tests is necessary. Although using identical forms of each of the test instruments may have alleviated some of the problems concerning low alternate forms reliability in the earlier test versions, it may also have generated other problems. For example, the most obvious problem with using repeated administrations of the same test instrument is that students may become familiar with the test items. However, the tests were not administered in close temporal proximity, thus the memorization of items was not expected to be a problem. That is, posttesting followed pretesting by a period of five weeks and follow-up testing was provided three months after the second test administration. Also, teachers were advised not to give out test answers until administering the test for the last time.

An examination of the data in Figure 8 for the students serving as controls revealed that there were slight increases at each grade level during the Post curriculum phase followed in two of the groups (i.e., Grades One and Six) by a slight decrease at Follow-up. These changes were quite small and none were statistically significant. Hence, there was little evidence that simple repetition of the test instrument had any effect on student performance.

There is, however, another problem which must be considered when using identical test instruments. Although the wording was never exactly similar, the test questions were constructed from the actual curriculum materials. Therefore, students receiving the curriculum may have been able to remember pretest items when exposed to similar information in the instructional units. This may have resulted in posttest

and follow-up scores which reflect the memorization of answers to specific test questions rather than general knowledge in the area of litter control. Although this may be a problem, it was not considered to be severe because of attempts to avoid wording test questions directly from curriculum activities.

Conclusion. The results of the student achievement tests indicated substantial gains following the implementation of both curriculum programs. Yet no evidence was found that would indicate that students exposed to the Modified curriculum were superior in test performance when compared to those receiving the Standard program. Hence, overall the data from the achievement tests suggested that the curriculum program in general was able to increase and maintain student knowledge of the principles of waste management. Further study of the psychometric properties of the test instruments is strongly suggested. Although the First, Fourth, and Sixth grade tests were modified in line with the suggestions of the Galano et al. (1981) study, no attempt in the present evaluation was made to determine if these tests were in fact better constructed in terms of the stated deficiencies. For example, all the tests were lengthened and all items were reevaluated in terms of difficulty level; however, the effects of these changes was not specifically examined across the three different grade levels. Since the tests were extensively modified, further evaluation of the psychometric properties of these instruments is warranted.

Behavioral Assessment vs Achievement Testing

The results indicated support for Hypotheses One and Two only in the achievement testing. Although there were behavioral trends which were in line with the predictions, the data resulting from the behavioral assessments was not found to be statistically reliable. Hence, there is some evidence that both curriculum programs were effective in raising the level of student knowledge; yet there is little evidence that the programs had any real effect on student behavior.

The basic question which results from the present research is whether or not the OWW program was successful in raising the general level of student awareness in terms of the principles of solid waste management. If only the data from the more traditional pencil and paper assessments were considered, there would be little problem in stating that the program (i.e., both Standard and Modified) was successful. Yet we must deal with the fact that this success did not carry over to actual student behavior.

These findings are consistent with the past literature where several authors have had difficulty finding a direct relationship between what people say or indicate on questionnaires and what they subsequently do in terms of behavior (e.g., Bickman, 1972; Heberlein, Note 1; Robinson & Frisch, Note 3). For example, the subjects in Bickman's study knew that it was wrong to litter and believed that people could help by picking up litter whenever possible. Yet, few of these people actually picked up litter placed directly in their paths. In the Heberlein and Robinson and Frisch studies, subjects' attitudes about litter rarely corresponded with their actual littering behavior.

Indeed, there are many other authors in other areas of environmental protection which have found the same inconsistencies (e.g., Abelson, 1972; Ramsey & Rickson, 1976; Burrus-Bammel, 1978).

However, it is also quite possible that the program was effective and did lead to students changing their behavior in a positive direction but that the behavioral indices used were not accurate enough to reflect these changes. Indeed, there is some evidence to support this notion. For example, there was behavioral evidence in line with the current predictions, yet this evidence was not strong enough to be considered reliable. Perhaps with better constructed assessment tools, the curriculum would have been shown to change behavior. Further support for this idea was provided on the Teacher Evaluation Questionnaire. Here, many of the teachers indicated that they had observed changes in behavior following the curriculum program. Subsequent discussions with several of the teachers also revealed that changes in student behavior had been observed, however, few concrete examples could be provided.

Although there were problems with administering the behavioral assessments, it is doubtful that had real changes in student behavior occurred, all of the assessments would have failed to register that change. Hence, a viable alternative is that the program simply was not able to yield changes in actual behavior.

One of the major problems in the present evaluation (which will be discussed further in subsequent sections) is that the teachers were asked to fit the curriculum into extremely busy schedules. None of the teachers who participated indicated that they had easy schedules. The

results of this may have been that the teachers simply could not devote the adequate amount of time to the program. Indeed, the results (as shown in Table 28) indicated that many of the teachers failed to teach all of the cards and several spent only a minimal amount of time on the individual cards (as shown in Table 29). Therefore, although the basic ideas of the program may have been conveyed, the emphasis needed for these ideas to be translated into practice by the students may not have been provided. Perhaps all of the teachers could not spend the time needed to allow the students to incorporate the knowledge gained into their own lives. Most of the teachers were, however, quite enthusiastic and earnestly attempted to teach as much as possible of the curriculum. These efforts may have been enough to yield changes in student knowledge. Indeed, much of the curriculum material (e.g., the filmstrips and vocabulary items) that the teachers did consistently use were directly related to test items. Hence, successful test performance may have been possible even with severe reductions in the number of activity cards throughout the program. Failure to teach all of the core cards may have resulted in a lack of practice with the concepts most likely to result in behavioral changes. That is, the activity cards provided actual practice (i.e., behavior) with the concepts being presented. Hence, when the teachers cut back on the number of cards used and the time spent working with the remaining cards, the students may not have been able to incorporate the principles into actual behavior.

Conclusion. The present evaluation did not demonstrate that the OWW curriculum program had a beneficial effect on student behavior. There was, however, evidence that the program did result in changes in student knowledge of the principles of waste management. The literature has provided ample evidence that changes in knowledge and attitudes often do not always correlate with changes in behavior.

Although some of the failure for the lack of behavioral effects can be attributed to problems in the assessment tools, there were also problems with the implementation of the curriculum which may also account for the lack of results.

Standard vs Modified Curriculum

In general, only Hypotheses One and Two received statistical support in the present evaluation. That is, both the Standard (i.e., Hypothesis One) and Modified (i.e., Hypothesis Two) curriculum programs were effective in increasing student test performance. However, almost no evidence was found (in either the Behavioral Assessments or in the Student Achievement Tests) which would support the notion that the Modified curriculum would lead to higher levels of litter awareness during Posttesting (i.e., Hypothesis Three) or during Follow-up (i.e., Hypothesis Four).

This latter evidence bears further discussion. To modify the basic OWW curriculum, four of the cards at each grade level were modified to encourage students to: (1) think about the problem of litter in terms of behavior, (2) understand that behavior is controlled by antecedents and response consequences, and (3) understand how to use

these principles to act as behavioral change agents. There was virtually no evidence which would suggest that these modifications were effective in changing student behavior or their performance on the achievement tests.

The failure of the Modified curriculum to add to that information provided in the Standard curriculum program may have resulted from several problems. For example, the modifications may not have been extensive enough to influence the students. That is, only eight cards were modified at each grade level (except for the sixth grade level, where only four cards were changed). This may not have been enough to lead to changes in the various dependent variables over and above the changes which resulted from administration of the Standard curriculum. The Modified program required that students learn extra material in terms of the various behavioral principles. That is, in addition to learning the original litter control material, a student was also expected to pick up various behavioral techniques; yet they were given only a few basic examples. Hence, it might be expected that students would be better trained in terms of the basic OWW goals but not as well prepared to use the procedures of contingency management. Therefore, students may not have received enough behavioral background to yield superior results as compared to their Standard curriculum counterparts. Perhaps the use of behavioral principles must be incorporated into all of the cards before we will see differential results between the two programs.

Another possible problem with the Modified curriculum may have

resulted from the fact the teachers were not familiar with the behavioral techniques being provided to the students. Although the principles of contingency management were not difficult, the teachers may have been reluctant to encourage students to attempt to influence the behaviors of others. Indeed, one teacher stated to one of the collection team members that some of the cards seemed to encourage the children to "mind the business of others." Although there is no direct evidence that the teachers failed to present the modified materials, they may not have placed the same amount of emphasis on these activities as they did on the nonbehavioral cards. For example, teachers at each grade level were given extensive resources to apply toward teaching the rest of the package but almost no information pertaining to the behavioral components. Hence, any attempts to use behavioral techniques in designing future litter curriculum programs might also include informational materials for the teachers describing the procedures and their intended effects. Teachers fully aware of the type of procedures being used might be expected to be better able to present this material to their students.

The final problem may have resulted from the severe time restrictions that most teachers were forced to teach under throughout the evaluation. The OWW program for many of the teachers was simply one more extra project to be worked in among all of the other things which had to be accomplished during the year. Since the behavioral activities constituted only a small component of the student activities for each grade, time restrictions may have especially precluded an adequate

presentation of these activities. As indicated in the Teacher Evaluation Questionnaire, many of the teachers were severely limited in terms of teaching time. That is, with only limited time to dedicate to the whole program, the time devoted to any one activity was probably quite limited. Hence, the relatively few behavior items might have received limited attention in relation to the other OWW activities. Again, an increase in the number of behavioral cards may eliminate this type of problem.

Conculsion. The failure of the Modified curriculum to lead to superior results as compared to the Standard curriculum is not so surprising in retrospect, given the amount of problems encountered. Of major importance was the fact that only a few items were modified in the basic OWW curriculum unit. Hence, students may not have acquired an adequate grasp of the various behavioral principles. Future attempts to use a litter control curriculum based on the principles of contingency management should attempt to incorporate these principles throughout the curriculum material. Also, attempts should be made to ensure that the participating teachers are given an adequate background to teach the materials.

Teacher Assessment

Teacher assessment was provided by the Litter Analysis Questionnaire (LAQ). The LAQ was used to assess the teachers' sensitivity to the overall problem of litter and the degree to which litter was a problem for their students. The LAQ was used primarily to answer questions concerning Hypotheses Five through Eight. That is, it was

expected that because the teachers were required to actively participate in the OWW curriculum program, that their attitudes, knowledge, and opinions about litter might also change following curriculum exposure.

Responses to LAQ items were transformed into Z scores and subjected to factor analysis. Five factors were retained after rotation. Three of these factors (i.e., Factors 1, 3, and 5) reflected teachers' sensitivity to various litter related issues. A separate analysis of variance on the scores for each factor failed to show statistical support for Hypotheses Five and Six.

Factor 2 concerned the teachers' opinions of whether or not the problem of litter could be solved, whereas Factor 4 contained items that measured teacher perceptions of student littering behavior. Separate analysis of variances on the scores in each of these factors again revealed no significant support for Hypotheses Five and Six.

Subsequent discussion with the teachers following the final administration of the LAQ revealed several procedural problems. The same form of the LAQ was provided to each teacher three times during the evaluation (i.e., during the Pre-test phase, five weeks later during the Posttest phase, and three months later during Follow-up). Many of the teachers complained about this procedure. For example, most teachers were quite aware that they had taken the same test on earlier occasions. This fact often resulted in confusion and on some occasions, animosity. That is, the teachers often stated that they had given a great deal of time to answering the first LAQ and were

quite familiar with what their responses were when taking it a second and third time. Several stated that they knew that they had responded in a similar manner because they had recorded their earlier answers. Indeed, one teacher had made a photocopy of the first LAQ test instrument and used it to fill out the second and third instruments. Another teacher stated that it was repetitious to continue filling out the same test instrument, whereas another stated that the repetition "insulted his dignity as a professional educator."

Additional problems arose from schools where more than one teacher was involved. In at least two cases (i.e., Back Creek and Pembroke) teachers within a school collaborated in filling out the LAQ. In both cases the teachers were from different grades and different treatment groups. In subsequent interviews with other teachers, it became clear that many of the teachers within schools knew how other target teachers were responding to certain LAQ items. Indeed, at several schools the LAQ was the topic of much "lunch hour" debate. The problem stemming from this collaboration was that it may have confounded the effects due to grade and curriculum condition, thus making the results almost impossible to interpret.

Conclusion. The lack of results from the LAQ administration were not surprising in retrospect, given the type of problems encountered. Future use of an assessment procedure similar to the LAQ should be set up around alternate forms. The time intervals involved were simply too short (at least between the first and second administration) for the teachers to have forgotten the responses to earlier tests.

Additional test items examining the same concepts would have possibly alleviated some of the problems encountered in the present study.

Teachers resented having to spend valuable time reanswering the same set of questions. Although this point is largely academic, unless the present evaluation design is replicated, one way to get around these problems would be to tell the teachers that the LAQ would occur in three sections to be given during the three separate evaluation phases. This, along with the use of alternate test forms, would better ensure that each test instrument was treated by the teachers with the same amount of concern.

Teachers should also be warned against collaboration with other target teachers eithin the same school. One way to ensure this would be by administering different test forms to different teachers within the same school.

Teacher Evaluation

The Teacher Evaluation Questionnaire (TEQ) was administered to all teachers who were provided a curriculum package. The TEQ was used in its original form and was not intended to serve as a major dependent variable in the present evaluation. The intention of this instrument was to supply supplemental teacher feedback to the Virginia Division of Litter Control in regards to the usefulness of the OWW materials, the difficulty and meaningfulness of the activities, and the degree of student mastery of the different curriculum objectives.

No procedural problems were encountered in administering the TEQ to teachers. Subsequent discussions with teachers revealed that the

TEQ was regarded as relevant and necessary. Indeed, most of the teachers took the completion of the TEQ quite seriously and spent a good deal of time reviewing the materials and providing feedback. One teacher again, however, indicated that the task of reviewing the OWW materials was below his "professional dignity."

A review of the findings for Section I, which dealt with teacher attitudes concerning the problem of litter, showed that the teachers were quite convinced that litter was a problem. Also, the teachers felt that litter control was an area which should be taught in public schools. Hence, teacher reaction to the need for the program was quite positive across each of the three grades.

The questions in Section II examined the usefulness of the materials, their level of difficulty, and the degree of student mastery of the materials. In summary, across all three grades, the teachers were convinced that the curriculum materials were well targeted and meaningful to the students. Few of the teachers were concerned with the level of difficulty of the materials. That is, most teachers felt that the curriculum was designed to fit the needs of their students and was not too easy or too difficult. In addition, the teachers believed that most of their students were able to master the program objectives. At each grade level, some teachers had students who could not grasp various concepts, yet these students were not typical of the whole class. Hence, in the opinion of the teachers, the overall curriculum appeared to be well designed and to provide information at a level appropriate to each age group.

In Section II, teachers were also asked to indicate if the OWW materials were redundant to materials already being provided in the public school program at each grade level. Many of the teachers were undecided on this question. Only teachers at the first and sixth grade level gave some indication that the materials were unique.

Although it is outside the scope of the present project to fully evaluate the TEQ, this latter question deserves review. That is, Item 7, which deals with whether or not the teachers believed the materials to present information different from information already available to the students, could be greatly expanded. Given the variety of anti-litter information provided in the OWW material, a single item based on a five-point rating scale may not have allowed the teachers to adequately respond to this question. Also, Item 7 allowed no room for teacher comments. Hence, modification of this item is recommended. For example, the question could be set up in such a way that the teachers could list the different curriculum components which are covered in other school teaching units. Also, it should be possible for the teachers to indicate how the redundant material is being provided in the existing school curriculum.

Section III was designed to allow the teachers to subjectively assess the impact of the program on the students as well as the students' interest in the program materials. Almost all of the teachers indicated that the program materials were interesting to the students. Many of the teachers also believed that student behavior actually changed following the program. That is, for Item 15, on the average,

about 50% of the teachers detected a change in student littering behavior.

Given the current failure of the behavioral assessments to accurately detect such changes in student activities, it would be quite interesting to know exactly what behaviors the teachers were monitoring. However, Item 15 was based on a simple five-point rating scale and provided no space for teacher comments. Therefore, there was no information as to how the teachers determined behavior change. Therefore, it is suggested that this item be redesigned to allow the teachers to provide detailed examples of behavioral change, rather than simply designating that a change took place. As the question stands, we have no way of knowing if the teachers simply thought behaviors changed or were able to document actual examples of student change.

In Section IV, an examination of the teachers' opinions of the curriculum materials was provided. Most of the teachers felt that the program instructions were easily understood and easily administered. Few of the teachers had any troubles assembling the needed materials and almost all of the teachers taught the program without outside help or assistance. Many of the teachers were, however, quite resourceful in organizing additional teaching aids such as games and quizzes, as well as in obtaining additional audio visual material such as films and film cassettes. Also, although it was not assessed directly by the TEQ, many of the teachers (as indicated by their comments) displayed a great deal of enthusiasm in assembling and using the various materials.

Section V provided a detailed examination of the Individual Activity Cards (IACs). Because the Modified and Standard program differed in terms of the activity cards, each was reviewed separately. Overall, the IACs were viewed quite positively by teachers in the two groups. Negative comments were not consistent across the two groups. That is, teachers in the two groups seldom indicated the same activities as being problematic. Hence, few consistent patterns emerged which would categorize the two different curriculum groups.

In the Modified groups only one card (i.e., Card 8 in the Grade Six curriculum) was indicated as being a problem. All other cards were rated as being acceptable. It is important to note that the card which received a negative review was administered by an individual who was extremely antagonistic to the program and who provided only negative criticisms throughout the TEQ to almost all of the items.

In general, the IACs which were viewed negatively were activities that the teachers found difficult to accomplish in a classroom setting or which failed to capture the interest of the particular group of students. For example, two of the items (i.e., Cards 2 and 3, Grade One, Standard curriculum) required the students to bring in magazine cutouts of litter. Several students in one of the classes had problems in that these materials were not available in their home environment. Indeed, the class in question was in a very rural, low-income area of Giles County. Hence, it might be important to examine activities with this in mind. These particular items could be easily restructured so that the teachers could provide magazines for student use.

A more general problem found in Section V was that many of the teachers failed to rate or comment on cards they did not use. Therefore, the evidence in this section which was largely positive may have been biased because teachers failed to provide information on cards they did not use. In the future, efforts should be made to encourage teachers to state the reasons for deleting a particular activity.

In Section VI, teachers were asked to assess the various Classroom Activity Cards (CACs). Again, the reviews by teachers in the Modified and Standard groups were treated separately. In general, both groups felt the activities were helpful to their classes and as with the IACs, few consistent patterns emerged in terms of negatively rated items.

One major problem in this section was that many teachers failed to use all of the CACs. Again, teachers often did not rate or comment on items which were deleted. For example, in the sixth grade groups receiving the Modified curriculum, none of the teachers provided ratings or comments on any of the activities.

Across the two groups several specific problems were encountered. Several teachers indicated that items requiring outside activity caused particular problems. For example, several cards (e.g., Cards 2 and 3 in the Grade Four, Standard curriculum and Card 11 in the Grade Four, Modified curriculum) required the students to involve their families. Three teachers indicated that they were reluctant to intrude into the children's home environment or to ask the children to participate in activities involving other family members. Hence, these items may require modification especially for rural locations in that each of

the complaining teachers were from Giles County schools. Other items were given low rating because they were uninteresting (i.e., Card 2, Grade One, Standard curriculum) or because they required materials unavailable to the teacher (i.e., Cards 9, 10, and 11, Grade Four Standard curriculum).

In regards to the curriculum in general, several additional comments were provided by the teachers. Several teachers expressed the concern that the curriculum program was too long and that it should be incorporated into existing school programs. Indeed, a large percentage of the teachers were found reluctant to reteach the curriculum program.

Conclusion. Across all of the teachers who taught the various OWW material, it is apparent that most were enthusiastic about the program and attempted to teach the material as well as possible. However, it is also apparent that the teachers were attempting to shorten the workload by dropping student activities whenever possible. This latter point is interesting in light of the fact that all teachers were instructed to teach all of the activities on several occasions as part of the regular teacher briefings.

Hence, there was considerable evidence from the teachers that the program was overly involved and lengthy. It is, of course, possible that the workload on teachers in these two counties was unusually high. However, subsequent discussions with school administrators revealed that schools in these areas were not atypical in terms of workload for the teachers.

This later information is important. A real problem for the OWW

program is that teachers will be simply too busy to implement the materials without incorporating the package into existing curriculum programs. Repeated statements requesting such an incorporation were heard from the teachers and school officials. Regardless of how well the program is designed, it will not be effective if it is not taught. Hence, attempts to shorten the program should be undertaken. Further study of existing public educational units should also be undertaken in order to better fit the OWW materials to existing curriculum.

A second problem that may result from the length of the program is that it could cause overt hostility from teachers who are given administrative mandates to teach the program. Such a result is consistent with the theory of psychological reactance (Brehm, 1966; 1972) which states that people who experience a loss in personal freedom will act to regain their lost sense of freedom. Often this results in deviant behavior. Therefore, if teachers are forced to teach a program which is burdensome to their schedule, they may react with hostility and belligerence to the OWW curriculum. The result is a poorly taught program with little gain in student awareness.

Summary. Overall, the Operation Waste Watch (OWW) curriculum program was found to significantly improve only student achievement test performance. Little evidence was found that would suggest that the curriculum material had any reliable effect on actual student behavior as measured by the present assessment devices. In addition, the effects of the modified curriculum program were not found to be significantly discernible from those stemming from exposure to the original

curriculum material.

This evidence, when taken in consideration along with the information provided by evaluation of the participating teachers, would seem to suggest that the OWW program as a whole may not have been universal effective. That is, given the severe time constraints of the teachers and their consistent requests that the materials be shortened and incorporated into ongoing school programs, one must seriously question the overall utility of a program that demonstrates little success in terms of changing student behavior. Therefore, considering the commitment of the VDLC to provide a curriculum effective in terms of real behavioral change, the curriculum materials as presently constructed may not meet this goal without attempts to shorten the various units. Hence, it is suggested that the program be redesigned in light of these findings prior to being implemented on a large scale.

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APPENDIX A
LETTERS OF PERMISSION

OFFICE OF THE PRINCIPAL

Back Creek Elementary School

R. F. D. No. 7, Box 313
ROANOKE, VIRGINIA 24018

July 23, 1980

John G. Cope
Dept. of Psychology
Va. Tech.
Blacksburg, Va.

Dear Mr. Cope,

I am hereby granting you permission to carry out research through the litter control project in grades 1 & 4 at Back Creek School during the academic year 1980-81. It is understood that the project will only be initiated after the teachers in these grades agree to participate.

It is my understanding that we may stop participation in this project at any time.

Sincerely,

Douglas L. Kingery,
Principal



Phone
Office of The Principal

BURLINGTON SCHOOL

6533 Peters Creek Road
Roanoke, Virginia 24019

July 17, 1980

Mr. John G. Cope
Department of Psychology
VPI
Blacksburg, Virginia 24061

Dear Mr. Cope:

Burlington School wishes to participate in the evaluation project for the Virginia Division of Litter Control, contingent upon receiving acceptance of the program from the teachers who would be involved.

Our teachers will arrive in our school on August 18, at which time this project will be discussed with them.

Sincerely,

C. V. Crush
Principal

CONEHURST SCHOOL

1813 E. MAIN STREET
SALEM, VIRGINIA 24153

October 17, 1980

John G. Cope
Virginia Polytechnic Institute
and State University
Department of Psychology
Blacksburg, Virginia 24061

Dear Mr. Cope:

Mrs. Boham, Mrs. Tarpley, and Mr. Kessler have consented to participate in the OWW program for Conehurst School.

Sincerely,

George A. Gearhart
Principal

gs

East Salem Elementary School

1765 BOULEVARD
SALEM, VIRGINIA 24153

Office of the Principal

July 3, 1980

TO WHOM IT MAY CONCERN:

We give permission for John Cope and his research team to implement "Operation Waste Watch" into the school program for the 1980-81 year.

James S. Kelley, Jr. Principal

East Vinton Elementary

1002 RUDELL ROAD

VINTON, VIRGINIA 24179



OFFICE OF
THE PRINCIPAL

July 2, 1980

Mr. John G. Cope
Department of Psychology
Va. Tech.
Blacksburg, Virginia 24016

Dear Mr. Cope:

Thank you for your time in explaining the Litter Control Program to me. You have my permission to conduct a portion of your pilot program at East Vinton. We will select a first grade class and a fourth grade class for your work, and you are welcome to bring materials to them and secure results from them as needed.

I understand that this administration will have complete control of the program and will have the option of dropping the study if conditions warrant such action.

Thank you for including us as a part of your study.

Very truly yours,

Robert L. Kight

RLK/bd

Glen Cove Elementary School

5901 COVE ROAD
ROANOKE, VIRGINIA 24019

Office of the Principal

June 30, 1980

Mr. John G. Cope
Department of Psychology
Va. Tech.
Blacksburg, Virginia 24061

Dear Mr. Cope

I should like to acknowledge that three staff members at Glen Cove Elementary School in grades one, four, and six have consented to use the Operation Waste Watch project. I shall be awaiting the materials and further instructions for developing the project.

Thank you for providing this opportunity for our students and staff.

Sincerely,

L. Berkley Lucas
Principal

Hardy Road Elementary School

1200 HARDY ROAD

VINTON, VIRGINIA 24179

OFFICE OF
THE PRINCIPAL

July 21, 1980

Mr. John G. Cope
Virginia Polytechnic Institute and
State University
Department of Psychology
Blacksburg, Virginia 24061

Dear Mr. Cope:

This is to notify you that Hardy Road School will participate in "Operation Waste Watch" in our first and fourth grades.

We look forward to working with you in the fall and feel that "Waste Watch" will prove to be a valuable experience for our children.

Sincerely,

(Mrs.) Lorraine S. Lange
Assistant Principal

/eh

"A Child-Centered School"

Mason's Cove Elementary School

ROUTE 4 . BOX 328
SALEM, VIRGINIA 24153
PHONE 389-9301

September 10, 1980

Mr. Terry Conrad
Assistant to
Mr. John G. Cope
Virginia Tech
Department of Psychology
Blacksburg, Virginia 24061

Dear Sir:

Permission has been granted to Mr. John G. Cope and his research team to implement Operation Waste Watch at Mason's Cove Elementary School for the year, 1980-81. The following teachers will implement this program in our school; Miss Cindy Neighbors and Mrs. Evelene Long.

Hopefully, this type of program will be educational and informative to our staff and student body. We eagerly await further data concerning the program.

Sincerely,

Steve L. Lonker
Principal

SLL:jm

Oak Grove School

5005 Grandin Road Ext.

Roanoke, Virginia 24018

July 17, 1980

John G. Cope
Virginia Polytechnic Institute & State University
Department of Psychology
Blacksburg, Virginia 24061

To whom it may concern:

This letter gives permission for Oak Grove School, Roanoke, Virginia, to participate in the Litter Awareness Program being sponsored by Virginia Polytechnic Institute & State University.

George O. Thompson
Principal

Henn Forest Elementary School

6328 MERRIMAN ROAD. S. W.
ROANOKE, VIRGINIA 24018

MRS. PATRICIA A. SALES
PRINCIPAL

July 15, 1980

Mr. John Cope
Department of Psychology
VPI and S.U.
Blacksburg, VA 24061

Dear Mr. Cope:

This letter will confirm our phone conversation concerning the program of Waste Watch. The first and fourth grades would like to participate in the program to be conducted during the 1980-81 school year.

We will look forward to working with you on this worthwhile project.

Sincerely,

Patricia A. Sales
Principal

West Salem Elementary School
520 North Bruffey Street
Salem, Virginia 24153
July 9, 1980

To whom it may concern:

This is to inform you that Mr. John G. Cope has my permission to conduct the evaluation project for the Virginia Division of Litter Control, Operation Waste Watch, in West Salem Elementary School during the fall of 1980.

The three teachers who will be expected to participate in the study have not been contacted at this date.

Sincerely,

William O. Brubeck, Principal
West Salem Elementary School

William Byrd Intermediate School

Highland Avenue
Vinton, Virginia 24179

August 20, 1980

Mr. John J. Cope
Virginia Tech
Department of Psychology
Blacksburg, Virginia 24061

Dear Mr. Cope:

Mrs. Mae C. Edwards, self contained sixth grade teacher at William Byrd Junior High School, has volunteered to do the program Operation Waste Watch at this school during the 1980-81 session.

Sincerely yours,

C. Ray Wells
Principal

CRW/ph

Giles County Public Schools

Harold Absher, Jr.
Division Superintendent
ROUTE 1, BOX 86
PEARISBURG, VIRGINIA 24134
July 17, 1980

Mr. John G. Cope
5100 Derring Hall
VPI & SU
Blacksburg, Virginia 24061

Dear John,

This is to confirm our telephone conversation of July 16, 1980 in which Giles County Public Schools agreed to participate in Operation Waste Watch during the 1980-81 school session.

It is agreed that we would participate as described in our previous conversations and in accord with the program manual.

It is further understood that we would reserve the right to discontinue our participation if unforeseen problems arise.

We look forward to working with you in this important and badly needed endeavor.

Sincerely,

Robert L. Dunn
Assistant Superintendent for Instruction

RLD:bd

Enclosure

RETURN ADDRESS

JOHN G. COPE
DEPT. OF PSYCHOLOGY
VA. TECH.
BLACKSBURG, VA. 24061

*Permission granted to work in
little context program.*

OFFICE OF DIVISION SUPERINTENDENT
ROANOKE COUNTY SCHOOLS
ARNOLD R. BURTON, SUPERINTENDENT
526 SOUTH COLLEGE AVENUE
SALEM, VIRGINIA 24153

June 2, 1980

Mr. John G. Cope
Virginia Polytechnic Institute and
State University
Department of Psychology
Blacksburg, Virginia 24061

Dear Mr. Cope:

Following our conversation this morning by telephone, I am giving you permission to contact our elementary principals and certain junior high principals to discuss the upcoming evaluation project for the Virginia Division of Litter Control.

I understand you will need twenty-four target schools; eight of which will be utilized for first-grade classes, eight for fourth-grade classes, and eight for sixth-grade classes, respectively.

As I indicated to you by telephone, each principal will decide whether his/her school will participate or not participate.

I am enclosing guidelines used in Roanoke County/Salem City Public Schools concerning research conducted in the school division. I trust you will review these guidelines carefully before contacting the principals.

Please let me know if I can be of further assistance.

Sincerely,

Theodore J. Viars
Assistant Superintendent
Instruction

bgh
Enclosure

c: Elementary Principals
Junior High Principals (with Grade 6)
Mr. Aubrey R. Vaughan, Director of Elementary Education
Mr. Bayes E. Wilson, Assistant Superintendent - Business & Finance

APPENDIX B
VIRGINIA DIVISION OF LITTER CONTROL
LETTER OF INTRODUCTION



June 23, 1980

Dear

We would like to introduce you to Mr. John G. Cope, a Graduate Assistant of Dr. Scott Geller of Virginia Tech. John is working closely with Clean Valley Committee and the Virginia Division of Litter Control to reduce littering in the Roanoke Valley as well as throughout the Commonwealth.

We are certain that John's work will be invaluable in solving the pervasive problem of litter. Should you have further questions about our program, please call Lew Phelps at 981-4941 or Sherry Wilkinson at

Sincerely,

Lewis M. Phelps
President

Sharon P. Wilkinson
Executive Coordinator

APPENDIX C
OPERATION WASTE WATCH
(FIRST, FOURTH, AND SIXTH GRADE ONLY) CURRICULUM

OPERATION WASTE WATCH

LEVEL 1

WASTE OUT OF PLACE

Based on WASTE IN PLACE, the Solid Waste Management Curriculum for
Kindergarten through Grade Six by Keep America Beautiful

DEVELOPED BY

VIRGINIA DIVISION OF LITTER CONTROL
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
1116 WASHINGTON BUILDING
RICHMOND, VIRGINIA 23219

1980

INTRODUCTION

OPERATION WASTE WATCH is a series of seven sequential learning units which address the subjects of litter control and solid waste management. The curriculum, developed by the Division of Litter Control, Virginia's state litter prevention agency, is designed for classroom use in kindergarten through grade six.

Each OPERATION WASTE WATCH unit may be used in a variety of ways, depending on the needs and schedules of individual students and schools. Each unit is interdisciplinary in approach and may be incorporated into the various science, social studies, and health curricula Virginia teachers are presently using. Language arts, mathematics, and artistic activities are also highlighted. Each unit consists of a teacher's guide, filmstrip-cassette set, activity cards for class and individual student use, test materials, coloring book duplicating masters or comic books, and a colorful poster. Each elementary school in Virginia may receive two complete sets of OPERATION WASTE WATCH without cost.

Flexibility is a key element of the OPERATION WASTE WATCH program. The sequence of the units within the curriculum may be changed to suit the abilities of students in the individual school. For this reason, teachers should become familiar with each of the units. Each instructor should also feel free to present concepts found in previous units. This is especially important for upper elementary students who are unfamiliar with the solid waste vocabulary and ideas presented in earlier units. The materials in each unit are color-coded for easy identification.

Flexibility is also a component within each individual unit. The teacher is free to shorten or lengthen the series of activity cards which are the heart of the unit, to suit her/his schedule or to build her/his own unit around the OPERATION WASTE WATCH auxiliary materials.

OPERATION WASTE WATCH is based on WASTE IN PLACE, the elementary school curriculum recently created by Keep America Beautiful. Solid waste management has become a very important environmental topic, but it is a subject which is too often superficially addressed in elementary textbooks. WASTE IN PLACE was the first sequential elementary curriculum in the United States to address the concepts of proper waste handling. WASTE IN PLACE is available at cost to all localities around the country organized under the Clean Community System of Keep America Beautiful and to other interested groups. In developing OPERATION WASTE WATCH for Virginia's elementary schools, the Division of Litter Control changed the format of WASTE IN PLACE and designed supplementary activities and materials, including audiovisual aids.

OPERATION WASTE WATCH differs significantly from WASTE IN PLACE in its approach to the subject matter only in Levels 2 and 3. The Division believes that the ideas presented in these two units merit special

emphasis in a study of solid waste problems in Virginia. Level 2, LITTER POLLUTION, addresses pollution problems associated with litter, while Level 3, TRASH TRENDS, examines packaging trends in relationship to current solid waste problems.

FIELD TESTING

Two versions of OPERATION WASTE WATCH were piloted during the 1979-1980 school year in over 220 classrooms in 14 school systems with very positive results. A summary of the results of this field testing is available from the Division. Based on the results of the piloting, portions of the draft curriculum were revised in the Fall of 1980.

CHANGING ATTITUDES AND BEHAVIOR

In addition to equipping students with important facts about litter and solid waste management, OPERATION WASTE WATCH is designed to help students modify their everyday waste disposal habits.

As this guide goes to print, a study of students' attitudes and littering behaviors is being conducted by psychologists at Virginia Tech. The researchers, Mr. John Cope and Dr. Scott Geller are attempting to pinpoint the methods for teaching OPERATION WASTE WATCH which will be most successful in changing littering behavior. A pamphlet describing techniques for changing student behavior will be published as a supplement to OPERATION WASTE WATCH when the research is completed in 1981.

THE VIRGINIA PLAN TO REDUCE LITTERING

The DIVISION OF LITTER CONTROL was established in 1977 to control, prevent, and eliminate litter from the state to the maximum practical extent.

One-half of Division funds are granted annually to the localities of the state to finance local litter prevention programs. In 1979, 94% of the counties and cities applied for and received grant money from the Division. To assist these localities in organizing effective, comprehensive, long-range litter control programs, the Division had developed an organizational package, THE VIRGINIA PLAN TO REDUCE LITTERING, which is available to all community leaders interested in developing local programs. OPERATION WASTE WATCH is one component of the VIRGINIA PLAN.

The Division is encouraging local litter prevention coordinators to work closely with schools in each locality. Many localities are promoting the implementation of OPERATION WASTE WATCH in their schools.

CONTACT THE DIVISION OF LITTER CONTROL FOR THE NAME AND PHONE NUMBER OF THE LITTER CONTROL COORDINATOR IN YOUR LOCALITY.

OPERATION WASTE WATCH UNIT TOPICS

- Kindergarten Level Natural and Man-Made Objects
Students practice classification skills and learn to differentiate between natural and man-made objects in indoor and outdoor environments. They also learn to identify litter.
- Level 1 Waste Out of Place
Students classify objects into two categories, "waste objects" and "useful objects." In addition, they learn to identify litter and dispose of their own waste items properly.
- Level 2 Litter Pollution
Students study the negative effects of littering: injury to humans and animals, environmental pollution, and wasted resources. In addition, they explore a littered area, study the characteristics of litter, and learn how to clean it up.
- Level 3 Trash Trends
Students trace historical changes in consumption and packaging. They also study the roles of packaging in everyday life and learn the meaning of "biodegradable."
- Level 4 Let's Waste Less Waste
Students examine changes which can be made in their homes to reduce solid waste and litter. They also explore various sources of litter in their communities.
- Level 5 Trash Treasures
Students discover that while many things are recycled by nature, quite a number of modern products must be recycled by people. They learn that recycling and resource recovery can help save important resources which are often lost when items are tossed into a trash receptacle.
- Level 6 Community Solutions for Solid Waste Management
Student study their own locality's solid waste problems and design a model waste disposal plan for an imaginary community.

ACKNOWLEDGEMENTS

Through the diligence and creativity of numerous individuals, the Division of Litter Control has produced a unique instructional program for the teachers and, most importantly, for the children of Virginia. Our wholehearted appreciation is extended to each individual and firm which helped make OPERATION WASTE WATCH a reality.

Our thanks go first to Drs. Edwin White and William Brown who wrote the original draft and developed our activity card format.

Lawler Ballard Advertising of Richmond and Norfolk produced the comic and coloring books, the posters, and all of the artwork for the kits. We feel that the art alone will heighten the "litter awareness" of many students and teachers. We wish to thank especially Rich Terrell, Joel Jamison, and Diasey Sanders of Lawler Ballard Advertising for their creative contributions. J. P. Bell Company of Lynchburg printed all the kit items in final form, from boxes to comic books. Jon Peterson and Saul Wren of the Film Production Service, State Department of Education, produced our colorful filmstrips, while Alpha Audio of Richmond created the high-quality cassettes.

Several professional educators contributed their talents in evaluating the project. Teresa Myer and Michal Bentley of the State Department of Education provided expert critiques. Drs. Allen Turnbull, John Nezlek, and Joseph Galano of Williamsburg conducted the formal analysis of our field-testing. Dr. Richard Mercer of Richmond edited the pilot manuscript.

We also wish to thank Outdoor Biological Instructional Strategies, (OBIS) of the University of California for permission to use the Recycling Game in the Level 5 Unit. And we thank the Phoenix Quarterly for granting permission to use two articles in the Level 5 unit.

My personal thanks go to several fellow members of the Division of Litter Control staff who contributed many hours and their "litter expertise" to the effort: Ginger Raymond who assisted in all aspects of production; Janet Wynne, Crystal Belt, and Mollie Osborne who typed the manuscript; and our Commissioner, Robert W. Slocum, who made it all possible.

Finally, we wish to recognize and thank all those individuals who participated in the field testing of OPERATION WASTE WATCH: the local coordinators, principals, and above all, the teachers who provided invaluable suggestions for refining the program.

The following local school systems were involved in this pilot program: Accomac County, Albermarle County, Arlington County, Colonial Heights, Fairfax County, Franklin County, Hanover County, Henry County,

Lynchburg, Martinsville, Nelson County, Northampton County, Roanoke, and Virginia Beach.

The enthusiasm of students and teachers who field-tested OPERATION WASTE WATCH reinforces our conviction that the curriculum will provide an exciting and important program of study for the children of Virginia.

JAN ROBERTSON
Director of Education and
Program Coordinator, 1980

LEVEL 1

RATIONALE—This series of instructional materials, developed by the Division of Litter Control, is designed to help elementary students deal effectively with solid waste problems encountered in their everyday lives. It will also prepare them to deal as adults with the growing problem of waste disposal facing each community. In Virginia, litter pickup alone is estimated to cost \$25 million annually.

Litter is a very accessible pollutant and one even young children can comprehend. Children may be able to do very little to solve other environmental problems; but they can learn to dispose of waste properly, help to recycle some items, and come to understand how their own behavior affects the environment. A litter prevention unit is an excellent place to begin creating environmental awareness. From this point, we can begin building a strong sense of environmental stewardship and pride in our youth.

The materials, activities, and instructional resources selected for the first grade students introduce the ideas that natural and man-made objects have uses in our world, and that the objects which are not useful are classified as waste objects. The unit emphasizes the development of scientific observation and classification skills essential to the ultimate goal of preparing young citizens to make rational decisions about personal and community solid waste disposal. This program follows objectives established in Program Goals and Objectives for Elementary Science, developed by the Virginia Department of Education in 1978.

If your students have not studied the kindergarten unit of OPERATION WASTE WATCH, feel free to borrow ideas, activities, and the film-strip/cassette set from the kindergarten kit to prepare your students for the Level 1 ideas.

MAJOR IDEAS OF THE LEVEL 1 UNIT

1. Natural and man-made objects have uses in our world.
2. Objects in our environment can be classified into useful and waste objects.
3. Litter is man-made or man-used solid waste objects which have been put in the wrong place through the actions of people.
4. People are responsible for disposing of waste properly.

OBJECTIVES

At the completion of this unit, the student will be able to:

1. CLASSIFY a set of objects into useful and waste subgroups;
2. IDENTIFY objects which are litter;
3. RECOGNIZE that people cause litter;
4. RECOGNIZE that littering is improper behavior.
5. RECOGNIZE that waste objects belong in a waste receptable or litter bag;
6. PREDICT whether an object will change shape or form.

ELEMENTARY SCIENCE PROGRAM OBJECTIVES

The following program objectives should be emphasized in Level 1 science programs throughout Virginia and are incorporated into this unit (see reference 1, p. 8):

1. Observing—the student will use all senses to identify objects,

their properties and changes in those properties; and he/she will make controlled observations and practice ordering a series of observations.

2. Classifying—the student will classify objects, actions, and phenomena.
3. Summarizing—the student will describe orally, in writing, or nonverbally, conclusions about the processes and products of scientific inquiry.
4. Valuing Scientific Inquiry—the student will participate in science activities, accept evidence gathered through scientific methods, and value critical thinking.

