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ATTITUDES TOWARD WASTE MANAGEMENT AND PERCEPTIONS OF ENVIRONMENTAL EDUCATION IN POKHARA NEPAL

By

Hiroyuki Hikawa

A THESIS

Submitted to Michigan State University in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Department of Agricultural and Extension and Education

ABSTRACT

ATTITUDES TOWARD WASTE MANAGEMENT AND PERCEPTIONS OF ENVIRONMENTAL EDUCATION IN POKHARA NEPAL

By

Hiroyuki Hikawa

Like other developing countries, Nepal has been confronting waste related pollution caused by improper waste management and the lack of facilities. As a remedy for this situation, schools have started to teach environmental education (EE). The primary purpose of this study was to evaluate EE by assessing students' and teachers' attitudes toward waste management and perceptions of EE. Data were collected using a group-administered survey with 1,152 eighth graders and personal interviews with six eighth graders and six EE teachers in 22 schools in Pokhara.

The results showed that students and teachers were aware of waste related pollution and its effects on human beings. Despite awareness, positive attitudes, and behavioral intentions, respondents tended not to follow proper waste management. Findings also suggested that EE was not solving this problem of lack of understanding and improper waste management practices. This was partly due to a lack of facilities and other barriers. EE in Nepal tended to be theory-oriented and did not provide handson experience. Additionally, teachers were not well-trained to teach EE and did not have access to instructional materials.

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CHAPTER I: INTRODUCTION

Problem Statemen

Education aims at changing learner's behavioral in a destrable way. Hungerford

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large extent, its effectiveness on behavioral change is not evaluated in meet ease. Leeming, Dwyer, Porter, and Coherni (1993) indicated that various studies about environmental education have produced a wealth of literature, whereas a clatively few of them have provided empirical evidence of its effectiveness. Thus, they pointed out the significance of evaluation of environmental education to identify and refine effective curricula and educational (ecimiques.

Similarly in Nepul, to date, there are few efforts made to evaluate formal invitoinmental education curricula, teaching methods, students' knowledge mprovement and, more importunity, students' enviroinmental behavior change CHAPTER 1: INTRODUCTION

Education aims at changing learner's behavioral in a desirable way. Hungerford

and Volk (1990) remarked that the ultimate goal of education is to modify human behavior. Accordingly, the ultimate goal of environmental education is also to change learners' behavior in order to solve present environmental issues and prevent future ones. To fulfill this goal, it is of importance to cover topics about the local environment and its issues that students are confronting in their daily life. Given this main goal, in Pokhara, one of the largest cities of Nepal, school environmental education taught in the sixth, seventh, and eighth grades is supposed to aim at changing students' behavior toward one of the most severe local environmental issues: pollution caused by improper waste management.

Although the importance of environmental education has been recognized to a large extent, its effectiveness on behavioral change is not evaluated in most cases. Leeming, Dwyer, Porter, and Cobern (1993) indicated that various studies about environmental education have produced a wealth of literature, whereas relatively few of them have provided empirical evidence of its effectiveness. Thus, they pointed out the significance of evaluation of environmental education to identify and refine effective curricula and educational techniques.

Similarly in Nepal, to date, there are few efforts made to evaluate formal environmental education curricula, teaching methods, students' knowledge improvement and, more importantly, students' environmental behavior change

(National Conservation Strategy and Implementation Programme, National Planning Commission, 1991). Moreover, there is no study assessing their present behavior toward environmental issues, such as the local waste management issues in Pokhara. Without useful information, teachers, schools, and educational policy makers cannot find the future direction to enhance effectiveness of environmental education on student's environmental behavior change. Therefore, this study focused on evaluating the effectiveness of environmental education in changing students' behavior toward waste management in Pokhara, Nepal.

Background of the Study

Cities in developing countries are becoming much more industrialized and are producing more forms of waste. Robinson (1993) described the waste management situation in developing countries as less than 10 percent of urban wastes receiving some treatment and only a small amount of them being treated to an acceptable quality standard. By the end of the 20th century, over two million people would not have basic sanitation facilities and approximately one half of the urban population in developing countries would be without sufficient waste management services. Such inadequate waste management would affect health, quality of life, and the potential for development, and cause water, land, and air pollution. As a result, approximately 5.2 million people would die each year from waste-related diseases.