INSTRUCTIONAL STRATEGY

1. Review this teacher's guide and study all unit components thoroughly. The activity cards are the heart of the unit. Also become familiar with the other OPERATION WASTE WATCH units. PHOTOCOPIES OF THE UNITS K-6 ARE AVAILABLE WITHOUT CHARGE FROM THE DIVISION TO INDIVIDUAL TEACHERS.
2. Decide which elements of the unit kit and which activity cards you will use. Add your own ideas as necessary or pull activities from OPERATION WASTE WATCH UNITS on other grade levels.
3. Prepare all necessary materials and arrange for any outside speakers or field trips.
4. Be sure to find out what your community is doing to fight the littering problem. Contact the Division of Litter Control or your local government.

5. Administer the pretest to your students, use the results to modify your unit plans as necessary.
6. Briefly discuss the topic and title of the unit with your class. Tell the students about some of the activities they will be involved in. Review with them the ideas of natural and man-made objects found in the kindergarten level unit.
7. Explain the contents of the unit kit to your students.
8. Hang the poster in a prominent spot in your classroom.
9. Present the filmstrip to the class. During the showing, elicit discussion of important ideas.
10. Order the Junior Ecology Club Certificates from the Division.
11. Proceed with the INDIVIDUAL AND CLASS ACTIVITY CARDS.
12. Present the coloring books at some appropriate point in the unit. Use these as motivational and teaching tools.
13. At the completion of the unit, present the filmstrip once again as a review activity. Elicit discussion of ideas the children have learned.
14. Administer the posttest to your students.
15. Return all unit components to the box for use by the next class.
16. Be sure to review and reinforce proper waste disposal habits throughout the school year!

TIME FRAME

The complete Level 1 unit will take approximately 25 learning periods (about 5 weeks) to complete. On the average, allow 20-30 minutes

per learning period.

If you desire to teach a shortened version of the unit, we recommend you use just the CORE ACTIVITY CARDS. The CORE ACTIVITY CARDS for each level are marked (CORE) in the upper left-hand corners. Using just the core activities should cut the required instructional time to two or three weeks. Another method is to use the activity cards and other materials as guidelines for developing your own shortened unit. The activities in the kindergarten unit should also prove helpful in this regard.

Allow approximately 20 minutes for administering the tests at the beginning and end of the unit. Each filmstrip viewing should take less than 10 minutes. The INDIVIDUAL ACTIVITY CARDS will take about 5 hours of instruction time, as will the CLASS ACTIVITY CARDS. The coloring books will take approximately 40 minutes of instruction time to complete.

EVALUATION INSTRUMENTS

In the inside cover packet of the unit box, you will find directions for administering short tests to your students. The pretest results should tell you which students are already familiar with the major ideas of the unit and which students may need special help grasping these ideas.

The posttest results will help you determine the effectiveness of your unit.

FILMSTRIP AND CASSETTE

The filmstrip and cassette set provided with this unit is designed for use as both an introductory and review activity. This teacher's

guide contains a copy of the filmstrip script with asterisks (*) indicating spots in the program where we encourage you to stop the cassette and filmstrip to allow for class discussion. The cassette has audible tones and should be used with a manually-operated filmstrip projector. The filmstrip is brief and is to be used as a teaching tool. During the showing, please stop the projector and cassette as necessary to encourage group discussion of the ideas presented.

You may wish to present the ideas from the kindergarten level unit of natural and man-made objects before showing the filmstrip. Before using the ACTIVITY CARDS, present the Level 1 filmstrip to the class as an introduction to the unit. This may be done in small groups or as a total class activity. Present the filmstrip again at the end of the unit as a review of major ideas.

INDIVIDUAL ACTIVITY CARDS (IACs)

The 18 IACs are designed for small groups or individual students. They can be handed out by the teacher, or learning centers can be set up using the IACs as the foundation. For many classes of young children, the IACs may have to be combined with the CLASS ACTIVITY CARDS (CACs) and used as a lesson plan for total class activities. We encourage the teacher to modify, delete, and create additional IAC activities as necessary. As activities for individual students, the IACs may be used before, after, or in conjunction with the CACs. Take time to explain and discuss the various IAC activities with the class as you proceed through the unit. IACs which provide more advanced activities are marked with asterisks (*).

The teacher is free to resequence, modify, and delete ACTIVITY CARDS as necessary. OPERATION WASTE WATCH is a flexible program.

CLASS ACTIVITY CARDS (CACs)

The 11 CACs provide the teacher with a sequential set of instructional activities. They are basically a lesson plan presented in card form to simplify modifications, additions, deletions, or resequencing by the teacher. The CACs are designed as total class activities.

COLORING BOOKS

In the kit box you will find a folder containing duplicating masters for the coloring book, Who Causes Litter? Before you teach the unit, duplicate a copy of the coloring book for each student.

At some point in the unit, pass out the coloring books to your students. Read the captions to your class or allow the children to read them out loud. Discuss the illustrations and the theme of the story presented.

After the children color the pages, instruct them to take the books home to share with their families.

Quantities of printed, assembled coloring books are available from the Division of Litter Control on a limited basis.

JUNIOR ECOLOGY CLUB PROGRAM

Since the fall of 1978, the Division of Litter Control has sponsored a successful ECOLOGY CLUB PROGRAM for grades 6-12. Because of the favorable input from teachers in the lower grades, the Division has developed a JUNIOR ECOLOGY PROGRAM for students in kindergarten through grade 5 who have completed at least one unit of OPERATION WASTE WATCH.

To obtain membership certificates for your students, simply duplicate the JUNIOR ECOLOGY CLUB ORDER FORM included in this teacher's guide and return a completed copy to the Division.

The certificates may be used simply as a final reward for your students once they have completed the OPERATION WASTE WATCH unit, or used to begin an active ecology club program with your class. A list of suggested club activities will be included with your certificates.

COMING IN THE FUTURE

A major advantage of the activity card format used in OPERATION WASTE WATCH is that additional cards may be added and revisions made at minimal expense to the Division.

The Division will continue to evaluate the program throughout the coming years. As a result of this evaluation, new and revised ACTIVITY CARDS will be developed periodically and sent to your school.

ORDERING REPLACEMENT MATERIALS FOR THIS UNIT

Replacement copies of the filmstrip, cassette, poster, teacher's guide, activity cards, and duplicating masters for this unit may be obtained without charge from the Division of Litter Control.

To purchase a complete boxed unit of OPERATION WASTE WATCH on one grade level, send the Division a check payable to the Treasurer, State of Virginia in the amount of \$10.00. The complete set of seven OPERATION WASTE WATCH units for grades K-6 may be purchased for \$70.00.

In addition, photocopies of the entire curriculum K-6 are available free of charge to individual teachers.

DUPLICATING MASTERS

This unit contains the duplicating masters listed below. Mimeo-graph or photocopy these materias as necessary: (1) pretest and post-test, (2) coloring book pages—spirit masters, and (3) worksheet.

VOCABULARY

As you proceed through this unit, help your students learn the definitions of the following words. Be sure the children understand the oral definitions of these words, based on their own experiences.

1. Litter—man-used or man-made solid waste which a person has put in the wrong place or allowed to escape from a container.
2. Man-made—anything in our world made by people or machines.
3. Man-used—anything in our world used by people.
4. Natural— anything in our world not made by people or machines.
5. Useful—anything that makes a task easier to do, or helps us in some way.
6. Waste—anything that is man-made or man-used that cannot be used anymore.

REFERENCES

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2. Keep America Beautiful. Waste in Place—First Grade Level. New York: n.p., 1979.

LEVEL ONE FILMSTRIPWaste Out of Place

(4:38 min.)

Narration	Visuals
1. (Title Slide)	
2. (Credit Slide)	
3. Teacher: "Is everyone ready for our picnic?"	Teacher in front of class
4. Teacher: "We have the sandwiches, lemonade, apples, cups, and napkins." Girl: "How about something to put our trash in?"	Class packing items for picnic
5. Boy: "We could use a wastepaper basket, grocery bag, or a big plastic bag."	Wastebasket, grocery bag, plastic bag
6. Teacher: "Well, let's take this plastic bag with us."	Teacher with plastic bag
7. Teacher: "Now we're ready. Does everyone have a partner?"	Children leaving classroom
8. Girl: "Can we eat here?" This looks like a nice spot."	Class preparing to eat
9. Teacher: "Alright, I know we're all hungry."	"
10. (Shot of everyone eating)	Children eating
11. (Shot of everyone eating)	"
12. Several children: "Look, some of our things are blowing away!" Girl: There goes my cup and plate!"	Litter on grass
13. Girl: "Look at this mess!"	Shot of girl
14. Teacher: "You're right. Our trash is becoming litter! Let's clean it up."	Shot of teacher
15. (Clean-up slide)	Children picking up litter
16. Teacher: "Trash that is littered is an ugly sight and can keep other people from enjoying the park."	"
17. Teacher: "We used the bags to keep our sandwiches in, and we needed the cups for our lemonade. But now that we don't need them for our picnic anymore, they have become waste."	Teacher holding plastic bag

Level One Filmstrip (Cont'd.)

<u>Narration</u>	<u>Visuals</u>
18. Girl: "If we leave our trash on the ground instead of putting it in a garbage bag or trash can, then we are littering, right?"	Children talking
19. Teacher: "That's exactly correct. I'm glad we remembered to bring our plastic bag along with us."	Children putting trash in plastic bag
20. Teacher: "Well, you found lots of litter. Let's play a game with it. Let's divide this waste into two piles—one of natural and one of man-made objects. Who remembers the difference between natural and man-made objects?"	Class examining trash
21. Girl: "I think I remember." "Natural objects are things that people or machines can't make—like an apple tree, a bird, and a rock."	Close-up of girl
22. Boy: "And man-made objects are things that people do make. Like houses, and barns and trucks."	Close-up of boy
23. Teacher: "That's right, James. And both natural and man-made objects can end up as trash. Who would like to try grouping these things into natural and man-made objects? Give it a try, Bill."	Boy examining trash
24. Boy: "I think the can, spoon, paper, and cup should go here. And the apple and branch in the other group."	Trash on grass
25. Teacher: "That's right, now let's make two <u>new</u> piles with these same objects. Who can tell us which things will stay the same for a long time and which ones will change after being outside for a little while?"	Trash on grass
26. Boy: "This is really tricky—but I'll give it a try."	Boy grouping objects
27. Boy: "I think the aluminum can, the spoon, and the cup will go into one group because they won't change much or rot away. And I think the tree branch, apple, and paper will go into another	Group of objects

Level One Filmstrip (Cont'd.)

Narration	Visuals
27. (Cont'd.) group because they will rot away and go back into the soil before too long."	
28. Teacher: "I'm proud of you, James. that was really hard. Man-made objects that won't rot away make the <u>worst</u> kind of litter—like glass, plastic, and aluminum. They will stay on the ground a long, long time and can often hurt people and animals."	Close-up of teacher
29. Teacher: "We certainly did a lot today. Besides having a picnic, we found out that some of the things we needed for our picnic we don't need anymore. These things became waste, and waste can be made of natural or man-made objects."	Class with waste objects
30. Teacher: "We also found out that man-made objects that don't rot away make the worst kind of litter. But if we put all our waste in a trash can, we won't be littering."	Children using plastic bag
31. Boy: Let's tell our families and friends not to litter!"	Class preparing to leave park
32. Girl: We need to keep our park and school clean for everyone!"	Class walking back to school
33. (Credit slide)	
24. (Credit slide)	

RESOURCE MATERIALSA. BOOKS AND OTHER PUBLICATIONS

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2. Binzen, Bill. The Walk. New York: Coward, McCann and Geohegan, Inc., 1972.
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22. Keep Britain Tidy. Litter: An Environmental Project. Brighton, England: Brighton Corp., 1977.
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28. Miles, Betty. Save the Earth: An Ecology Handbook for Kids. New York: Alfred Knopf, 1974.
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B. AUDIOVISUAL AIDS

CASSETTES

1. Sesame Street, Vol. III: People in Your Neighborhood; Somebody Come and Play; Goin' for a Ride; Trash. n.p.: Troll Associates. Primary Grades.

FILMS

1. Forest Murmurs. Northfield, Ill.: Perennial Education, 8½ min. Reminds the viewer of his/her responsibility for litter, showing a place of great beauty being ruined by carelessness. Primary Grades
2. Help Woodsy Spread the Word. Los Angeles: Animedia, Inc. Production, 18 min. Helps children recognize pollution problems and their solutions. The film is an enjoyable musical production. Primary through Elementary Grades
3. *In the Bag. Burbank, Calif.: Walt Disney Productions, 8 min. Features the cartoon character, Humphrey the Bear and his problems in cleaning up a littered park. Primary Grades
4. Let's Help Recycle. New York: ACI Media, Inc., 11 Min. Students present solutions for recycling problems to their city council as an illustration of what children can do about recycling wastes. Elementary Grades

- *5. Meecology. Lake Forest, Ill.: Peshak Films, 26 min. Portrays children from varied surroundings (rural, urban, suburban, and inner city), showing how each child relates to his environment in an ecologically productive way. (Complemented by a school teaching aid called the "McDonald's Ecology Action Pack.") Primary through Elementary Grades.
- *6. The Litterbug. Burbank, Calif.: Walt Disney Productions, 10 min. When a teacher shows a film about the beauty of uncluttered landscapes, contrasted with the ugliness and danger of littered areas, Lyle is impressed with the lesson and becomes determined to stop being a litterer. Primary through Elementary Grades.
- *7. The Litter Monster. New York: Keep America Beautiful, Inc., 15 min. Encourages young people to look around themselves and see what they can do about litter spoiling our environment. Elementary Grades.
8. A Community Park. New York: Youth Film Distribution Center, 8 min. A garbage-strewn lot becomes an adventure playground because of people working together. Elementary Grades.
9. A Decent Burial. New York: Modern Talking Picture Service, 12 min. Explains the simplicity, effectiveness, and economy of the sanitary landfill method of refuse disposal. Elementary Grades.
10. A Place to Begin. New York: Keep America Beautiful, 13½ min. The citizens of Macon, Ga., speak about how the CLEAN COMMUNITY SYSTEM (a behavioral approach to changing attitudes about the handling of waste) worked in their city. Upper Elementary through Adult.
11. Ecology Lady. Falls Church, Va.: Stuart Finley, Inc., 15 min. Problems of a neighborhood recycling center are revealed. Elementary Grades.
12. Help Yourself. Bloomington, In.: Indiana University Audiovisual Center, 29 min. Demonstrates how behavior is influenced by the physical and social aspects of the environment. Elementary Grades.
13. Money to Burn. Austin, Tx.: Travel and information Division, Texas Highway Dept. Film Library, 20 min. Depicts waste and the unsightliness of litter. Elementary Grades.
14. Resources Recovery Is. . . New York: Modern Talking Picture Service, 20 min. Major approaches to recovery of resources, featuring communities already using these methods. Elementary Grades.
15. Sanitary Landfill. Washington, D.C.: NACD, Distribution Branch, National Audiovisual Center, 15 min. A sanitary landfill foreman describes his job. Elementary Grades.
16. Sparkles. Portland, Ore.: Robert E. Landsburg, Film Productions, 15 min. Without narration this film follows drops of water down a beautiful mountain stream to the littered banks of the Columbus River. Upper Elementary through Adult.

17. The House that Recycling Built. Richmond, Va.: Reynolds Metals Co., 9½ min. Shows how products of recycled materials were used in building a home. Upper Elementary through Adult.
18. The Trouble with Trash. New York: Modern Talking Picture Service, 28 min. Refuse problems and solutions are shown and discussed. Elementary Grades.
19. To Four Parts Refuse. Washington, D.C.: NACD, Distribution Branch, National Audiovisual Center, 15 min. Describes a well-planned landfill. Elementary Grades through High School.
- *20. Wealth Out of Waste. Washington, D.C.: Bureau of Mines, U.S. Department of the Interior, 20 min. Explains secondary recovery techniques presently in use or experimentally in operation throughout the United States. Upper Elementary through Adult.

FILMSTRIPS

1. Far Apart. New York: Devoyer-Geppert Audiovisuals. Demonstrates the concept of "opposite." Primary Grades.
2. Nothing Stays the Same. New York: Devoyer-Geppert Audiovisuals, Discusses change. Primary Grades.
3. Our Earth. New York: Herbert E. Budeck Films and Slides. Basic concepts of ecology are highlighted. Primary Grades.

FILMLOOPS

1. The Trash Problem. Cambridge, Mass.: Ealing Film-Loops. Primary through Elementary Grades.

NOTE: *These films are available through the Bureau of Teaching Materials, Virginia Department of Education.

The Virginia Division of Litter Control and Keep America Beautiful, Inc. (99 Park Ave., New York, N.Y. 10016) maintain additional film lists for youth and adults.

JUNIOR ECOLOGY CLUB ORDER FORM

My students have completed the Level ____ unit of OPERATION WASTE WATCH. Please enroll my class in the JUNIOR ECOLOGY CLUB PROGRAM and send me ____ membership certificates.

I plan to use the certificates to reward my students for completing the OPERATION WASTE WATCH unit.

I plan to involve my class in conservation/environmental projects. Please send a list of suggested activities.

On the whole, I would give this OPERATION WASTE WATCH unit a rating of:
poor poor average good excellent

In terms of reaching the unit objectives, on the average my students did:
poorly fair about average very well an excellent job

I would rank my students' interest level in the unit as:
not interested fairly interested interested very interested exceptionally interested

COMMENTS: _____

* * * * * * * * * * * * *

Please send the Junior Ecology Club Membership Certificates to:

Name: _____
Position: _____
School: _____
Address: _____
Phone: _____
School Division: _____

RETURN THIS FORM TO: Division of Litter Control
1116 Washington Building
Capitol Square
Richmond, VA 23219

OPERATION WASTE WATCH
WASTE OUT OF PLACE
LEVEL 1
INDIVIDUAL ACTIVITY CARDS
VIRGINIA DIVISION OF LITTER CONTROL

Teacher Card—Level 1

Introduce the INDIVIDUAL ACTIVITY CARDS after all the students have seen the filmstrip. The 18 IACs are designed for small groups of children or individual students. However, the IACs may be used as total class activities, if it is not feasible to carry out individual or small group activities with your class. For most cards, someone (you, an aide, or parent) will have to read the directions to the students.

There are several ways to use the IACs:

1. Since many of the cards require verbal responses, one group of students could work with you on a few of the cards while an aide or other adult uses other cards with the rest of the children.
2. Another way to manage the IACs is to use three or four IACs at one time set up at a Learning Center. Let the majority of the students work on other tasks while you assist a small group with the IACs.
3. You may decide to put the IACs on audiotape. Small groups of children could then use the cassette player while you work with the rest of the class.
4. Another idea is to photocopy several additional sets of the IACs so that small groups/children can work on the same IAC simultaneously.
5. You may decide to simply combine the IACs with the CACs and use them as total class activities

The IACs may be used before, after, or in conjunction with the CLASS ACTIVITY CARDS (CACs). Cards containing more difficult activities are marked with asterisks (*) in the upper right-hand corners. Level 1 IACs need not be completed in numbered sequence. To shorten the unit from approximately 5 weeks to 2 or 3 weeks, we suggest that you use only the CORE IACs and CACs. Core cards are marked (CORE) in the upper left-hand corners.

You will need to develop a large collection of pictures for several of the IACs. Put a collection of pictures in each of 4 or 5 boxes labeled "PICTURE BOX." Many children will be glad to help collect these pictures. The Level 1 IACs continue the emphasis on classification

skills begun in the kindergarten unit, while introducing the concepts of useful and waste objects.

For IAC-5, you will need some crackers wrapped in cellophane.

For IAC-17, you will need some ice cubes, apples, a glass bottle, an aluminum drink can, small rocks, and pieces of bread, paper, and an open box.

NOTE: IACs 1, 2, and 3 refer to the ideas of natural and man-made objects developed in the kindergarten unit of OPERATION WASTE WATCH. Please refer to the kindergarten unit if your students have not yet been exposed to these ideas.

For safety's sake, before beginning the unit instruct the children to pick up only "safe" litter—like paper and plastic, never glass or sharp metal objects.

Date Started _____

Date Completed _____

Operation Waste Watch

(CORE)

Level 1

PICTURE BOX GAME

IAC 1/18

Get a PICTURE BOX from your teacher. Take out six pictures you like. Put them on top of your desk.

Now, work just with the pictures on your desk. Put any pictures you may have of natural objects in one pile. Put any pictures of man-made objects in another pile.

Show your teacher what you have done.

*drawing of natural and man-made objects

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

MAGAZINE CUT-OUTS

IAC 2/18

When you go home today, cut out four pictures you like from magazines.

Bring the four pictures to school tomorrow.

Go on to IAC-3

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

PICTURES FROM HOME

IAC 3/18

Look at the four pictures you brought from home.

Paste the pictures on a piece of paper.

Draw a circle around any pictures you have of natural objects.

Draw an "X" through any pictures you have of man-made objects.

Show your teacher the pictures you have made.

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

USEFUL OBJECTS

IAC 4/18

Look around your classroom until you see three things that help people in some way. We say these objects are useful.

Draw a picture showing the three things you see.

Give the picture to your teacher.

Now think of three things in your house that are useful. Say the names of these things.

*drawing of three useful objects

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

SNACK TIME!

IAC 5/18

Take some crackers wrapped in cellophane from the teacher's desk. Unwrap the crackers and eat them. Why are the crackers wrapped? After the crackers are eaten, is the wrapper a useful or a waste object?

That's right, it's now a waste object. Put the wrapper in the waste-basket.

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

IAC 6/18

Look around the classroom. Do you see any waste objects?

Look out the window. Do you see any waste outside?

Pick up something that is waste in the classroom. Put it in the waste-basket.

*picture here of waste in trash receptacle and on the ground

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

Level 1

PLAY A GAME WITH A FRIEND

IAC 7/18

Find three pictures in a PICTURE BOX that show useful objects. Then find three pictures of waste objects. Mix up the pictures and ask a friend to group them into a waste object group and useful object group.

*drawing of a child sorting pictures

Operation Waste Watch

Level 1

IS LITTER UGLY OR PRETTY?

IAC 8/18

Litter is trash or waste people have put in the wrong place.

Look through the PICTURE BOX and find three pictures which show things which often become litter, like bottles and paper.

Draw a picture of a child putting litter into a wastebasket or garbage can. Give your picture to your teacher.

Level 1

WASTE OBJECTS

IAC 7/12

Look around the classroom. Do you see any waste objects?

Look out the window. Do you see any waste outside?

Pick up something that is waste in the classroom. Put it in the wastebasket.

*picture here of waste in trash receptacle and on the ground

Date card taught _____ Time spent teaching card (min.) _____

Level 1

STOP LITTER NOW!

IAC 8/12

Litter is waste objects which were put in the wrong place. Draw a picture of three things you can do which will help stop litter. Have the class discuss various possibilities before drawing their pictures.

- Example:
- 1) using a litterbag in their car
 - 2) throwing out waste into a dumpster
 - 3) picking up classroom trash

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

CLEANUP TIME

IAC 9/18

Look around your classroom. Do you see any litter? Remember: Litter is waste put in the wrong place by people. How did this waste get in the wrong place? If you see any litter, pick it up and put it in the wastebasket.

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

Level 1

HALLWAY LITTER

IAC 10/18

The next time you walk down the hallway, see if you can find any litter.

Bring it back to the classroom and talk about how the litter got in the hall.

Then throw the litter in the wastebasket.

Remember: Litter is waste put in the wrong place by people.

Operation Waste Watch

(CORE)

Level 1

DO LITTERBUGS BUG YOU?

IAC 11/18

A litterbug is what we call someone who litters his trash instead of putting it in a wastebasket or trash can.

Draw a scary or a funny picture of a "litterbug!"

*drawing of litterbug monster

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

STOP LITTER NOW!

IAC 12/18

Draw a picture of three things that can help stop litter, like a trash can or a litter bag.

*drawing of trash receptable

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

Level 1

HELPING AT HOME

IAC 13/18

Draw a picture of your family putting trash in the correct place.

Operation Waste Watch

Level 1

PICKUP CONTEST

IAC 14/18

Make a litterbag by decorating a paper grocery bag. Tape the bag to the side of your desk. Put your trash in this bag and empty it into the wastebasket at the end of the day. When you pick up litter in your classroom, put it in your litter bag.

Keep a paper at your desk and put a mark on it each time you pick up a piece of litter and put it in your litter bag. Add all the marks up at the end of the day.

Have a contest with your friend—see who has the most marks at the end of the day. Try it for a whole week.

Remember: Litter is waste put in the wrong place by people.

Operation Waste Watch

Level 1

LITTER PREVENTION BADGES

IAC 15/18

Make an anti-litter badge or button for yourself. Wear it around the school all day. Tell people that littering is wrong.

Make badges for your teacher, your family, and your neighbors to wear.

*drawing of a child with -litter badge

Operation Waste Watch

(CORE)

Level 1

CHANGES

IAC 16/18

Look through the PICTURE BOX and find three pictures of things that will not change or will change very slowly. Then find three pictures of things that will change very quickly.

(For example, a rock changes very slowly, but a cloud changes quickly.)

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

EXPERIMENT—FIND OUT WHAT CHANGES!

IAC 17/18

Get an ice cube, an apple or an apple core, a rock, a glass bottle, a drink can, a piece of paper, a piece of plastic, and a piece of bread and put them outside the window in an open box. Which things are man-made objects and which are natural objects? Check them at the end of the day. Check them tomorrow morning. Has anything happened to change them?

Which man-made objects changed?

Which natural object changed?

Keep the box outside for several weeks. Continue to check the objects often to see if and how they change.

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

THINGS THAT CHANGE SLOWLY

IAC 18/18

If someone litters a glass bottle, an aluminum drink can, and a piece of plastic, do you think this litter will stay on the ground a long time or will these objects change quickly and disappear?

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH
WASTE OUT OF PLACE
LEVEL 1
CLASS ACTIVITY CARDS
VIRGINIA DIVISION OF LITTER CONTROL

CLASS ACTIVITY CARDS

Teacher Card—Level 1

The 11 CLASS ACTIVITY CARDS (CACs) are designed for the whole class or a large group of students. Used in numerical order, these cards present a suggested sequence of activities to help develop the ideas of useful and waste objects and litter. The CACs should be used after the students have seen the filmstrip, and before, after, or in conjunction with the INDIVIDUAL ACTIVITY CARDS (IACs). At the completion of the CACs, present the filmstrip again as a review activity.

The Level 1 CLASS ACTIVITY CARDS are designed to encourage young children to become actively involved in the collection and redistribution of waste in their immediate environment. The activities also focus on the concept of recycling at a level appropriate to the abilities of young children.

To shorten the unit, use only the CACs which present core activities. These CORE ACTIVITY CARDS are marked (CORE) in the upper left-hand corners.

Be sure to find out what your community is doing to fight the littering problem. Contact the Division of Litter Control or your local government for information. Explain the local program to your students.

Date started _____ Date completed _____

Operation Waste Watch

(CORE)

Level 1

CAC 1/11

As a review, give each child wrapped crackers, fruit, or vegetable sticks wrapped in foil or plastic wrap. Ask them to tell you whether or not the wrapper is useful and why or why not.

Ask them to unwrap the treat and eat it. Afterward, ask them to tell you whether or not the wrapper is still useful or whether it has become waste.

Ask one-half of the class to drop the wrappers on the floor. Ask what this action is called. (The correct response is "littering.")

Ask each child in the class to put his or her wrapper in the correct receptacle so no one will be littering.

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

CAC 2/11

Ask the children to look around the classroom. Ask them to pick out five useful and five waste objects. Make lists of the objects on the blackboard and draw small pictures of each object. Write the word "useful" on the board above one list of objects and elicit a verbal definition for "useful." Write the word "waste" above the list of waste objects. Ask the children to put the waste in the proper place.

Ask several children to use useful objects in the classroom while the rest of the class observes them.

Ask one child to touch a waste object in the classroom.

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

CAC 3/11

Ask the class to find examples of waste in the classroom which are also litter. Ask for a definition of "litter." Ask the children what people should do with litter. Ask the children to put all the litter in the trash can.

Ask the children to look for litter in their bedrooms at home tonight.

Ask them to put all the litter they find in their bedrooms in a waste-basket in their house.

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

CAC 4/11

An excellent story for you to read to your class is Litterbugs Come In Every Size by Norah Smaridge. This is a colorful well illustrated, hard-bound book with an important message told in rhyme.

Help the class make hand puppets of NEATOS and LITTERBUGS from paper lunch bags, recycled objects, or socks. Create a little puppet show about waste and littering.

If your school does not have this book, urge your librarian to order it from the Division of Litter Control or Western Publishing Co., Racine, Wisconsin 53404.

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

CAC 5/11

For the next several days, save all the clean waste from your classroom in a large container. After a few days, ask the class to group the different kinds of objects in the container into the following groups:

paper—plastic—glass—metal

Did the class discover any other categories? Ask the students whether some of the objects are still useful objects rather than waste objects. Some objects may be reused or recycled by your class.

Go on to CAC-6

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

CAC 6/11

Ask the students "What type of waste do we have the most of?" Ask them if the most abundant waste is "man-made" or "natural" waste.

Go on to CAC-7

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

CAC 7/11

Ask each child to pick out one of the waste objects and tell how he or she could make something new from it or do something new with it.

Help the student reuse some of the waste items to make new things. Ask the class to bring one waste object from home to make into a new object or to reuse in some way.

*drawing of cup being used to grow seed and chain made from pull tabs and bird feeder from milk jug

Go on to CAC-8

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

(CORE)

Level 1

CAC 8/11

Explain to the class that some waste objects they cannot seem to find a use for can still be reused.

Tell the class that paper, glass, and aluminum waste objects can often be made into new things in special factories. This is called RECYCLING.

Go on to CAC-9

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

Level 1

CAC 9/11

Contact the Division of Litter Control for information on how to set up a recycling program in your school.

Ask the class to start saving waste objects at school that can be recycled in your community. You may need to get a large box for each kind of waste object. Label each box.

The students might also want to save waste objects at home or bring them to class to add to the recycling boxes.

*drawing of stack of newspapers, bottles, and cans

Go on to CAC-10

Operation Waste Watch

Level 1

CAC 10/11

Hopefully, you can find someone who will buy some of the waste objects that your class has collected (e.g. at Reynolds Aluminum collection stations). The class will then have to decide what to spend money on. Perhaps they can purchase a trash container for the school or playground or buy some plants and flowers to beautify the school yard.

*drawing of trash container

Go on to CAC-11

Operation Waste Watch

Level 1

CAC 11/11

If you decide to buy a trash container, help the children write a letter to the local sanitation department or the Division of Litter Control to get information on purchasing trash receptacles. Also, help compose a letter to the principal about giving the receptacle to the school.

You could let the children decorate the trash receptacle by painting it. Let the class decide where to put the receptacle. Take them on a walk to decide where most of the litter is around your school. This may be the best place for the receptacle.

OPERATION WASTE WATCH

LEVEL 4

LET'S WASTE LESS WASTE

Based on WASTE IN PLACE, the Solid Waste Managment Curriculum for
Kindergarten through Grade Six by Keep America Beautiful

DEVELOPED BY

VIRGINIA DIVISION OF LITTER CONTROL
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
1116 WASHINGTON BUILDING
RICHMOND, VIRGINIA 23219

1980

INTRODUCTION

OPERATION WASTE WATCH is a series of seven sequential learning units which address the subjects of litter control and solid waste management. The curriculum, developed by the Division of Litter Control, Virginia's state litter prevention agency, is designed for classroom use in kindergarten through grade six.

Each OPERATION WASTE WATCH unit may be used in a variety of ways, depending on the needs and schedules of individual students and schools. Each unit is interdisciplinary in approach and may be incorporated into the various science, social studies, and health curricula Virginia teachers are presently using. Language arts, mathematics, and artistic activities are also highlighted. Each unit consists of a teacher's guide, filmstrip-cassette set, activity cards for class and individual student use, test materials, coloring book duplicating masters or comic books, and a colorful poster. Each elementary school in Virginia may receive two complete sets of OPERATION WASTE WATCH without cost.

Flexibility is a key element of the OPERATION WASTE WATCH program. The sequence of the units within the curriculum may be changed to suit the abilities of students in the individual school. For this reason, teachers should become familiar with each of the units. Each instructor should also feel free to present concepts found in previous units. This is especially important for upper elementary students who are unfamiliar with the solid waste vocabulary and ideas presented in earlier units. The materials in each unit are color-coded for easy identification.

Flexibility is also a component within each individual unit. The teacher is free to shorten or lengthen the series of activity cards which are the heart of the unit, to suit her/his schedule or to build her/his own unit around the OPERATION WASTE WATCH auxiliary materials.

OPERATION WASTE WATCH is based on WASTE IN PLACE, the elementary school curriculum recently created by Keep America Beautiful. Solid waste management has become a very important environmental topic, but it is a subject which is too often superficially addressed in elementary textbooks. WASTE IN PLACE was the first sequential elementary curriculum in the United States to address the concepts of proper waste handling. WASTE IN PLACE is available at cost to all localities around the country organized under the Clean Community System of Keep America Beautiful and to other interested groups. In developing OPERATION WASTE WATCH for Virginia's elementary schools, the Division of Litter Control changed the format of WASTE IN PLACE and designed supplementary activities and materials, including audiovisual aids.

OPERATION WASTE WATCH differs significantly from WASTE IN PLACE in its approach to the subject matter only in Levels 2 and 3. The Division believes that the ideas presented in these two units merit special

emphasis in a study of solid waste problems in Virginia. Level 2, LITTER POLLUTION, addresses pollution problems associated with litter, while Level 3, TRASH TRENDS, examines packaging trends in relationship to current solid waste problems.

FIELD TESTING

Two versions of OPERATION WASTE WATCH were piloted during the 1979-1980 school year in over 220 classrooms in 14 school systems with very positive results. A summary of the results of this field testing is available from the Division. Based on the results of the piloting, portions of the draft curriculum were revised in the Fall of 1980.

CHANGING ATTITUDES AND BEHAVIOR

In addition to equipping students with important facts about litter and solid waste management, OPERATION WASTE WATCH is designed to help students modify their everyday waste disposal habits.

As this guide goes to print, a study of students' attitudes and littering behaviors is being conducted by psychologists at Virginia Tech. The researchers, Mr. John Cope and Dr. Scott Geller are attempting to pinpoint the methods for teaching OPERATION WASTE WATCH which will be most successful in changing littering behavior. A pamphlet describing techniques for changing student behavior will be published as a supplement to OPERATION WASTE WATCH when the research is completed in 1981.

THE VIRGINIA PLAN TO REDUCE LITTERING

The DIVISION OF LITTER CONTROL was established in 1977 to control, prevent, and eliminate litter from the state to the maximum practical extent.

One-half of Division funds are granted annually to the localities of the state to finance local litter prevention programs. In 1979, 94% of the counties and cities applied for and received grant money from the Division. To assist these localities in organizing effective, comprehensive, long-range litter control programs, the Division had developed an organizational package, THE VIRGINIA PLAN TO REDUCE LITTERING, which is available to all community leaders interested in developing local programs. OPERATION WASTE WATCH is one component of the VIRGINIA PLAN.

The Division is encouraging local litter prevention coordinators to work closely with schools in each locality. Many localities are promoting the implementation of OPERATION WASTE WATCH in their schools.

CONTACT THE DIVISION OF LITTER CONTROL FOR THE NAME AND PHONE NUMBER OF THE LITTER CONTROL COORDINATOR IN YOUR LOCALITY.

OPERATION WASTE WATCH UNIT TOPICS

Kindergarten Level

Natural and Man-Made Objects

Students practice classification skills and learn to differentiate between natural and man-made objects in indoor and outdoor environments. They also learn to identify litter.

Level 1

Waste Out of Place

Students classify objects into two categories, "waste objects" and "useful objects." In addition, they learn to identify litter and dispose of their own waste items properly.

Level 2Litter Pollution

Students study the negative effects of littering: injury to humans and animals, environmental pollution, and wasted resources. In addition, they explore a littered area, study the characteristics of litter, and learn how to clean it up.

Level 3Trash Trends

Students trace historical changes in consumption and packaging. They also study the roles of packaging in everyday life and learn the meaning of "biodegradable."

Level 4Let's Waste Less Waste

Students examine changes which can be made in their homes to reduce solid waste and litter. They also explore various sources of litter in their communities.

Level 5Trash Treasures

Students discover that while many things are recycled by nature, quite a number of modern products must be recycled by people. They learn that recycling and resource recovery can help save important resources which are often lost when items are tossed into a trash receptacle.

Level 6Community Solutions for Solid Waste Management

Students study their own locality's solid waste problems and design a model waste disposal plan for an imaginary community.

ACKNOWLEDGEMENTS

Through the diligence and creativity of numerous individuals, the Division of Litter Control has produced a unique instructional program for the teachers and, most importantly, for the children of Virginia. Our wholehearted appreciation is extended to each individual and firm which helped make OPERATION WASTE WATCH a reality.

Our thanks go first to Drs. Edwin White and William Brown who wrote the original draft and developed our activity card format.

Lawler Ballard Advertising of Richmond and Norfolk produced the comic and coloring books, the posters, and all of the artwork for the kits. We feel that the art alone will heighten the "litter awareness" of many students and teachers. We wish to thank especially Rich Terrell, Joel Jamison, and Diasey Sanders of Lawler Ballard Advertising for their creative contributions. J. P. Bell Company of Lynchburg printed all the kit items in final form, from boxes to comic books. Jon Peterson and Saul Wren of the Film Production Service, State Department of Education, produced our colorful filmstrips, while Alpha Audio of Richmond created the high-quality cassettes.

Several professional educators contributed their talents in evaluating the project. Teresa Myer and Michal Bentley of the State Department of Education provided expert critiques. Drs. Allen Turnbull, John Nezlek, and Joseph Galano of Williamsburg conducted the formal analysis of our field-testing. Dr. Richard Mercer of Richmond edited the pilot manuscript.

We also wish to thank Outdoor Biological Instructional Strategies, (OBIS) of the University of California for permission to use the Recycling Game in the Level 5 Unit. And we thank the Phoenix Quarterly for granting permission to use two articles in the Level 5 unit.

My personal thanks go to several fellow members of the Division of Litter Control staff who contributed many hours and their "litter expertise" to the effort: Ginger Raymond who assisted in all aspects of production; Janet Wynne, Crystal Belt, and Mollie Osborne who typed the manuscript; and our Commissioner, Robert W. Slocum, who made it all possible.

Finally, we wish to recognize and thank all those individuals who participated in the field testing of OPERATION WASTE WATCH: the local coordinators, principals, and above all, the teachers who provided invaluable suggestions for refining the program.

The following local school systems were involved in this pilot program: Accomac County, Albermarle County, Arlington County, Colonial Heights, Fairfax County, Franklin County, Hanover County, Henry County,

Lynchburg, Martinsville, Nelson County, Northampton County, Roanoke, and Virginia Beach.

The enthusiasm of students and teachers who field-tested OPERATION WASTE WATCH reinforces our conviction that the curriculum will provide an exciting and important program of study for the children of Virginia.

JAN ROBERTSON
Director of Education and
Program Coordinator, 1980

LEVEL 4

RATIONALE—This series of instructional materials, developed by the Division of Litter Control, is designed to help elementary students deal effectively with solid waste problems encountered in their everyday lives. It will also prepare them to deal as adults with the growing problem of waste disposal facing each community. In Virginia, litter pickup alone is estimated to cost \$25 million annually.

Litter is a very accessible pollutant and one even young children can comprehend. Children may be able to do very little to solve other environmental problems; but they can learn to dispose of waste properly, help recycle some items, and come to understand how their own behavior affects the environment. A solid waste management unit is an excellent place to begin creating environmental awareness. From this point, we can begin building a strong sense of environmental stewardship and pride in our youth.

In this unit, fourth graders are asked to deal with solid waste management problems in their homes and neighborhoods. The principles emphasized here are enlarged upon to encompass the entire community's solid waste management problems in the fifth and sixth grade units of OPERATION WASTE WATCH.

If your students have not studied earlier units of OPERATION WASTE WATCH, feel free to borrow ideas, activities, and filmstrips from previous kits to prepare your students for the Level 4 tasks.

MAJOR IDEAS IN THE LEVEL 4 UNIT

1. People learn a great variety of habits as they grow up.
2. Some people have developed habits of littering and mismanaging household trash.
3. A large amount of solid waste is generated each week by a family unit.
4. Families can quite easily make a few changes in the ways they manage solid waste. These changes would decrease litter and other solid waste problems.
5. There are several sources of litter in a community, These include:

(1) Household trash	(5) Uncovered trucks
(2) Commerical refuse	(6) Pedestrians
(3) Loading docks	(7) Motorists
(4) Construction sites	

OBJECTIVES

At the completion of the unit, the student will be able to:

1. TRACE the usual way trash is handled in a typical American home;
2. ESTIMATE the amount of trash generated in a household in one week;
3. CLASSIFY the different products going into household trash;
4. DESIGN a system for family refuse disposal which minimizes littering and also decreases the amount of solid waste which must go to a landfill;
5. DEFINE "habit" and "norm";

6. DEFINE "litter" and IDENTIFY a few reasons why littering is an undesirable habit;
7. IDENTIFY sources of litter in a typical neighborhood.

ELEMENTARY SCIENCE PROGRAM OBJECTIVES

The following program objectives should be emphasized in Level 4 science programs throughout Virginia and are incorporated into this unit (see reference 3, p. 9).

1. Observing—the student will use all senses to identify objects and their properties and changes in properties; and he/she will make controlled observations and practice ordering a series of observations.
2. Classifying—the student will classify objects, actions, and phenomena.
3. Measuring—the student will demonstrate the ability to use standard units of measurement in determining length, area, volume, weight, and temperature.
4. Collecting and Organizing Data—the student will collect and organize information about a problem, communicate it verbally or graphically, and present these data so that trends can be analyzed.
5. Using Equipment—the student will assemble and use the appropriate tools and apparatus needed to investigate a problem.
6. Summarizing—the student will describe orally, in writing, or nonverbally, conclusions about the processes and products of scientific inquiry.

INSTRUCTIONAL STRATEGY

1. Review this teacher's guide and study all unit components thoroughly. The activity cards are the heart of the unit. Also become familiar with the other OPERATION WASTE WATCH units. PHOTOCOPIES OF THE UNITS K-6 ARE AVAILABLE WITHOUT CHARGE FROM THE DIVISION TO INDIVIDUAL TEACHERS.
2. Decide which elements of the unit kit and which activity cards you will use. Add your own ideas as necessary or pull activities from OPERATION WASTE WATCH UNITS on other grade levels.
3. Prepare all necessary materials and arrange for any outside speakers or field trips.
4. Be sure to find out what your community is doing to fight the littering problem. Contact the Division of Litter Control or your local government.
5. Administer the pretest to your students, use the results to modify your unit plans as necessary.
6. Briefly discuss the topic and title of the unit with your class. Tell the students about some of the activities they will be involved in. Review with them the ideas of natural and man-made objects found in the kindergarten level unit.
7. Explain the contents of the unit kit to your students.
8. Hang the poster in a prominent spot in your classroom.
9. Present the filmstrip to the class. During the showing, elicit discussion of important ideas.
10. Order the Junior Ecology Club Certificates from the Division.

11. Proceed with the INDIVIDUAL AND CLASS ACTIVITY CARDS.
12. Present the coloring books at some appropriate point in the unit. Use these as motivational and teaching tools.
13. At the completion of the unit, present the filmstrip once again as a review activity. Elicit discussion of ideas the children have learned.
14. Administer the posttest to your students.
15. Return all unit components to the box for use by the next class.
16. Be sure to review and reinforce proper waste disposal habits throughout the school year!

TIME FRAME

The Level 4 unit will take approximately 6 weeks (30 thirty-minute learning sessions).

If you want to teach a shortened version of the unit, we recommend that you use only the CORE ACTIVITY CARDS. Each core card is marked (CORE) in the upper left-hand corner. Using only the core activities should cut the required instructional time to three or four weeks. Another method is to use the activity cards and other materials as guidelines for developing your own shortened unit.

Allow approximately 20 minutes for administering the tests at the beginning and end of the unit. Each filmstrip viewing should take about 15 minutes.

EVALUATION INSTRUMENTS

Included in this unit are duplicating masters for the student PRE-TEST AND POSTTEST. Photocopy or mimeograph a copy of each test for each pupil. Administer the test to your class just before beginning the unit. This test should be used as a screening device to identify children who will need special help. You may need to develop additional activities for these children.

Administer the test once again, immediately after the class completes the unit. Posttest results will show whether or not your students attained the unit objectives. Comparison of the pretest and posttest results for each student can help you determine the effectiveness of this unit.

FILMSTRIP AND CASSETTE

The filmstrip and cassette set provided with this unit is designed for use as both an introductory and review activity. Before using the ACTIVITY CARDS, present the filmstrip to the class as an introduction to the unit. This may be done in small groups or as a total class activity. Present the filmstrip again at the end of the unit as a review of major ideas.

This teacher's guide contains a copy of the filmstrip script with asterisks (*) indicating spots in the program where we encourage you to stop the cassette and filmstrip to allow for class discussion. The cassette has audible tones and should be used with a manually-operated filmstrip projector. The filmstrip is brief and is to be used as a

teaching tool. During the showing, please encourage group discussion of the ideas presented.

When the filmstrip is used as a review activity, it may be most helpful to read the script rather than use the cassette tape. Proceeding at a comfortable speed, ask the children to respond orally to the questions raised while they view the filmstrip.

INDIVIDUAL ACTIVITY CARDS (IACs)

The 12 IACs are designed for small groups or individual students. The teacher can hand them out to individuals or set up learning centers using the IACs as the foundation. In some classes, the IACs may have to be combined with the CLASS ACTIVITY CARDS (CACs) and used as a lesson plan for total class activities.

The teacher is encouraged to modify, delete, and create additional IAC activities as necessary. IACs which provide more advanced activities are marked with asterisks (*). Students who do very well on the pretest may need to complete only a few of the IAC activities.

The teacher is free to resequence, modify, and delete ACTIVITY CARDS as necessary. OPERATION WASTE WATCH is a flexible program.

The IACs may be used before or simultaneously with the CACs. Take time to discuss the various IAC activities with the total class as you proceed with the unit. IACs 5 through 7 definitely require class discussion.

CLASS ACTIVITY CARDS (CACs)

The 17 CACs provide the teacher with a sequential set of instructional activities. They are basically a lesson plan presented in card

form to simplify modifications, additions, deletions, or resequencing by the teacher. The CACs are designed as total class activities.

COMIC BOOKS

In the kit box you should find 30 copies of the comic book entitled Follow the Litter. Before teaching the unit, read the comic yourself. You may decide to design study questions based on the story to gauge your students' vocabulary and comprehension skills. Or you could plan to use the comics just for fun.

At some point while you are teaching the unit, pass out the books to your students. Allow the children to read the story out loud. Discuss the theme of the comic book as a class or in small groups.

If you have extra time, you may decide to have your students act out a skit based on the story. Perhaps they could present their skit to another class or the students could write and illustrate their own litter prevention comics to take home to their families. Be creative!

Be sure to return the comic books to the unit box for use by the next class.

JUNIOR ECOLOGY CLUB PROGRAM

Since the fall of 1978, the Division of Litter Control has sponsored a successful ECOLOGY CLUB PROGRAM for grades 6-12. Because of the favorable input from teachers in the lower grades, the Division has developed a JUNIOR ECOLOGY CLUB PROGRAM for students in kindergarten through grade 5 who have completed at least one unit of OPERATION WASTE WATCH. To obtain membership certificates for your students, simply duplicate the JUNIOR ECOLOGY CLUB ORDER FORM included in this teacher's

guide and return a completed copy to the Division.

The certificates may be used simply as a final reward for your students once they have completed the OPERATION WASTE WATCH unit, or used to begin an active ecology club program with your class. A list of suggested club activities will be included with your certificate.

COMING IN THE FUTURE

A major advantage of the activity card format used in OPERATION WASTE WATCH is that additional cards may be added and revisions made at minimal expense to the Division.

The Division will continue to evaluate the program throughout the coming years. As a result of this evaluation, new and revised ACTIVITY CARDS will be developed periodically and sent to your school.

ORDERING REPLACEMENT MATERIALS FOR THIS UNIT

Replacement copies of the filmstrip, cassette, poster, teacher's guide, activity cards, and duplicating masters for this unit may be obtained without charge from the Division of Litter Control.

To purchase a complete boxed unit of OPERATION WASTE WATCH on one grade level, send the Division a check payable to the Treasurer, State of Virginia in the amount of \$10.00. The complete set of seven OPERATION WASTE WATCH units for grades K-6 may be purchased for \$70.00

In addition, photocopies of the entire curriculum K-6 are available free of charge to individual teachers.

DUPLICATING MASTERS

This unit contains the duplicating masters listed below. Mimeograph or photocopy these materials as necessary: (1) pretest and

postest, (2) solid waste observation form, and (3) source of litter worksheet.

VOCABULARY

The following is a list of terms of major significance in this unit. The function of this list is, first of all, to provide a glossary for the teacher. We do not recommend rote memorization of these definitions. The exercises provided in the activity cards should help the students understand these terms on an experiential level. Remember, DEFINITIONS DEVELOPED WITHOUT AN EXPERIENCE BASE ARE MEANINGLESS TO CHILDREN.

As your class proceeds through this unit, we suggest that you help the students develop definitions for the terms—in their own words. Each student should be able to recognize the terms in written form by the end of the unit.

1. Container—something used to hold something else
2. Dispose of—get rid of an unwanted item
3. Dumpster—large refuse container, usually used by apartment buildings, stores, restaurants, etc., to keep waste until it is collected by a sanitation department or other refuse hauling service
4. Habit—an action a person does over and over again without thinking about it
5. Litter—man-made (or man-used) solid waste that is disposed of in the wrong place or allowed to escape from a container
6. Norm—a habit shared by most people that makes them act a

certain way in certain places or at certain times

7. Normative System—a cluster of norms followed by people, which strengthens an individual habit and makes it harder to change
8. Organic Waste—things that were once alive, or are products of a living thing, but are now no longer useful; for example, egg shells, coffee grounds, leaves, grass cuttings food scraps
9. Receptacle—a container that is used to hold something else. As used in this unit, primarily a waste container for small items—a litter basket or a wastebasket
10. Refuse—another word for solid waste
11. Resource—something that can be used to make something else
12. Resource Recovery—taking usable materials or energy out of solid waste.

REFERENCES

1. Division of Elementary, Secondary, and Vocational Education, Virginia Department of Education. Environmental Education Guide K-12. Richmond, Va.: n.p., 1974.
2. Division of Litter Control, Department of Conservation and Economic Development. Litter Control Project Guide for Elementary School Teachers. Richmond, Va.: Spencer's Printing, 1979.
3. Division of Science and Elementary Administration, Virginia Department of Education. Program Goals and Objectives for Elementary Science. Richmond, Va.: n.p., 1978.
4. Keep America Beautiful. Waste in Place. New York; n.p., 1979.

LEVEL FOUR FILMSTRIPWhittling Down Waste

(6:30 min.)

Narration	Visuals
1. (Title slide)	
2. (Credit slide)	
3. Boy: "This cold is terrible. I think I am going to . . ."	Boy about to sneeze
4. Boy: "A-choo!"	Boy sneezing
5. Boy: "A-choo!"	Boy sneezing
6. Boy: "I wonder what happened to the wastebasket?"	Boy with used tissue
7. Boy: "I guess I'll have to use the wastebasket in the kitchen."	Boy dropping tissue in kitchen wastebasket
8. Narrator? Do you think most people would take a used tissue from one room to another to throw it away?	Floor plan of house
9. When this boy used a tissue to blow his nose and moved to put it in the bathroom wastebasket, he showed us that he is in the habit of disposing of waste properly.	Boy reaching for tissue
10. A habit is something a person does over and over again without thinking about it.	Boy dropping tissue in bathroom wastebasket
11. This boy also showed a second habit. He took the used tissue to another wastebasket.	Boy in kitchen
12. He did <u>not</u> leave the tissue in the sink.	Tissue in sink
13. And he was not in the habit of throwing tissues into the toilet, even though this would not be a bad choice.	Boy in bathroom
14. The proper disposal of waste is a habit for many people in their homes.	Family separating trash for recycling
15. A habit <u>shared</u> by many people that makes them act a certain way in certain places or at certain times is called a <u>norm</u> .	Traffic signal
16. Habits and norms help us to do many things without having to give them much thought.	Boy emptying wastebasket

Narration	Visuals
17. Good habits can help us dispose of our trash properly without having to think about it.	Boy dropping tissue in wastebasket
18. This keeps our homes neat and clean.	Living room
19. Unfortunately, some people have poor habits which don't lead to cleanliness.	Trash improperly disposed of behind house
20. For example, some people have the bad habit of dropping litter on other people's property.	Pedestrian littering
21. These people need to learn a new habit of putting trash in the proper place.	Boy putting refuse in trash receptacle
22. People learn most of their habits when they are children.	Boy putting toothpaste on toothbrush
23. How do you think we learn our habits?	Boy emptying wastebasket
24. First, someone teaches us how to do something—like riding a bike or playing baseball.	Child holding baseball bat
25. After we learn how something is done, we must practice this behavior over and over again until it becomes automatic.	Child holding baseball bat
26. Once the behavior is automatic—it has become a habit. This is true for both good and bad habits.	Children with baseball bat
27. If we can learn the right way to hit a ball with a bat, we can also learn how to dispose of trash properly in our homes.	Boy emptying wastebasket
28. We want to dispose of our trash without littering. We also want to send less trash to our community landfills because they are getting overcrowded with all the waste we throw away.	Landfill
29. One way to send less to the landfill is to separate our trash at home and <u>re-cycle</u> some objects. For example, we can put glass, aluminum, and paper into separate containers.	Glass and aluminum separated at home
30. These items can be taken to a recycling center.	Bag of aluminum cans

Narration	Visuals
31. Newspapers may be recycled into cardboard boxes or other paper products. Old glass can be used to make new glass bottles or jars. Aluminum can be used to make new cans.	Paper recycling center
32. By recovering these materials, we can use our natural resources over and over again.	Paper recycling center
33. Removing items from our household trash which can be recycled decreases the amount of refuse which must be taken to a landfill to be buried.	Landfill
34. Litter is trash which is thrown away in the wrong place or escapes from a trash can. Less trash will blow or spill from cans which have tight-fitting lids. Check the lids on your family's trash containers to make sure they are on tight.	Home trash receptacles with tight lids
35. If all household trash were put into the right kind of containers, do you think your neighborhood would look nicer? (*)	Clean neighborhood
36. What other sources of litter are there in your community besides trash from homes? (*)	Local business
37. Does trash from stores, factories, and schools ever become litter?	Business disposal site
38. Yes, businesses and schools are sources of trash—and litter.	Business disposal site
39. Think of all the packaging materials a grocery store has to dispose of.	Cardboard boxes from grocery store
40. Other sources of litter can be loading docks . . .	Littered loading dock
41. Uncovered trucks . . .	Uncovered truck
42. And construction sites.	Home construction site
43. Do pedestrians ever add to the problem?	Pedestrian
44. People in cars sometimes throw out litter. Can you think of any other place litter comes from? (*)	Person littering contents of car ashtray

Narration	Visuals
45. Sometimes people even throw their household garbage onto the roadsides.	Open dump on roadside
46. There seem to be several littering norms. One of these norms or habits is that people tend to litter where there is already litter.	Littered green box area
47. People also tend to litter where they think someone else will clean up after them.	Pedestrian littering near trash receptacle
48. And littering can happen when people feel a certain place is someone else's concern, not theirs.	Littered green box area
49. Many people ignore litter. They just put up with loose trash.	Litter on sidewalk
50. Some people are just careless.	Pedestrian littering
51. In order to change bad "littering norms," we must all learn the proper ways to get rid of our refuse.	Boy disposing of trash in trash receptacle
52. We must teach other people how to dispose of waste correctly in our homes and in our neighborhoods.	Family separating trash at home
53. We must encourage each other.	Boy picking up litter from sidewalk
54. Habits and norms can be improved only when we really want to change them.	Boy disposing of trash
55. We must all work together to decrease littering.	Students with teacher
56. (Credit slide)	
57. (Credit slide)	

Note: Asterisks (*) indicate spot where the cassette may be stopped for discussion.

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26. McDonald Corp. Ecology and Energy Pack. Oak Brook, Ill.: n.p., 1977.
27. Marshall, James. Going to Waste. New York: Coward, McCann and Geohegan, Inc., 1972.
28. Miles, Betty. Save the Earth: An Ecology Handbook for Kids. New York: Alfred Knopf, 1974.
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B. AUDIOVISUAL AIDS

CASSETTES

1. Sesame Street, Vol. III: People in Your Neighborhood; Somebody Come and Play; Goin' for a Ride; Trash. n.p.: Troll Associates. Primary Grades.

FILMS

1. Forest Murmurs. Northfield, Ill.: Perennial Education, 8½ min. Reminds the viewer of his/her responsibility for litter, showing a place of great beauty being ruined by carelessness. Primary Grades
2. Help Woodsy Spread the Word. Los Angeles: Animedia, Inc. Production, 18 min. Helps children recognize pollution problems and their solutions. The film is an enjoyable musical production. Primary through Elementary Grades
3. *In the Bag. Burbank, Calif.: Walt Disney Productions, 8 min. Features the cartoon character, Humphrey the Bear and his problems in cleaning up a littered park. Primary Grades
4. Let's Help Recycle. New York: ACI Media, Inc., 11 Min. Students present solutions for recycling problems to their city council as an illustration of what children can do about recycling wastes. Elementary Grades

- *5. Meecology. Lake Forest, Ill.: Peshak Films, 26 min. Portrays children from varied surroundings (rural, urban, suburban, and inner city), showing how each child relates to his environment in an ecologically productive way. (Complemented by a school teaching aid called the "McDonald's Ecology Action Pack.") Primary through Elementary Grades.
- *6. The Litterbug. Burbank, Calif.: Walt Disney Productions, 10 min. When a teacher shows a film about the beauty of uncluttered landscapes, contrasted with the ugliness and danger of littered areas, Lyle is impressed with the lesson and becomes determined to stop being a litterer. Primary through Elementary Grades.
- *7. The Litter Monster. New York: Keep America Beautiful, Inc., 15 min. Encourages young people to look around themselves and see what they can do about litter spoiling our environment. Elementary Grades.
8. A Community Park. New York: Youth Film Distribution Center, 8 min. A garbage-strewn lot becomes an adventure playground because of people working together. Elementary Grades.
9. A Decent Burial. New York: Modern Talking Picture Service, 12 min. Explains the simplicity, effectiveness, and economy of the sanitary landfill method of refuse disposal. Elementary Grades.
10. A Place to Begin. New York: Keep America Beautiful, 13½ min. The citizens of Macon, Ga., speak about how the CLEAN COMMUNITY SYSTEM (a behavioral approach to changing attitudes about the handling of waste) worked in their city. Upper Elementary through Adult.
11. Ecology Lady. Falls Church, Va.: Stuart Finley, Inc., 15 min. Problems of a neighborhood recycling center are revealed. Elementary Grades.
12. Help Yourself. Bloomington, In.: Indiana University Audiovisual Center, 29 min. Demonstrates how behavior is influenced by the physical and social aspects of the environment. Elementary Grades.
13. Money to Burn. Austin, Tx.: Travel and information Division, Texas Highway Dept. Film Library, 20 min. Depicts waste and the unsightliness of litter. Elementary Grades.
14. Resources Recovery Is. . . New York: Modern Talking Picture Service, 20 min. Major approaches to recovery of resources, featuring communities already using these methods. Elementary Grades.
15. Sanitary Landfill. Washington, D.C.: NACD, Distribution Branch, National Audiovisual Center, 15 min. A sanitary landfill foreman describes his job. Elementary Grades.
16. Sparkles. Portland, Ore.: Robert E. Landsburg, Film Productions, 15 min. Without narration this film follows drops of water down a beautiful mountain stream to the littered banks of the Columbus River. Upper Elementary through Adult.

17. The House that Recycling Built. Richmond, Va.: Reynolds Metals Co., 9½ min. Shows how products of recycled materials were used in building a home. Upper Elementary through Adult.
18. The Trouble with Trash. New York: Modern Talking Picture Service, 28 min. Refuse problems and solutions are shown and discussed. Elementary Grades.
19. To Four Parts Refuse. Washington, D.C.: NACD, Distribution Branch, National Audiovisual Center, 15 min. Describes a well-planned landfill. Elementary Grades through High School.
- *20. Wealth Out of Waste. Washington, D.C.: Bureau of Mines, U.S. Department of the Interior, 20 min. Explains secondary recovery techniques presently in use or experimentally in operation throughout the United States. Upper Elementary through Adult.

FILMSTRIPS

1. Far Apart. New York: Devoyer-Geppert Audiovisuals. Demonstrates the concept of "opposite." Primary Grades.
2. Nothing Stays the Same. New York: Devoyer-Geppert Audiovisuals. Discusses change. Primary Grades.
3. Our Earth. New York: Herbert E. Budeck Films and Slides. Basic concepts of ecology are highlighted. Primary Grades.

FILMLOOPS

1. The Trash Problem. Cambridge, Mass.: Ealing Film-Loops. Primary through Elementary Grades.

NOTE: *These films are available through the Bureau of Teaching Materials, Virginia Department of Education.

The Virginia Division of Litter Control and Keep America Beautiful, Inc. (99 Park Ave., New York, N.Y. 10016) maintain additional film lists for youth and adults.

Duplicating MasterSOLID WASTE OBSERVATION FORM_____
Student Name_____
Date

1. Write the date and the time of day you put all the other wastebaskets away and put your special container where everyone could use it.

Date: _____ Time of Day: _____

2. What kind of container did you use in the solid waste activity?

3. How many inches high is it? _____ How many inches wide is it on the long side? _____ How many inches wide is it on the narrower side? _____

4. How much did it weigh when it was empty? _____

5. Write the date and the time of day you put all the other wastebaskets back where they belong and weighed your container.

Date: _____ Time of Day: _____

6. How much did it weigh with all the solid waste in it at the end of 24 yours? _____

7. How many people in your family took part in the activity? _____

8. Ask your mother or father to write below whether they think that having only one wastebasket made it harder or easire for the members of the family to dispose of waste properly.

(from Waste in Place)

OPERATION WASTE WATCH
 LET'S WASTE LESS WASTE
 INDIVIDUAL ACTIVITY CARDS
 LEVEL 4
 VIRGINIA DIVISION OF LITTER CONTROL

INDIVIDUAL ACTIVITY CARDS

TEACHER CARD—LEVEL 4

Introduce the INDIVIDUAL ACTIVITY CARDS after all students have seen the filmstrip. The 12 IACs are designed for small groups of children or individual students. However, the IACs may be used as total class activities if it is not feasible to carry out individual or small group activities with your class. Either way, it will be helpful to periodically review the IAC ideas and activities in class discussion.

We recommend that each student complete the IACs before the CLASS ACTIVITY CARDS (CACs) are introduced. Cards containing more difficult activities are marked with asterisks (*) in the upper right-hand corner.

To shorten the unit, we suggest that only the CORE ACTIVITY CARDS be used. Core cards are marked with (CORE) in the upper left-hand corner.

Several Level 4 IACs need to be completed in numbered sequence. There are several ways to use the IACs:

1. Individual students can work alone on single cards, or one group of students could work with you on a few cards while an aide or other adult uses some other cards with another group.
2. Place three or four IACs at one time in a Learning Center Station.
3. Let the majority of students work on other tasks while you assist a small group with the IACs. You may wish to duplicate additional sets of cards so that several children can work on the same activity simultaneously.
4. Small groups of students or individual pupils could carry out one activity and then make a report to the rest of the class.
5. If a cassette player is available, you may decide to put the IACs on audiotape.

Date started _____

Date completed _____

OPERATION WASTE WATCH

(CORE)

Level 4

CROSSING THE STREET

IAC-1/12

Pretend that you are watching a six-year-old child at a street crossing . . .

Think about what you would do if the child started to cross the street on a red light.

Now, think about what you would do if you were (1) a policeman, (2) the parent of the child, (3) a little old lady with a walking cane, (4) or a child on a bicycle.

On your paper, write down what you would do in each of these 4 roles. Turn in your ideas to your teacher. Be ready to act out your ideas if your teacher asks you to.

Why do you think people act the way they do if they see a child start to cross the street on a red light?

We expect the child to wait for a green light because most people follow the "norm" of waiting for a green light before crossing the street. The "Norm" of crossing the street on a green light is a "habit" most people share.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 4

CLASSROOM NORMS

IAC-2/12

A habit is a certain action a person does over and over again. For example, a person might have a habit of chewing gum, watching television after school, or biting his/her nails. A norm is a habit which most people do, like using a knife and fork to eat meat at dinner.

Make a list of five norms which are habits of student behavior in the classroom. Discuss your list with other students. Turn in your list to your teacher.

An example: 1. In our class people are usually quiet when others are speaking.
 2. _____
 3. _____
 4. _____
 5. _____

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 4

DESSERT TIME

IAC-3/12

When do you eat dessert—before your meat and vegetables or afterwards?

Back in the Middle Ages in the days of knights in armor, it was the norm to have sweets, cakes, candy, and pudding all through the meal. Now most of us save dessert until last.

What other norms help keep this norm strong? Copy the list below on your paper and add one other norm to the list.

1. Parents often do not let their children eat dessert until after the rest of the meal.
2. In most cafeterias, the desserts are at the end of the serving line.
3. Books often tell us we should eat dessert last.
4. _____

Turn in your list to your teacher.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 4

SOME NORMATIVE SYSTEMS

IAC-4/12

Think of some norms of behavior in your school related to disposing of trash. Two norms are:

1. Most teachers put their trash in a wastebasket or trash can.
2. Students do not usually pick up litter dropped in the hallways by other students.

List two other norms on your paper and give your list to your teacher.

1.

2.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 4

IAC-7/12

When everyone finishes the activity on IAC-5 and IAC-6, your teacher will lead a class discussion about it. Think about these "Litter Norms" before the class discussion:

- a. People tend to litter where there is already litter.
- b. Disposing of trash carelessly is, too often, the norm.
- c. People tend to litter where they think someone will clean up after them.
- d. People tend to litter where they feel the property is someone else's concern.
- e. People ignore litter. Many people just put up with loose trash.

Can you add any norms to this list? If you can, write them down and tell your class about your ideas during the class discussion.

Keep your paper until after the class discussion.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 4

CARTOONS

IAC-8/12

On one-half of a piece of drawing paper, draw a picture of one source of litter. Examples: Overflowing litter basket, dumpster with trash around it, uncovered truck, person driving a car

Now on the other half of the sheet, draw a picture of the person whose "bad habit" created this litter. Have him/her say something about the litter. Put the words he says in the form of a balloon, as in a cartoon.

Look at the drawings doen by your classmates.

Now draw another picture showing on one-half of the paper something bad happening because of the person littering and on the other half the person talking about how he/she learned a good lesson.

Give your pictures to your teacher.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 4

HOW DO I FEEL ABOUT LITTER?

IAC 9/12

For a full seven days, you may live with litter! Use the classroom (if the entire class does this card), or your room at home (if you do this by yourself). No one will clean up after you for this week!

During the week, throw all discarded paper, old pencils, and any other objects you usually throw in a wastebasket directly on the floor. (Note: Food products and milk containers should be put in a waste can, but do not remove this can from the room!) Write down how you feel about what is happening during this week.

Your teacher will lead a discussion of the experience—Think about these questions before the class discussion:

- a. Did you find it difficult or uncomfortable to move around or work in the room?
- b. How did you feel when other people threw trash in your area?

Go on to IAC-10

OPERATION WASTE WATCH

Level 4

IAC-10/12

- c. Can you think of ways to reduce the amount of trash which builds up each day?
- d. Do you think your room looked like a nice place to work?
- e. Would a visitor think your room looked like a nice place to visit?
- f. Do you think someone else should always clean up after you?
- g. If everyone in your school, home, and neighborhood failed to put waste in the proper containers, how would the world around us look?
- h. Why do you think people litter? Think about habits and the "litter norms" on card IAC-7

OPERATION WASTE WATCH

Level 4

AN "ARCHAEOLOGICAL" DIG"

IAC-11/12

Examine a full trash can in your classroom. Start at the top of the can and carefully remove each piece of trash. Keep a record of what you take out and where it was in the can by drawing a diagram like the one below. After you have emptied the can, think about the answers to these questions: What do you think happened earliest in the day in your class? Why?

What do you think happened earliest in the day in the example drawn? Did someone wash the board? When might there have been an art lesson? Did someone eat something they should not eat in school?

Example:

empty paint jar
math papers
trash can
newspaper
candy wrapper
lunch bags
chalk pieces
wet paper towel

Go on to IAC-12

OPERATION WASTE WATCH

Level 4

IAC-12/12

Why are the lunch bags near the middle of the can?

Now use your record of what was in your class trash can and decide what happened during the day. Decide which events happened first and second in the day, etc. When you finish, put all the trash back in the can in the same order you found it so someone else can examine it. Now list any objects you feel should not have been thrown away. Could any items be recycled? Give your diagram to your teacher.

Try the same study with a trash can at home. Can you find out what happened in your home by studying trash?

(Note: The scientific study of the life and culture of ancient peoples, as by excavation of ancient cities, is called "archaeology." The study of people's trash, and this is a true science, is called "garbology.")

OPERATION WASTE WATCH

LET'S WASTE LESS WASTE

CLASS ACTIVITY CARDS

LEVEL 4

VIRGINIA DIVISION OF LITTER CONTROL

CLASS ACTIVITY CARDS

TEACHER CARD—LEVEL 4

The 17 CLASS ACTIVITY CARDS (CACs) are designed for a large group or the whole class. These cards suggest an outline of activities to develop the major ideas of solid waste management in the home and neighborhood. The CACs should be used after or in conjunction with the IACs.

To shorten the unit, use only the CORE ACTIVITY CARDS. These cards are marked (CORE) in the upper left-hand corner.

Materials that you will need are listed on each card. Notice that in quite a few cases two or more cards go together. For example, CAC-4 is a continuation of CAC-3.

Duplicate a "Solid Waste Observation Form" for each student for CAC-3 through 7; duplicate the "Sources of Litter" worksheet for each student for CAC-10/16.

Be sure to find out what your community is doing to fight the littering problem. Contact the Division of Litter Control or your local government for information. Explain the local program to your students.

OPERATION WASTE WATCH

(CORE)

Level 4

HABITS

CAC-1/17

Ask the children what a habit is. (An action a person does over and over again without thinking about it.)

Each child, and the teacher, should make a list of five of their own good habits.

Collect the lists and read some aloud without identifying the students whose lists are being read.

Discuss the lists with the students. Return the lists to the children.

Ask the children how habits can help us. Ask them how habits can sometimes cause us problems.

Go on to CAC-2

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 4

NORMS

CAC-2/17

Return the lists to the students.

Ask for volunteers to read the lists of their own good habits out loud. (See card CAC-1.) As the lists are being read aloud, have the other children check off on their own lists those habits which appear on the other students' lists. Determine whether one habit, that is not strictly personal, appears most frequently. Explain that this frequent habit (e.g., drinking milk for breakfast) can be considered a norm. A norm is a habit most people have that makes them tend to act in a certain way at particular times or in certain places. It is behavior that is expected and accepted, an unwritten rule. Ask how norms affect what we do in good and bad ways.

Discuss these questions and the norms they concern with the children:

1. Do we always, or almost always, wait for a green light before crossing the street? Why?
2. Do we yell when playing an exciting game? Why?
3. Do we raise our hands in class when we know the correct answer to a question? Why?
4. Do most people eat three meals a day? Why or why not?
5. Do most people in the United States watch television? Why or why not?

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

LEVEL 4

THE WASTE BOX

CAC-3/17

Ask the students to put all the wastebaskets in their homes in a closet, the garage, or somewhere else out of sight. For this activity, have them take just one large wastebasket, or a box, or some other container and put it where everyone in the family can see and use it—but not where a wastebasket is usually kept. Don't have them put it in the bathroom, or in the kitchen, put perhaps in the hall or on the stairs, or in the middle of the living room. The students should ask their families to use only this container for the next 24 hours. All the organic waste, such as . . . Go on to CAC-4

NOTE: If it is not possible to carry out this activity in the students' homes, the weighing can be demonstrated in the classroom and hypothetical data may be used for CAC-5.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 4

CAC-4/17

Garbage should be put where it usually goes; but all inorganic waste from the kitchen should be put in the "special" waste container.

Before they begin the activity, have the students weigh their large boxes or containers on their bathroom scales. Have them write down how much each weighs when it is empty. Also, have them measure their boxes with a ruler. After 24 hours they should weigh their containers again. (You may decide to have them use the metric system.) Demonstrate the weighing and measuring in class before they try the experiment at home.

The students should use the "Solid Waste Observation Form" to record their data. Explain the use of this data sheet and give one sheet to each student.

Go to card CAC-5 after they have completed this project.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 4

MAP IT—A SURVEY

CAC-9/17

You will need a large, detailed map of the area served by your school and straight pins with heads of two colors.

In order to plan the survey, look at the map as a class and decide if there are places in the area that are more likely to be littered than other places. Review the definition of "litter" with the students. Have the children suggest locations (shopping centers, high-density residential areas, parking lots, vacant lots, bus stops, highway entrances, etc.). Mark these locations with pins of one color.

One of the most common sources of loose refuse is household waste put in containers carelessly. Other sources of litter include poorly contained commercial waste, delivery areas that are not kept clean and neat, construction sites, and uncovered trucks carrying things that could blow or fall off.

One of the most common sources of loose refuse is poorly containerized household waste. Other sources of litter include poorly containerized commercial waste, delivery areas that are not kept clean and neat, construction sites, and uncovered trucks carrying things that could blow or fall off.

Arrange a tour of the mapped area with the class on foot or by bus. On the tour, keep a record of any loose refuse. At each spot where you find a lot of litter, encourage the children to try to figure out where it came from and how it might have escaped from the proper container.

NOTE: If a tour is not possible, keep a daily chart of the children's observations of types and locations of litter in their neighborhoods.

Go on to CAC-10

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 4

CAC-10/17

FOLLOW-UP IN CLASSROOM—Give each student a pin of the second color and have the student mark a spot on the map where the class found loose refuse.

OPTIONAL: THAT NIGHT HAVE EACH STUDENT DO THIS ACTIVITY—Draw a map of the area where you live, such as a city block. Walk around your area or block and put a square (■) on the map for every house, an X (X) for every store or restaurant or other commercial building, and an O (O) wherever you see a waste container such as a garbage can, dumpster, or litter basket. Put a dot (•) wherever you see loose refuse.

Discussion—The next day help the students transfer the data from the individual maps to the master map.

Go on to CAC-11

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 4

CAC-11/17

Discuss these questions in class:

- What kinds of litter were most common?
- Is there any pattern to where litter was found? Is it more prevalent where waste containers are present or absent?
- If litter was prevalent in areas where there were waste containers, were the containers overflowing? Did they have lids or covers? Could animals have knocked them over, spreading the refuse around? If the containers were in good condition and not overflowing, is it possible that some people didn't even try to get their waste in the containers, but just tossed it in that general direction? Why do people sometimes "just toss" litter?
- If litter was more prevalent where there were no waste containers, why didn't people carry their waste with them until they could dispose of it properly?
- Did we make good guesses before we went on our walk about where litter would be found? Why or why not?
- What could be done to encourage better habits about handling waste?

Pass out the "Sources of Litter" worksheet to the students. Discuss the directions for completing the worksheet. After the students complete the worksheet, discuss their responses in class.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 4

WHY DO PEOPLE LITTER?

CAC-12/17

Ask the children why they think people litter. Discuss the children's responses being sure that blame is not placed on any individuals or groups. Emphasize that most people litter at one time or another. This does not mean we should label people as "bad" because they litter. Littering is simply a habit people learn, and habits can be changed. Some of the reasons why people litter are listed below:

1. People litter because they think someone will pick up after them.
2. People litter because they learn it from family and friends.
3. People litter because they do not feel the property is their concern.
4. Sometimes people litter because they have little respect for the environment or other people.
5. Sometimes people litter because they feel that a certain place is their territory, and they have a right to do what they want with this land.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 4

A FAMILY PLAN

CAC-13/17

Refer to cards CAC 3 through 5, THE WASTE BOX activity, and to A TRASH STORY, cards CACs 6 and 7.

In these activities you looked at what each family would do with trash for a 24-hour period.

With all the wastebaskets and refuse containers in their "regular" locations, calculate the amount of solid waste each family throws away for seven days. Have students weigh all trash cans before they start and weigh all the refuse for a week.

Have them enter the data on a master chart like this one:

	(1)	(2)	(3)	(4)	(5)
	Your	Total Wt.	No. People	Average lbs.	Average lbs.
	Name	Collected	in House	per person	per person
				per week	per year
Example:	Jim				
	Russell's	84 lbs.	4	21	1,092 lbs.
	Family				

Go on to CAC-14

OPERATION WASTE WATCH

Level 4

CAC-14/17

Then ask these questions:

What does your family do with an average of "84 lbs." of trash each week? Do you separate items such as newspapers, aluminum, and glass? Do you take these items to a recycling center? Do you compact your trash into a smaller size?

After you have studied the families' trash disposal habits, as a class design a system to improve family trash disposal which minimizes litter, decreases the amount of solid waste which must go to a landfill, and recycles aluminum, glass, newspaper, and organic substances, if possible.

OPERATION WASTE WATCH

Level 4

A NEIGHBORHOOD PLAN

CAC-15/17

Divide the class into three or four groups.

Have each group select one area of the map (CAC-9) where litter was prevalent. Also discuss the data collected about families.

Have each group pretend to be members of the "block association" in the neighborhood. Have each group develop a plan to help insure that all waste in the area selected is properly disposed of and put in containers.

Have the students within each group select roles as committee chairmen assigned to carry out various aspects of their plan. Have them act out what they would do before the rest of the class.

Have the class as a whole vote on what they consider the three or four better ideas from those presented by the role players. Carry out some of these ideas in the neighborhood.

OPERATION WASTE WATCH

Level 4

A CLASS DEBATE

CAC-16/17

Divide the class into two teams to debate opposite opinions about "Solid Waste Management in the Home and Neighborhood." Possible topics:

- a. Is all litter undesirable?
- b. Is littering really a problem? Is litter so harmful, or blight so unattractive, that the expense of cleaning it up is worthwhile?
- c. If more stringent anti-litter laws were passed, would people be likely to obey them all of the time?
- d. Since so many people seem oblivious to the litter problem, should other people be willing to pick up after them?
- e. If the only way that litter problems can be solved is through higher taxes to pay for more cleanups should good citizens be willing to contribute their own money by paying higher taxes?
- f. Is littering a problem in our classroom or in our school?
- g. Can new norms and personal habits be established to help people dispose of wastes properly?
- h. Have the class think of other topics.

OPERATION WASTE WATCH

(CORE)

Level 4

WHAT WE CAN DO

CAC-17/17

Ask each child to list the ways that he or she could control and reduce litter at home, school, or in the neighborhood.

Encourage each child to share his/her list with the class.

Allow the class to select one or more of the ideas as a follow-up to the Operation Waste Watch unit. Once the unit is complete, help the class carry out their plan of action.

OPERATION WASTE WATCH

LEVEL 6

COMMUNITY SOLUTIONS FOR
SOLID WASTE POLLUTION

Based on WASTE IN PLACE, the Solid Waste Management Curriculum for
Kindergarten through Grade Six by Keep America Beautiful

DEVELOPED BY

VIRGINIA DIVISION OF LITTER CONTROL
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
1116 WASHINGTON BUILDING
RICHMOND, VIRGINIA 23219

1980

INTRODUCTION

OPERATION WASTE WATCH is a series of seven sequential learning units which address the subjects of litter control and solid waste management. The curriculum, developed by the Division of Litter Control, Virginia's state litter prevention agency, is designed for classroom use in kindergarten through grade six.

Each OPERATION WASTE WATCH unit may be used in a variety of ways, depending on the needs and schedules of individual students and schools. Each unit is interdisciplinary in approach and may be incorporated into the various science, social studies, and health curricula Virginia teachers are presently using. Language arts, mathematics, and artistic activities are also highlighted. Each unit consists of a teacher's guide, filmstrip-cassette set, activity cards for class and individual student use, test materials, coloring book duplicating masters or comic books, and a colorful poster. Each elementary school in Virginia may receive two complete sets of OPERATION WASTE WATCH without cost.

Flexibility is a key element of the OPERATION WASTE WATCH program. The sequence of the units within the curriculum may be changed to suit the abilities of students in the individual school. For this reason, teachers should become familiar with each of the units. Each instructor should also feel free to present concepts found in previous units. This is especially important for upper elementary students who are unfamiliar with the solid waste vocabulary and ideas presented in earlier units. The materials in each unit are color-coded for easy identification.

Flexibility is also a component within each individual unit. The teacher is free to shorten or lengthen the series of activity cards which are the heart of the unit, to suit her/his schedule or to build her/his own unit around the OPERATION WASTE WATCH auxiliary materials.

OPERATION WASTE WATCH is based on WASTE IN PLACE, the elementary school curriculum recently created by Keep America Beautiful. Solid waste management has become a very important environmental topic, but it is a subject which is too often superficially addressed in elementary textbooks. WASTE IN PLACE was the first sequential elementary curriculum in the United States to address the concepts of proper waste handling. WASTE IN PLACE is available at cost to all localities around the country organized under the Clean Community System of Keep America Beautiful and to other interested groups. In developing OPERATION WASTE WATCH for Virginia's elementary schools, the Division of Litter Control changed the format of WASTE IN PLACE and designed supplementary activities and materials, including audiovisual aids.

OPERATION WASTE WATCH differs significantly from WASTE IN PLACE in its approach to the subject matter only in Levels 2 and 3. The Division believes that the ideas presented in these two units merit special

emphasis in a study of solid waste problems in Virginia. Level 2, LITTER POLLUTION, addresses pollution problems associated with litter, while Level 3, TRASH TRENDS, examines packaging trends in relationship to current solid waste problems.

FIELD TESTING

Two versions of OPERATION WASTE WATCH were piloted during the 1979-1980 school year in over 220 classrooms in 14 school systems with very positive results. A summary of the results of this field testing is available from the Division. Based on the results of the piloting, portions of the draft curriculum were revised in the Fall of 1980.

CHANGING ATTITUDES AND BEHAVIOR

In addition to equipping students with important facts about litter and solid waste management, OPERATION WASTE WATCH is designed to help students modify their everyday waste disposal habits.

As this guide goes to print, a study of students' attitudes and littering behaviors is being conducted by psychologists at Virginia Tech. The researchers, Mr. John Cope and Dr. Scott Geller are attempting to pinpoint the methods for teaching OPERATION WASTE WATCH which will be most successful in changing littering behavior. A pamphlet describing techniques for changing student behavior will be published as a supplement to OPERATION WASTE WATCH when the research is completed in 1981.

THE VIRGINIA PLAN TO REDUCE LITTERING

The DIVISION OF LITTER CONTROL was established in 1977 to control, prevent, and eliminate litter from the state to the maximum practical extent.

One-half of Division funds are granted annually to the localities of the state to finance local litter prevention programs. In 1979, 94% of the counties and cities applied for and received grant money from the Division. To assist these localities in organizing effective, comprehensive, long-range litter control programs, the Division had developed an organizational package, THE VIRGINIA PLAN TO REDUCE LITTERING, which is available to all community leaders interested in developing local programs. OPERATION WASTE WATCH is one component of the VIRGINIA PLAN.

The Division is encouraging local litter prevention coordinators to work closely with schools in each locality. Many localities are promoting the implementation of OPERATION WASTE WATCH in their schools.

CONTACT THE DIVISION OF LITTER CONTROL FOR THE NAME AND PHONE NUMBER OF THE LITTER CONTROL COORDINATOR IN YOUR LOCALITY.

OPERATION WASTE WATCH UNIT TOPICS

Kindergarten Level

Natural and Man-Made Objects

Students practice classification skills and learn to differentiate between natural and man-made objects in indoor and outdoor environments. They also learn to identify litter.

Level 1

Waste Out of Place

Students classify objects into two categories, "waste objects" and "useful objects." In addition, they learn to identify litter and dispose of their own waste items properly.

Level 2Litter Pollution

Students study the negative effects of littering: injury to humans and animals, environmental pollution, and wasted resources. In addition, they explore a littered area, study the characteristics of litter, and learn how to clean it up.

Level 3Trash Trends

Students trace historical changes in consumption and packaging. They also study the roles of packaging in everyday life and learn the meaning of "biodegradable."

Level 4Let's Waste Less Waste

Students examine changes which can be made in their homes to reduce solid waste and litter. They also explore various sources of litter in their communities.

Level 5Trash Treasures

Students discover that while many things are recycled by nature, quite a number of modern products must be recycled by people. They learn that recycling and resource recovery can help save important resources which are often lost when items are tossed into a trash receptacle.

Level 6Community Solutions for Solid Waste Management

Students study their own locality's solid waste problems and design a model waste disposal plan for an imaginary community.