Similarly, in Nepal, pollution caused by inadequate and improper waste management has been progressively increasing in the past few decades. One major contributing factor is an enormous growth of the urban population caused by migration into urban areas and improved medical care mingled with a high birth rate. This

immense urbanization has increased waste volumes in the urban areas. Another factor aggravating this pollution is industrialization. Industrial development has brought a number of inorganic pollutants to Nepal, such as metal, plastic and glass, which can not be absorbed by the natural process of waste transformation. As a result, these inorganic wastes have been accumulated in cities without proper treatment. In spite of the increased amount of untreated wastes, there are hardly any successful national strategies for mitigating this situation, programs to curtail waste generation, or notions of recycling. The increased amount of untreated wastes and its inadequate management have been causing a variety of diseases and high child mortality rates in cities (Spreen, 1993).

The targeted city of this study, Pokhara, has also been affected by urbanization and industrialization, which have resulted in a radical increase of waste volumes. Furthermore, tourism, for which Pokhara is famous, has been generating a large amount of waste in this area. In addition, Pokhara does not have any adequate and organized waste management system. Although the Pokhara Sub-Metropolitan Office and Municipality Office have a plan to develop a landfill site by the year 2001, there are currently no proper dumping or landfill sites. Therefore, people are liable to dispose of solid wastes at open dumping sites, such as riversides and roadsides, or to burn everything in their backyards, regardless of waste categories. Although the Pokhara Sub-Metropolitan Office and Municipality Office provide trucks to collect solid wastes in the city, they are not provided on a regular basis and local people are not willing to collect wastes. Even if these trucks collect solid wastes from the city area, they eventually bring them to riversides and throw all the wastes into Gandaki River, which

flows through the middle of Pokhara. Similarly, liquid wastes are not treated in an adequate manner. Sewage water from households runs directly into the river. Furthermore, a main drainage line passing through the center of the city collects all liquid wastes from the whole city and flows into lakes without any treatment. In addition, the majority of people cannot afford to purchase adequate liquid waste management facilities for their households.

To alleviate this situation, the Pokhara Environmental Improvement Project (PEIP) was established in January, 1998, with a view to ensuring the effective implementation of sanitation facilities improvement. PEIP has a list of environmental improvement projects, such as waste minimization, street cleansing/sweeping, a secondary waste collection system, etc. (Pokhara Environmental Improvements Project, 1998). However, all the projects are still under consideration, and there do not seem to be any projects currently underway.

Since environmental pollution is a reflection of people's attitudes toward and awareness of the environment (Gigliotti, 1992), environmental education, promoting learners' behavioral change, has been largely recognized as a tool for various kinds of environmental conservation. Javis (1981) pointed out that the crucial role of environmental education is to improve environmental management by disseminating the knowledge and skills necessary to resolve environmental problems. Likewise, Boom (1994) indicated that environmental education can increase awareness of environmental problems among the population and can be a driving force for political and economic transformation.

The Tbilisi Intergovernmental Conference on Environmental Education (1977) defined the overall goal of environmental education as developing citizens who have (1) knowledge, (2) attitudes, (3) skills, (4) motivation, and (5) commitment to work individually and collaboratively toward solutions to a variety of environmental issues. All these five factors are the salient predictors of responsible environmental behavior. Thus, supported by the statement that the ultimate goal of all education is to shape human behavior (Hungerford and Volk, 1990), the goal of environmental education is to develop learners' responsible environmental behavior to solve environmental issues.

In 1991, the Nepalese Ministry of Education decided to implement a subject called "population and environmental education" in the school curriculum, and schools implemented this new subject gradually. Currently, most schools in Nepal teach "population and environmental education" in the 6th, 7th, and 8th grades. This subject puts an emphasis on the relationship between expanding population growth and environmental issues. More specifically, this subject introduces the following major topics: (1) the importance of population and environment, (2) the situation of population, natural resources, and cultural heritage, (3) changes in population and reasons for environmental degradation, (4) the rise in population and effects on environmental degradation, (5) population control and environmental conservation, and (6) environmental conservation and different organizations involved in its conservation. However, regarding waste management issues, even though population growth and urbanization have been the underlying factor for such issues in urban cities, environmental education in Nepalese schools provides only general information, such as the importance of proper management for different solid and liquid wastes.