ACKNOWLEDGEMENTS

Through the diligence and creativity of numerous individuals, the Division of Litter Control has produced a unique instructional program for the teachers and, most importantly, for the children of Virginia. Our wholehearted appreciation is extended to each individual and firm which helped make OPERATION WASTE WATCH a reality.

Our thanks go first to Drs. Edwin White and William Brown who wrote the original draft and developed our activity card format.

Lawler Ballard Advertising of Richmond and Norfolk produced the comic and coloring books, the posters, and all of the artwork for the kits. We feel that the art alone will heighten the "litter awareness" of many students and teachers. We wish to thank especially Rich Terrell, Joel Jamison, and Diasey Sanders of Lawler Ballard Advertising for their creative contributions. J. P. Bell Company of Lynchburg printed all the kit items in final form, from boxes to comic books. Jon Peterson and Saul Wren of the Film Production Service, State Department of Education, produced our colorful filmstrips, while Alpha Audio of Richmond created the high-quality cassettes.

Several professional educators contributed their talents in evaluating the project. Teresa Myer and Michal Bentley of the State Department of Education provided expert critiques. Drs. Allen Turnbull, John Nezelek, and Joseph Galano of Williamsburg conducted the formal analysis of our field-testing. Dr. Richard Mercer of Richmond edited the pilot manuscript.

We also wish to thank Outdoor Biological Instructional Strategies, (OBIS) of the University of California for permission to use the Recycling Game in the Level 5 Unit. And we thank the Phoenix Quarterly for granting permission to use two articles in the Level 5 unit.

My personal thanks go to several fellow members of the Division of Litter Control staff who contributed many hours and their "litter expertise" to the effort: Ginger Raymond who assisted in all aspects of production; Janet Wynne, Crystal Belt, and Mollie Osborne who typed the manuscript; and our Commissioner, Robert W. Slocum, who made it all possible.

Finally, we wish to recognize and thank all those individuals who participated in the field testing of OPERATION WASTE WATCH: the local coordinators, principals, and above all, the teachers who provided invaluable suggestions for refining the program.

The following local school systems were involved in this pilot program: Accomac County, Albermarle County, Arlington County, Colonial Heights, Fairfax County, Franklin County, Hanover County, Henry County,

Lynchburg, Martinsville, Nelson County, Northampton County, Roanoke, and Virginia Beach.

The enthusiasm of students and teachers who field-tested OPERATION WASTE WATCH reinforces our conviction that the curriculum will provide an exciting and important program of study for the children of Virginia.

JAN ROBERTSON
Director of Education and
Program Coordinator, 1980

LEVEL 6

RATIONALE—This series of instructional materials, developed by the Division of Litter Control, is designed to help elementary students deal effectively with solid waste problems encountered in their everyday lives. It will also prepare them to deal as adults with the growing problem of waste disposal facing each community. In Virginia, litter pickup alone is estimated to cost \$25 million annually.

Litter is a very accessible pollutant and one children can comprehend. Children may be able to do very little to solve other environmental problems; but they can learn to dispose of waste properly, help recycle some items, and come to understand how their own behavior affects the environment. A solid waste management unit is an excellent place to begin creating environmental awareness. From this point, we can begin building a strong sense of environmental stewardship and pride in our youth.

Older students can begin to appreciate the complexities of solid waste management and see that individual habits and community-wide attitudes and norms must be changed to improve waste management systems.

The sixth grade unit of OPERATION WASTE WATCH requires the students to study their own community's waste disposal system and identify problems in this system. In a simulation game, the students will apply the knowledge they gain to make decisions concerning solid waste management in a hypothetical community, GLEN CITY.

If your students have not studied earlier units of OPERATION WASTE WATCH, feel free to borrow ideas, activities, and filmstrips from the

previous kits to prepare your students for the Level 6 ideas.

MAJOR IDEAS OF THE UNIT

1. Solid waste management is a very important issue in all communities.
2. Because of the complexity of the issues, decisions regarding solid waste management are often difficult to make.
3. There are several things individuals and communities can do to improve solid waste management.
4. Citizens need to learn about waste management problems, and some citizens' disposal habits must be changed.
5. In many communities, local laws need improvement before litter and solid waste problems can be adequately handled.
6. Landfills must be managed properly to avoid water pollution and other problems.

OBJECTIVES

By the end of the unit, the student will be able to:

1. IDENTIFY several solid waste problems in his/her community;
2. WORK WITH CLASSMATES TO DESIGN a solid waste plan which is educational, workable, and affordable;
3. DEFINE common terms associated with solid waste management.

ELEMENTARY SCIENCE PROGRAM OBJECTIVES

The following program objectives are emphasized in grade six science curricula and incorporated into this unit (see reference 5, p. 10).

1. Inferring—the student will make inferences, suggesting explanations, reasons, or causes for events which have occurred.

2. Predicting—the student will predict the result of a trend in data, using inference, extrapolation, or interpolation.
3. Identifying and Controlling Variables—the student will identify the independent and dependent variables in experiments and describe how they are controlled and interrelated.
4. Hypothesizing—the student will identify a question or problem that can be tested.

TIME FRAME

The complete grade 6 unit will take approximately 6-8 weeks (30 or more 45 minute learning sessions).

If you want to shorten the unit to three or four weeks, we recommend that you use only the CORE ACTIVITY CARDS of the INDIVIDUAL ACTIVITY CARDS. Each core card is marked with (CORE) in the upper left-hand corner. You may also shorten the unit by modifying the CLASS ACTIVITY CARD simulation game. Another method is to use the activity cards and other materials as guidelines for developing your own shortened unit.

Allow approximately 30 minutes for administering the tests at the beginning and end of the unit. Each filmstrip should take about 15 minutes.

INSTRUCTIONAL STRATEGY

1. Review this teacher's guide and study all unit components including the activity cards thoroughly. Also become familiar with the other OPERATION WASTE WATCH units. PHOTOCOPIES OF THE UNITS K-6 ARE AVAILABLE WITHOUT CHARGE TO INDIVIDUAL TEACHERS.

2. Decide which elements of the unit kit and which activity cards you will use. Add your own ideas as necessary or pull activities from OPERATION WASTE WATCH UNITS on other grade levels.
3. Prepare all necessary materials and arrange for any outside speakers or field trips.
4. Be sure to find out what your community is doing to fight the littering problem. Contact the Division of Litter Control or your local government.
5. Administer the pretest to your students. Use the results to modify your unit plans as necessary.
6. Briefly discuss the topic and title of the unit with your class. Tell the students about some of the activities they will be involved in.
7. Explain the contents of the unit kit to your students.
8. Hang the poster in a prominent spot in your classroom.
9. Present the filmstrip to the class. During the showing, stop the filmstrip to allow for discussion of important ideas.
10. Proceed with the INDIVIDUAL AND CLASS ACTIVITY CARDS.
11. Present the comic books at some appropriate point in the unit. Use these as motivational and teaching tools.
12. At the completion of the unit, present the filmstrip once again as a review activity. Elicit discussion of ideas the students have learned.
13. Administer the posttest to your students.

14. Return all unit components to the box for use by the next class.
15. Be sure to review and reinforce proper waste disposal habits throughout the school year.

EVALUATION INSTRUMENTS

Included in this unit are duplicating masters for the student PRETEST and POSTTEST. Photocopy or mimeograph a copy of each test for each pupil. Administer the test to your class just before beginning the unit. This test should be used as a screening device to identify students who will need special help. You may need to develop additional activities for these students.

Administer the test once again, immediately after the class completes the unit. Posttest results will show whether or not your students attained the unit objectives. Comparison of the pretest and posttest results for each student can help you determine the effectiveness of this unit.

FILMSTRIP AND CASSETTE

The filmstrip and cassette set provided with this unit is designed for use as both an introductory and review activity.*

This teacher's guide contains a copy of the filmstrip script with asterisks (*) indicating spots in the program where we encourage you to stop the cassette and filmstrip to allow for class discussion. The cassette has audible tones and should be used with a manually-operated filmstrip projector. The filmstrip is brief and is to be used as a

teaching tool. During the showing, please encourage group discussion of the ideas presented.

Before using the ACTIVITY CARDS, present the filmstrip to the class as an introduction to the unit. This may be done in small groups or as a total class activity. Present the filmstrip again at the end of the unit as a review of major ideas.

When the filmstrip is used as a review activity, it may be most helpful to read the script rather than use the cassette tape. Proceeding at a comfortable speed, ask the children to respond orally to the questions raised while they view the filmstrip.

INDIVIDUAL ACTIVITY CARDS (IACs)

The 17 IACs are designed for use by small groups or individual students. However, they can be used as total class activities. The teacher can hand them out or set up learning centers using the IACs as the foundation. Most of the IACs need not be used in the order in which they are numbered. Throughout the unit, make a point of discussing the various IAC activities with the whole class.

The teacher is encouraged to modify, delete and create additional IAC activities as necessary. IACs which provide more advanced activities are marked with asterisks (*).

THE IAC ACTIVITIES SHOULD BE COMPLETED BEFORE THE CLASS ACTIVITY CARDS (CACs) ARE INTRODUCED. However, the MINI-LANDFILL activity (IAC 13 through 17) will require some time spent during the CAC portion of the unit.

The teacher is free to resequence, modify, and delete ACTIVITY CARDS as necessary. OPERATION WASTE WATCH is a flexible program.

CLASS ACTIVITY CARDS

Used in numerical order, the 12 CACs provide the teacher with a sequential set of instructional activities. The CACs are designed as a class activity which will involve four student committees. For the Level 6 unit, they are the foundation of a simulation game concerning an imaginary community, Glen City. This game should help develop the students' decision-making skills.

COMIC BOOKS

In the kit box you should find 30 copies of the comic book entitled, Where's My Science Report?. Before teaching the unit, read the comic yourself. You may decide to design study questions based on the story to gauge your students' vocabulary and comprehension skills. Or you could plan to use the comics just for fun.

At some point while you are teaching the unit, pass out the books to your students. Allow the children to read the story out loud. Discuss the theme of the comic book as a class or in small groups.

If you have extra time, you may decide to have your students act out a skit based on the story. Perhaps they could present their skit to another class, or the students could write and illustrate their own litter prevention comics to take home to their families. Be creative!

Be sure to return the comic books to the unit box for use by the next class.

ECOLOGY CLUB PROGRAM

Since the fall of 1978, the Division of Litter Control has sponsored a successful ECOLOGY CLUB PROGRAM to grades 6-12. As of October 1980, 55 clubs have been formed around the state. A brochure in this kit describes the free membership materials and resources available to Ecology Club members. To obtain these materials for your students, simply duplicate the order form provided in the brochure and return the completed form to the Division. Return the Ecology Club Brochure to the unit box.

COMING IN THE FUTURE

A major advantage of the activity card format used in OPERATION WASTE WATCH is that additional cards may be added and revisions made at minimal expense to the Division.

The Division will continue to evaluate the program throughout the coming years. As a result of this evaluation, new and revised ACTIVITY CARDS will be developed periodically and sent to your school.

ORDERING REPLACEMENT MATERIALS FOR THIS UNIT

Replacement copies of the filmstrip, cassette, poster, teacher's guide, activity cards, and duplicating masters for this unit may be obtained without charge from the Division of Litter Control.

To purchase a complete boxed unit of OPERATION WASTE WATCH on one grade level, send the Division a check payable to the Treasurer, State of Virginia in the amount of \$10.00. The complete set of seven OPERATION WASTE WATCH units for grades K-6 may be purchased for \$70.00

In addition, photocopies of the entire curriculum K-6 are available free of charge to individual teachers.

DUPLICATING MASTERS

This unit contains the duplicating masters listed below. Mimeograph or photocopy these materials as necessary:

1. PRETEST AND POSTTEST
2. VOCABULARY WORKSHEET
3. GLEN CITY INFORMATION SHEET
4. MAP OF GLEN CITY
5. LEGAL COMMITTEE RESPONSIBILITIES
6. EQUIPMENT COMMITTEE RESPONSIBILITIES
7. DISPOSAL METHODS COMMITTEE RESPONSIBILITIES
8. TEMPORARY LANDFILL SITING COMMITTEE RESPONSIBILITIES

VOCABULARY

The following terms may be used in this unit. The function of this list is to provide a glossary for the teacher. REMEMBER, DEFINITIONS DEVELOPED WITHOUT AN EXPERIENCE BASE ARE MEANINGLESS TO STUDENTS. While teaching this unit, help the students recognize these terms. And assist them to develop definitions in their own words.

VOCABULARY

1. BIODEGRADABLE—material capable of decomposing naturally, by biological process
2. COMPACTOR—equipment used to crush trash into a small size
3. COMPOST—a mixture of soil and decayed plant and animal matter used as a fertilizer
4. DECOMPOSE—to break down to basic elements; to rot
5. DISPOSE OF—get rid of an unwanted item, or items

6. DUMPSTER—a waste container used for storing large amounts of solid waste
7. ENERGY RECOVERY—incinerating waste in such a way that the heat from burning can be used to make steam for heating, cooling, and/or to make electricity
8. GROUND WATER—water within the earth that supplies wells and springs
9. INCINERATE—reduce the amount of waste to be disposed of by burning it
10. LEACHATE—water which has drained through something (such as through solid waste in a landfill), dissolved some of the material, and has become polluted as a result
11. LITTER—man-made (or man-used) solid waste that is disposed of in the wrong place or allowed to escape from a container
12. ORGANIC WASTE—once living material, or products of a living thing, that are now useless, i.e., egg shells, coffee grinds, leaves, grass clippings, food scraps, hair, etc.
13. RECYCLING—using materials recovered from solid waste to make new things
14. RESIDUE—what is left after waste has been incinerated, or after all the recoverable resources have been recovered
15. RESOURCE—something that can be used to make something else—wood into paper, iron ore into steel, bauxite into aluminum, sand into glass, old cans into new cans, old bottles into new ones, old newspapers into cardboard
16. RESOURCE RECOVERY—taking usable materials (resources) out of solid waste (what is not usable still has to be disposed of)
17. SANITARY LANDFILL—a large outdoor area for waste disposal where discarded materials are usually compacted and then covered with a layer of earth; a place to bury solid waste. If the earth cover is not thinly and carefully applied, a sanitary landfill can become an open dump.
18. SIMULATION—pretense; a dramatization of an imaginary situation
19. SOLID WASTE—all useless, unwanted, or discarded materials, i.e., refuse, trash, garbage, debris
20. SOLID WASTE MANAGEMENT—everything that has to be done to get rid of all the waste that is produced in the community including collecting it, transporting it, and, finally, processing it in one way or another
21. WASTE PROCESSING—doing something to discarded materials so they can be handled more easily (such as incineration), or so resources can be recovered from them (recycling)

REFERENCES

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2. Essence. Indianapolis: Addison-Wesley Publishing Co., 1971.
3. USMES. How to Make an Opinion Survey. Durham, N.C.: Moore Publishing Co., 1978.
4. Division of Litter Control, Department of Conservation and Economic Development. Litter Control Project Guide for Elementary School Teachers. Richmond, Va.: Spencer's Printing, 1978.
5. Division of Science and Elementary Administration, Virginia Department of Education. Program Goals and Objectives for Elementary Science. Richmond, Va.: n.p., 1978.
6. Keep America Beautiful. Waste in Place. New York: n.p., 1979.

LEVEL SIX FILMSTRIP

Community Solutions to Solid Waste Pollution

(5:12 min.)

Narration	Visuals
1. (Title Slide)	
2. (Credit Slide)	
3. Music Continues	Man littering on sidewalk
4. Boy: "Excuse me, sir, but I noticed that you dropped your piece of paper. Don't you think it would be a good idea to put it in the trash can?"	Boy pointing
5. Man: "But what difference does one little piece of paper make?"	Close-up of man
6. Boy: "One piece doesn't make much difference, but think what 10 pieces would be like. . .	10 pieces of litter on sidewalk
7. . . . or 100 pieces. . .	100 pieces of litter on sidewalk
8. . . . how about 1000 pieces of paper?"	1000 pieces of litter on sidewalk
9. Narrator: Even if it appears that one piece of trash doesn't make a difference, when many accumulate, we then have a big litter problem.	Boy adding one piece of trash to pile
10. Many communities in Virginia have started campaigns to fight litter and other trash disposal problems.	Dump truck
11. Trash disposal is a very important issue for people who run local governments, because it costs a lot of money to dispose of solid waste. In the United States today, each person creates about one ton of trash each year.	Green boxes
12. Solid waste management is everything that has to be done to get rid of all the waste produced in a community. This includes collecting it, moving it, and finally processing it in one way or another.	Solid Waste Cycle
13. One way to help manage solid waste is to recycle some of them. Recycling means using materials in solid waste to make new things.	Paper recycling center

Narration	Visuals
14. Cardboard and other products can be made from old newspapers. Beverage cans, lawn furniture and other things are constructed from recycled aluminum cans.	Paper recycling
15. Some communities use incinerators to burn part of their trash. This reduces the amount of solid waste which must go to a landfill.	Incinerator
16. When waste is incinerated, heat energy is produced. This energy can be used to make steam for producing electricity. The electricity can be used to heat or cool buildings, or for lights, or to run machines.	Incineration process
17. However, many communities do not yet have recycling centers or waste incinerators and the trash must go to a sanitary landfill.	Landfill equipment
18. A sanitary landfill is a large outdoor area for solid waste disposal where discarded materials are crushed each day before being covered with a layer of earth.	Landfill equipment
19. Although landfills are a great improvement over open dumps, several problems can arise. If the dirt is not thickly applied, some trash can blow away and become litter.	Litter
20. If water drains through a landfill, some dangerous substances can be dissolved in the water.	Water at landfill
21. If this polluted water drains into a river, the river, too, may become polluted. The site for a sanitary landfill must be carefully chosen to avoid water pollution.	Polluted Water
22. It is often difficult to find space for a landfill. People usually do not want to live near one.	City scene
23. Some communities plan and manage landfills very carefully and even find new uses for them when they are filled up. Mt. Trashmore in Virginia Beach is a	Mt. Trashmore

Narration	Visuals
23. (Cont'd.)—a city park built on a closed landfill.	
24. People can participate in many recreational activities at Mt. Trashmore.	Lake at Mt. Trashmore
25. Someday this landfill could be another Mt. Trashmore. Do you think a landfill in your community could become a park someday? (*)	Landfill
26. Since every person creates trash, proper solid waste management in a community is an issue that should involve everyone.	Crowd of people
27. First of all, communities need good litter prevention and solid waste management laws. (*)	Highway anti-littering sign
28. Everyone in the community should know what their laws are and what the fines are for breaking the laws.	Returnable beverage bottle
29. All students should study their state and community littering laws.	<u>Virginia Anti-Litter Laws Booklet</u>
30. All members of a community need to get involved in making decisions about solid waste management. They must study their litter and other trash disposal problems, and the possibilities of recycling in their community.	Community Committee Meeting
31. Decision making in a community involves many different people looking at the problems and finding solutions to these problems.	Community Meeting
32. Whatever the decisions reached, all members of a community, young and old alike, must take pride in their city, town, or county.	Children in school yard
33. It's up to all of us to build a better tomorrow. Won't you do your part?	Pedestrians littering with boy watching
34. (Credit Slide)	
35. (Credit Slide)	

NOTE: Asterisks (*) indicate spot where the cassette may be stopped for discussion.

RESOURCE MATERIALSA. BOOKS AND OTHER PUBLICATIONS

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28. Miles, Betty. Save the Earth: An Ecology Handbook for Kids. New York: Alfred Knopf, 1974.
29. Milliken, Margaret. Field Study Manual for Outdoor Learning. Minneapolis: Burgess Publishing Co., 1968.
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B. AUDIOVISUAL AIDS

CASSETTES

1. Sesame Street, Vol. III: People in Your Neighborhood; Somebody Come and Play; Goin' for a Ride; Trash. n.p.: Troll Associates. Primary Grades.

FILMS

1. Forest Murmurs. Northfield, Ill.: Perennial Education, 8½ min. Reminds the viewer of his/her responsibility for litter, showing a place of great beauty being ruined by carelessness. Primary Grades
2. Help Woodsy Spread the Word. Los Angeles: Animedia, Inc. Production, 18 min. Helps children recognize pollution problems and their solutions. The film is an enjoyable musical production. Primary through Elementary Grades
3. *In the Bag. Burbank, Calif.: Walt Disney Productions, 8 min. Features the cartoon character, Humphrey the Bear and his problems in cleaning up a littered park. Primary Grades
4. Let's Help Recycle. New York: ACI Media, Inc., 11 Min. Students present solutions for recycling problems to their city council as an illustration of what children can do about recycling wastes. Elementary Grades

- *5. Meecology. Lake Forest, Ill.: Peshak Films, 26 min. Portrays children from varied surroundings (rural, urban, suburban, and inner city), showing how each child relates to his environment in an ecologically productive way. (Complemented by a school teaching aid called the "McDonald's Ecology Action Pack.") Primary through Elementary Grades.
- *6. The Litterbug. Burbank, Calif.: Walt Disney Productions, 10 min. When a teacher shows a film about the beauty of uncluttered landscapes, contrasted with the ugliness and danger of littered areas, Lyle is impressed with the lesson and becomes determined to stop being a litterer. Primary through Elementary Grades.
- *7. The Litter Monster. New York: Keep America Beautiful, Inc., 15 min. Encourages young people to look around themselves and see what they can do about litter spoiling our environment. Elementary Grades.
8. A Community Park. New York: Youth Film Distribution Center, 8 min. A garbage-strewn lot becomes an adventure playground because of people working together. Elementary Grades.
9. A Decent Burial. New York: Modern Talking Picture Service, 12 min. Explains the simplicity, effectiveness, and economy of the sanitary landfill method of refuse disposal. Elementary Grades.
10. A Place to Begin. New York: Keep America Beautiful, 13½ min. The citizens of Macon, Ga., speak about how the CLEAN COMMUNITY SYSTEM (a behavioral approach to changing attitudes about the handling of waste) worked in their city. Upper Elementary through Adult.
11. Ecology Lady. Falls Church, Va.: Stuart Finley, Inc., 15 min. Problems of a neighborhood recycling center are revealed. Elementary Grades.
12. Help Yourself. Bloomington, In.: Indiana University Audiovisual Center, 29 min. Demonstrates how behavior is influenced by the physical and social aspects of the environment. Elementary Grades.
13. Money to Burn. Austin, Tx.: Travel and information Division, Texas Highway Dept. Film Library, 20 min. Depicts waste and the unsightliness of litter. Elementary Grades.
14. Resources Recovery Is. . . New York: Modern Talking Picture Service, 20 min. Major approaches to recovery of resources, featuring communities already using these methods. Elementary Grades.
15. Sanitary Landfill. Washington, D.C.: NACD, Distribution Branch, National Audiovisual Center, 15 min. A sanitary landfill foreman describes his job. Elementary Grades.
16. Sparkles. Portland, Ore.: Robert E. Landsburg, Film Productions, 15 min. Without narration this film follows drops of water down a beautiful mountain stream to the littered banks of the Columbus River. Upper Elementary through Adult.

17. The House that Recycling Built. Richmond, Va.: Reynolds Metals Co., 9½ min. Shows how products of recycled materials were used in building a home. Upper Elementary through Adult.
18. The Trouble with Trash. New York: Modern Talking Picture Service, 28 min. Refuse problems and solutions are shown and discussed. Elementary Grades.
19. To Four Parts Refuse. Washington, D.C.: NACD, Distribution Branch, National Audiovisual Center, 15 min. Describes a well-planned landfill. Elementary Grades through High School.
- *20. Wealth Out of Waste. Washington, D.C.: Bureau of Mines, U.S. Department of the Interior, 20 min. Explains secondary recovery techniques presently in use or experimentally in operation throughout the United States. Upper Elementary through Adult.

FILMSTRIPS

1. Far Apart. New York: Devoyer-Geppert Audiovisuals. Demonstrates the concept of "opposite." Primary Grades.
2. Nothing Stays the Same. New York: Devoyer-Geppert Audiovisuals, Discusses change. Primary Grades.
3. Our Earth. New York: Herbert E. Budeck Films and Slides. Basic concepts of ecology are highlighted. Primary Grades.

FILMLOOPS

1. The Trash Problem. Cambridge, Mass.: Ealing Film-Loops. Primary through Elementary Grades.

NOTE: *These films are available through the Bureau of Teaching Materials, Virginia Department of Education.

The Virginia Division of Litter Control and Keep America Beautiful, Inc. (99 Park Ave., New York, N.Y. 10016) maintain additional film lists for youth and adults.

GLEN CITY INFORMATION SHEET

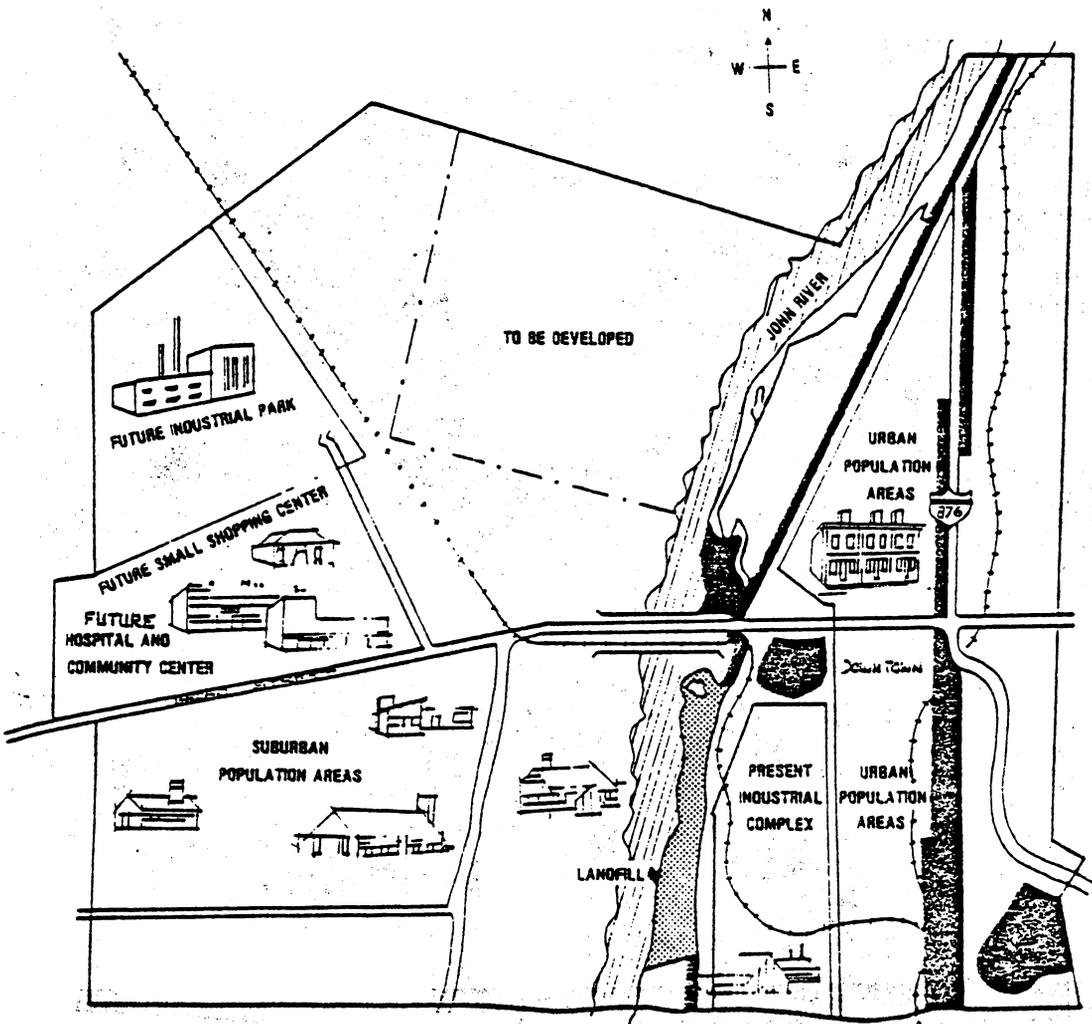
We are going to pretend that we live in Glen City. Glen City needs a new way to manage solid waste. Here is some information about the city.

1. The area shown on the map is five square miles.
2. Glen City is a small city, about the size of Staunton, Hopewell, or Bristol, Virginia. 25,000 people live in Glen City.
3. 65% (about 16,000) of the people live in the area east of the river.
4. A major four-lane highway, Interstate 876, runs north-south through downtown Glen City.
5. Many new people and businesses are expected to move into Glen City in the next few years.
6. The John River is 300 yards wide. It can handle logs and small boats, but not large barges. There is a park along its bank (black area) with swimming, fishing, and boating facilities. The river flows from north to south. Other city parks are shown as black areas. The Southern Landfill, shown by diagonal lines on the map, will become a park when it is filled to capacity.
7. Voters are deeply concerned with the way the city looks and have made it known to the City Council that they would like more open space areas (such as parks) in the city.
8. The city's downtown area, lower right on map, has just received a \$350 million grant to improve this urban area.
9. The city has sufficient energy resources.
10. The lower left portion of the map shows a suburban area that contains 30% (about 7,500) of the city's population.
11. The city's railroad system includes both rapid transit as well as large-scale freight service (K&Z Railroad).
12. Recently, several large industrial and commercial corporations signed "agreements to buy" with a contractor who is building a large industrial park across the river (upper left on map).
13. Glen City is also within a 60-minute drive of a large city.
14. Most of the factories are located in the present industrial area.
15. The city's unemployment rate is equal to that of the nation.
16. The city's old incinerator, located on the John River in the landfill area, was closed down because of air pollution control laws.
17. The landfill used by the city since its founding will shortly reach its capacity.
18. Several local businessmen are trying to buy some land between the future industrial park and Broad Street where they would like to

18. (Cont'd.)—construct a small shopping center and, in cooperation with city government, build a small hospital and community center.

GLEN CITY MAP

GLEN CITY



LEGAL COMMITTEE RESPONSIBILITIES*

1. Call your local litter control program director or the office of the Director of Public Works in city government and find out who makes sure people follow the rules about solid waste management in our community.
2. Write a letter (or call) to invite someone from the agency responsible for seeing that the rules about solid waste management are kept to come to the school and tell the class about the laws. (Police, Sanitation, Health Departments)
3. Ask that person if these rules—laws, ordinances—are enforced. If they are, ask how: Are people allowed to burn or bury their trash? Do people get tickets for putting trash or garbage out on the sidewalk in open containers? Do people get fined for not having a big enough dumpster to hold all the solid waste generated by a store or restaurant? Do all parking lots have to have trash receptacles? What are the fines for breaking these laws and just putting out waste any old way?
4. If people don't pay much attention to the laws about managing solid waste, ask the person who is responsible for enforcing the laws? "Why are the laws ignored?"
5. Find out what other kinds of laws there might be to tell people how they should manage their waste. Ask the community's litter control program leaders. (You can get the names of these people from the Division of Litter Control Office in Richmond.)
6. Look at the Glen City Information Sheet. What is happening in the city that might get people to follow new rules (look at #7 and #8)? Will special rules be needed for #12 and #18?
7. From what you have learned, decide on rules for families, rules for businesses, rules for people on the street—rules you think people will follow that Glen City should have in its waste management plan.
8. Write down those rules and, when the time comes to play the "Glen City Council" part of the simulation game, tell the Council what this committee thinks the laws should be.
9. Be prepared to explain why the committee thinks these rules are important and why people would follow these rules if they knew about them.

EQUIPMENT COMMITTEE RESPONSIBILITIES*

1. Look around the community—in your neighborhood or on your roadsides, around the school, downtown, wherever you go in the next few days—and try to see what kinds of equipment are used to store, collect, and carry solid waste to the disposal site. What kinds of containers do people put outside their homes for garbage? What kinds of containers do businesses use outside their stores or factories?
 - a. Make a list of the containers and equipment you see.
 - b. Decide which ones do the best job. Make a list of these best containers.
2. Contact the Sanitation Department or community's litter control program leaders (get these names from the Division of Litter Control office) and ask if someone can come to the school with some of the trucks and other machinery used to handle solid waste and tell the class about them. Or visit the department to look at the equipment.
 - a. Ask the sanitation workers if these are the best kinds of trucks or machinery for the job. If the locality had more money, would it buy new equipment? What kind of equipment would it buy? What would each cost?
 - b. Show your list of the best containers to the sanitation people. Ask them if they agree that these are the best containers. Do they know of other kinds of containers that might be better? Do they know how much they cost?
 - c. Find out if the sanitation people have equipment catalogs the Committee might borrow, so you can see what is available and make more suggestions for the kind of equipment Glen City should have.
3. Review all the ideas you have about containers and equipment.
 - a. Look at the Glen City Information Sheet to see if there is anything that should be considered before deciding on what kinds of containers and equipment you will recommend to the Glen City Council. Look especially at #6, 7, and 8 when thinking about containers. Look at #3, 5, 8, 10, 11, 14, and 18 when thinking about equipment.
 - b. Make a list of the number and kinds of containers and piece of new equipment Glen City should have. Figure out how much everything would cost.
 - c. Look at the Information Sheet and see how much the City has to spend.
 - d. If the things on your list would cost more than the city has to spend, either take some things off your list, or see if there is any way to get more money for containers and equipment.

EQUIPMENT COMMITTEE RESPONSIBILITIES (Cont'd.)

4. Prepare your final list of recommended new equipment and containers to present to the Glen City Council. Be prepared to discuss your recommendations and the reasons for them with your class.

DISPOSAL METHODS COMMITTEE RESPONSIBILITIES*

1. Ask your teacher to arrange for you to visit a sanitary landfill in your community or invite someone from the Sanitation Department to visit the class and describe the landfill and how it operates. Ask that person to bring pictures, drawings, maps and diagrams. Get a copy of the questions the Temporary Landfill Siting Committee is using and ask the persons these listed questions.
2. Call the Sanitation Department or the community's litter control program leaders (get these names from the Division of Litter Control Office) and find out if there is a citizen (or municipal recycling center in your community. If there is, ask the teacher to arrange for this committee to visit it, or invite someone from the Center to talk to the class.
3. Ask your teacher to arrange for you to see a film about resource recovery or recycling. Divide the Committee into two "literature search" teams. One team is to go to the community or school library and look up books and articles about sanitary landfills, recycling centers, incineration and resource recovery systems; the other team is to go to the Public Library and look up the same material. The Division of Litter Control also has some booklets dealing with these topics.
4. When meeting with people from the Sanitation Department or Recycling Center (1. and 2. above), ask them to explain some of the advantages and disadvantages of the forms of solid waste disposal you are finding out about—recycling centers, sanitary landfill, incineration—to recover energy and resource recovery. Take notes on what they tell you.
5. After the "literature search" teams have found out everything they can at the libraries, and the Committee has visited the landfill and recycling center, make lists of all the advantages and disadvantages you have discovered about each of the three disposal methods (sanitary landfills, incineration, and recycling or resource money).
6. Discuss this among yourselves until you can agree on the method you recommend to the Glen City Council, and on the reasons why the Committee thinks that method is the best one for Glen City.
7. Be prepared to make this recommendation to the Glen City Council and to discuss your suggestion with the rest of the class.

TEMPORARY LANDFILL SITING COMMITTEE RESPONSIBILITIES

1. Ask the teacher to arrange for this committee to visit the sanitary landfill in your community or see a film about landfills.
2. At the landfill, ask the Landfill Manager the following questions and write down his/her answers. If you view a film, write a letter to the Landfill Manager asking him/her these questions:
 - (1) How large is the landfill?
 - (2) How many trucks dispose of solid waste daily?
 - (3) How much solid waste can each truck hold?
 - (4) Who owns the landfill?
 - (5) Does it serve a municipality, county or region of a county or private customers?
 - (6) Is there a fee for individuals to bring materials to be thrown out?
 - (7) At what hours may the public use the landfill?
 - (8) How much did it cost to build the landfill?
 - (9) How many people does this landfill service?
 - (10) What is the expected life of the landfill?
 - (11) How accessible is the landfill?
 - (12) What are the reactions of people living near the landfill?
 - (13) How much noise is there from trucks and earth-moving equipment?
 - (14) Does it smell?
 - (15) Are any water pollution problems developing at the landfill? What has been done to prevent leachate (water containing waste from the landfill) from the buried waste from running off into the groundwater?
 - (16) How much does it cost to build and keep a sanitary landfill going?
 - (17) Are the trucks coming into the landfill covered? How would this help?
 - (18) Do the roads going into the landfill go past many houses or stores?
 - (19) How big a landfill would be needed to take care of the waste of a city of 25,000 people for five years if the city has several factories?
 - (20) What is done to keep the solid waste from getting loose and turning into litter before it is covered with earth?

3. After you have made notes of what everyone learned at the landfill, do the following tasks?
 - a. Study the map and find out where all open space is in Glen City that could possibly be used for a temporary landfill. (How much land will be needed to take care of the solid waste generated by 25,000 people for five years?)
 - b. Choose a first choice site for building the landfill, a second choice and a third choice.
 - c. Mark on the map the places where most of the solid waste will come from. Draw lines in pencil from those places to your first choice for the new landfill—to your second choice and your third choice. Which possible site requires the least carrying of solid waste?
4. Would the trucks carrying solid waste to your first choice for the temporary landfill have to go through many streets where people live? Would this cause a problem? What could be done about it?
5. Is your first choice location very far from the sites where new buildings may be constructed?
6. Is your first choice for the landfill near the river? Might this allow leachate from the buried solid waste to pollute the river? What could be done about it?
7. How many new roads would have to be built to permit trucks to get to your first choice for the temporary landfill site? Where would they go?
8. Ask your parents and other adults how they would feel if:
 - a. the community built a landfill near their house
 - b. trucks had to go past their house to get to the landfill
 - c. the city built a solid waste transfer station on their street
 - d. If they say they would be very unhappy if one of these things happened, ask them what they would do about it.
9. Might any of the people in Glen City object to having the temporary landfill where you are planning to put it? Would they object to having trucks go by their houses or businesses? Would they object to waste getting loose and blowing on their property? What could be done about their objections?
10. Discuss these points, then review your first choice for a site. If necessary, change the location of the site the Committee will recommend to the Glen City Council. Draw a map of what the landfill will look like. Show the roads leading to it and any other important features you may decide that it should have.
11. Be prepared to present your recommendation to the Glen City Council and to discuss the reasons for it with the rest of the class.

Date Started _____

Date Completed _____

OPERATION WASTE WATCH

COMMUNITY SOLUTIONS FOR SOLID WASTE POLLUTION

INDIVIDUAL ACTIVITY CARDS

LEVEL 6

VIRGINIA DIVISION OF LITTER CONTROL

INDIVIDUAL ACTIVITY CARDS

Teacher Card—Level 6

Introduce the INDIVIDUAL ACTIVITY CARDS after all the students have seen the filmstrip. The 17 IACs are designed for small groups or individual students. However, the IACs may be used as total class activities if it is not feasible to carry out individual or small group activities with your class.

The majority of the Level 6 IACs need not be completed in numbered sequence (with the exception of IAC 13-17). There are several ways to use the IACs:

1. One group of students could work with you on a few cards while an aide or other adult uses some other cards with another group.
2. Place three or four IACs at one time in a Learning Center.
3. Allow small groups of students to choose one activity card and then make a group report to the class about the activity selected. You may wish to duplicate additional sets of cards so that several students can work on the same card simultaneously.
4. If a cassette player is available, you may decide to put the IACs on audiotape.

Each student should complete the IACs before the CLASS ACTIVITY CARDS (CACs) are introduced. (However, the MINI-LANDFILL Activity will overlap the CAC activity.) Cards containing more difficult activities are marked with asterisks (*) in the upper right-hand corners.

To shorten the unit somewhat, we suggest that only the CORE ACTIVITY CARDS be used. Core Cards are marked (CORE) in the upper left-hand corners.

Duplicate the VOCABULARY WORKSHEET for each student for IAC-12.

Note: Contact the Division of Litter Control for the name of the Litter Control Program Coordinator in your community. This individual should be able to inform your class about solid waste disposal and laws in your locality. For IAC-8 you will need to prepare a short list of local anti-littering laws in simple language to distribute to the students.

OPERATION WASTE WATCH

(CORE)

Level 6

THROW AWAY

IAC-1/17

Make a list of the amount and kinds of solid materials you dispose of (throw away) during normal living activities for a certain period of time, such as one day or one week. Examples of solid waste most people dispose of are food wrappers, cardboard boxes, cans, bottles, waste paper, food remains, and used school supplies.

Turn in your paper to your teacher.

(Note to the teacher: You can extend this activity into a game—Ask a few students to read the lists of other students to the class without identifying the authors. Ask the class to try to guess something about the writer of the list [for example, is the writer a boy or girl? What does the author enjoy doing, etc.?.])

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 6

A WASTE SURVEY

IAC-2/17

Look around the community near the school for solid wastes.

Look for trash in receptacles, "junk" automobiles, rubble from demolished buildings, food remains, piles of leaves, lawn clippings, unused building materials, tires, discarded home appliances such as refrigerators, and litter such as beverage cans, plastic, and paper.

Make a list of all the solid waste you find.

Are there certain places in the community where there is more solid waste than in other places? Write down the name of the place where there is the least amount of solid waste. Write down the name of the place where you found the most solid waste.

Turn your paper in to your teacher.

*drawing of an abandoned automobile

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 6

CAFETERIA COUNT

IAC-3/17

Write down the names and numbers of items which your class throws away in the school cafeteria in one lunch period (for example: 25 milk cartons, 5 sandwich bags, 30 paper napkins, 2 apple cores, etc.).

Think about how many of each item the whole school probably throws away in one day. Make a list of what you would guess these amounts are (for example, 375 milk cartons, 75 sandwich bags, etc.).

Where is all this trash taken? Could any of the items thrown away be recycled?

Turn your lists and the answers to these questions in to your teacher.

OPERATION WASTE WATCH

(CORE)

Level 6

WHAT DO CITIZENS THINK?

IAC-4/17

Ask one of your parents and two adult neighbors these questions. Write down their answers.