Despite the lack of waste management-related topics in Nepalese environmental education, a number of researchers recognize the importance of including such topics in the school environmental education curricula. Robinson (1993) indicates the significance of including the advantages and civic obligations associated with proper waste management in school curricula. Educating young children about waste management is of particular importance, because they will eventually make decisions at different levels that will influence the consumption of resources and production of various wastes. They can also become agents for alleviating the problem by sharing the knowledge and information with their families and others. They also have other advantages; that is, they are in the process of forming values and habits, and it is relatively easier to mold these than to change established ones. Additionally, they are more accessible via educational strategies through schools (Boersching and De Young, 1993). Therefore, school environmental education can play an essential role in mitigating waste related pollution.

One critical shortcoming of environmental education is its outcome evaluation. Tangible effectiveness of various environmental education programs has not been evaluated adequately. Leeming et al. (1993) indicated that relatively few studies had provided evidence of program effectiveness. Equally, in the case of Nepalese environmental education, the National Conservation Strategy and Implementation Programme of the National Planning Commission (1991) argued that detailed evaluation of teaching methods and their effectiveness had not been conducted for environmental education. Therefore, environmental education teachers and educational policy makers are not able to assess their effectiveness on students' behavior change and identify more effective teaching methods and strategies for the future.

Given this lack of evaluation, a number of researchers pointed out the significance of evaluating environmental education, especially measuring students' environmental behavior levels. Maloney and Ward (1973) mentioned that, because "the ecological crisis is a crisis of maladaptive behavior" (p. 583), it is essential to understand humans' present behavior prior to an attempt to modify such behavior. More specifically, it is salient to investigate: what the people know regarding ecology, environment, and pollution; how they feel about them; what commitments they are willing to make; and what commitments they do make. Newhouse (1990) also explained that some researchers had proven that some environmental education programs could have negative effects on the development of responsible environmental behavior, so that the evaluation of environmental education programs should assure students' attitude and behavior change as a result of the programs.

Purposes/Objectives of the Study

The ultimate purpose of this study was to evaluate the effectiveness of school environmental education on changing students' behavior toward waste management in Pokhara. However, since there had been no evaluative study on this school subject yet, this study also had more fundamental purposes to: (1) assess students' and teachers' perceptions of environmental education and (2) understand their attitudes toward waste management. The first purpose was useful to evaluate environmental education, because students' and teachers' perceptions should be the reflection of its quality. Additionally, it was imperative to obtain baseline information for evaluating this school

subject due to a lack of previous information. The second purpose was identified because understanding present attitudes must be the foremost step for modification of responsible environmental behavior (Maloney and Ward, 1973). Specific objectives of this study were to:

- Describe students' and teachers' perceptions of environmental
 education.
- 2. Describe students' and teachers' attitudes toward waste management.
- 3. Identify differences in the students' perceptions and attitudes by sex.
- Explore relationships between the students' perceptions and attitudes with age.
- Identify differences in the students' perceptions and attitudes between public and private schools.
- Explore relationships between the students' perceptions and attitudes with class size.
 - 7. Explore relationships between students' perceptions of
- environmental education and attitudes toward waste management.
- 8. Describe the present situation of teacher training for environmental

education and teachers' needs for improvement.

Significance of the Study

The research results will be submitted to the local private school association, called "Private and Boarding School Organization of Nepal (PABSON)", and will be utilized as the evaluative report to decide the future direction of school environmental education. PABSON will hold sequential workshops with teachers to enhance environmental education on the basis of this research report. More specifically, the results will enable these teachers to identify students' perceptions of environmental education, their attitudes toward waste management, and shortcomings of environmental education and needs for improvement. This will also provide recommendations for effective and appropriate educational strategies to teachers.

The results will also be submitted to the Regional Office of the Ministry of Education, the District Office of the Ministry of Education, the Pokhara Sub-Metropolitan Office (Mayor's office), the Pokhara Valley Town Project, and the Chief of the District Office. These two offices of the Ministry of Education will utilize the report to recognize the current situations and problems of school environmental education and decide the direction for improving it. The other offices will be able to grasp young citizens' attitudes toward waste management in Pokhara. Further, all the information from this report will be useful in modifying their environmental improvement projects.

Lastly, these research results will also serve as the baseline information for future evaluative research on environmental education in Pokhara, Nepal.

Limitation of the Study

The primary limitation of this study was the difficulty in drawing informants' honest comments and feelings. Since Nepalese students have a tendency to give socially desirable comments to behavioral statements, this tendency might have decreased the validity of their comments. To minimize this risk, prior to and during the data collection, the researcher emphasized repeatedly that results would not influence

their school grades, confidentiality would be strictly enforced, there were no right or wrong answers, and the researcher would like to solicit their honest opinions. Another Another factor which might have affected the data validity was students' interaction during the data collection. Some students were consulting with others to fill out the survey. This interaction might have diminished the authenticity of each student's comments. To avoid this problem, the researcher reminded students several times to work on the surveys alone and to provide their own opinions.

As has been the case with many international researchers, this researcher also faced the risk that the research assistant's translation of interview results might have lost some of the authenticity of the informants' opinions. Since the researcher was not completely fluent in Nepali, the local language, and therefore could not conduct interviews and translate Nepali into English, he hired a female Nepalese assistant. She conducted interviews in Nepali and translated the results into English. During this process, the informants' comments could have been translated in an inaccurate manner and lost their validity. To minimize this limitation, the assistant consulted with an English professor at a nearby university, so that she could provide as accurate a translation as possible.

Lastly, the scope of this study was limited to measuring perceptions of environmental education and attitudes toward waste management. It did not assess how such perceptions and attitudes would influence actual behavior and ultimately wasterelated pollution. Thus, the results from this study will serve as the foundation for future research on actual behavior and its direct relationship with environmental education.

Operational Definitions of Terms

In order to avoid confusion, it is essential to provide operational definitions of terms that are frequently referred to in this study.

Objective of environmental education: The primary objective of environmental education is to develop responsible environmental behavior by augmenting awareness, sensitivity, attitudes, skills, and participation regarding the environment.

Responsible environmental behavior: It signifies the desirable behavior of reducing various environmental issues and keeping the environment clean. Such behavior is the ultimate objective of environmental education.

Attitude: It is composed of the affective and the conative domain. In other words, attitude is individual's feelings and values (the affective domain) that reflect on her/his tendencies to act (the conative domain). Attitude can be measured by verbal and actual commitments that deal with the conative domain and affect that deals with the affective domain.

Verbal commitment: It denotes an individual's willingness to make commitments to responsible environmental behavior.

Actual commitment: It means self-perceived commitment to responsible environmental behavior.

Feeling and value: These are the affective domain toward responsible environmental behavior and the environment per se. In other studies, many researchers refer to them as affect.

CHAPTER 2: REVIEW OF LITERATURE

cen a great deal of criticism about the lack of emphasia on development of students

The purposes of this study were to: (1) assess students' and teachers' perceptions of environmental education and (2) understand their attitudes toward waste management. This literature review will bring better insight into this study's entire conceptual framework by providing an in-depth narration of important variables, and introducing findings and implications of previous evaluative studies on environmental education. Areas of this literature review are : (1) environmental education, (2) responsible environmental behavior, (3) behavior flow chart, (4) attitude and its relationship with behavior, and (5) findings from previous studies on environmental education. Additionally, at the end of this chapter, the theoretical and conceptual frameworks of this study are introduced on the basis of the literature review.

Environmental Education

The first considerable progress of environmental education took place in 1972 when representatives at the United Nations Conference on Human Environment in Stockholm, Sweden suggested that the UN establish an international environmental education program. Following up on this suggestion, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) started to sponsor a series of environmental workshops and conferences throughout the world. In 1975, representatives of the UN member nations held a meeting in Belgrade, in the former Yugoslavia, to outline the fundamental definition and goals of environmental education. Given this definition and goals, representatives from more than 60 nations assembled in Tbilisi in the former Soviet Republic of Georgia in 1977 and ratified the definition and

objectives of environmental education (Braus and Wood, 1993). However, there has been a great deal of criticism about the lack of emphasis on development of students' problem solving skills. In response to this criticism, in the early 1980's a superordinate goal of environmental education was developed that incorporated students' ownership of environmental issues and their empowerment for solving problems into the definition developed by the Tbilisi Intergovernmental Conference on Environmental Education in