1. Do you think solid wastes are disposed of properly in our community?
2. Would you like to see anything changed about the way solid wastes are handled?
3. What could the local government do to help solve solid waste problems?
4. Do you know what the laws are in our community about disposing of trash and keeping property clean?
5. Would you like to start recycling the glass, aluminum and paper you use? Read your answers to the class and turn in your paper to the teacher.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

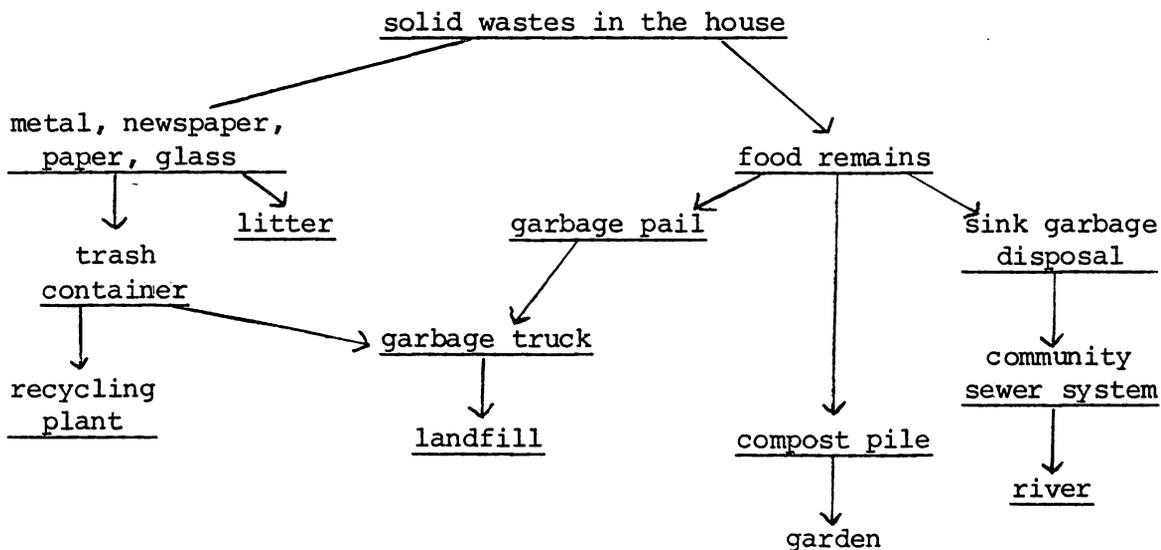
(CORE)

Level 6

PATTERNS

IAC-5/17

Here are some things which could happen to the solid wastes in and around a house:



Copy this chart and complete the "plastic" section. Underline in red the things that do happen in your house. Underline in green the things you think your family should do at home. Discuss your ideas with your family and show them your chart.

Turn in your chart to your teacher.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 6

AN ART PROJECT

IAC-6/17

Bring some clean solid waste to school from a trash receptacle at home or from litter found in the environment.

Create some art from the solid wastes you collected. (Make a sculpture, collage, painting, or other form of art.)

Now write a poem or a short story about your art.

Display your art and your writing in the classroom.

*drawing of solid waste art sculpture

OPERATION WASTE WATCH

Level 6

INVENT A USE

IAC-7/17

Gather at least six objects from your home or yard which are useless, unwanted, or discarded materials, solid waste. Find a new use for each object or for combinations of the objects.

Show each object to your class and talk about what new use you have invented for it.

(*drawing of bird feeder from milk carton

OPERATION WASTE WATCH

Level 6

LAWS

IAC-8/17

Get a copy of the litter and solid waste management laws for your community from your teacher.

Read these laws carefully. Make a list of everything a homeowner must do to dispose of trash properly. Make a list of responsibilities of every apartment dweller.

Do you think the laws need to be changed in any way? Do you think the community needs any new laws? Write down your answers to these questions and turn in your paper to your teacher.

(Note to the teacher: Contact the Division of Litter Control for information on state laws and local leaders who administer the litter control program in your community.

OPERATION WASTE WATCH

(CORE)

Level 6

WHAT'S GOING ON IN YOUR COMMUNITY

IAC-9/17

Find out how trash was disposed of in your community 50 years ago, 20 years ago, 10 years ago.

Find out how trash is disposed of today in your community. Do you have a home trash collection service? Do you use your county's green box system? Is the waste taken to a landfill, burned (incinerated), recycled or more than one of these? Find out where the landfills (and any incinerators or recycling centers) are in your community. On a map of your area, mark each location.

You can write a letter to the local SANITATION DEPARTMENT to get this information. Ask your teacher to help you with this project.

Write a short report on solid waste management in your community.

Give your written report to your teacher.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 6

T.V. COMMERCIAL

IAC-10/17

Write a three-minute, one-page commercial dealing with some part of the solid waste management system in your community. The commercial may be serious or humorous. Think about the age of the people who are to see your commercial.

Present the commercial to your class. Perhaps it can be videotaped for others to see.

OPERATION WASTE WATCH

Level 6

HOW DO YOU FEEL?

IAC-11/17

Answer the following questions on your paper:

Do you think all solid waste is ugly or are some things in solid waste nice looking?

Is it important for an outdoor environment to look beautiful? Why or why not?

Is it important to keep the indoor environment attractive? Why or why not?

Write a short story about how you feel when you are in a beautiful outdoor environment and how you feel in an ugly outdoor environment.

Give your answers and your story to your teacher.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 6

VOCABULARY WORKSHEET

-12/17

Get a copy of the VOCABULARY WORKSHEET from your teacher. Complete it on your own; then turn it in to your teacher.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 6

MINI-LANDFILL

IAC-13/17

Materials you will need:

Two identical pieces of each of the following materials:

food scraps, newspaper, cardboard, glass, cloth, soap chips,
paper, glass and aluminum and steel cans, plastics, copper
wire

1 cardboard shoe box

1 piece of aluminum foil or plastic. large enough to line the
shoe box

toothpicks

several pices of string, cut about 6 inches long

masking tape

several small pieces of cardboard

 $\frac{1}{2}$ glass water

Go to IAC14/17

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

IAC-14/17

Build a mini-landfill. Line a shoe box with aluminum foil or plastic.

Fill the box half full with earth. (Don't use potting soil, because it
does not contain the tiny creatures—organisms—which break down natur-
al waste.)

Attach a piece of string to a toothpick with tape. Write the name of
each waste object on a small piece of cardboard. Fasten each piece of
cardboard to the second end of the string with masking tape. Bury two
identical rows of waste material in the earth, leaving the cardboard
labels on top of the soil surface. Write down the date you buried the
waste items.

Add a little water. Put your mini-landfill in the sunlight, perhaps on
a windowsill. Wait about 10 days before you continue. Write down the
date you examine the items.

Carefully remove the waste items from one row of your landfill. Exam-
ine the items with a magnifying glass.

Date card taught _____ Time spent teaching card (min.) _____

Go to IAC-15/17

OPERATION WASTE WATCH

(CORE)

Level 6

IAC-15/17

Answer the following questions on your paper:

1. Which items in the mini-landfill have decomposed the most?
2. Are the items which are decomposing man-made or natural?
3. Are the items which are decomposing quickly biodegradable?
4. Which items show only a few signs of decomposition? Why do you suppose they are decomposing more slowly than the first group?
5. Which items showed no signs of decomposition? Can you tell why? will they remain unchanged indefinitely? Are they made of materials which should be reused or recycled instead of being buried in landfills?

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 6

IAC-16/17

6. Why might mold form on your mini-landfill? What would happen if the mini-landfills had been made of sand and no water had been added? What happens to waste left out on a desert?
7. Suppose the landfill wastes had been put in potting soil. Would the biodegradable wastes have decomposed as quickly? Why or why not?
8. Did you notice any space around some of the waste items as you dug them out? What do you think caused that space to form? If this happens in a full-sized landfill, might this affect how the land can be used after the landfill is filled with trash?

Give your paper to your teacher.

(Note: Write to Ms. Dorothy Castles, Clean Community Coordinator, Virginia Beach Clean Community System, Municipal Center, Virginia Beach, Va., 23456, to find out about Mt. Trashmore.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

(CORE)

Level 6

INCINERATION

IAC-17/17

Materials Needed: 1 pair of tongs
 1 candle in a holder
 matches

With your teacher supervising, take each item that showed no signs of decomposition and hold it over a candle flame with tongs. Burning is also called "INCINERATION." Some communities get rid of solid wastes by incinerating them in very large, very hot furnaces called incinerators. Caution: DO NOT BURN PLASTICS. SOME PLASTICS GIVE OFF VERY TOXIC FUMES WHEN THEY ARE BURNED.

1. Which items burn; which do not?
2. Of the ones that burn, which ones give off smoke?
3. Which of the ones that give off smoke, or an odor, would probably cause the most serious forms of air pollution? Why? (You may contact the Virginia Air Pollution Control Board for information.)
4. Of the items which do not burn, which ones do you think would burn if the heat were as high as that used in a municipal incinerator? How could you find out the answer to this question? If some materials such as glass and copper won't burn, will they melt when the heat gets high enough? Why might we want to melt some items?
5. Do you think it costs a lot of money to build and repair an incinerator for wastes?

* * * * *

Carefully remove the items in the second row of your landfill after 30 days. Repeat the observations and questions on IAC's 14, 15, and 16.

Based on what you have learned about sanitary landfills and about incineration, which do you think is the better of the two methods of solid waste disposal in your community?

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH
COMMUNITY SOLUTIONS FOR SOLID WASTE POLLUTION
CLASS ACTIVITY CARDS
LEVEL 6
VIRGINIA DIVISION OF LITTER CONTROL

CLASS ACTIVITY CARDS
TEACHER CARD—LEVEL 6

The 12 CLASS ACTIVITY CARDS (CACs) are designed for a large group or for the whole class. These cards present a simulation game designed to develop the students' decision-making skills and their understanding of community solid waste management problems. The CACs should be used after the students have seen the filmstrip and completed the IACs.

Notice that the 12 cards are in a sequence and should be followed 1, 2, 3, . . . 12. Before you begin the simulation game, distribute a copy of the Glen City Information Sheet and Map to each student. Duplicating masters are provided in this kit. The class will be divided into four committees and will conduct some independent research. (This activity is from the Sixth Grade Study Unit of WASTE IN PLACE. Keep America Beautiful's curriculum for elementary students.)

Be sure to find out what your community is doing to fight the littering problem. Contact the Division of Litter Control or your local government for information. Explain the local program to your students.

DUPLICATING MASTERS NEEDED FOR THIS ACTIVITY (see box lid packet)

1. Glen City Information Sheet
2. Map of Glen City
3. Legal Committee Responsibilities
4. Equipment Committee Responsibilities
5. Disposal Methods Committee Responsibilities
6. Temporary Landfill Siting Committee Responsibilities

Date started _____ Date completed _____

OPERATION WASTE WATCH

Level 6

SOLID WASTE IN OUR COMMUNITY

CAC-1/12

Discuss the following questions with the students:

1. When we talk about "waste management" what do we mean? (Everything that has to be done to get rid of all the waste in a community.)
2. Who can tell me where solid waste is generated—where many things are used and have to be discarded—here in school? (classroom, cafeteria, etc.). Who can tell me where most solid waste is generated in our homes? (kitchen). In our neighborhoods?
3. Let's think about the solid waste in our homes. What steps do we have to take to get rid of it? How do we manage it? (Empty all household containers into large, weatherproof containers, etc.)
4. Once it is outside our houses, does anyone know what happens? Can anyone tell us, step-by-step, where it goes and how it gets there? (Pickup by sanitation workers in collection vehicles—compactors, in many communities—transported to transfer station, or directly to disposal site.) Does our community use sanitary landfills? How many? In winter? Do we have any recycling Centers?
5. How many people do you think it takes, including the people in your house who help to get the garbage and trash ready for collection, to get rid of your family's solid waste?

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 6

CAC-2/12

6. Can anyone tell us what kind of equipment is used to get rid of your family's solid waste? What do the sanitation workers use to pick it up? What is it carried in?
7. Does anyone know how we dispose of solid waste in our community? Does our community use sanitary landfills? Incinerators? Recycling Centers? How many of each are there?
8. Does anyone know any other methods for disposing of solid waste—ways to get rid of it without hurting the environment?
9. What could happen to our city (town) if we didn't "manage" solid waste—if we just threw it in the street the way people did hundreds of years ago? What would our city look like? What would our city smell like? What would happen to our health if all our solid waste, all the trash and garbage and debris from every house and business, was just thrown out?
10. Now, can anyone tell me why it is very important to manage solid waste properly? For the next few weeks we are going to find out how waste is managed in our community, and what other ways there are for decreasing the amount of it, collecting it, and disposing of it in a way that won't hurt the environment. To help us learn, we are going to play a simulation game. Can anyone tell me what kind of game that is? (Continue discussion and introduce concept of "pretending".)

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 6

CAC-3/12

For the next few weeks we are going to pretend that we live in "Glen City." The Information Sheet I just handed out tells you about "Glen City." The map shows you what it looks like. (Read over the Information Sheet with the students and help them study the map of Glen City.

We are going to pretend that Glen City needs a new way to manage solid waste. The citizens here have been using a sanitary landfill, but there is only a little room left in that landfill. A new landfill, or a new way of getting rid of Glen City's waste, will be needed pretty soon. We also need to keep our city cleaner, to keep waste from escaping containers and becoming litter. And we want to save money.

We are going to pretend that this class has been asked to decide just what should be done. Some of us will pretend to be Research Committee member—people who have to get all the information about the various parts of waste management and make suggestions to the City Council about what Glen City should do with its waste. A few of us will pretend to be City Council members—the people who must decide what is the best way. They will listen to what the research Committees suggest, and then they will say what is going to be done.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 6

CAC-4/12

The four Research Committees are:

1. The Legal Committee—Its job is to find out what rules Glen City has about solid waste management. These rules should help people have good habits about handling waste. If they don't, maybe Glen City needs some new laws.
2. The Equipment Committee—Its job is to find out what kinds of containers and equipment Glen City needs to make sure that no solid waste escapes while it is being stored, collected, or taken to where it will be disposed of.
3. The Disposal Methods Committee—Its job is to find out what is good and what is not so good about the various methods available for getting rid of waste without hurting the environment.
4. The Temporary Landfill Siting Committee—We are pretending that there isn't enough time for Glen City to just go ahead and do something new. We will need a place to dispose of solid waste for a while, to give us time to build a permanent place. This committee will suggest a place and a design for the new landfill.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 6

CAC-5/12

If possible, let the students choose the committee on which they prefer to serve. Give each a copy of the responsibilities for that committee using the duplicating master provided.

Make sure everyone understands what is expected of his or her committee.

Set a schedule for carrying out the various responsibilities for each committee.

Remind the class that while they are pretending to live in Glen City, they will be getting information about waste management in their own community. They are to pretend that the facts they learn are true for Glen City, too.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 6

SIMULATION SITUATION

CAC-6/12

Read the following summary to the students:

A farmer who owns 350 acres along the John River recently passed away. After completing an extensive survey, a private consultant for the city has recommended that the land be used as a solid waste processing site. Three systems were proposed, specifically: (1) a long-life (50-60 years) sanitary landfill; (2) an energy-generating incinerator; (3) a recycling center or a resource recovery system. Based on considerable public reaction to each of the systems proposed, City Council has now decided to conduct a series of public hearings to determine what method will be adopted. In the meantime, the council has decided to create a temporary (3-5 years) sanitary landfill to handle wastes until the long-term system is functioning. \$125,000 is available for new equipment to store, collect, and carry waste to the new temporary landfill site.

The city is very concerned with improving solid waste management. The citizens also need to keep the city cleaner (that is, to keep waste from escaping from containers and uncovered trucks and becoming litter). And we want to use a system that will save us money.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 6

COMMITTEE WORK

CAC-7/12

Each committee is to carry out the research it is responsible for.

Ask each committee to write down all the facts each worker learns and keep this information in a Committee Notebook.

Reports—Each committee must prepare a written oral report about what is found out and about its recommendations. Each committee should decide which member will report and how to present the findings.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 6

CITY COUNCIL MEETING

CAC-8/12

After all the committee work is completed, hold a City Council meeting.

1. Have each committee draw straws among its members to select one to play the role of a "City Council Member".
2. Let the selected students choose the role they will play (or assign the roles yourself):
 - a. City Council President—this person is the president of the bank. He wants to see Glen City grow but knows that it will not continue to grow if it isn't a clean, pleasant, environmentally-sound community.
 - b. Council Member Jones—this person is worried about taxes. He or she wants a clean, pleasant, environmentally-sound city, but only if it won't cost any money.
 - c. Council Member Smith—this person doesn't pay attention and never remembers what has been said. He or she keeps asking questions that have already been answered.
 - d. Council Member Green—this person wants to be sure that whatever is decided is the best decision which could be made. He or she wants all the details, wants to know the disadvantages as well as the advantages, will accept some disadvantages if they are not too bad.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 6

CAC-9/12

3. Have the council members go up to the front of the room and sit in a row. The Council President says: "This meeting will now come to order. We are going to hear recommendations from the four committees that have been studying Glen City's solid waste management needs. Council members will let each committee finish its presentation before asking any questions. The first committee to report will be the Legal Committee."
4. Have the committee report in whatever manner they have agreed upon among themselves. When they have finished, encourage the "Council Members" to ask questions. Prompt them, if necessary.
5. Follow this procedure with each committee in turn.
6. When all the committees have completed their reports, allow the "Council Members" to ask more questions if they are so inclined. Allow committee members to ask questions of other committees.
7. When all the "Council's" questions have been answered, have them make individual lists of the recommendations they favor, but instruct them not to discuss their votes with the other members of the class.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 6

CAC-10/12

8. Meet with the "council" out of hearing from the rest of the class. Help them achieve concensus on the recommendations they favor, but do not urge them to adopt all the recommendaitons. Have the "Council President" write out the list of accepted recommendations to read to the rest of the class.
9. Have the Council President read the list of recommendations adopted by the Council. If some of the recommendations were not accepted, have other Council members tell the class why.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION, WASTE WATCH

Level 6

CAC-11/12

10. Initiate a discussion on the Council's deicision by asking the following questions:
 - a. What are some of the things that you learned about solid waste management?
 - b. How did you feel about the simulation?
 - c. Did it help you to work better with your classmates?
 - d. What did you learn about how your personal decisions affect the lives of other people?
 - e. What did you learn about how you personally have to bend your opinion at certain times in order to work with other people, such as your fellow committee members?
 - f. Did you like the Council's decision?
 - g. Did you agree with the parts of your proposal that they accepted?
 - h. Were you upset in any way about the parts of your proposal they didn't accept?
 - i. Do you feel that the parts that were left out would have made Glen City's solid waste program better?
 - j. Did you feel comfortable in making your presentation?
 - k. Did you have enough background information to make a good presentation?

Continue this line of discussion as long as necessary, letting students comment and evaluate the effectiveness of this project.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 6

FORM AN ECOLOGY CLUB!

CAC-12/12

Look over the information on forming an ECOLOGY CLUB which is provided in the Level 6 kit.

If the activity is appropriate for your students, present the idea of forming an ECOLOGY CLUB to study and deal with your community's environmental problems. The Division of Litter Control can provide project ideas and membership materials to any interested group of students, grades 6-12.

The Division also conducts an Annual Awards Program to recognize outstanding projects of the Ecology Clubs. Contact us for further information.

Date card taught _____ Time spent teaching card (min.) _____

APPENDIX D
MODIFIED ACTIVITY CARDS

OPERATION WASTE WATCH

WASTE OUT OF PLACE

Level 1

Revised Individual Activity CardsTeacher Card—Level 1

Introduce the INDIVIDUAL ACTIVITY CARDS after the filmstrip has been viewed by all students. The 12 IAC's have been designed for use by small groups of children or individual students. However, the IAC's may be used as total class activities if it is not feasible to carry out individual or small group activities with your class.

Level 1 IAC's need not be completed in numbered sequence. In most cases, someone (you, an aide, or parent) will have to read the directions to the students. Most of the IAC's require verbal responses by the students. One group of students could work with you on a few cards while an aide or other adult uses some other cards with another group. You may wish to duplicate additional sets of cards so that several children can work on the same card simultaneously. Or, if a cassette player is available, you may decide to put the IAC's on audiotape.

The IAC's should be used before in conjunction with the CLASS ACTIVITY CARDS (CAC's).

You will need to develop a large collection of pictures for several of the IAC's. Put a collection of pictures in each of 4 or 5 boxes labeled "PICTURE BOX." Many children will be glad to assist in the collection of these pictures. The Level 1 IAC's continue the emphasis on classification skills begun in the kindergarten unit, while introducing the concepts of useful and waste objects.

Date started _____ Date completed _____

Level 1

PICTURE BOX GAME

IAC-1/12

Get a PICTURE BOX from your teacher. Take out four pictures you like. Put them on top of your desk.

Now put any pictures you may have of natural objects in one pile. Put any pictures of man-made objects in another pile.

Show your teacher what you have done.

*drawing of natural and man-made objects

Date card taught _____ Time spent teaching card (min.) _____

Level 1

CHANGES

IAC-2/12

Look through the PICTURE BOX and find three pictures of things that will not change or will change very slowly. Then find three pictures of things that will change very quickly.

(for example, a rock changes very slowly, but a cloud changes quickly.)

Date card taught _____ Time spent teaching card (min.) _____

Level 1

MAGAZINE CUT-OUTS

IAC-3/12

When you go home today, cut our four pictures you like from magazines.

Bring the four pictures to school tomorrow.

Date card taught _____ Time spent teaching card (min.) _____

Level 1

PICTURES FROM HOME

IAC-4/12

Look at the four pictures you brought from home.

Paste the pictures on a piece of paper.

Draw a circle around any pictures you have of natural objects.

Draw an "X" through any pictures you have of man-made objects.

Show your teacher the pictures you have made.

Date card taught _____ Time spent teaching card (min.) _____

Level 1

USEFUL OBJECTS

IAC-5/12

Look around your classroom until you see three things that help people in some way. We say these objects are useful.

Draw a picture showing the three things you see.

Give the picture to your teacher.

Now think of three things in your house that are useful. Say the names of these things.

*drawing of three useful objects

Date card taught _____ Time spent teaching card (min.) _____

Level 1

SNACK TIME!

IAC-6/12

Take some crackers wrapped in cellophane from the teacher's desk. Unwrap the cracekrs and eat them. Why are the crackers wrapped? After the crackers are eaten, is the wrapper a useful or a waste object?

That's right, it's now a waste object. Put the wrapper in the waste-basekt.

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

Level 1

PLAY A GAME WITH A FRIEND

IAC 7/18

Find three pictures in a PICTURE BOX that show useful objects. Then find three pictures of waste objects. Mix up the pictures and ask a friend to group them into a waste object group and useful object group.

*drawing of child sorting pictures

Date card taught _____ Time spent teaching card (min.) _____

Operation Waste Watch

Level 1

IS LITTER UGLY OR PRETTY?

IAC 8/18

Litter is trash or waste people have put in the wrong place.

Look through the PICTURE BOX and find three pictures which show things which often become litter, like bottles and paper.

Draw a picture of a child putting litter into a wastebasket or garbage can. Give your picture to your teacher.

Date card taught _____ Time spent teaching card (min.) _____

Level 1

DO LITTERBUGS BUG YOU?

IAC-10/12

A litterbug is what we call someone who litters his trash instead of putting it in a wastebasket or trash can.

Draw a scary or a funny picture of a "litterbug!"

*drawing of Litterbug Monster

Date card taught _____ Time spent teaching card (min.) _____

Level 1

STOP LITTER NOW!

IAC-11/12

Draw a picture of three things that can help stop litter, like a trash can or a litter bag.

*drawing of trash receptacle

Date card taught _____ Time spent teaching card (min.) _____

Level 1

CLEAN-UP TIME

IAC-9/12

What happens when litter is left uncollected (or when we don't pick it up)? Look around your classroom. Can you find any litter? If you see any, go over and pick it up and put it in the wastebasket. What would happen if we did not pick up litter any more?

*Remember: Litter is waste put in the wrong place.

Date card taught _____ Time spent teaching card (min.) _____

Level 1

WHAT DO YOU SAY TO A LITTERBUG?

IAC-12/12

People feel good when something they have done is praised by others and feel bad when they are criticized for something they have done wrong. Things that people feel good about are often repeated, whereas the things we feel badly about are less likely to occur again. What would you say to a member of your family who picks up litter in your yard and puts it in the trash container? What would you say to a friend or a teacher? What if you saw a brother or sister throw away a cup in the street (and not in a trash can). What would you say then? Would you say something different to a friend or your teacher? What might be the results of saying these things?

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

WASTE OUT OF PLACE

Level 1

Revised Class Activity Cards

Teacher Card—Level 1

The 8 CLASS ACTIVITY CARDS (CAC's) are designed for the whole class or a large group of students. Used in numerical order, these cards present a suggested sequence of activities to help develop the ideas of natural and man-made objects. The CAC's should be used after the students have seen the filmstrip, and in conjunction with or after the INDIVIDUAL ACTIVITY CARDS (IAC's). At the completion of the CAC's, you may decide to present the filmstrip again as a review activity.

The Level 1 CLASS ACTIVITY CARDS are designed to encourage young children to become actively involved in the collection and redistribution of waste in their immediate environment. The activities also focus on the concept of recycling at a level appropriate to the abilities of children in this age group.

Date started _____ Date completed _____

Level 1

CAC-1/8

Write the word useful on one side of the board and the word waste on the other, and elicit a verbal definition for each. Go around the room and hold up five useful items and five waste items. Have the class identify the useful items by saying Yes and waste items by saying No.

Date card taught _____ Time spent teaching card (min.) _____

Level 1

CAC-2/8

An excellent story for you to read to your class is Litterbugs Come in Every Size by Norah Smalridge. This is a colorful, well-illustrated, hardbound book with an important message told in rhyme.

Help the class make hand puppets of NEATOS and LITTERBUGS from paper lunch bags, recycled objects, or socks. Create a litte puppet show about waste and littering.

If your school does not have this book, urge your librarian to order it from the Division of Litter Control or Western Publishing Co., Racine, Wisconsin 53404.

Date card taught _____ Time spent teaching card (min.) _____

Level 1

CAC-3/8

Ask the class to find five examples of waste in the classroom which are also litter. Ask the class how waste becomes litter. Ask them what people should do with litter. Ask some of the children to describe some of the ways waste can become litter. Now ask another group of children to describe some of the ways waste can become litter. Now ask another group of children to list different ways of preventing waste from becoming litter. Discuss with them some of the problems with litter (e.g., ugly, unclean, unsafe, etc.).

Date card taught _____ Time spent teaching card (min.) _____

Level 1

CAC-4/8

For the next several days, save all the clean waste from your class in a large container. After a few days ask the class to group the different kinds of objects in the container into the following groups:

paper—plastic—glass—metal

Did the class discover any other categories? Are some of the objects useful objects rather than waste objects?

Date card taught _____ Time spent teaching card (min.) _____

Level 1

CAC-6/8

Bring in an empty milk carton or large plastic drink bottle. Ask the class to stand up. Call on class members, one at a time, and ask each one to name a way in which the carton (or bottle) might be reused. Ask each child who answers incorrectly, or who fails to answer, to sit down. Those who correctly state a new use may remain standing. Continue until the class is all seated and verbally reward the child who answers with the most uses.

Date card taught _____ Time spent teaching card (min.) _____

Level 1

CAC-7/8

Explain to the class that some waste objects they cannot seem to find a use for can still be reused.

Tell the class that paper, glass, and aluminum waste objects can often be made into new things in special factories. This is called RECYCLING. Ask the class to start saving waste objects at school that can be recycled in your community. You may need to get a large box for each kind of waste object. The students might also want to save waste objects at home and bring them to class to add to the recycling box.

(Contact the Division of Litter Control for information on recycling.)

Date card taught _____ Time spent teaching card (min.) _____

Level 1

CAC-8/8

Discuss with the class again the idea that behaviors that are praised by others are repeated, whereas behaviors that are criticized are less likely to happen again. Ask the class what you should do when you see someone litter. List some ideas on the board and when the list is finished, let the children act out some of the different ideas. For example:

1. What should you do if, while walking to school, your friend started to pick up all the litter along the way? What would you say to him/her? Would you help?
2. What would you say, if, while driving to school with your parents, your father threw his plastic coffee cup out of the window? Might this influence your dad's future behavior?
3. What would you say at a Sunday school picnic if your teacher threw his/her napkin into the bushes? Where would you tell him/her to put the napkin instead? What would be the result of these statements?

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH
LET'S WASTE LESS WASTE

Level 4

Revised Individual Activity Cards

Teacher Card—Level 4

Introduce the INDIVIDUAL ACTIVITY CARDS after all the students have seen the filmstrip. The 7 IAC's are designed for small groups of children or individual students. However, the IAC's may be used as total class activities if it is not feasible to carry out individual or small group activities with your class. Either way, the activities require several class discussions about the cards.

Several Level 4 IAC's need to be completed in numbered sequence. One group of students could work with you on a few cards while an aide or other adult uses some other cards with another group. You may wish to duplicate additional sets of cards so that several children can work on the same card simultaneously. Or if a cassette player is available, you may decide to put the IAC's on audiotape.

We recommend that each student complete the IAC's before the CLASS ACTIVITY CARDS (CAC's) are introduced.

Date started _____ Date completed _____

Level 4

CROSSING THE STREET

IAC-1/7

Pretend that you are watching a six-year-old child at a street crossing.

Think about what you would do if the child started to cross the street on a red light.

Now think about what you would do if you were (1) a policeman, (2) the parent of the child, (3) a little old lady with a walking cane, (4) a child on a bicycle.

On your paper, write down what you would do in each of these 4 roles. Turn in your ideas to your teacher. Be ready to act out your ideas if your teacher asks you to.

Why do you think people act the way they do if they see a child start to cross the street on a red light?

We expect the child to wait for a green light, because most people follow . . .

Level 4

IAC-1/7

the "norm" of waiting for a green light before crossing the street. The "norm" of crossing the street on a green light is a "habit" most people share.

Date card taught _____ Time spent teaching card (min.) _____

Level 4

CLASSROOM NORMS

IAC-2/7

A habit is a certain action a person does over and over again. For example, a person might have a habit of chewing gum, or watching television after school, or biting his/her nails. A norm is a habit which most people do, like using a knife and fork to eat meat at dinner.

Make a list of five norms which are habits of student behavior in the classroom. Discuss your list with other students. Turn in your list to your teacher. Try to explain why the norms are being done.

Example: 1. In our class people are usually quiet when others are speaking.

2.

3.

4.

5.

Date card taught _____ Time spent teaching card (min.) _____

Level 4

SOME NORMATIVE SYSTEMS

IAC-3/7

Think of some norms of behavior in your school related to disposing of trash. Two norms are:

1. There is usually only one wastebasket in each classroom which the teacher and the students use.
2. Students do not usually pick up litter dropped in the hallways by other students.

List two other norms on your paper and give your list to your teacher.

1.

2.

Date card taught _____ Time spent teaching card (min.) _____

Level 4

HABITS—NORMS—LITTER

IAC-4/7

Think about habits and norms you follow. Copy the following questions on your paper and circle one answer for each question.

1. Imagine someone walking along the street eating a candy bar, and s/he wants to get rid of the wrapper. There is no receptacle or trashbasket around. Where do you think most people would put the wrapper?
 - a. on the sidewalk
 - b. in the gutter
 - c. on a pile of trash in a vacant lot

2. You see someone eating lunch in the school yard. When s/he is finished eating, s/he takes a used napkin and sandwich bag to the receptacle. However, the receptacle is full and overflowing. What would most people do with the trash?
 - a. throw it in the bushes
 - b. put it on top of the pile by the trash receptacle

Level 4

IAC-4/7

3. While eating lunch in the cafeteria, you notice someone who is obviously a bit late to class. The cleaning people are already beginning to wipe the tables when the person's cup rolls off his/her tray. Do you think most people would:
 - a. always stop to pick it up?
 - b. think the cleaning people would do it for them?

4. If you saw someone littering at school, would you tell them to pick up their waste?

Yes	No
-----	----

5. Would you litter something if you thought someone was watching?

Yes	No
-----	----

Level 4

IAC-4/7

6. On the way home from school, you buy a soft drink and drink it while you walk. As you finish it, you walk by a fence that divides a trash-covered lot from someone's front lawn. On which side of the fence would you likely throw the can?
- lot
 - lawn

Date cards taught _____ Time spent teaching card (min.) _____

Level 4

IAC-5/7

When the class finishes the activity on IAC-4, the teacher should lead a class discussion about it. Think about these "litter norms" before the class discussion.

- People tend to litter where there is already litter.
- People tend to litter where they think someone will clean up after them.
- Disposing of trash carelessly is, too often, the norm.
- People tend to litter where they feel the property is someone else's concern.
- People ignore litter. Many people just put up with loose trash.
- People tend to litter when no one is likely to see them.

Can you add any norms to this list? If you can, write them down and tell the class about your ideas.

Level 4

IAC-5/7

Have the class think about and discuss these situations. "If you had a candy wrapper in your hand, what would you do with it when you finished if you were:

1. in a crowded shopping mall?
2. on a hike alone?
3. at the school playground?
4. at a baseball game?
5. alone in your living room?

Have the class discuss the good and bad behavior possibilities in each case and ask them why it matters where you are in each of these instances and whether being alone matters and why.

Date cards taught _____ Time spent teaching card (min.) _____

Level 4

IAC-6/7

Discuss with the class that what we say and do is very important when we see someone litter. Also what others say and do when they see us litter is important. Behaviors that have positive consequences tend to be repeated, whereas those with negative consequences are not as likely to be repeated. Therefore, we should praise someone for good actions and save our criticisms for unacceptable behaviors. For example, what should we say to someone who has just thrown out a cup into the street? How would what you would say differ if that person was a friend, a parent, or your teacher? What should you say if while coming to school your friends all began to pick up litter along the way? Would you join them? Therefore, you can help others change bad habits into good habits by praising good behavior and scolding bad.

Date card taught _____ Time spent teaching card (min.) _____

Level 4

CARTOONS

IAC-7/7

On one-half of a piece of drawing paper draw a picture of one source of litter. Examples: overflowing litter basket
dumpster with trash around it
uncovered truck
person driving a car

Now on the other half of the sheet, draw a picture of the person whose "bad habit" created this litter. Have him/her say something about the litter. Put the words he says in the form of a balloon, as in a cartoon.

Look at the drawings done by your classmates.

Now draw another picture showing on one-half of the paper something bad happening because of the person littering and on the other half the person talking about how s/he learned a good lesson.

Now draw someone stopping another person from littering. What do they say to each other? Give your pictures to your teacher

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

LET'S WASTE LESS WASTE

Level 4

Revised Class Activity Cards

Teacher Card—Level 4

The 11 CLASS ACTIVITY CARDS (CAC's) are designed for a large group or the whole class. These cards suggest an outline of activities to develop the major ideas of solid waste management in the home and neighborhood. The CAC's should be used after or in conjunction with the IAC's.

Materials that you will need are listed on each card. Notice that in quite a few cases two or more cards go together. For example, CAC-4 is a continuation of CAC-3.

Duplicate a "Solid Waste Observation Form" for each student for CAC-3 through CAC-7.

Date started _____ Date completed _____

Level 4

HABITS

CAC-1/11

Ask the children what a habit is. (A behavior a person does over and over again without thinking about it.) Each child and the teacher should make a list of five of their own good habits. Now list some other things we do that are not habits. Why aren't these habits? If they are not habits, why do you think we do them?

Date card taught _____ Time spent teaching card (min.) _____

Level 4

NORMS

CAC-2/11

Return the lists to the students.

Ask several students to read the lists of their own good habits out loud. (See card CAC-1.) As the lists are being read aloud, have the other children check off on their own lists those habits which appear on the other students' lists. Determine whether one habit, that is not strictly personal, appears most frequently. Explain that his frequent habit (e.g., drinking milk for breakfast) can be considered a norm. A norm is a habit most people have that makes them tend to act in a certain way at particular times or in certain places. It is behavior that is expected and accepted, an unwritten rule. Ask how norms affect what we do in good and bad ways.

Discuss these questions and the norms they concern with the children:

1. Do we always, or almost always, wait for a green light before crossing the street? Why?
2. Do we yell when playing an exciting game? Why?
3. Do we raise our hands in class when we know the answer to a question? Why?
4. Do most people turn out lights when they are the last to leave a room?
5. Do we litter in movie theaters?

Date card taught _____ Time spent teaching card (min.) _____

Level 4

THE WASTE BOX

CAC-3/11

Ask the students to put all the wastebaskets in their homes in a closet, or the garage, or somewhere else out of sight. Leave a plastic trash bag in the kitchen for "organic waste." For this activity, have them take just one large wastebasket, or a box, or some other container and put it where everyone in the family can see and use it—but not where a wastebasket is usually kept. Don't have them put it in the bathroom, or in the kitchen, but perhaps in the hall or on the stairs, or in the middle of the living room. The students should ask their families to use only this container for the next 24 hours. All the organic waste, such as . . .

Go on to CAC-4

Level 4

CAC-4/11

garbage should be put where it usually goes; but all inorganic waste from the kitchen should be put in the "special" waste container.

Before they begin the activity, have the students weigh their large boxes or containers on their bathroom scales. Have them write down how much each weighs when it is empty. Also, have them measure their boxes with a ruler. After 24 hours they should weigh their containers again. (You may decide to have them use the metric system.) Demonstrate the weighing and measuring in class before they try the experiment at home.

The students should use the "Solid Waste Observation Form" to record their data. Explain the use of this data sheet and give one sheet to each student.

Go to card CAC-5 after they have completed this project.

Date card taught _____ Time spent teaching card (min.) _____

Level 4

TOTALING WASTE

CAC-5/11

With the students' assistance, transfer the data from the individual forms to a master chart on a large sheet of paper or on the chalkboard and complete the chart.

	(1)	(2)	(3)	(4)	(5)	(6)
Example:		Total	No.	Average	Average	Average
	Child's	Weight	in	lbs. per	per Person	per Person
	<u>Name</u>	<u>Collected</u>	<u>House</u>	<u>per Day</u>	<u>per Week</u>	<u>per Year</u>
	Cheryl Jones' Family	12 lbs.	4	3 lbs.	21 lbs.	1,092 lbs.

Discuss: Add up all the numbers in column 6. Explain that this is how much solid waste just the members of our own families generate. Discuss with the class what behaviors changed in this period. Ask the children to imagine what our homes would look like if we did not use any wastebaskets and what our neighborhoods would look like if all this waste got loose and piled up as litter. Ask the students if they can see why it is important to make sure that all waste is put . . .

Level 4

CAC-5/11

out for the Sanitation Department to collect and that it is carefully covered or tied.

Date card taught _____ Time spent teaching card (min.) _____

Level 4

MAP IT—A SURVEY

CAC-6/11

You will need a large, detailed map of the area served by your school and straight pins with heads of two colors.

In order to plan the survey, look at the map as a class and decide if there are places in the area that are more likely to be littered than other places. Review the definition of "litter" with the students. Have the children suggest locations (shopping centers, high-density residential areas, parking lots, bus stops, highway entrances, etc.) Mark these locations with pins of one color. Why are these areas more likely to be littered? What behaviors could have caused the situations? Discuss with the class the following:

One of the most common sources of loose refuse is household waste put in containers carelessly. Other sources of litter include poorly contained commercial waste, delivery areas that are not kept clean and neat, construction sites, and uncovered trucks carrying things that could blow or fall off.

Level 4

CAC-6/11

What could people do in each of these situations that would reduce the potential for litter?

Date card taught _____ Time spent teaching card (min.) _____

Level 4

CAC-7/11

Arrange a tour of the mapped area with the class on foot or by bus. On the tour, keep a record of any loose refuse. At each spot where you find a lot of litter, encourage the children to try to figure out where it came from and how it might have escaped from the proper container.

Follow-up in Classroom

Give each student a pin of the second color and have the student mark a spot on the map where the class found loose refuse. Again, have the children discuss what people have done (or have not done) that led to the litter in each location. That night have each student do this activity: Draw a map of the area where you live, such as a city block. Walk around your area or block and put a square (■) on the map for every house, an "X" for every store or restaurant or other commercial building, and an "O" wherever you see a waste container such as a garbage can, dumpster, or litter basket. Put a dot (•) wherever you see loose refuse.

Discussion: The next day help the students transfer the data from the individual maps to the master map.

Go on to CAC-8

Date card taught _____ Time spent teaching card (min.) _____

Level 4

CAC-8/11

Discuss these questions in class:

What kinds of litter were most common?

Is there any pattern to where litter was found? Is it more prevalent where waste containers are present or absent?

If litter was prevalent in areas where there were waste containers, were the containers overflowing? What behaviors cause this? Did they have lids or covers? Could animals have knocked them over, spreading the refuse around? If the containers were in good condition and not overflowing, is it possible that some people didn't even try to get their waste in the containers, but just tossed it in that general direction? Why do people sometimes "just toss" litter?

If litter was more prevalent where there were no waste containers, why didn't people carry their waste with them until they could dispose of it properly?

Did we make good guesses before we went on our walk about where litter would be found? Why or why not?

What could be done to encourage better habits about handling waste?

Level 4

CAC-8/11

As an example, ask the class if TV advertising such as the "crying Indian" would help get people to stop littering. Why or why not? Also ask the class about the effect of litter laws on littering behaviors. Do city ordinances work in stopping littering? Why or why not? What if it were discovered that all litter and waste could be sold as a fuel source. Would people help pick up litter then? Would people continue to carelessly throw away waste?

Date card taught _____ Time spent teaching card (min.) _____

Level 4

HOW TO HELP A LITTERBUG

CAC-9/11

Ask the children why they think people litter. For example, some of the reasons people litter are as follows:

1. People litter because they are used to having people pick up after them (in movie theatres, school janitors, perhaps at home).
2. People litter because they learn it from family and friends.
3. People litter because they do not feel the property is their concern.
4. Sometimes people litter because they have little respect for the environment or other people.
5. Sometimes people litter because they feel that a certain place is their territory, and they have a right to do what they want with this land.

Emphasize that most people litter at one time or another. Some people litter out of habit and others litter even if they are not in the habit of doing so. Habits and behaviors can be changed, and we can all help others stop littering. What are some of the ways we can help people stop littering? What could others do to help us stop littering?

Remind the class that people enjoy being told that their behavior is accepted and liked by others and when praised will tend to repeat those same behaviors. For example, what should you say to a parent who has been using your family litter bag instead of littering? Next time your parents appropriately throw something away rather than litter, tell them "Thank you for not littering." What do you think will happen? What would happen if you called your mother a litterbug when she threw out a gum wrapper while driving? Again remind your class that punished or scolded behavior will become less likely to recur.

Date card taught _____ Time spent teaching card _____

Level 4

HOW TO HELP OTHERS AND REDUCE LITTER

CAC-10/11

Have the children practice what they would say to someone who is littering and to someone who is helping reduce litter. Have the children act out each of the following scenes. Appoint one person who will act out the part of the litter helper or litterbug, one who will witness the behavior and respond, and the rest of the class to serve as the audience. However, split the audience in half. Half will verbalize what the litter helper (or litterbug) is thinking and the other will serve to direct what the witness is to say or do. Each scene may be re-enacted until both sides of the audience are satisfied that the witness has acted in the best interests of the scene.