1977. This superordinate goal of environmental education is:

"to aid citizens in becoming environmentally knowledgeable and, above all, skilled and dedicated citizens who are willing to work, individually and collectively, toward achieving and/or maintaining a dynamic equilibrium between quality of life and quality of the environment." (Hungerford and Volk, 1990, p. 13)

More specifically, the Tbilisi Intergovernmental Conference developed five objectives

of environmental education:

- "(1) Awareness to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems [and/or issues]
 - (2) Sensitivity to help social groups and individuals gain a variety of experiences in, and acquire a basic understanding of, the environment and its associated problems [and/or issues]
- (3) Attitudes to help social groups and individuals acquire a set of values and feelings of concern for the environment and motivation for actively participating in environmental improvement and protection
- (4) Skills to help social groups and individuals acquire skills for identifying and solving environmental problems [and/or issues]
 - (5) Participation to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems [and/or issues]." (Hungerford and Volk, 1990, p. 8-9)

Furthermore, Hungerford and Volk (1990) used the above five objectives to define

environmentally responsible citizens or responsible environmental behavior.

Since the ultimate goal of all education is to shape desirable human behavior (Hungerford and Volk, 1990), the ultimate goal of environmental education can also be summarized as the development of desirable behavior, or so-called responsible environmental behavior, by augmenting the above five factors: awareness, sensitivity, attitudes, skills, and participation.

Responsible Environmental Behavior

Many researchers have identified essential predictors of responsible environmental behavior. Hungerford and Volk (1990) utilized the five objectives of environmental education ratified by the Tbilisi Intergovernmental Conference to define the predictors. These are: (1) awareness and sensitivity to the total environment and its allied issues, (2) knowledge about such issues, (3) attitudes, such as concerns for the environment and motivation for actively participating in environmental protection, (4) skills for identifying and solving such issues, and (5) active participation in solution of such issues.

Hines, Hungerford, and Tomera (1987) and Boerschig and De Young (1993) also developed models of responsible environmental behavior. Hines et al. (1987) identified a model as a result of meta-analysis of 128 behavior studies. This model identified seven important predictors of such behavior: (1) action skills, (2) knowledge of action strategies, (3) knowledge of issues, (4) attitudes, (5) locus of control, (6) personal responsibility, and (7) situational factors. The unique part of the Hines model is that this model includes situational factors that few researchers included in their behavior models. Situational factors indicate economic constraints, social pressures and opportunities to choose different actions. On the basis of this Hines model of responsible environmental behavior and other studies, Boerschig and De Young (1993) revealed eight predictors: (1) knowledge of the issue, (2) knowledge of action strategies, (3) knowledge of action skills, (4) attitudes, (5) sensitivity, (6) locus of control, (7) personal responsibility, and (8) social norms. Six of the predictors were derived from the Hines model, while Boerschig and De Young excluded situational factors, because they believed that educators could not directly affect factors such as students' economic situations.

The Boerschig and De Young study provided a detailed description of each predictor. Their model divided knowledge into three different categories: knowledge of issues, knowledge of action strategies, and knowledge of action skills. As Hines et al. (1987) recognized, knowledge of issues is a prerequisite factor to take action. In addition, Newhouse (1990) suggested that knowledge of action strategies and action skills is essential for responsible environmental behavior. Knowledge of action strategies is defined as knowledge about courses of action which are available and most effective in a given situation, whereas knowledge of action skills engages students in the actual action strategies. This knowledge of action skills can be equated to action skills in the Hines model. Attitude deals with the affective domain and is a complex mental construct built on a basis of personal belief and value systems. Sensitivity refers to a respect for ecological structure and a notion that human beings have to live in harmony with the environment. Locus of control is an individual perception of his or her ability to bring about change through his or her own behavior. Personal responsibility denotes a personal obligation or a sense of duty to take an action and includes a sense of personal investment (Boerschig and De Young, 1993; Hines et al.,

1987). Social norms are able to evoke a sense of personal obligation to be engaged in environmentally responsible activities, because it is expected of individuals as responsible citizens or global community members (Vining and Ebreo, 1992).

Given all the information above, this study suggests that responsible environmental behavior can be predicted by: (1) awareness and sensitivity, (2) attitude, (3) knowledge of issues and action, (4) action skills, (5) locus of control, (6) sense of responsibility, (7) active participation in solutions, and (8) social norms, as shown in Figure 1. Situational factors were eliminated for the reason that environmental educators were hardly able to modify these factors, as Boerschig and De Young (1993) indicated.