- A. Two friends are walking home from the movies and one of them throws away his popcorn box into the bushes. What can the other person do so as to make that behavior less likely in the future, yet not make his friend mad. Half the audience will reflect the thoughts of the litterbug; the other half will help the other person with the best response.
- B. While out in the family boat, your father throws out a soft drink can.
- C. While out getting the morning paper, your brother stops to pick up some paper that has blown into the yard.
- D. While on a nature hike, your teacher brings a plastic bag along to gather litter.

Date card taught _____ Time spent teaching card (min.) _____

Level 4

CAC-11/11

Ask these questions:

What does your family do with an average of 84 lbs. of trash each week? Do you separate items such as newspapers, aluminum, and glass? Do you take these items to a recycling center? Do you compact your trash into a smaller size?

After you have studied the families' trash disposal habits, as a class design a system to improve family trash disposal which minimizes litter, decreases the amount of solid waste which must go to a landfill, and recycles aluminum, glass, newspaper, and organic substances, if possible.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH
COMMUNITY SOLUTIONS FOR
SOLID WASTE POLLUTION

Level 6

Revised Individual Activity Cards

Teacher Card—Level 6

Introduce the INDIVIDUAL ACTIVITY CARDS (IAC's) after all the students have seen the filmstrip. The 8 IAC's are designed for small groups of children or individual students. However, the IAC's may be used as total class activities if it is not feasible to carry out individual or small group activities with your class.

The Level 6 IAC's need not be completed in numbered sequence. One group of students could work with you on a few cards while an aide or other adult uses some other cards with another group.

You may wish to duplicate additional sets of cards so that several students can work on the same card simultaneously. Or if a cassette player is available, you may decide to put the IAC's on audiotape. Discuss the IAC activities with the whole class as necessary.

Each student should complete the IAC's before the CALAS ACTIVITY CARDS (CAC's) are introduced. (However, the MINI-LANDFILL activity will overlap the CAC activity.)

Date started _____ Date completed _____

Level 6

THROW AWAY

IAC-1/11

Make a list of the amount and kinds of solid waste you dispose of (throw away) during normal living activities for a certain period of time, such as one day or one week. Examples of solid waste are food wrappers, cans, etc.

What are the activities associated with each category of waste? For example, scrap paper and used school supplies are probably associated with the activity of homework. How does where you do your homework affect the likelihood of your littering these materials? For example, are you in a room where there is no trash can?

How can keeping in mind the waste associated with an activity and where the activity occurs help control the littering of your community?

Date card taught _____ Time spent teaching card (min.) _____

Level 6

WASTE SURVEY

IAC-2/11

Look around school and community near school (abandoned buildings, etc.). What kinds of litter are you likely to find and where would it most likely be? What activities lead to the litter? What kinds of planning before these activities would have prevented the litter? (Example: Litter bags in automobiles help prevent street/road litter; also, covering our trash containers so garbage won't blow out helps prevent litter.) Are certain places around your community more likely to be littered? Why do you think these places attract litter? Why, when we litter, are we not only adding to wasted resources but also contributing to overall problems in the community? For example, if we don't care enough to keep our community clean, will we care enough to join civic projects, help out needy citizens, or even vote? One bad habit may lead to others.

Playground project: After this discussion, send out a group of students to the playground before recess. Have the children litter the area immediately around a certain trash can. During recess ask that group to count the number of children who litter within 20 feet of the can. Have them praise the other children who actually pick up the litter around the can. On the next day, another group should make sure the can area is clean. Again, have a count at recess of how many children litter in the area of the can. Compare the counts for both days. Which yielded more litter? Does a cleaner environment promote more appropriate disposals? Why or why not?

Date card taught _____ Time spent teaching card (min.) _____

Level 6

WHAT DO CITIZENS THINK?

IAC-3/11

Ask one of your parents and two adult neighbors these questions. Write down their answers.

1. Do you think people in our community dispose of their solid wastes properly?
2. Would you like to see anything changed about the way solid wastes are handled?
3. What could the government do about the litter problem? Do you think litter laws work? Why or why not?
4. What would it take for people to stop generating so much waste?
5. If waste and litter could be sold, would people pick up litter and get not to carelessly throw out waste?

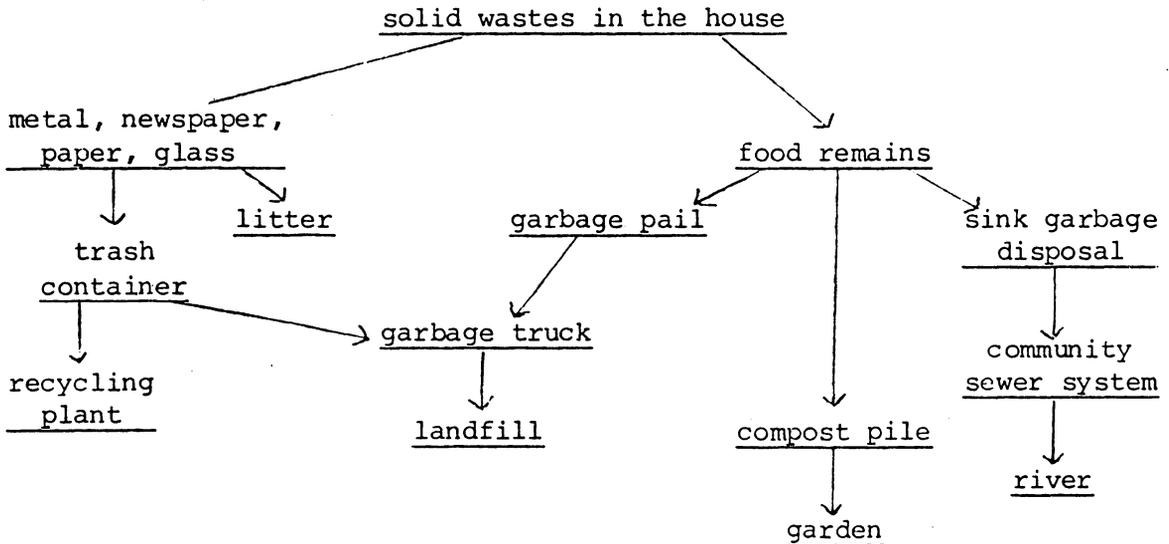
Date card taught _____ Time spent teaching card (min.) _____

Level 6

PATTERNS

IAC-4/11

Here are some things which could happen to the solid wastes in and around a house:



Copy this chart and complete the "plastic" section. Underline in red the things that do happen in your house. Underline in green the things you think your family should do at home. Discuss your ideas with your family and show them your chart.

Turn in your chart to your teacher.

Date card taught _____ Time spent teaching card (min.) _____

Level 6

WHAT'S GOING ON IN YOUR COMMUNITY

IAC-6/11

Find out how trash was disposed of in your community 50 years ago, 20 years ago, 10 years ago.

Find out how trash is disposed of today in your community. Do you have a home trash collection service? Do you use your county's green box system? Is the waste taken to a landfill, burned (incinerated), recycled or more than one of these? Find out where the landfills (and any incinerators or recycling centers) are in your community. On a map of your area, mark each location.

You can write a letter to the local Sanitation Department to get this information. Ask your teacher to help you with this project.

Write a short report on solid waste management in your community.

Give your written report to your teacher.

Date card taught _____ Time spent teaching card (min.) _____

Level 6

VOCABULARY WORKSHEET

IAC-7/11

Get a copy of the VOCABULARY WORKSHEET from your teacher. Complete it on your own; then turn it in to your teacher.

Date card taught _____ Time spent teaching card (min.) _____

Level 6

HELPING OTHERS STOP LITTERING

IAC-5/11

What are some of the ways you can help influence others to stop littering our environment? What things would you say to someone who you saw littering? Would you ordinarily say anything to someone you saw picking up litter? What we do when others litter or what they do when we litter is important. Behaviors that have positive consequences or that are reinforcing for the individual tend to be repeated, whereas behaviors that are followed by negative consequences or are punished by others are not as likely to be repeated. That is, we all like to be told that what we have done is positively regarded by others, and none of us enjoy being told that we have done something wrong. Therefore, we can all help others change bad habits into good habits by praising good behavior and scolding bad.

Ask the class again what they should say to someone who has littered. Would they say anything different if that person were a friend, a teacher, or a parent?

Date card taught _____ Time spent teaching card (min.) _____

Level 6

WHAT TO SAY AND DO

IAC-8/11

Now let the class practice what they would say to someone who has inappropriately disposed of their trash and to someone who is acting in a manner that will help keep our environment clean. Have the children act out each of the following scenes. Appoint one person who will act out the part of the litter helper or litterbug, one who will witness the behavior and respond, and allow the rest of the class to serve as the audience. However, split the audience in half. Half will verbalize what the litter helper (or litterbug) is thinking and the other half will serve to direct what the witness is to say or do. Each scene may be re-enacted until both sides of the audience are satisfied that the witness has acted in the best interests of the scene.

- A. Two friends are walking home from the movies and one of them throws away his popcorn box into the bushes. What can the other person do so as to make that behavior less likely in the future yet not make his friend mad? Half the audience will reflect the thoughts of the litterbug; the other half will help the other person with the best response.
- B. While out in the family boat, your father throws out a soft drink can.
- C. While out getting the morning paper, your brother stops to pick up some paper that has blown into the yard.
- D. While on a nature hike, your teacher brings a plastic bag along to gather litter.

Date card taught _____ Time spent teaching card (min.) _____

Level 6

MINI-LANDFILL

IAC-9/11

Materials you will need:

Two identical pieces of each of the following materials:

food scraps, newspaper, cardboard, glass, cloth, soap chips, paper, glass and aluminum and steel cans, plastics, copper wire

1 cardboard shoe box

1 piece of aluminum foil or plastic. large enough to line the shoe box

toothpicks

several pices of string, cut about 6 inches long

masking tape

several small pieces of cardboard

½ glass water

Level 6

IAC-9/11

Build a mini-landfill. Line a shoe box with aluminum foil or plastic.

Fill the box half full with earth. (Don't use potting soil, because it does not contain the tiny creatures—organisms—which break down natural waste.)

Attach a piece of string to a toothpick with tape. Write the name of each waste object on a small piece of cardboard. Fasten each piece of cardboard to the second end of the string with masking tape. Bury two identical rows of waste material in the earth, leaving the cardboard labels on top of the soil surface. Write down the date you buried the waste items.

Add a little water. Put your mini-landfill in the sunlight, perhaps on a windowsill. Wait about 10 days before you continue. Write down the date you examine the items.

Carefully remove the waste items from one row of your landfill. Examine the items with a magnifying glass.

Go on to IAC-10

Date card taught _____ Time spent teaching card (min.) _____

Level 6

IAC-10/11

Answer the following questions on your paper:

1. Which items in the mini-landfill have decomposed the most?
2. Are the items which are decomposing man-made or natural?
3. Are the items which are decomposing quickly biodegradable?
4. Which items show only a few signs of decomposition? Why do you suppose they are decomposing more slowly than the first group?
5. Which items showed no signs of decomposition. Can you tell why? Will they remain unchanged indefinitely? Are they made of materials which should be reused or recycled instead of being buried in landfills?
6. Why might mold form on your mini-landfill? What would happen if the mini-landfills had been made of sand and no water had been added? What happens to waste left out on a desert?
7. In what ways would organizing a landfill be good for your community? What would be short-term consequences? What would be long-term consequences?

Date card taught _____ Time spent teaching card (min.) _____

Level 6

INCINERATION

IAC-11/11

Materials needed: 1 pair of tongs
1 candle in a holder
matches

With your teacher supervising, take each item that showed no signs of decomposition and hold it over a candle flame with tongs. Burning is also called "INCINERATION." Some communities get rid of solid wastes by incinerating them in very large, very hot furnaces called incinerators. Caution: DO NOT BURN PLASTICS. SOME PLASTICS GIVE OFF VERY TOXIC FUMES WHEN THEY ARE BURNED.

1. Which items burn; which do not?
2. Of the ones that burn, which ones give off smoke?
3. Which of the ones that give off smoke, or an odor, would probably cause the most serious forms of air pollution? Why? (You may contact the Virginia Air Pollution Control Board for information.)
4. Of the items which do not burn, which ones do you think would burn if the heat were as high as that used in a municipal incinerator? How could you find out the answer to this question? If some materials such as glass and copper won't burn, will they melt when the heat gets high enough? Why might we want to melt some items?

Level 6

IAC-11/11

5. What are the positive and negative consequences of using an incinerator?

Carefully remove the items in the second row of your landfill after 20 days. Repeat the observations and questions on IAC's 7 and 8.

Based on what you have learned about sanitary landfills and about incineration, which do you think is the better of the two methods of solid waste disposal in your community?

Set up two teams on each side of the classroom: One to propose positive consequences of a landfill and the community goals it meets, and the other to debate its feasibility.

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH
COMMUNITY SOLUTIONS FOR
SOLID WASTE POLLUTION

Level 6

Revised Class Activity Cards

Teacher Card—Level 6

The 12 CLASS ACTIVITY CARDS (CAC's) are designed for a large group or for the whole class. These cards present a simulation game designed to develop the students' decision-making skills and their understanding of community solid waste management problems. The CAC's should be used after the students have seen the filmstrip and completed the IAC's.

Notice that the 12 cards are in a sequence and should be followed 1, 2, 3, . . . 12. Before you begin the simulation game, distribute a copy of the Glen City Information Sheet and Map to each student. Duplicating masters are provided in this kit. The class will be divided into four committees and will conduct some independent research. (This activity is from the Sixth Grade Study Unit of WASTE IN PLACE, Keep America Beautiful's curriculum for elementary students.)

Duplicating Masters Needed for this Activity:

1. Glen City Information Sheet
2. Map of Glen City
3. Legal Committee Responsibilities
4. Equipment Committee Responsibilities
5. Disposal Methods Committee Responsibilities
6. Temporary Landfill Siting Committee Responsibilities

Date started _____ Date completed _____

OPERATION WASTE WATCH

Level 6

SOLID WASTE IN OUR COMMUNITY

CAC-1/12

Discuss the following questions with the students:

1. When we talk about "waste management" what do we mean? (Everything that has to be done to get rid of all the waste in a community.)
 2. Who can tell me where solid waste is generated—where many things are used and have to be discarded—here in school? (classroom, cafeteria, etc.). Who can tell me where most solid waste is generated in our homes? (kitchen). In our neighborhoods?
 3. Let's think about the solid waste in our homes. What steps do we have to take to get rid of it? How do we manage it? (Empty all household containers into large, weatherproof containers, etc.)
 4. Once it is outside our houses, does anyone know what happens? Can anyone tell us, step-by-step, where it goes and how it gets there? (Pickup by sanitation workers in collection vehicles—compactors, in many communities—transported to transfer station, or directly to disposal site.) Does our community use sanitary landfills? How many? In winter? Do we have any recycling Centers?
 5. How many people do you think it takes, including the people in your house who help to get the garbage and trash ready for collection, to get rid of your family's solid waste?
-

Level 6

CAC-2/12

6. Can anyone tell us what kind of equipment is used to get rid of your family's solid waste? What do the sanitation workers use to pick it up? What is it carried in?
7. Does anyone know how we dispose of solid waste in our community? Does our community use sanitary landfills? Incinerators? Recycling Centers? How many of each are there?
8. Does anyone know any other methods for disposing of solid waste—ways to get rid of it without hurting the environment?
9. What could happen to our city (town) if we didn't "manage" solid waste—if we just threw it in the street the way people did hundreds of years ago? What would our city look like? What would our city smell like? What would happen to our health if all our solid waste, all the trash and garbage and debris from every house and business, was just thrown out?
10. Now, can anyone tell me why it is very important to manage solid waste properly? For the next few weeks we are going to find out how waste is managed in our community, and what other ways there are for decreasing the amount of it, collecting it, and disposing of it in a way that won't hurt the environment. To help us learn, we are going to play a simulation game. Can anyone tell me what kind of game that is? (Continue discussion and introduce concept of "pretending".)

Date card taught _____ Time spent teaching card (min.) _____

OPERATION WASTE WATCH

Level 6.

CAC-3/12

For the next few weeks we are going to pretend that we live in "Glen City." The Information Sheet I just handed out tells you about "Glen City." The map shows you what it looks like. (Read over the Information Sheet with the students and help them study the map of Glen City.

We are going to pretend that Glen City needs a new way to manage solid waste. The citizens here have been using a sanitary landfill, but there is only a little room left in that landfill. A new landfill, or a new way of getting rid of Glen City's waste, will be needed pretty soon. We also need to keep our city cleaner, to keep waste from escaping containers and becoming litter. And we want to save money.

We are going to pretend that this class has been asked to decide just what should be done. Some of us will pretend to be Research Committee member—people who have to get all the information about the various parts of waste management and make suggestions to the City Council about what Glen City should do with its waste. A few of us will pretend to be City Council members—the people who must decide what is the best way. They will listen to what the research Committees suggest, and then they will say what is going to be done.

Date card taught _____ Time spent teaching card (min.) _____

Level 6

CAC-4/12

The Four Research Committees Are:

1. The Legal Committee—Its job is to find out what rules Glen City has about solid waste management. These rules should help people have good habits about handling waste. If they don't, maybe Glen City needs some new laws.
2. The Equipment Committee—Its job is to find out what kinds of containers and equipment Glen City needs to make sure that no solid waste escapes while it is being stored, collected, or taken to where it will be disposed of.
3. The Disposal Methods Committee—Its job is to find out what is good and what is not so good about the various methods available for getting rid of waste without hurting the environment.
4. The Temporary Landfill Citing Committee—We are pretending that there isn't enough time for Glen City to just go ahead and do something new. We will need a place to dispose of solid waste for a while, to give us time to build a permanent place. This committee will suggest a place and a design for the new landfill.

Date card taught _____ Time spent teaching card (min.) _____

Level 6

CAC-5/12

If possible, let the students choose the committee on which they prefer to serve. Give each a copy of the responsibilities for that committee using the duplicating master provided.

Make sure everyone understands what is expected of his or her committee.

Set a schedule for carrying out the various responsibilities for each committee.

Remind the class that while they are pretending to live in Glen City, they will be getting information about waste management in their own community. They are to pretend that the facts they learn are true for Glen City, too.

Date card taught _____ Time spent teaching card (min.) _____

Level 6

SIMULATION SITUATION

CAC-6/12

Read the following summary to the students:

A farmer who owns 350 acres along the John River recently passed away. After completing an extensive survey, a private consultant for the city has recommended that the land be used as a solid waste processing site. Three systems were proposed, specifically: (1) a long-life (50-60 years) sanitary landfill; (2) an energy-generating incinerator; (3) a recycling center or a resource recovery system. Based on considerable public reaction to each of the systems proposed, City Council has now decided to conduct a series of public hearings to determine what method will be adopted. In the meantime, the council has decided to create a temporary (3-5 years) sanitary landfill to handle wastes until the long-term system is functioning. \$125,000 is available for new equipment to store, collect, and carry waste to the new temporary landfill site.

The city is very concerned with improving solid waste management. The citizens also need to keep the city cleaner (that is, to keep waste from escaping from containers and uncovered trucks and becoming litter). And we want to use a system that will save us money.

Date card taught _____ Time spent teaching card (min.) _____

Level 6

COMMITTEE WORK

CAC-7/12

Each committee is to carry out the research it is responsible for.

Ask each committee to write down all the facts each worker learns and keep this information in a Committee Notebook.

Reports—Each committee must prepare a written oral report about what is found out and about its recommendations. Each committee should decide which member will report and how to present the findings.

Date card taught _____ Time spent teaching card (min.) _____

Level 6

CITY COUNCIL MEETING

CAC-8/12

After all the committee work is completed, hold a City Council meeting.

1. Have each committee draw straws among its members to select one to play the role of a "City Council Member".
2. Let the selected students choose the role they will play (or assign the roles yourself):
 - a. City Council President—this person is the president of the bank. He wants to see Glen City grow but knows that it will not continue to grow if it isn't a clean, pleasant, environmentally-sound community.
 - b. Council Member Jones—this person is worried about taxes. He or she wants a clean, pleasant, environmentally-sound city, but only if it won't cost any money.
 - c. Council Member Smith—this person doesn't pay attention and never remembers what has been said. He or shee keeps asking questions that have already been answered.
 - d. Council Member Green—this person wants to be sure that whatever is decided is the best decision which could be made. He or she wants all the details, wants to know the disadvantages as well as the advantages, will accept some disadvantages if they are not too bad.

Date card taught _____ Time spent teaching card (min.) _____

Level 6

CAC-9/12

3. Have the council members go up to the front of the room and sit in a row. The Council President says: "This meeting will now come to order. We are going to hear recommendations from the four committees that have been studying Glen City's solid waste management needs. Council members will let each committee finish its presentation before asking any questions. The first committee to report will be the Legal Committee."
4. Have the committee report in whatever manner they have agreed upon among themselves. When they have finished, encourage the "Council Members" to ask questions. Prompt them, if necessary.
5. Follow this procedure with each committee in turn.
6. When all the committees have completed their reports, allow the "Council Members" to ask more questions if they are so inclined. Allow committee members to ask questions of other committees.
7. When all the "Council's" questions have been answered, have them make individual lists of the recommendations they favor, but instruct them not to discuss their votes with the other members of the class.

Date card taught _____ Time spent teaching card (min.) _____

Level 6

CAC-10/12

8. Meet with the "council" out of hearing from the rest of the class. Help them achieve concensus on the recommendations they favor, but do not urge them to adopt all the recommendaitons. Have the "Council President" write out the list of accepted recommendations to read to the rest of the class.
9. Have the Council President read the list of recommendations adopted by the Council. If some of the recommendations were not accepted, have other Council members tell the class why.

Date card taught _____ Time spent teaching card (min.) _____

Level 6

CAC-11/12

10. Initiate a discussion on the Council's deicision by asking the following questions:
 - a. What are some of the things that you learned about solid waste management?
 - b. How did you feel about the simulation?
 - c. Did it help you to work better with your classmates?
 - d. What did you learn about how your personal decisions affect the lives of other people?
 - e. What did you learn about how you personally have to bend your opinion at certain times in order to work with other people, such as your fellow committee members?
 - f. Did you like the Council's decision?
 - g. Did you agree with the parts of your proposal that they accepted?
 - h. Were you upset in any way about the parts of your proposal they didn't accept?
 - i. Do you feel that the parts that were left out would have made Glen City's solid waste program better?
 - j. Did you feel comfortable in making your presentation?
 - k. Did you have enough background information to make a good presentation?

Continue this line of discussion as long as necessary, letting students comment and evaluate the effectiveness of this project.

Date card taught _____ Time spent teaching card (min.) _____

Level 6

FORM AN ECOLOGY CLUB!

CAC-12/12

Look over the information on forming an ECOLOGY CLUB which is provided in the Level 6 kit.

If the activity is appropriate for your students, present the idea of forming an ECOLOGY CLUB to study and deal with your community's environmental problems. The Division of Litter Control can provide project ideas and membership materials to any interested group of students, grades 6-12.

The Division also conducts an Annual Awards Program to recognize outstanding projects of the Ecology Clubs. Contact us for further information.

Date card taught _____ Time spent teaching card (min.) _____

GLEN CITY INFORMATION SHEET

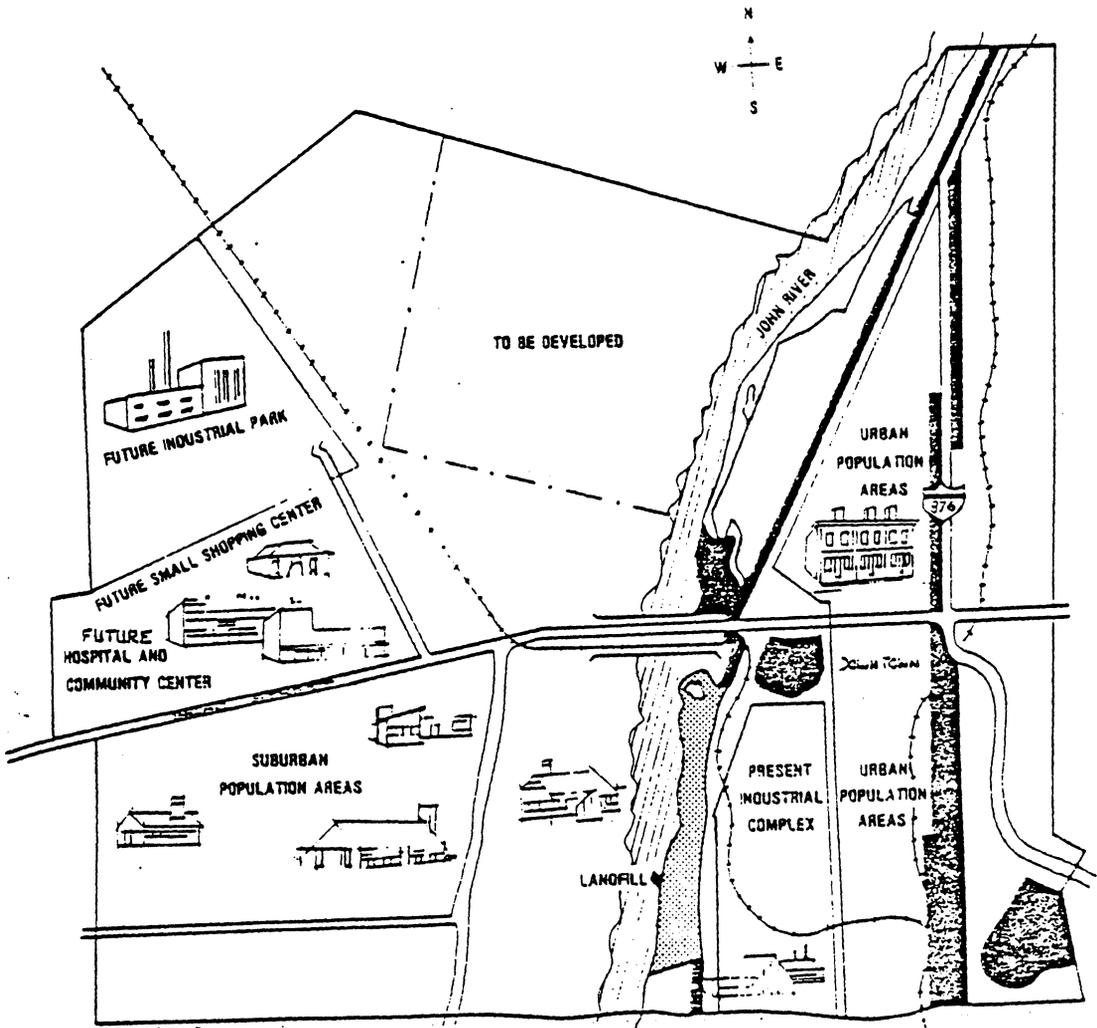
We are going to pretend that we live in Glen City. Glen City needs a new way to manage solid waste. Here is some information about the city.

1. The area shown on the map is five square miles.
2. Glen City is a small city, about the size of Staunton, Hopewell, or Bristol, Virginia. 25,000 people live in Glen City.
3. 65% (about 16,000) of the people live in the area east of the river.
4. A major four-lane highway, Interstate 876, runs north-south through downtown Glen City.
5. Many new people and businesses are expected to move into Glen City in the next few years.
6. The John River is 300 yards wide. It can handle logs and small boats, but not large barges. There is a park along its bank (black area) with swimming, fishing, and boating facilities. The river flows from north to south. Other city parks are shown as black areas. The Southern Landfill, shown by diagonal lines on the map, will become a park when it is filled to capacity.
7. Voters are deeply concerned with the way the city looks and have made it known to the City Council that they would like more open space areas (such as parks) in the city.
8. The city's downtown area, lower right on map, has just received a \$350 million grant to improve this urban area.
9. The city has sufficient energy resources.
10. The lower left portion of the map shows a suburban area that contains 30% (about 7,500) of the city's population.
11. The city's railroad system includes both rapid transit as well as large-scale freight service (K&Z Railroad).
12. Recently, several large industrial and commercial corporations signed "agreements to buy" with a contractor who is building a large industrial park across the river (upper left on map).
13. Glen City is also within a 60-minute drive of a large city.
14. Most of the factories are located in the present industrial area.
15. The city's unemployment rate is equal to that of the nation.
16. The city's old incinerator, located on the John River in the landfill area, was closed down because of air pollution control laws.
17. The landfill used by the city since its founding will shortly reach its capacity.
18. Several local businessmen are trying to buy some land between the future industrial park and Broad Street where they would like to

18. (Cont'd.)—construct a small shopping center and, in cooperation with city government, build a small hospital and community center.

GLEN CITY MAP

GLEN CITY



LEGAL COMMITTEE RESPONSIBILITIES*

1. Call your local litter control program director or the office of the Director of Public Works in city government and find out who makes sure people follow the rules about solid waste management in our community.
2. Write a letter (or call) to invite someone from the agency responsible for seeing that the rules about solid waste management are kept to come to the school and tell the class about the laws. (Police, Sanitation, Health Departments)
3. Ask that person if these rules—laws, ordinances—are enforced. If they are, ask how: Are people allowed to burn or bury their trash? Do people get tickets for putting trash or garbage out on the sidewalk in open containers? Do people get fined for not having a big enough dumpster to hold all the solid waste generated by a store or restaurant? Do all parking lots have to have trash receptacles? What are the fines for breaking these laws and just putting out waste any old way?
4. If people don't pay much attention to the laws about managing solid waste, ask the person who is responsible for enforcing the laws? "Why are the laws ignored?"
5. Find out what other kinds of laws there might be to tell people how they should manage their waste. Ask the community's litter control program leaders. (You can get the names of these people from the Division of Litter Control Office in Richmond.)
6. Look at the Glen City Information Sheet. What is happening in the city that might get people to follow new rules (look at #7 and #8)? Will special rules be needed for #12 and #18?
7. From what you have learned, decide on rules for families, rules for businesses, rules for people on the street—rules you think people will follow that Glen City should have in its waste management plan.
8. Write down those rules and, when the time comes to play the "Glen City Council" part of the simulation game, tell the Council what this committee thinks the laws should be.
9. Be prepared to explain why the committee thinks these rules are important and why people would follow these rules if they knew about them.

EQUIPMENT COMMITTEE RESPONSIBILITIES*

1. Look around the community—in your neighborhood or on your roadsides, around the school, downtown, wherever you go in the next few days—and try to see what kinds of equipment are used to store, collect, and carry solid waste to the disposal site. What kinds of containers do people put outside their homes for garbage? What kinds of containers do businesses use outside their stores or factories?
 - a. Make a list of the containers and equipment you see.
 - b. Decide which ones do the best job. Make a list of these best containers.

2. Contact the Sanitation Department or community's litter control program leaders (get these names from the Division of Litter Control office) and ask if someone can come to the school with some of the trucks and other machinery used to handle solid waste and tell the class about them. Or visit the department to look at the equipment.
 - a. Ask the sanitation workers if these are the best kinds of trucks or machinery for the job. If the locality had more money, would it buy new equipment? What kind of equipment would it buy? What would each cost?
 - b. Show your list of the best containers to the sanitation people. Ask them if they agree that these are the best containers. Do they know of other kinds of containers that might be better? Do they know how much they cost?
 - c. Find out if the sanitation people have equipment catalogs the Committee might borrow, so you can see what is available and make more suggestions for the kind of equipment Glen City should have.

3. Review all the ideas you have about containers and equipment.
 - a. Look at the Glen City Information Sheet to see if there is anything that should be considered before deciding on what kinds of containers and equipment you will recommend to the Glen City Council. Look especially at #6, 7, and 8 when thinking about containers. Look at #3, 5, 8, 10, 11, 14, and 18 when thinking about equipment.
 - b. Make a list of the number and kinds of containers and piece of new equipment Glen City should have. Figure out how much everything would cost.
 - c. Look at the Information Sheet and see how much the City has to spend.
 - d. If the things on your list would cost more than the city has to spend, either take some things off your list, or see if there is any way to get more money for containers and equipment.

EQUIPMENT COMMITTEE RESPONSIBILITIES (Cont'd.)

4. Prepare your final list of recommended new equipment and containers to present to the Glen City Council. Be prepared to discuss your recommendations and the reasons for them with your class.

DISPOSAL METHODS COMMITTEE RESPONSIBILITIES*

1. Ask your teacher to arrange for you to visit a sanitary landfill in your community or invite someone from the Sanitation Department to visit the class and describe the landfill and how it operates. Ask that person to bring pictures, drawings, maps and diagrams. Get a copy of the questions the Temporary Landfill Siting Committee is using and ask the persons these listed questions.
2. Call the Sanitation Department or the community's litter control program leaders (get these names from the Division of Litter Control Office) and find out if there is a citizen (or municipal recycling center in your community. If there is, ask the teacher to arrange for this committee to visit it, or invite someone from the Center to talk to the class.
3. Ask your teacher to arrange for you to see a film about resource recovery or recycling. Divide the Committee into two "literature search" teams. One team is to go to the community or school library and look up books and articles about sanitary landfills, recycling centers, incineration and resource recovery systems; the other team is to go to the Public Library and look up the same material. The Division of Litter Control also has some booklets dealing with these topics.
4. When meeting with people from the Sanitation Department or Recycling Center (1. and 2. above), ask them to explain some of the advantages and disadvantages of the forms of solid waste disposal you are finding out about—recycling centers, sanitary landfill, incineration—to recover energy and resource recovery. Take notes on what they tell you.
5. After the "literature search" teams have found out everything they can at the libraries, and the Committee has visited the landfill and recycling center, make lists of all the advantages and disadvantages you have discovered about each of the three disposal methods (sanitary landfills, incineration, and recycling or resource money).
6. Discuss this among yourselves until you can agree on the method you recommend to the Glen City Council, and on the reasons why the Committee thinks that method is the best one for Glen City.
7. Be prepared to make this recommendation to the Glen City Council and to discuss your suggestion with the rest of the class.

TEMPORARY LANDFILL SITING COMMITTEE RESPONSIBILITIES

1. Ask the teacher to arrange for this committee to visit the sanitary landfill in your community or see a film about landfills.
2. At the landfill, ask the Landfill Manager the following questions and write down his/her answers. If you view a film, write a letter to the Landfill Manager asking him/her these questions:
 - (1) How large is the landfill?
 - (2) How many trucks dispose of solid waste daily?
 - (3) How much solid waste can each truck hold?
 - (4) Who owns the landfill?
 - (5) Does it serve a municipality, county or region of a county or private customers?
 - (6) Is there a fee for individuals to bring materials to be thrown out?
 - (7) At what hours may the public use the landfill?
 - (8) How much did it cost to build the landfill?
 - (9) How many people does this landfill service?
 - (10) What is the expected life of the landfill?
 - (11) How accessible is the landfill?
 - (12) What are the reactions of people living near the landfill?
 - (13) How much noise is there from trucks and earth-moving equipment?
 - (14) Does it smell?
 - (15) Are any water pollution problems developing at the landfill? What has been done to prevent leachate (water containing waste from the landfill) from the buried waste from running off into the groundwater?
 - (16) How much does it cost to build and keep a sanitary landfill going?
 - (17) Are the trucks coming into the landfill covered? How would this help?
 - (18) Do the roads going into the landfill go past many houses or stores?
 - (19) How big a landfill would be needed to take care of the waste of a city of 25,000 people for five years if the city has several factories?
 - (20) What is done to keep the solid waste from getting loose and turning into litter before it is covered with earth?

3. After you have made notes of what everyone learned at the landfill, do the following tasks?
 - a. Study the map and find out where all open space is in Glen City that could possibly be used for a temporary landfill. (How much land will be needed to take care of the solid waste generated by 25,000 people for five years?)
 - b. Choose a first choice site for building the landfill, a second choice and a third choice.
 - c. Mark on the map the places where most of the solid waste will come from. Draw lines in pencil from those places to your first choice for the new landfill—to your second choice and your third choice. Which possible site requires the least carrying of solid waste?
4. Would the trucks carrying solid waste to your first choice for the temporary landfill have to go through many streets where people live? Would this cause a problem? What could be done about it?
5. Is your first choice location very far from the sites where new buildings may be constructed?
6. Is your first choice for the landfill near the river? Might this allow leachate from the buried solid waste to pollute the river? What could be done about it?
7. How many new roads would have to be build to permit trucks to get to your first choice for the temporary landfill site? Where would they go?
8. Ask your parents and other adults how they would feel if:
 - a. the community built a landfill near their house
 - b. trucks had to go past their house to get to the landfill
 - c. the city built a solid waste transfer station on their street
 - d. If they say they would be very unhappy if one of these things happened, ask them what they would do about it.
9. Might any of the people in Glen City object to having the temporary landfill where you are planning to put it? Would they object to having trucks go by their houses or businesses? Would they object to waste getting loose and blowing on their property? What could be done about their objections?
10. Discuss these points, then review your first choice for a site. If necessary, change the location of the site the Committee will recommend to the Glen City Council. Draw a map of what the landfill will look like. Show the roads leading to it and any other important features you may decide that it should have.
11. Be prepared to present your recommendation to the Glen City Council and to discuss the reasons for it with the rest of the class.

APPENDIX E
PRELIMINARY CLASS SCHEDULING SHEET

Preliminary Class Scheduling Sheet

Teacher _____ School _____

Phone Number: Home _____ Work: _____

Lunch time of class _____

Duration of lunch period _____

Location of lunchroom _____

1. Location of class _____

2. Does class return directly to classroom after lunch? ___Yes ___No

3. Describe route if yes _____

4. How long will class remain in classroom? _____

5. Describe route if no to question 2. _____

6. Is there a hall trash can? ___Yes ___No

7. How many classroom trashcans are there? _____

8. Where does the class go for recreational activities? _____

APPENDIX F
NEIGHBORHOOD AND SCHOOL ANALYSIS QUESTIONNAIRE

Neighborhood and School Analysis Questionnaire

School _____ Principal _____

Number of Students in Elementary Section (K-6) _____

Age of Building _____

Prior Purpose of Building (if any) _____

Most littered areas (please rank from most littered to least littered).

1. _____
2. _____
3. _____
4. _____
5. _____

For the preceding question, who was asked? _____

Number of litter receptacles: Outside _____ Inside _____

Janitorial Schedule:

	Inside	Outside
Normal		
Christmas		
Summer		
Other		

What Is the Overall School Appearance?

Well Kept Rundown



How Littered Is the School Environment?

Clean Littered



What Type of Neighborhood (1 mile radius) Surrounds the School?

Rural Urban



What Is the General Appearance of the Neighborhood?

Well Kept Rundown



How Littered Is the Neighborhood Surrounding the School?

Clean Littered



What Is the Average Income of the People in the Neighborhood?

High Low



How was the Average Income Determined? _____

There are _____ Number of Houses Within 50 Feet of the School.

There are _____ Number of Houses Within 100 Feet of the School.

There are _____ Number of Houses Within 300 Feet of the School.

APPENDIX G
AMBIENT LITTER ASSESSMENT

Ambient Litter Assessment

School _____ Date _____

WALK AROUND THE SCHOOL BUILDING AND COUNT THE NUMBER OF LITTER ITEMS FOUND WITHIN A BOUNDARY OF 20 FEET OF THE BUILDING.

BOTH COLLECTORS SHOULD COUNT ITEMS ON THEIR OWN AND THEN ON A SECOND TRIP AROUND COME TO A CONSENSUS.

OUTSIDE COUNT			
COUNT 1	COUNT 2	CONSENSUS	COMMENTS

INSIDE THE BUILDING COUNT LITTER ITEMS FOUND IN THE BATHROOMS NEAR THE ROOMS YOU WILL BE ASSESSING. FOLLOW THE SAME PROCEDURE AS ABOVE USING TWO COLLECTORS TO COUNT.

INSIDE COUNT							
	BATHROOM	NEAR	FLOOR	COUNT 1	COUNT 2	CONSENSUS	COMMENTS
MALE	1						
FEMALE							
MALE	2						
FEMALE							
MALE	3						
FEMALE							

APPENDIX H
DATA SHEETS FOR CLASSROOM LITTER ASSESSMENT

OPERATION WASTE WATCH

Attachment: Classroom Litter Assessment

School:

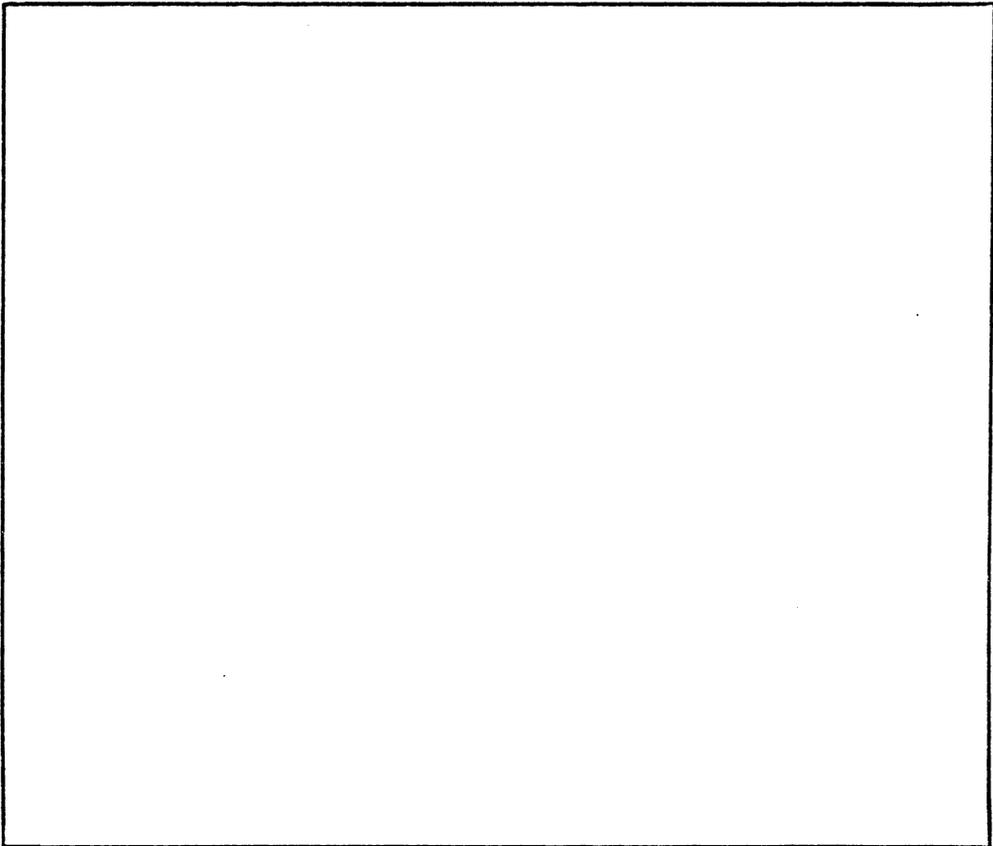
Teacher:

Grade:

Room:

Date:

Please mark the map below in accordance with the classroom you are measuring:



- Mark:
- | | | | | | |
|-----------------|-----------------------------|-------------|------------------------------|----|-----------------------------|
| 1. Doors | | 5. Cabinets | <input type="checkbox"/> CAB | or | <input type="checkbox"/> SF |
| a. Hallway | <input type="checkbox"/> HD | or shelves | | | |
| b. Outside | <input type="checkbox"/> OD | 6. Tables | <input type="checkbox"/> Tb | | |
| 2. Windows | <input type="checkbox"/> W | 7. Other | _____ | | |
| 3. Teacher Desk | <input type="checkbox"/> T | | | | |
| 4. Child Desk | <input type="checkbox"/> C | | | | |

OPERATION WASTE WATCH

Planted Classroom Litter Assessment

Following your 1 hour break, both data collectors should re-enter the classroom. Ask the teacher if you can interrupt her class for a few minutes to pick up any of the marked litter still out. As you pick up the marked litter, you should code each piece as to where it was found. Also, note where you found any of the handouts given earlier.

Coding: NC - Near trash can
 F - Floor
 Prd - On student desks
 Td - On teacher's desk
 Pud - On public desk
 IC - In trash can
 O - Other (please specify location)

After coding the litter, tell the teacher you need to examine the contents of her trash can(s) and take the can(s) out into the hall. Code all marked items found in the can with a "C." Use the table below to tally the number of items found in a given location.

Where You Found the Marked Litter

		NC	IC	Prd	Pud	Td	F	O
Where You Put the Marked Litter	F							
	Prd							
	Pud							
	NC							
	Handouts							

What was the situation when you returned to the room (for example, was the room empty, at nap time, etc.)?

OPERATION WASTE WATCH

Distributed Litter Assessment

I. Distributed Litter: Classroom

- A. Put 3 pieces of litter on the floor area near student desks. Be sure each piece is marked with the letter "F." Put 3 pieces of litter on 3 randomly selected student desks and mark each piece with the letters "Prd." Put 3 pieces of litter on a publically used table and mark each piece with the letters "Pud." Finally, put 1 piece of litter next to the classroom trash can and mark it with the letters "NC."

II. Distributed Litter: Hallway. Is there a hall trash can? _____

- A. Make sure a trash can is located about halfway between the lunchroom and the classroom (move the can, if necessary).
- B. Data collector #1 should locate himself near the lunchroom and have the handouts ready. As the class leaves the lunchroom, give each child a handout. Remember to count how many children accept a handout.
- C. Data collector #2 should locate herself between the trash can and the classroom in an unobtrusive location. Primary responsibility for hallway data collection rests with data collector #2. Data collector #1 should follow the class and note litter behaviors.
1. How many children took the handout? _____
 2. How many dropped the handout in the hall? _____
 3. How many put the handout in the hall trash can? _____
- D. After completing the hallway data collection, you should briefly explain to the teacher what you have done and tell her you will be back at the end of the day.

Important: Ask the teacher not to instruct her students to pick up any of the litter.

APPENDIX I
TEACHER'S CHECK LIST

Teacher's Check List

I. Pretesting

- A. Give pretest to students
 - 1. All 1st graders will get an answer booklet.
 - 2. Please copy the answers from the answer booklet onto the answer sheet provided for all 1st graders.
 - 3. All 4th and 6th grade classes get a question booklet and an answer sheet.
- B. Collect all answer booklets or answer sheets.
- C. Fill out the cover sheet provided and attach to the answer sheets.
- D. Complete the litter analysis questionnaire (Note: Please fill out only 1 copy of the LAQ and save the other form until the time when you readminister the test).
- E. Place both the answer sheets and the LAQ into the envelope provided and mail them back to Virginia Tech.

II. Curriculum (if applicable)

- A. Please attempt all the curriculum cards in the OWW program that are marked "CORE." Please note that if you have the revised materials (i.e., Level 1, 4, or 6R) only the core cards have been provided and you will not find the word "CORE."
- B. Complete all information as to time parameters and length of teaching time. Note that this information is requested on the "teacher card" (i.e., the first card in any Individual Activity Card [IAC] or Class Activity Card [CAC] set).
- C. Remember that some card items may be out of numbered sequence.
- D. For any problems call 703-961-7403 or 703-961-6223.

III. Posttesting

- A. After the curriculum is completed in five school weeks, please retest your students in the same way as done for pretesting.
- B. Complete the LAQ as before.
- C. After the curriculum has been taught, please complete the teacher evaluation questionnaire. Note that only those teachers actually receiving the curriculum package need to complete this step.
- D. All posttests, LAQs and TEQs will be picked up at the end of the fifth week of the study.

APPENDIX J
OWW TESTING MATERIAL

OPERATION WASTE WATCH TESTING PROGRAM

CLASS COVER SHEET

Teacher's Name: _____ Years Teaching: _____

School: _____

School System: _____

Class Size: _____

Number of Sessions in Program: _____

Length of Average Program: _____

Test Version: _____

(Note: If version is not listed, leave blank)

NOTE: Please return this form with your completed test answer sheets.

WASTE OUT OF PLACE—GRADE ONE

Help the students understand the correct procedure for answering the test questions by working the following example with them:

Example: Have the students look at the four drawings on the example page of their answer sheet. State the name of each object depicted.

Have the students circle the drawings which depict natural objects. (You may wish to reproduce the drawings on the overhead and circle the correct objects with a pen.) The correct answer is (D), an apple.

Check each child's answer sheet to make sure s/he understands the procedure.

Test Questions: Ask the children to circle the correct pictures on their answer sheets as you read the following directions to them. State the name of each object as you proceed.

1. Circle the picture of the objects which are no longer useful. Jugs, horse, trash bin, bottle
2. Circle the natural object that is man used. Screws, nest, newspaper, boards
3. Circle the useful object. Crumpled paper, tomato, empty can, wilted flower
4. Circle the waste object. Empty Coke bottle, banana, boards, rapped pack of crackers
5. Circle the picture of the object which will change shape or rot away. Bottles, pile of rocks, ice cream, tires
6. Circle the man-made object. Shell, boards, tree, carrot
7. Circle the litter. Garbage can, wire basket, brick wall, container with some papers
8. Circle the object that will soon change shape. Plastic comb, bottle, apple peelings, log
9. Circle the picture that is not a good place to put waste. Wire basket, gutter with leaves, garbage can with lid on, dumpster
10. Circle a cause of litter. Tree losing its leaves, garbage can with top on, dog playing with a ball, truck with some papers flying off the load
11. Circle the picture that is a good place for waste. Wire basket, pile of leaves, gutter with leaves, pile of rocks

12. Circle a cause of litter. Children playing tug-of-war, children throwing rocks in water, children dropping candy wrapper, children raking leaves
13. Circle a cause of litter. Dog sniffing into open garbage can, wire basket with branches protruding, tied bundle(s) of newspapers, leaves piled in baskets

ANSWER SHEET

Waste Out of Place

GRADE ONE

Student's Name: _____

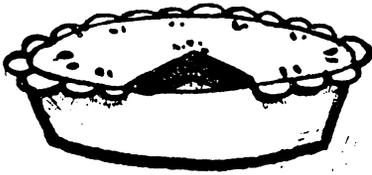
Student's School: _____

Teacher's Name: _____

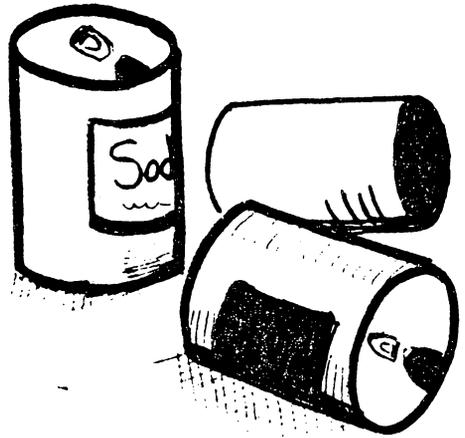
School System: _____

GRADE ONE

NAME _____



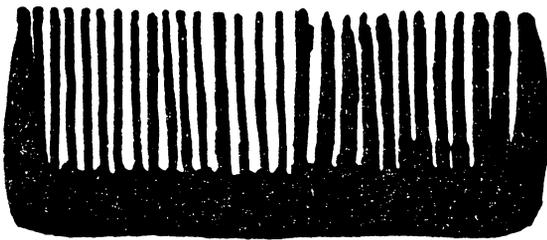
A



B

C

D



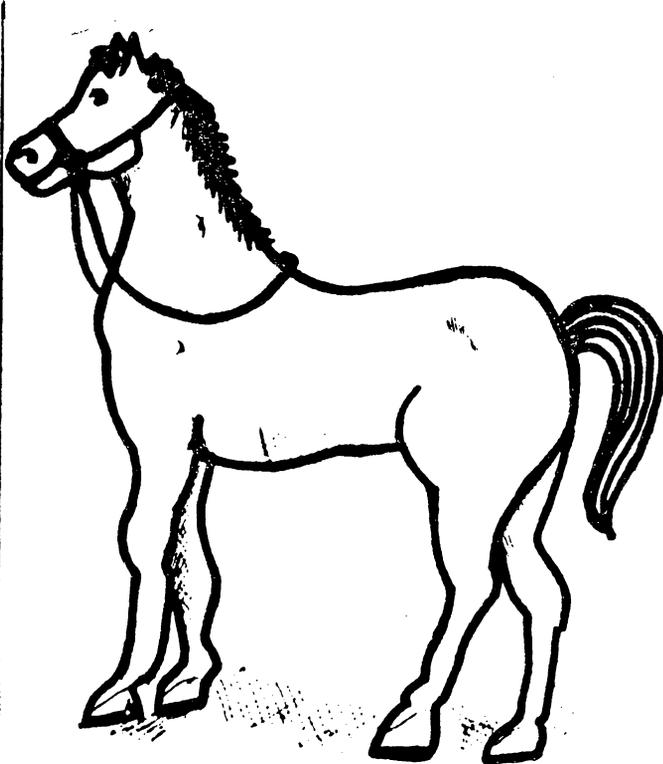
(EXAMPLE)

GRADE ONE

NAME _____



A



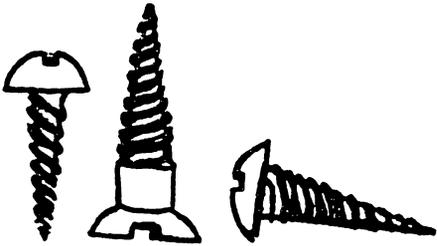
D

C



GRADE ONE

NAME _____

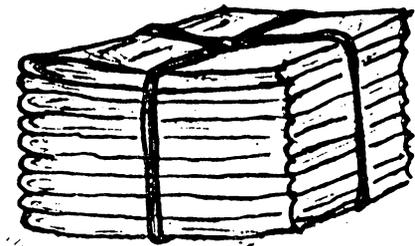


A

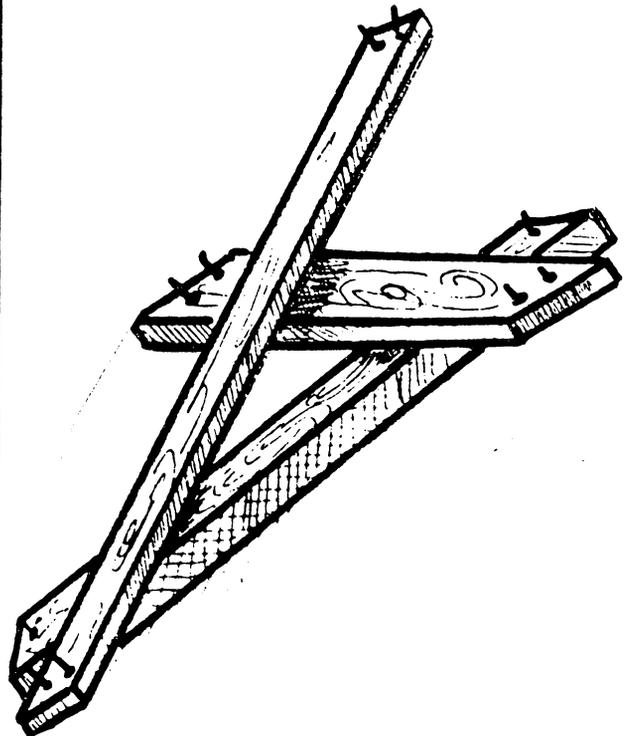


B

C

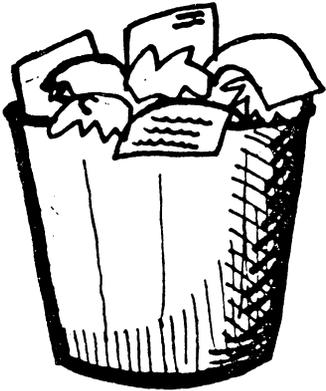


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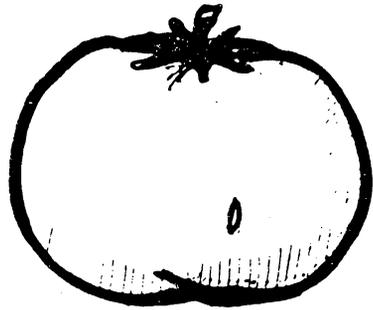


GRADE ONE

NAME _____

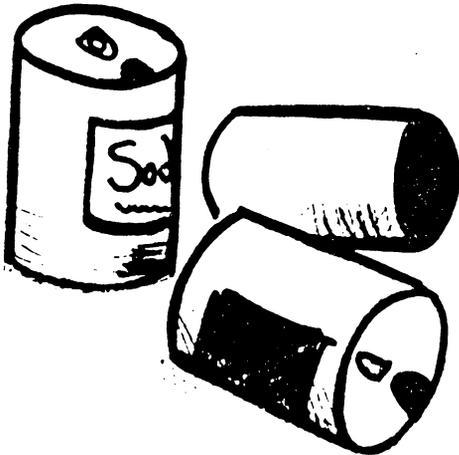


A

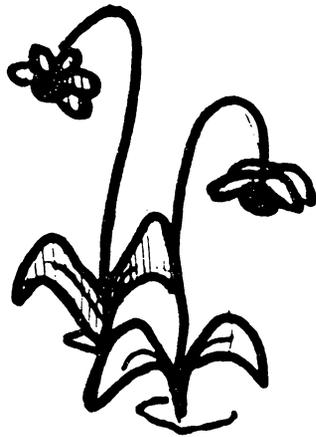


B

C



D

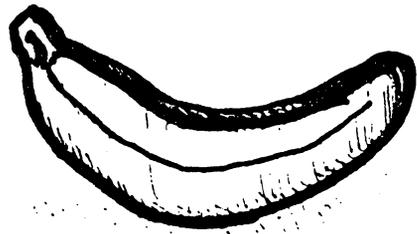


GRADE ONE

NAME _____

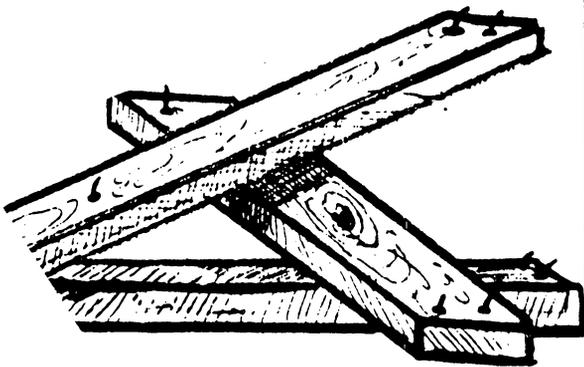


A

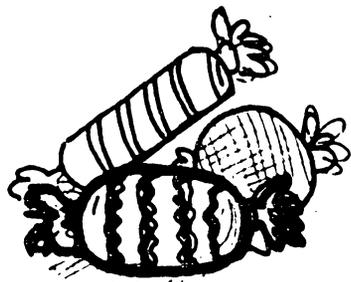


B

C

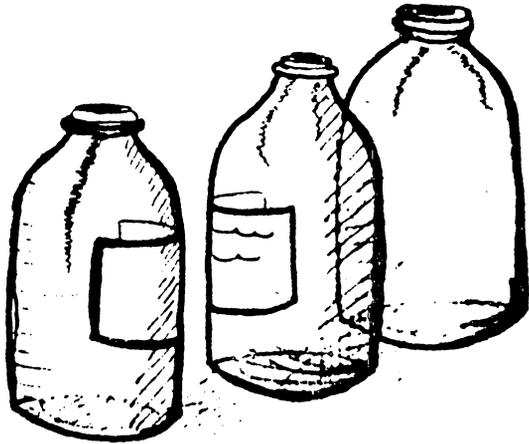


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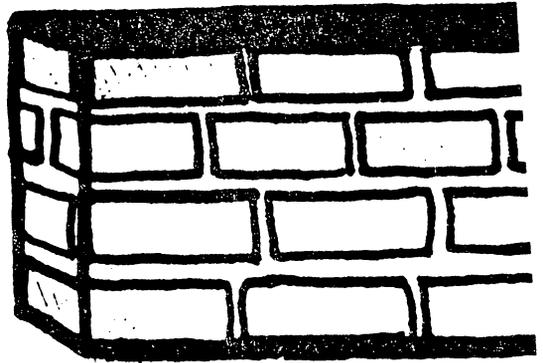


GRADE ONE

NAME _____

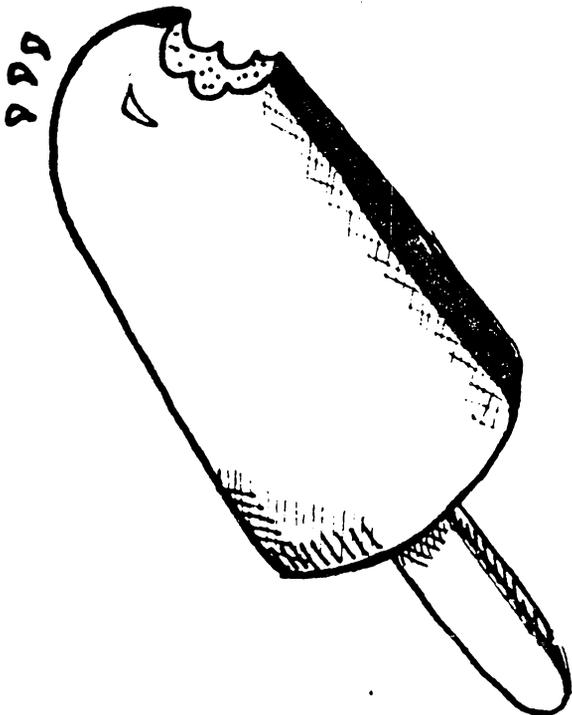


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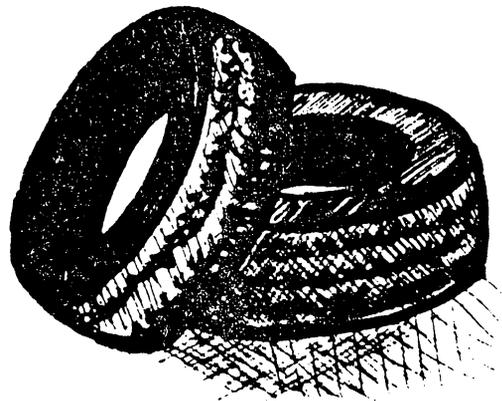


B

C

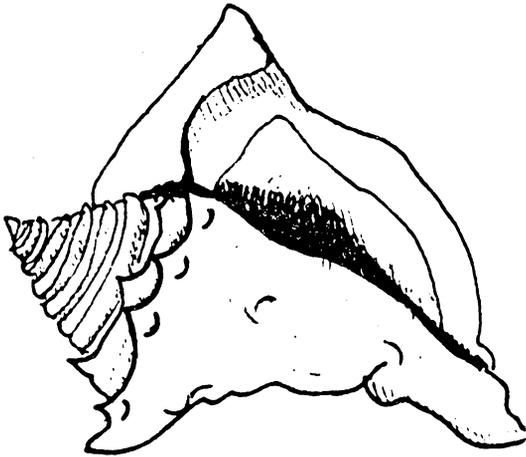


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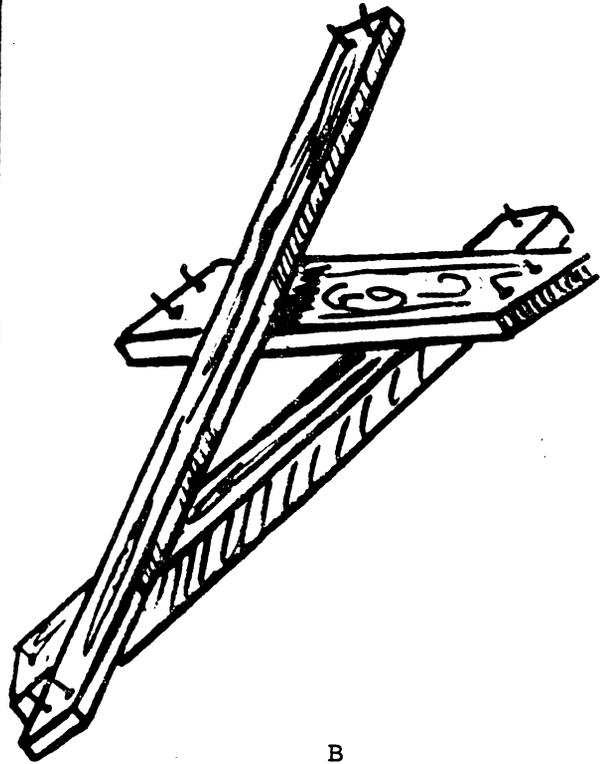


GRADE ONE

NAME _____

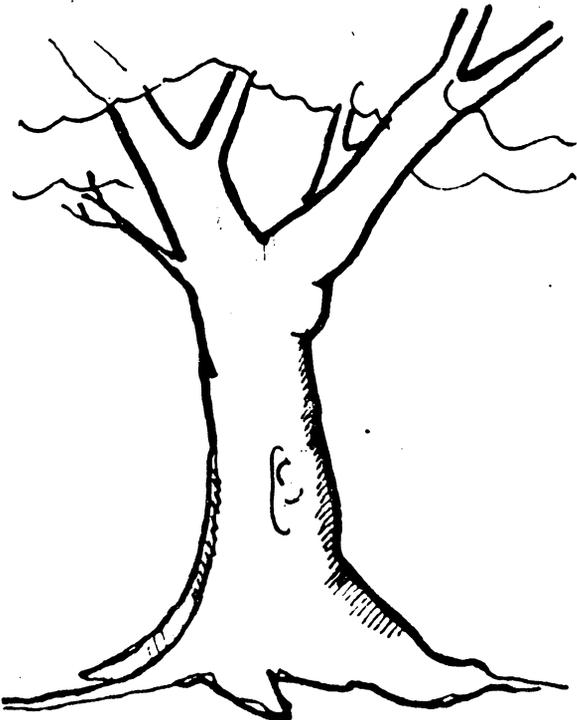


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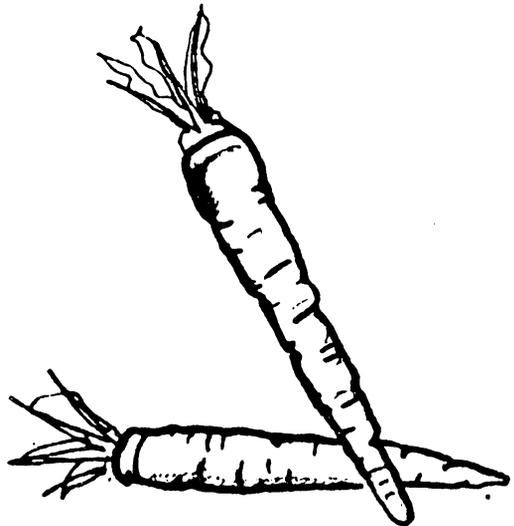


B

C

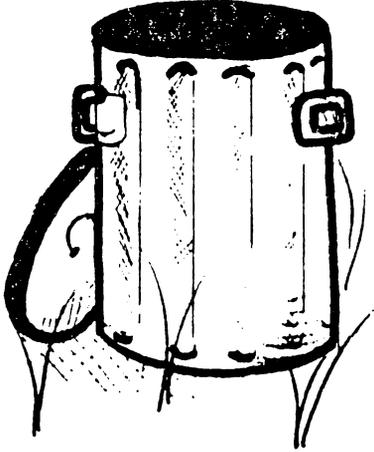


D

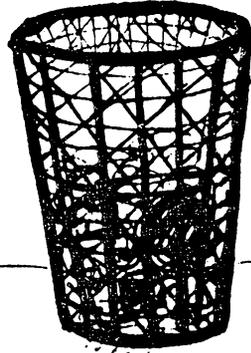


GRADE ONE

NAME _____

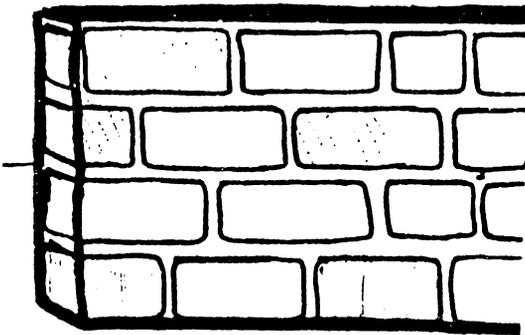


A



B

C

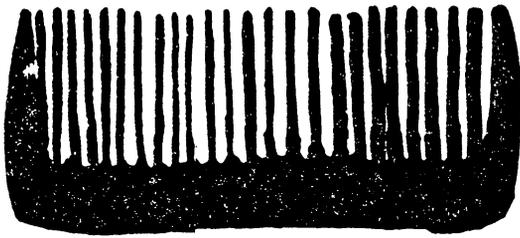


D



GRADE ONE

NAME _____



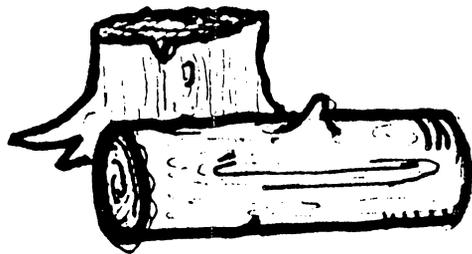
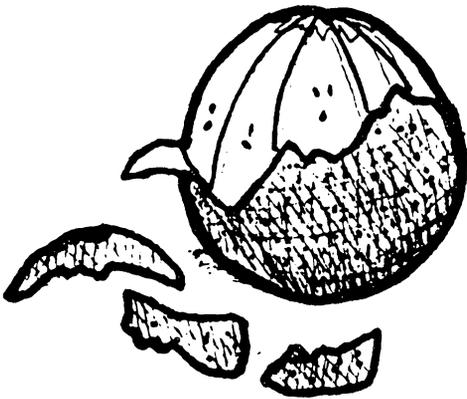
A



B

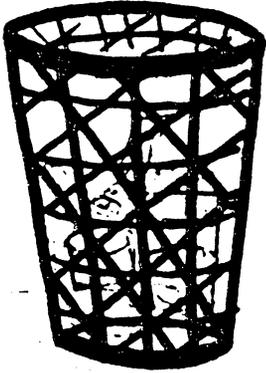
C

D

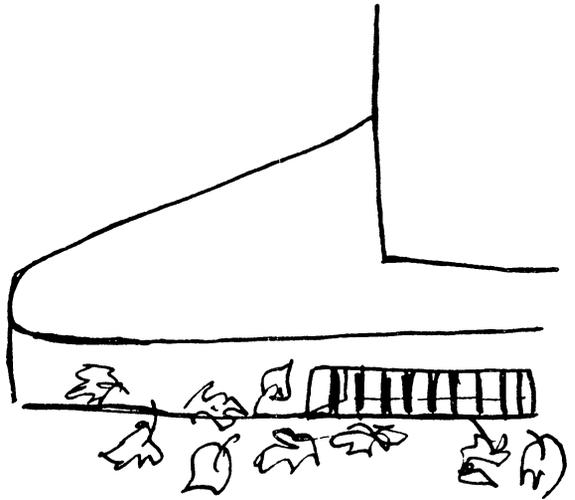


GRADE ONE

NAME _____

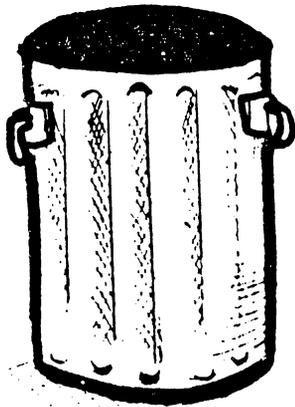


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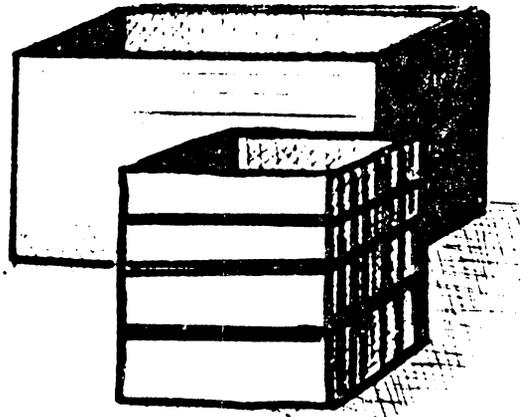


B

C

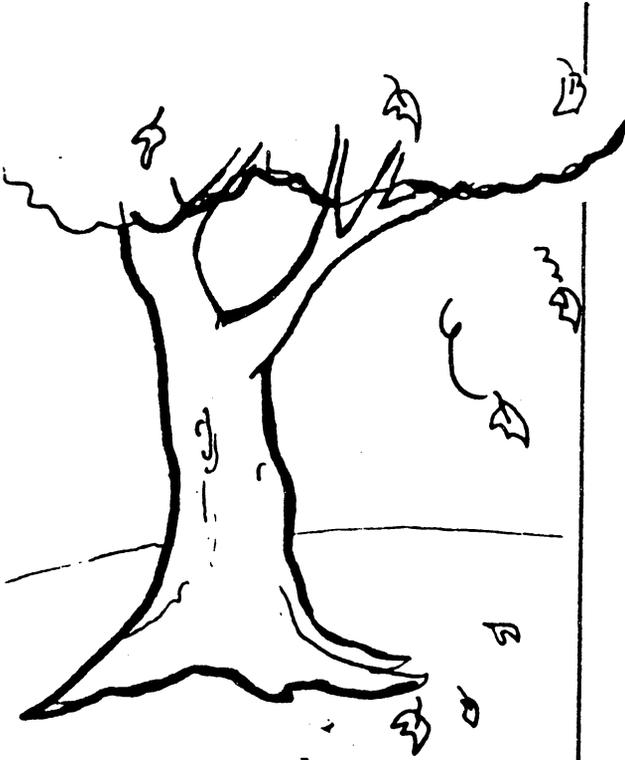


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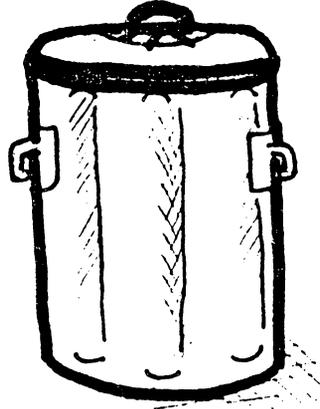


GRADE ONE

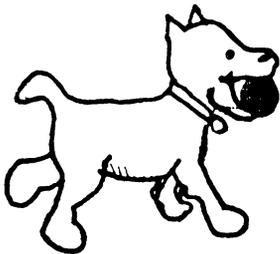
NAME _____



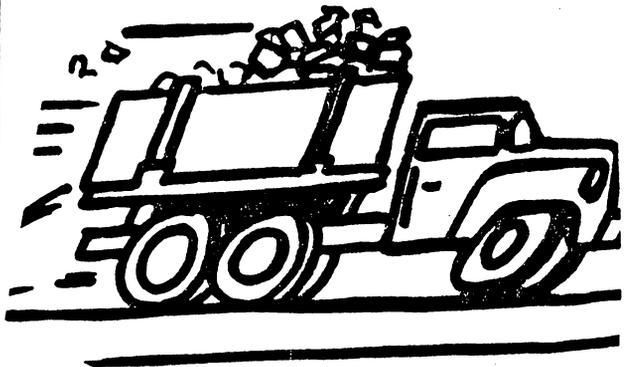
A



B



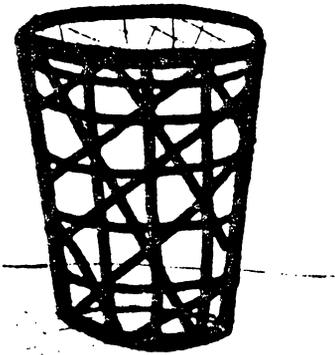
C



D

GRADE ONE

NAME _____

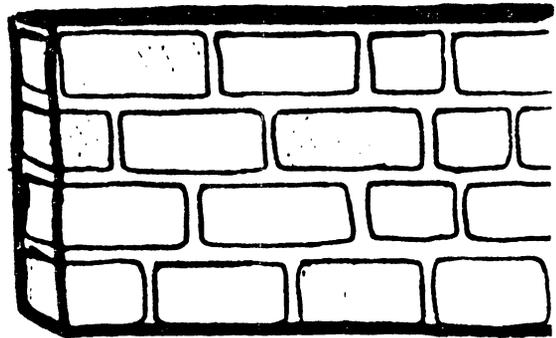
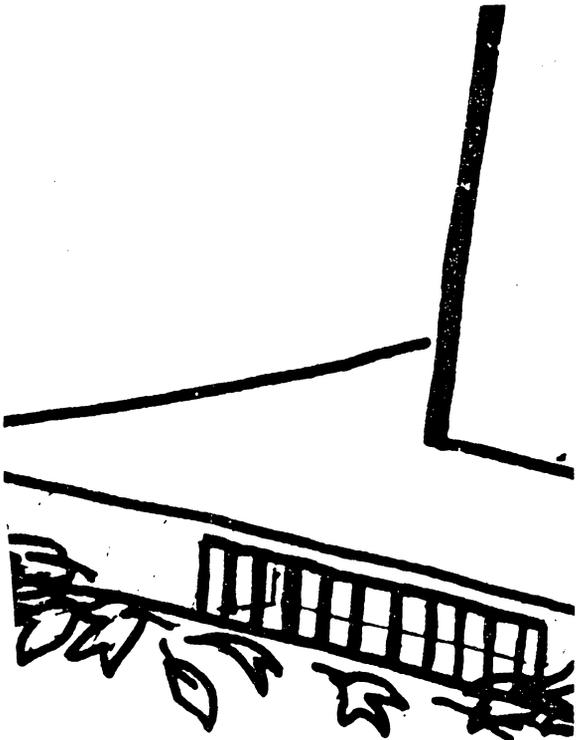


A



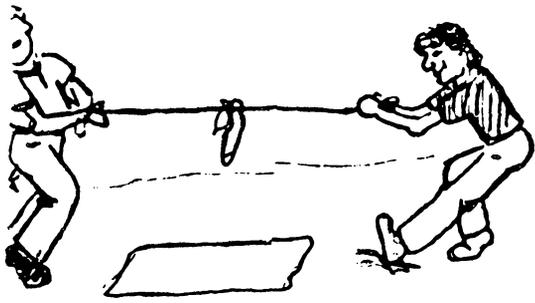
D

C



GRADE ONE

NAME _____



A



B



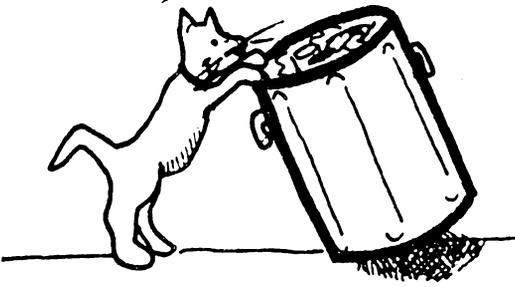
C



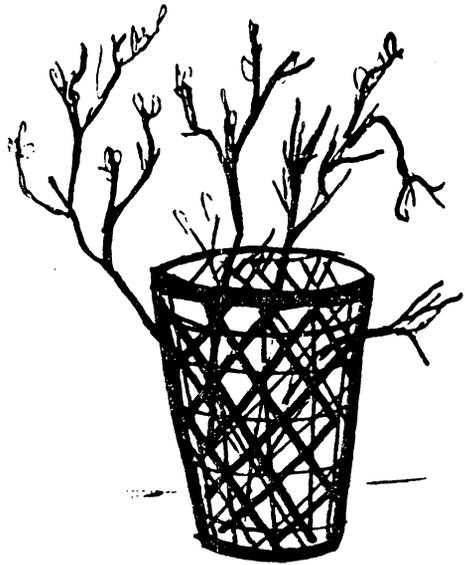
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GRADE ONE

NAME _____

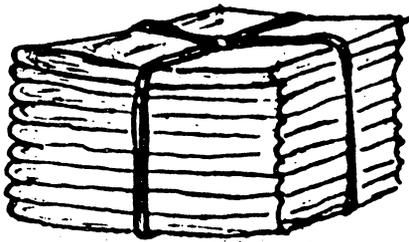


A



B

C



D



GRADE ONE—ANSWER KEY

- E. D
- 1. C
- 2. D
- 3. B
- 4. A
- 5. C
- 6. B
- 7. D
- 8. C
- 9. B
- 10. D
- 11. A
- 12. C
- 13. A

NOTE: Use the results of the pretest to determine which ideas and objectives need special emphasis as you teach the unit. After administering the test, do not review the results or the correct answers with the students.

OPERATION WASTE WATCH ANSWER SHEET
(GRADE ONE)

NAME: _____ GRADE: _____

After your students have marked their answer sheets, collect them without comment. Please use this sheet to record the answers for each student. Send the coded answer sheets back to Virginia Tech in the return envelope that is provided. Note: Please do not try to send the actual answer forms themselves in that the postage will not be sufficient. Also note that you have been given the posttest material as well. It is not necessary to mail the posttest scores since they will be picked up.

-
- | | | | | |
|-----|---|---|---|---|
| 1. | A | B | C | D |
| 2. | A | B | C | D |
| 3. | A | B | C | D |
| 4. | A | B | C | D |
| 5. | A | B | C | D |
| 6. | A | B | C | D |
| 7. | A | B | C | D |
| 8. | A | B | C | D |
| 9. | A | B | C | D |
| 10. | A | B | C | D |
| 11. | A | B | C | D |
| 12. | A | B | C | D |
| 13. | A | B | C | D |

ROOM NO. _____

STUDENT'S NAME: _____ SEX: _____ ETHNIC GROUP: _____

AGE: _____ PRETEST: _____ POSTTEST: _____

WAS THE STUDENT EXPOSED TO THE OWW CURRICULUM? YES _____ NO _____

PRETEST/POSTTEST

Let's Waste Less Waste

GRADE FOUR

STUDENT'S NAME: _____

STUDENT'S SCHOOL: _____

TEACHER'S NAME: _____

SCHOOL SYSTEM: _____

LET'S WASTE LESS WASTEGRADE FOUR

1. Loose trash in our neighborhood comes from
 - a. overflowing litter baskets
 - b. many sources
 - c. people in cars
 - d. school children
2. I should not throw trash into a stream because
 - a. I might get caught and punished
 - b. it can pollute the water and hurt people or animals
 - c. litter makes the water look ugly
 - d. people should not do stupid things
3. We should keep our school clean because
 - a. it is a good habit which helps stop litter pollution
 - b. the principal likes to show off our school to visitors
 - c. litter is smelly and ugly
 - d. we have enough brush receptacles to hold all the waste
4. Litter is
 - a. paper, bottles, boxes, and cans
 - b. man-made solid waste in the wrong place
 - c. what people throw on the ground
 - d. a smelly object on the ground
5. A habit is
 - a. an action shared by most people
 - b. thinking about how to act at a certain time
 - c. an action repeated by a person without thinking
 - d. the behavior of children in the classroom
6. A norm is
 - a. the habits a person has
 - b. a set of actions shared by a family
 - c. a certain action done at a certain time
 - d. a habit shared by most people
7. A person is more likely to litter when
 - a. the paper is small
 - b. he thinks someone will clean up after him
 - c. the land is his own
 - d. he thinks people will ignore it
8. A person is most likely to litter where
 - a. there is already litter
 - b. the property is his own
 - c. the lid is off the garbage can
 - d. the container is a basket

9. Which set of items could be recycled?
 - a. newspapers, tissues, cans
 - b. bottles, peelings, cans
 - c. newspapers, cans bottles
 - d. cans, bottles, food wrappers
10. Which is the "litter norm"?
 - a. People litter where the property is someone else's concern.
 - b. People litter if the garbage can lid is too tight.
 - c. People litter when only their own family notices.
 - d. People litter while taking vacations in a new area.
11. Which is a source of litter?
 - a. a recycling center
 - b. too much trash made by a family in a week
 - c. garbage can without lid
 - d. gutters that are not kept clean
12. Why is littering a bad habit?
 - a. People need the exercise of walking to trash containers.
 - b. It stops flowers from growing by the highways.
 - c. It adds to the pounds of garbage from each person.
 - d. It can hurt people and pollute the area.
13. How could a family cut down on its garbage?
 - a. They could eat fewer snacks.
 - b. They could recycle certain items.
 - c. They could take their own garbage to the landfill.
 - d. They could throw things in vacant lots.
14. We should have a litter bag in our car because
 - a. my teacher tells us to
 - b. we can use it to hold our lunch
 - c. litter can hurt people and pollute the environment
 - d. the police might give you a ticket for throwing things out the window
15. When I take the garbage cans out to be picked up by the garbage truck, I should make sure that the lids are on tight because
 - a. the trash could get loose and blow away
 - b. my teacher told me to put the lids on tight
 - c. the men on the truck might get mad if I don't
 - d. the cans look neater this way
16. It is wrong to throw trash and junk in vacant lots because this litter
 - a. can never be recycled or put in proper waste containers
 - b. makes a messy scene
 - c. makes people angry
 - d. can hurt people and animals
17. Organic waste is waste that
 - a. is solid
 - b. will all rot away
 - c. should be disposed of right away
 - d. came from living things

GRADE FOUR—ANSWER KEY

1. B
2. B
3. A
4. B
5. C
6. D
7. B
8. A
9. C
10. A
11. D
12. C
13. B
14. C
15. A
16. D
17. B

Note: Use the results of the pretest to determine which ideas and objectives need special emphasis as you teach the unit. After administering the test, do not review the results or the correct answers with the students.

OPERATION WASTE WATCH ANSWER SHEET
(Grades 4 and 6)

NAME: _____

GRADE: _____

Mark your answers to the questions in the test booklet here. Be sure that the question number and the answer number are the same. Mark your answer by circling the one correct answer.

EXAMPLE: A B C D

-
- | | |
|-------------|-------------|
| 1. A B C D | 11. A B C D |
| 2. A B C D | 12. A B C D |
| 3. A B C D | 13. A B C D |
| 4. A B C D | 14. A B C D |
| 5. A B C D | 15. A B C D |
| 6. A B C D | 16. A B C D |
| 7. A B C D | 17. A B C D |
| 8. A B C D | 18. A B C D |
| 9. A B C D | 19. A B C D |
| 10. A B C D | 20. A B C D |
| | 21. A B C D |
-

FOR TEACHER'S USE ONLY: Room No. _____ Test Date _____

Student's Name: _____ Sex: _____ Ethnic Group: _____

Student's Age: _____ PRETEST: _____ POSTTEST: _____

Reading Ability: ___ Below Grade Level Student received/will receive curriculum ___
 ___ On Grade Level
 ___ Above Grade Level Control student _____

PRETEST/POSTTEST

COMMUNITY SOLUTIONS TO SOLID WASTE POLLUTION

GRADE SIX

STUDENT'S NAME: _____

STUDENT'S SCHOOL: _____

TEACHER'S NAME: _____

SCHOOL SYSTEM: _____

COMMUNITY SOLUTIONS TO SOLID WASTE POLLUTIONGRADE SIX

1. How many pounds of trash does each man, woman, and child produce each day?
 - a. 1 pound
 - b. 4 pounds
 - c. 10 pounds
 - d. 20 pounds
2. Garbage, trash, and debris are also called
 - a. junk
 - b. pollution
 - c. sewage
 - d. solid waste
3. Debris that has escaped from containers is called
 - a. biodegradable
 - b. free
 - c. junk
 - d. litter
4. Resources recovered from solid waste and used to make new products are called
 - a. new products
 - b. ores and aluminum
 - c. recycled materials
 - d. incinerated resources
5. One disadvantage of burying garbage, trash, and debris in a sanitary land fill is that
 - a. land used for a landfill can never be reused
 - b. the soil becomes spoiled by the garbage in every landfill
 - c. nearby water supplies always become polluted
 - d. we are running out of inexpensive land on which to build landfills
6. Important things that must be considered in selecting a landfill area
 - a. possibility of water pollution
 - b. costs of building and operating
 - c. the opinions of citizens
 - d. all of the above
7. After trash and garbage is carried to the sanitary landfill it
 - a. is covered with earth
 - b. stays above ground until it decomposes
 - c. is always incinerated
 - d. is then recycled

8. Landfill sites must be carefully chosen so that any _____ does not pollute the ground water.
 - a. residue
 - b. run-off from rainfall
 - c. compost
 - d. leachate
9. Before the discarded waste at the landfill is finally processed, it is
 - a. compacted
 - b. allowed to decompose
 - c. sorted into solid waste and inorganic waste
 - d. incinerated
10. To incinerate means to
 - a. dispose of by burning
 - b. recover energy
 - c. get rid of by burying
 - d. put in jail
11. The process of incinerating waste so that the heat from burning can be used to make steam for heating, cooling and/or to make electricity is known as
 - a. residue treatment
 - b. waste recovery
 - c. energy recovery
 - d. decomposition
12. One important way for a community to dispose of trash is through
 - a. litter ordinances
 - b. law enforcement
 - c. recycling
 - d. better health codes
13. One problem sanitation workers often have is
 - a. too narrow driveways
 - b. dog houses
 - c. wastes that are not put into proper containers
 - d. unfriendly customers
14. Collecting, transporting, and processing wastes are a part of the
 - a. incineration process
 - b. life cycle
 - c. natural decomposition cycle
 - d. solid waste cycle
15. Waste materials that decompose naturally through the action of tiny plants and animals are
 - a. bilateral
 - b. biodegradable
 - c. bionic
 - d. biosphere

16. Which set of objects below are biodegradable?
 - a. leaves and apples
 - b. plastic and glass
 - c. steel and lead
 - d. all of the above

17. Large amounts of solid wastes are usually stored in containers called
 - a. dumpsters
 - b. incinerators
 - c. refusals
 - d. trailers

18. One source of large amounts of litter in most communities is
 - a. Uncovered trucks
 - b. cigarettes
 - c. dead tree branches
 - d. street sewers

GRADE SIX—ANSWER KEY

1. D
2. D
3. D
4. C
5. D
6. D
7. A
8. D
9. A
10. A
11. C
12. A
13. C
14. D
15. B
16. A
17. A
18. A

NOTE: Use the results of the pretest to determine which ideas and objectives need special emphasis as you teach the unit. After administering the test, do not review the results or the correct answers with the students.

APPENDIX K
REVISED OWW TESTING MATERIAL

PRETEST/POSTTEST

LET'S WASTE LESS WASTE

GRADE FOUR

Test Version (R)

STUDENT'S NAME: _____

STUDENT'S SCHOOL: _____

TEACHER'S NAME: _____

SCHOOL SYSTEM: _____

LET'S WASTE LESS WASTE—GRADE FOUR

1. Loose trash in our neighborhood comes from
 - a. overflowing litter baskets
 - b. many sources
 - c. people in cars
 - d. school children
2. I should not throw trash into a stream because
 - a. I might get caught and punished
 - b. it can pollute the water and hurt people or animals
 - c. litter makes the water look ugly
 - d. people should not do stupid things
3. When we do something that is followed by praise from others, it will tend to
 - a. make us suspicious of those people giving the praise
 - b. make us laugh
 - c. make us like the person who has praised us
 - d. make us more likely to repeat the behavior
4. If you saw someone you knew picking up litter, would you
 - a. do nothing and allow the person to continue
 - b. praise them for helping to keep our environment clean
 - c. ask them who was making them pick up trash
 - d. wonder what they were doing
5. When someone we know criticizes our actions, it will tend to make us
 - a. less likely to repeat the behaviors
 - b. angry
 - c. dislike the person
 - d. more likely to repeat the behaviors
6. We should keep our school clean because
 - a. it is a good habit which helps stop litter pollution
 - b. the principal likes to show off our school to visitors
 - c. litter is smelly and ugly
 - d. we have enough trash receptacles to hold all the waste
7. Litter is
 - a. paper, bottles, boxes, and cans
 - b. man-made solid waste in the wrong place
 - c. what people throw on the ground
 - d. a smelly object on the ground
8. A habit is
 - a. an action shared by most people
 - b. thinking about how to act at a certain time
 - c. an action repeated by a person without thinking
 - d. the behavior of children in the classroom

9. A norm is
 - a. the habits a person has
 - b. a set of actions shared by a family
 - c. a certain action done at a certain time
 - d. a habit shared by most people
10. A person is more likely to litter when
 - a. the paper is small
 - b. he thinks someone will clean up after him
 - c. the land is his own
 - d. he thinks people will ignore it
11. A person is most likely to litter where
 - a. there is already litter
 - b. the property is his own
 - c. the lid is off the garbage can
 - d. the container is a basket
12. Which set of items could be recycled?
 - a. newspapers, tissues, cans
 - b. bottles, peelings, cans
 - c. newspapers, cans, bottles
 - d. cans, bottles, food wrappers
13. Which is the "litter norm"?
 - a. people litter where the property is someone else's concern
 - b. people litter if the garbage can lid is too tight
 - c. people litter when only their own family notices
 - d. people litter while taking vacations in a new area
14. Which is a source of litter?
 - a. a recycling center
 - b. too much trash made by a family in a week
 - c. garbage can without a lid
 - d. gutters that are not kept clean
15. Why is littering a bad habit?
 - a. people need the exercise of walking to trash containers
 - b. it stops flowers from growing by the highways
 - c. it adds to the pounds of garbage from each person
 - d. it can hurt people and pollute the area
16. How could a family cut down on its garbage?
 - a. they could eat fewer snacks
 - b. they could recycle certain items
 - c. they could take their own garbage to the landfill
 - d. they could throw things in vacant lots
17. We should have a litter bag in our car because
 - a. my teacher tells us to
 - b. we can use it to hold our lunch
 - c. litter can hurt people and pollute the environment
 - d. the police might give you a ticket for throwing things out the window

18. When I take the garbage cans out to be picked up by the garbage truck, I should make sure that the lids are on tight because
 - a. the trash could get loose and blow away
 - b. my teacher told me to put the lids on tight
 - c. the men on the truck might get mad if I don't
 - d. the cans look neater this way

19. It is wrong to throw trash and junk in vacant lots because this litter
 - a. can never be recycled or put in proper waste containers
 - b. makes a messy scene
 - c. makes people angry
 - d. can hurt people and animals

20. Organic waste is waste that
 - a. is solid
 - b. will all rot away
 - c. should be disposed of right away
 - d. came from living things

GRADE FOUR—ANSWER KEY

1. B
2. B
3. D
4. B
5. A
6. A
7. B
8. C
9. D
10. B
11. A
12. C
13. A
14. C
15. D
16. B
17. C
18. A
19. D
20. B

NOTE: Use the results of the pretest to determine which ideas and objectives need special emphasis as you teach the unit. After administering the test, do not review the results or the correct answers with the students.

PRETEST/POSTTEST

Community Solutions to Solid Waste Pollution

GRADE SIX

Test Version (R)

STUDENT'S NAME: _____

STUDENT'S SCHOOL: _____

TEACHER'S NAME: _____

SCHOOL SYSTEM: _____

COMMUNITY SOLUTIONS TO SOLID WASTE POLLUTIONGRADE SIX

1. How many pounds of trash does each man, woman, and child produce each day?
 - a. 1 pound
 - b. 4 pounds
 - c. 10 pounds
 - d. 20 pounds
2. Garbage, trash, and debris are also called
 - a. junk
 - b. pollution
 - c. sewage
 - d. solid waste
3. Debris that has escaped from containers is called
 - a. biodegradable
 - b. free
 - c. junk
 - d. litter
4. Resources recovered from solid waste and used to make new products are called
 - a. new products
 - b. ores and aluminum
 - c. recycled materials
 - d. incinerated resources
5. When we praise a person's actions, those behaviors will
 - a. be more likely to occur again
 - b. be less likely to occur again
 - c. be quickly forgotten
 - d. be more likely to be remembered
6. One disadvantage of burying garbage, trash, and debris in a sanitary landfill is that
 - a. land used for a landfill can never be reused
 - b. the soil becomes spoiled by the garbage in every landfill
 - c. nearby water supplies always become polluted
 - d. we are running out of inexpensive land on which to build landfills
7. If you saw someone you knew carefully covering all of their garbage cans, would you
 - a. ignore the situation
 - b. wonder what they were hiding in the cans
 - c. praise them for helping stop our litter problem by covering their cans
 - d. wonder if a dog had been in their cans

8. Behaviors that are followed by negative consequences tend
 - a. to make us angry
 - b. to make us unhappy
 - c. to be less likely to recur
 - d. to be quickly forgotten
9. Important things that must be considered in selecting a landfill area
 - a. possibility of water pollution
 - b. costs of building and operating
 - c. the opinions of citizens
 - d. all of the above
10. After trash and garbage is carried to the sanitary landfill, it
 - a. is covered with earth
 - b. stays above ground until it decomposes
 - c. is always incinerated
 - d. is then recycled
11. Landfill sites must be carefully chosen so that any _____ does not pollute the ground water
 - a. residue
 - b. run-off from rainfall
 - c. compost
 - d. leachate
12. Before the discarded waste at the landfill is finally processed, it is
 - a. compacted
 - b. allowed to decompose
 - c. sorted into solid waste and inorganic waste
 - d. incinerated
13. To incinerate means to
 - a. dispose of by burning
 - b. recover energy
 - c. get rid of by burying
 - d. put in jail
14. The process of incinerating waste so that the heat from burning can be used to make steam for heating, cooling and/or to make electricity is known as
 - a. residue treatment
 - b. waste recovery
 - c. energy recovery
 - d. decomposition
15. One important way for a community to dispose of trash is through
 - a. litter ordinances
 - b. law enforcement
 - c. recycling
 - d. better health codes

16. One problem sanitation workers often have is
 - a. too narrow driveways
 - b. dog houses
 - c. wastes that are not put into proper containers
 - d. unfriendly customers
17. Collecting, transporting, and processing wastes are a part of the
 - a. incineration process
 - b. life cycle
 - c. natural decomposition cycle
 - d. solid waste cycle
18. Waste materials that decompose naturally through the action of tiny plants and animals are
 - a. bilateral
 - b. biodegradable
 - c. bionic
 - d. biosphere
19. Which set of objects below are biodegradable?
 - a. leaves and apples
 - b. plastic and glass
 - c. steel and lead
 - d. all of the above
20. Large amounts of solid wastes are usually stored in containers called
 - a. dumpsters
 - b. incinerators
 - c. refusals
 - d. trailers
21. One source of large amounts of litter in most communities is
 - a. uncovered trucks
 - b. cigarettes
 - c. dead tree branches
 - d. street sewers

GRADE SIX—ANSWER KEY

1. D
2. D
3. D
4. C
5. A
6. D
7. C
8. C
9. D
10. A
11. D
12. A
13. A
14. C
15. A
16. C
17. D
18. B
19. A
20. A
21. A

NOTE: Use the results of the pretest to determine which ideas and objectives need special emphasis as you teach the unit. After administering the test, do not review the results or the correct answers with the students.

APPENDIX L
LITTER AWARENESS QUESTIONNAIRE

1) Name _____

2) Sex

Male

Female

3) Age Category

Under 25

26-45

46-55

56 or over

4) Current position _____

5) Years in this position

Under 1 year

1 to 5

6 to 10

Over 10

6) Classes currently teaching: _____

7) In your opinion how littered is your school environment?

Heavily

Moderately

Lightly

Not littered

8) Which areas around your school have you noticed to accumulate litter?

stairs	<input type="checkbox"/>	walkways	<input type="checkbox"/>	grounds	<input type="checkbox"/>
coat room	<input type="checkbox"/>	hallways	<input type="checkbox"/>	auditorium (gym)	<input type="checkbox"/>
classrooms	<input type="checkbox"/>	bathrooms	<input type="checkbox"/>	playgrounds	<input type="checkbox"/>
cafeteria	<input type="checkbox"/>	lunchrooms	<input type="checkbox"/>	other: _____	

9) Which of the following do you feel contributes most to the litter problem in your school? (check one)

Innappropriately placed receptacles	<input type="checkbox"/>
Poor janitorial collection practices	<input type="checkbox"/>
Poor disposal habits by staff	<input type="checkbox"/>
Poor disposal habits by students	<input type="checkbox"/>
Other	<input type="checkbox"/>

10) How do you rate the school janitorial service?

Excellent	<input type="checkbox"/>
Good	<input type="checkbox"/>
Fair	<input type="checkbox"/>
Poor	<input type="checkbox"/>
Very poor	<input type="checkbox"/>

11) Generally, how littered is your classroom at the end of the day?

Heavily	<input type="checkbox"/>
Moderately	<input type="checkbox"/>
Lightly	<input type="checkbox"/>
Not littered	<input type="checkbox"/>

12) To what extent do the children in your class litter?

- A Lot
- A Little
- Moderately
- Not at all

13) Do you believe that there is a litter problem in your community?

- yes no don't know

14) How severe is the litter problem in your community?

- Very
- Moderately
- Slightly
- Not a problem at all

15) How much responsibility do you feel for getting others to reduce litter?

- Strong responsibility
- Some responsibility
- Little responsibility
- No responsibility

16) Is litter a safety and health problem?

- yes no don't know

17) Do you believe that there is a litter problem in your school?

- yes no don't know

18) How severe is the litter problem in your school?

Very

Moderately

Slightly

Not a problem at all

19) Do you feel that you can do anything to improve the environmental conditions surrounding your school?

Definitely not

Probably not

Do not know

Probably yes

Definitely yes

20) Do your students exhibit an awareness of litter through their behavior?

All do

Most do

Some do

None do

21) Do you think an educational awareness program for children concerning proper waste disposal would prove effective?

Definitely yes

Probably yes

Do not know

Probably no

Definitely no

22) How would you feel if you littered (i.e., disposed of trash inappropriately)?

Very guilty

Slightly guilty

Anxious

No concern

23) When you see a stranger litter, what do you do?

Nothing

Pick it up

Ask the person to pick it up

Demand that the person pick it up

24) When you see a friend litter, what do you do?

Nothing

Pick it up

Ask the person to pick it up

Demand that the person pick it up

APPENDIX M
TEACHER EVALUATION QUESTIONNAIRE

NAME: _____ PHONE NUMBER: _____

ADDRESS: _____

DATES DURING WHICH THE UNIT WAS TAUGHT: _____

DATE MAJORITY OF STUDENTS COMPLETED POSTTEST: _____

DATE THIS EVALUATION FORM WAS COMPLETED: _____

PROGRAM OR SUBJECT THIS UNIT WAS INCORPORATED INTO: _____
(Science, Social Studies, etc.)

GRADE: _____

SCHOOL: _____

SCHOOL SYSTEM: _____

NUMBER OF WEEKS IN WHICH UNIT WAS TAUGHT _____

TOTAL NUMBER OF STUDENTS IN YOUR CLASS _____

Sex: %Male _____

%Female _____

Race: % Caucasian _____

% Black _____

% Other _____

Socioeconomic background of students _____
(1=low, 2=medium, 3=high, 4=mixed)

COMMENTS: _____

Intellectual ability of students _____
(1=low, 2=medium, 3=high, 4=mixed)

COMMENTS: _____

DIRECTIONS: For each question, please circle the number 1 through 5 which represents the correct or most appropriate response(s). Space is provided for your comments. You may attach additional sheets if necessary.

I. THE "PROBLEM" AND ATTITUDES TOWARD OPERATION WASTE WATCH

1. To what extent is littering a problem in your community?

1	2	3	4	5
No litter problem at all				serious problem

2. If you notice any other solid waste management problems in your community, please list these below:

3. Is it important for children to learn in school about the proper handling of solid waste?

1	2	3	4	5
not important				very important

If so, in which grade(s) should this study be undertaken?

1	2	3	4	5	6	7	8	9
Kindergarten	1st	2nd	3rd	4th	5th	6th	7/8th	High School

II. THE OPERATION WASTE WATCH CURRICULUM

A. Usefulness of materials:

4. Listed below are the materials supplied with this unit. Please place a check (✓) by the materials you used and then rate the value of each in assisting your teaching of this unit. Place the scale number to the right of the materials used.

1	2	3	4	5
Extremely Useful	Very Useful	Moderately Useful	Of Some Use	Of Very Little Use

Check if used	Rating
_____ Filmstrip	_____
_____ Cassette	_____
_____ Teacher's Guide	_____
_____ Individual Activity Cards	_____
_____ Class Activity Cards	_____
_____ Coloring/Comic Books	_____

4. (Continued)

Check if used	Rating
_____ Posters	_____
_____ Pretest	_____
_____ Posttest	_____

Comments: _____

 _____5. What additional materials do you think the Division should provide in the unit kit?

B. Difficulty and Meaningfulness

6. Do you think the subject matter was meaningful to your students?

1	2	3	4	5
Not				Very
Meaningful				Meaningful

7. Do other curriculum materials at your school present many of the same ideas?

1	2	3	4	5
Not				Almost
At All				Totally

8. How would you rate the difficulty level of the unit ideas for your students?

1	2	3	4	5
Too		Right on		Too
Easy		Target		Difficult

Please make specific comments: _____

9. Is the vocabulary in this unit on the correct grade level?

1	2	3	4	5
Too		Right on		Too
Easy		Target		Difficult

10. Did you need to pull vocabulary or concepts from the OPERATION WASTE WATCH units to give your students the proper background for your grade level unit?

1	2	3	4	5
Almost Never				Almost Always

C. Mastering Objectives:

11. How well did the students do, on the whole, in reaching the objectives of the unit?

1	2	3	4	5
Poorly				Very Well

Please identify and comment on any of the "Unit Objectives" which students experienced difficulty with:

12. Test results aside, in your opinion did the unit significantly increase your students' knowledge of the subject matter?

1	2	3	4	5
No Increase At All				Very Important Increases

13. Did the tests help you plan and evaluate your unit?

1	2	3	4	5
Not Helpful				Very Helpful

III. STUDENTS: ATTITUDES AND IMPACT

14. Do you think most of the students were interested in the ideas presented?

1	2	3	4	5
Not Interested				Very Interested

15. Did you notice a decrease in littering among your students as the unit progressed?

1	2	3	4	5
No Decrease				Significant Decrease

16. Did the children have an impact on their parents' attitudes toward littering and solid waste disposal?

1	2	3	4	5
No				Major
Impact				Impact

IV. EVALUATION OF OPERATION WASTE WATCH II MATERIALS

17. Were the directions for the unit clear and easy to follow?

1	2	3	4	5
Very				Very Clear
Difficult				and Easy

Comments: _____

18. Do you feel showing the filmstrip was a good way to introduce this unit?

1	2	3	4	5
Not				Excellent
At All				Way

Comments on the filmstrip: _____

19. Did you have any difficulty assembling materials to use with this unit?

1	2	3	4	5
Lots of				None
Difficulty				At All

20. Did you need assistance from other adults in teaching the unit or in conducting the activities?

1	2	3	4	5
Not				Very Much
At All				

21. Did you use supplementary materials with the adult (films, posters, pictures, books, etc.)? Yes ___ No ___

Please list any supplementary items used: _____

Were these materials easy to find? _____

VI. Class Activity Cards

Please note whether or not you used each of the Class Activity Cards in your unit (not all units have as many as 17 cards). For those that you did use, please circle the number indicating how helpful you found them in presenting the unit.

Grade Level _____

Card	Used	Not Used	For Those Used						
			Degree of Helpfulness						
			Not Helpful						Very Helpful
1			1	2	3	4	5	6	7
2			1	2	3	4	5	6	7
3			1	2	3	4	5	6	7
4			1	2	3	4	5	6	7
5			1	2	3	4	5	6	7
6			1	2	3	4	5	6	7
7			1	2	3	4	5	6	7
8			1	2	3	4	5	6	7
9			1	2	3	4	5	6	7
10			1	2	3	4	5	6	7
11			1	2	3	4	5	6	7
12			1	2	3	4	5	6	7
13			1	2	3	4	5	6	7
14			1	2	3	4	5	6	7
15			1	2	3	4	5	6	7
16			1	2	3	4	5	6	7
17			1	2	3	4	5	6	7

If cards were rated as not helpful or of very little help (1 or 2), please indicate if any of the problems listed below were responsible.

	No Problem					Big Problem		Card(s)
	1	2	3	4	5	6	7	No.
a. Too little time	1	2	3	4	5	6	7	_____
b. Poor instructions	1	2	3	4	5	6	7	_____
c. Uninteresting	1	2	3	4	5	6	7	_____
d. Reading level too high	1	2	3	4	5	6	7	_____

If there were other significant problems, please specify these.

e. Other (specify)	1	2	3	4	5	6	7	_____
_____	1	2	3	4	5	6	7	_____
_____								_____

Comments: _____

22. Do you have any additional suggestions for improving this unit such as methods of integrating the material into the current curriculum?

23. Were individuals in your community helpful in planning and conducting field trips or other activities?

24. Would you like to teach this unit again?

1 2 3 4 5
Definitely Not Definitely

Explain:

25. Would you like to have a free copy of one grade level unit in its final form in 1980?

- (a) Yes
- (b) No

Mailing Address:

Level Desired:

APPENDIX N
ANALYSIS OF VARIANCE SUMMARY TABLES

Table 1

Analysis of Variance Summary Table
Examination of Room Litter—Number of Crumbled Items

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	<u>df</u>	MS	Error Terms	<u>F</u>
Grade (GR)	522.4343	2	261.2171	1	.62
Curr. Condition (CD)	14.0907	2	7.0454	1	.02
GR X CD	1759.6170	4	439.9043	1	1.04
Phase (PH)	925.4534	2	402.7267	2	2.62
GR X PH	694.0846	4	173.52.2	2	.98
CD X PH	331.9811	4	82.9953	2	.47
GR X CD X PH	1163.9833	8	145.4979	2	.83
Error Terms					
1 Ss (GR X CD)	13088.9573	27	484.7762		
2 Ss X PH (GR X CD)	8110.1408	46	176.3074		

Table 2

Analysis of Variance Summary Table
Examination of Room Litter—Number of Intact Items

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	df	MS	Error Terms	<u>F</u>
Grade (GR)	20.3970	2	10.1985	1	.45
Curr. Condition (CD)	10.5353	2	5.2677	1	.23
GR X CD	49.6492	4	12.4123	1	.55
Phase (PH)	80.8080	2	40.4040	2	1.10
GR X PH	36.1048	4	9.0262	2	.25
CD X PH	151.9792	4	39.4948	2	1.08
GR X CD X PH	93.5376	7	13.3625	2	.36
<hr/>					
Error Terms					
<hr/>					
1 Ss (GR X CD)	809.1053	27	29.9669		
2 Ss X PH (GR X CD)	917.0623	25	36.6825		
<hr/>					

Table 3

Analysis of Variance Summary Table
Examination of Room Litter—Total Number of Items

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	df	MS	Error Terms	<u>F</u>
Grade (GR)	428.0907	2	214.0454	1	
Curr. Condition (CD)	210.8913	2	105.4457	1	
GR X CD	2115.6913	4	528.9228	1	
Phase (PH)	776.3889	2	388.1945	2	
GR X PH	398.4828	4	99.6207	2	
CD X PH	557.0619	4	139.2655	2	
GR X CD X PH	1529.8889	8	191.2361	2	
<hr/>					
Error Terms					
<hr/>					
1 Ss (GR X CE)	568.2178	27	21.0451		
2 Ss X PH (GR X CD)	8954.9111	54	165.8317		
<hr/>					

Table 4

Analysis of Variance Summary Table
Examination of Room Litter—Number of Litter Total Items per Child

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	df	MS	Error Terms	<u>F</u>
Grade (GR)	.9183	2	.4569	1	.44
Curr. Condition (CD)	.5478	2	.2739	1	.26
GR X CD	5.2555	4	1.3139	1	1.26
Phase (PH)	1.2345	2	.6173	2	1.94
GR X PH	1.1356	4	.2839	2	.89
CD X PH	1.3072	4	.3268	2	1.03
GR X CD X PH	2.3078	8	.2885	2	.91
Error Terms					
1 Ss (GR X CD)	28.0864	27	1.0402		
2 Ss X PH (GR X CD)	11.8904	53	.3187		

Table 5

Analysis of Variance Summary Table
 Examination of Room Litter—
 Number of Total Litter Items per Classroom Area (sq. ft.)

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	df	MS	Error Terms	<u>F</u>
Grade (GR)	.0023	2	.0012	1	.78
Curr. Condition (CD)	.0011	2	.0006	1	.36
GR X CD	.0073	4	.0010	1	1.23
Phase (PH)	.0018	2	.0009	2	2.94
GR X PH	.0010	4	.0003	2	.89
CD X PH	.0018	4	.0005	2	1.52
GR X CD X PH	.0028	8	.0004	2	1.17
Error Terms					
1 Ss (GR X CD)	.0399	27	.0015		
2 Ss X PH (GR X CD)	.0164	54	.0003		

Table 6

Analysis of Variance Summary Table
 Examination of Room Litter—
 Number of Total Litter Items per Room Density
 (Number of Students/Room Area)

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	df	MS	Error Terms	<u>F</u>
Grade (GR)	505928.5897	2	252964.2949	1	.56
Curr. Condition (CD)	77347.4474	2	38673.7237	1	.56
GR X CD	1170557.8142	2	432639.4535	1	.96
Phase (PH)	506917.4235	2	253458.7118	2	1.53
GR X PH	495940.7127	4	123985.1782	2	.75
CD X PH	512915.2485	4	128228.8121	2	.77
GR X CD X PH	1072920.6684	8	134115.0835	2	.81
<hr/>					
Error Terms					
<hr/>					
1 Ss (GR X CD)	12106688.6407	27	448395.8756		
2 Ss X PH (GR X CD)	8938436.6701	54	165526.6050		

Table 7

Analysis of Variance Summary Table
 Student Behavior in Regards to Planted Floor Litter—
 Number of Appropriate Litter Disposals

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	df	MS	Error Terms	<u>F</u>
Grade (GR)	1.6535	2	.8268	1	.43
Curr. Condition (CD)	.9693	2	.4847	1	.24
GR X CD	6.2021	4	1.5505	1	.81
Phase (PH)	4.2222	2	2.1110	2	2.70
GR X PH	2.5556	4	.6389	2	.82
CD X PH	6.9538	4	1.7385	2	2.23
GR X CD X PH	10.9052	8	1.3632	2	1.75
<hr/>					
Error Terms					
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1 Ss (GR X CD)	51.7111	27	1.9152		
2 Ss X PH (GR X CD)	42.1555	54	.7807		

Table 8

Analysis of Variance Summary Table
 Student Behavior in Regards to Planted Desk Litter—
 Number of Appropriate Litter Disposals

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. Control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	df	MS	Error Terms	<u>F</u>
Grade (GR)	1.5819	2	.7910	1	.60
Curr. Condition (CD)	1.2913	2	.6457	1	.49
GR X CD	5.6201	4	1.4050	1	1.06
Phase (PH)	4.6667	2	2.3333	2	3.27*
GR X PH	2.7871	4	.6968	2	.98
CD X PH	2.9682	4	.7421	2	1.04
GR X CD X PH	2.3615	8	.2952	2	.41
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Error Terms					
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1 Ss (GR X CD)	35.6500	27	1.3204		
2 Sx X PH (GR X CD)	38.5667	54	.7142		
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*Significat at the .05 level.

Table 9

Analysis of Variance Summary Table
 Student Behavior in Regards to Planted Litter in Public Areas—
 Number of Appropriate Litter Disposals

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	df	MS	Error Terms	<u>F</u>
Grade (GR)	.5871	2	.2936	1	.11
Curr. Condition (CD)	2.9946	2	1.4973	1	.59
GR X CD	9.3802	2	2.3451	1	.92
Phase (PH)	9.4629	2	4.7315	2	5.72*
GR X PH	1.2401	4	.3100	2	.38
CD X PH	6.6450	4	1.6613	2	2.02
GR X CD X PH	4.8327	8	.6040	2	.73
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Error Terms					
<hr/>					
1 Ss (GR X CD)	69.0778	27	2.5584		
2 Ss X PH (GR X CD)	44.4222	54	.8226		

*Significant at the .01 level.

Table 10

Analysis of Variance Summary Table
 Student Behavior in Regards to Planned Litter Near the Class Receptacle-
 Number of Appropriate Litter Disposals

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3 (Phase: pre vs. post vs. follow-up)					
Source	SS	df	MS	Error Terms	F
Grade (GR)	.5901	2	.2951	1	1.94
Curr. Condition (CD)	.3207	2	.1604	1	1.05
GR X CD	1.1370	4	.2843	1	1.87
Phase (PH)	1.3519	2	.6760	2	3.47
GR X PH	.6038	4	.1510	2	.77
CD X PH	2.2270	4	.5568	2	.86
GR X CD X PH	1.2771	8	.1597	2	.82
Error Terms					
1 Ss (GR X CD)	1.1368	27	.0421		
2 Ss X PH (GR X CD)	10.5222	54	.1949		

Table 11

Analysis of Variance Summary Table
 Student Disposals of a Provided Handout (i.e., Baby Wet Ones)
 Number of Appropriate Litter Disposals

3 (Grade: 1 vs. 4 vs. 6) X 3 (Curriculum Condition: standard vs. modified vs. control) X 3 (Phase: pre vs. post vs. follow-up)					
Source	SS	df	MS	Error Terms	<u>F</u>
Grade (GR)	567.3075	2	283.6538	1	7.18*
Curr. Condition (CD)	247.1863	2	123.5932	1	3.13
GR X CD	70.4206	4	17.6052	1	.45
Phase (PH)	36.2569	2	18.1285	2	.94
GR X PH	104.9535	4	26.2384	2	1.35
CD X PH	35.7424	4	8.9356	2	.46
GR X CD X PH	100.9766	8	12.6221	2	.65
Error Terms					
1 Ss (GR X CD)	1162.9511	29			
2 Ss X PH (GR X CD)	1007.3167	52			

Table 12

Analysis of Variance Summary Table
Student Achievement Test—Number of Correct Responses

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	<u>df</u>	MS	Error Terms	<u>F</u>
Grade (GR)	3323.35	2	1661.68	1	130.93**
Curr. Condition (CD)	110.92	2	55.46	1	4.73*
GR X CD	1016.63	4	254.16	1	20.03**
Phase (PH)	2042.90	2	1021.45	2	277.01**
GR X PH	728.61	4	182.15	2	49.40**
CD X PH	348.84	4	87.21	2	23.65**
GR X CD X PH	175.57	8	21.95	2	5.95**
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Error Terms					
<hr/>					
1 Ss (GR X CD)	7005.60	552	12.69		
2 Ss X PH (GR X CD)	4070.83	1004	3.69		

*Significant at the .05 level.

**Significant at the .01 level.

Table 13

Analysis of Variance Summary Table
LAQ Factor 1 (Items 7 and 13-18)—Total Factor Score

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	df	MS	Error Terms	<u>F</u>
Grade (GR)	259.2437	2	129.6219	1	5.70*
Curr. Condition (CD)	41.0327	2	20.5164	1	.90
GR X CD	120.6291	4	30.1573	1	1.33
Phase (PH)	43.5825	2	21.7913	2	1.55
GR X PH	10.9366	4	2.7342	2	.19
CD X PH	31.7084	4	7.9271	2	.56
GR X CD X PH	48.7414	7	6.9631	2	.50
<hr/> Error Terms					
1 Ss (GR X CD)	811.4389	25	32.4576		
2 Ss X PH (GR X CD)	337.5770	24	14.0657		

*Significant at the .01 level.

Table 14

Analysis of Variance Summary Table
 LAQ Factor 2 (Items 20-22)—Total Factor Score

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	<u>df</u>	MS	Error Terms	<u>F</u>
Grade (GR)	.8248	2	.4124	1	.15
Curr. Condition (CD)	17.0430	2	8.5212	1	3.04
GR X CD	1.4245	4	.3561	1	.13
Phase (PH)	4.2545	2	2.1225	2	.87
GR X PH	7.3574	4	1.8394	2	.76
CD X PH	5.1266	4	1.2820	2	.53
GR X CD X PH	12.6057	7	1.8008	2	.74
<hr/>					
Error Terms					
<hr/>					
1 Ss (GR X CD)	106.1898	25	4.2476		
2 Ss X PH (GR X CD)	58.3664	24	2.4320		

Table 15

Analysis of Variance Summary Table
LAQ Factor 3 (Items 23-24)—Factor Score

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	df	MS	Error Terms	<u>F</u>
Grade (GR)	29.5429	2	14.7715	1	4.59*
Curr. Condition (CD)	14.6283	2	7.3152	1	2.27
GR X CD	11.2243	4	2.8061	1	.87
Phase (PH)	1.2856	2	.6433	2	.36
GR X PH	1.0370	4	.2593	2	.14
CD X PH	12.5659	4	3.1415	2	1.75
GR X CD X PH	16.5708	7	2.3673	2	1.32
Error Terms					
1 Ss (GR X CD)	89.4991	25	3.5780		
2 Ss X PH (GR X CD)	43.0551	24	1.7940		

*Significant at the .05 level.

Table 16

Analysis of Variance Summary Table
 LAQ Factor 4 (Items 11-12)—Total Factor Score

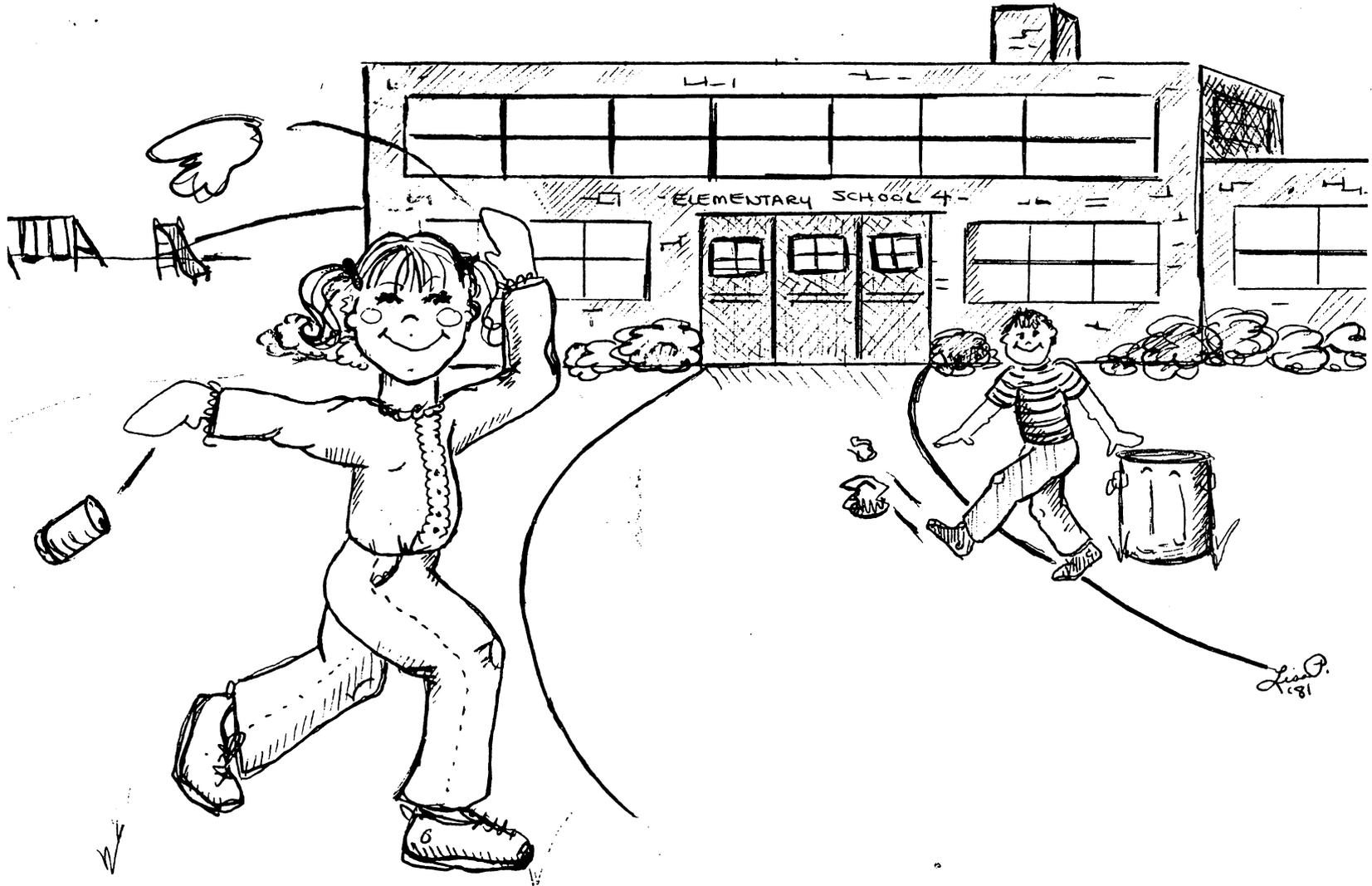
3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	df	MS	Error Terms	<u>F</u>
Grade (GR)	1.7029	2	.8515	1	.19
Curr. Condition (CD)	.2474	2	.1237	1	.03
GR X CD	18.2107	4	4.5527	1	1.03
Phase (PH)	2.7950	2	1.3975	2	2.77
GR X PH	4.4698	4	1.1175	2	2.22
CD X PH	1.0175	4	.2544	2	.50
GR X CD X PH	1.6557	7	.2365	2	.47
Error Terms					
1 Ss (GR X CD)	166.8888	25	6.6756		
2 Ss X PH (GR X CD)	12.1072	24	.5045		

Table 17

Analysis of Variance Summary Table
LAQ Factor 5—Total Factor Scale

3(Grade: 1 vs. 4 vs. 6) X 3(Curriculum Condition: standard vs. modified vs. control) X 3(Phase: pre vs. post vs. follow-up)					
Source	SS	df	MS	Error Terms	<u>F</u>
Grade (GR)	1.9497	2	.9749	1	.71
Curr. Condition (CD)	.2407	2	.1204	1	.09
GR X CD	8.3308	4	2.0827	1	1.51
Phase (PH)	.0691	2	.0346	2	.11
GR X PH	.2679	4	.0670	2	.21
CD X PH	1.0257	4	.3014	2	.95
GR X CD X PH	2.5076	4	.3582	2	1.13
<hr/>					
Error Terms					
<hr/>					
1 Ss (GR X CD)	46.5525	25	1.8621		
2 Ss X PH (GR X CD)	7.6048	24	.3169		

APPENDIX O
ILLUSTRATION OF THE PROBLEM



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EVALUATION OF EDUCATIONAL STRATEGIES FOR LITTER CONTROL

by

John G. Cope

(ABSTRACT)

The Virginia Division of Litter Control's education package entitled Operation Waste Watch (OWW) was evaluated at the first, fourth, and sixth grade level in 19 elementary schools in two southwestern counties in Virginia. Evaluation was provided for the standard curriculum program and for a specially modified behavioral version of the original material. Program evaluation for both curriculum packages was provided immediately before, after, and three months after the implementation of the program and consisted of student achievement testing in terms of knowledge about solid waste management and the assessment of actual student behavior. Specifically, the data was analyzed according to the factorial design: 3 Grade (First, Fourth, Sixth) x 3 Curriculum Condition (Standard, Modified, Control) x 3 Phase (Pre, Post, Follow-up). Significant improvements following the implementation of the educational curriculum occurred only for the student achievement tests. Both programs were found to significantly raise student test performance immediately following presentation of the curriculum materials. The level of student knowledge three months later was also found to statistically surpass baseline performance. However, there was little or no evidence, during Posttesting or Follow-up, of superior performance by students receiving the modified curriculum program. Supplemental information from the teachers concerning

the overall effectiveness of the different curriculum components indicated that while the materials of OWW were needed and generally well constructed, there were severe problems concerning the amount of time needed to adequately teach the different student activities.