Behavior Flow Chart

Now that predictors of responsible environmental behavior have been identified, how are these predictors interacting synergistically or multi-dimensionally and resulting in behavior change? The traditional thought in environmental education was that behavior change took place through improvement of knowledge. This thought was based on the assumption that if human beings became more knowledgeable, they would become more aware of the environment and related issues, and, thus, would become more motivated to behave responsibly toward the environment (Hungerford and Volk, 1990).

However, many researchers have dismissed the validity of this linear model for behavior change and have developed more complex models with multiple variables. Hungerford and Volk (1990) created a model for a behavior change by coupling the findings of numerous researchers with the Hines model for responsible environmental

behavior as previously described. They revealed that there are three categories of variables: entry-level, ownership, and empowerment variables. They then identified major and minor variables that compose each of these three categories. This model for a behavior change flow chart is described in Figure 1. The eight predictors of responsible environmental behavior introduced before are coupled with the variables in this chart and described within parentheses. This would help to illustrate how the predictors would interact with each other and contribute to determining such behavior. It should be noted that all the variables shown in Figure 1 interact in synergistic manners. Additionally, the three categories operate in a linear way, while the variables under them do not necessarily operate in a similar fashion.

Entry-level variables are good predictors of responsible environmental behavior and are fundamental prerequisite variables. The major variable, environmental sensitivity, denotes an empathetic respect for the environment developed through direct experience. Although a number of researchers indicated that knowledge of ecology did not create environmental behavior directly, it is an essential prerequisite to proper decision-making. Knowledge of ecology includes knowledge about environmental decision-making, population dynamics, nutrient cycling, and so forth. Androgyny refers to characteristics of some human beings that tend to behave in non-traditional manners and is moderately associated with those who take environmental action. Attitudes toward pollution, technology, and economics have been significant for environmental behavior development.

Ownership variables have been proven to be critical factors for responsible environmental behavior. These help individuals perceive environmental issues at



personal levels. In-depth knowledge of issues is a crucial factor for ownership. This is based on the assumption that prior to developing responsible environmental behavior, individuals must grasp the nature of the issues and their ecological and human implications. Another major variable for ownership is personal investment in the environment and its relevant issues. Individuals with personal investment have private interests in environmental issues. For instance, an individual who has an environmental understanding of recycling and waste disposal issues tends to use a substantial amount of recycled products. Therefore, s/he might feel a robust personal investment in recycling.

Empowerment variables are essential in developing individuals' responsible environmental behavior. These variables make people confident in making changes and solving environmental issues. Perceived skill in using environmental action strategies is one of the most reliable predictors. This denotes an individual's belief that s/he is able to take environmental action strategies to solve environmental issues. This perceived skill is synergistically associated with knowledge of environmental action strategies, because the skill component is largely dependent on the knowledge variables. Given this association between these two variables, they are listed together in the behavior flow chart (Figure 1). Nonetheless, it should be noted that knowledge of action strategies appears to be a less reliable predictor than the perceived skill variable. Another major variable is locus of control, which denotes individuals' beliefs that they can make changes in environmental issues. Environmental education in classrooms cannot develop one's locus of control directly, but it can be improved by teaching action skills and supporting students' involvement in environmental issues. The other major

variable is intention to act. An individual with intention to act holds more opportunities to take action. This intention to act is strongly related to perceived skill in taking action, locus of control, and personal investment.

Although many researchers have developed different behavior change models, none of them can be entirely reliable due to external and conditional variables. Guagnano, Stern, and Dietz (1995) insisted on the importance of integrating both internal conditions and external conditions into a behavior change model, while very few researchers have done so. Internal conditions mean attitude, beliefs, knowledge. intention, etc., and external conditions denote physical structures, social institutions, economic situations, opportunities, etc. These external conditions appear to have a significant influence on the internal conditions. Mezirow (1992) also asserted the significant influence of external variables in behavior change. For instance, even though one has decided to change behavior, s/he may delay the change because of external variables, such as the immediate situation, lack of dependable information, emotional commitment to proceed, etc. Mezirow advocated "there is no simple one-toone relationship between deciding to change a behavior and doing so, or everyone would have quit smoking long ago" (Mezirow, 1992, p. 252). As a consequence, it is salient to take into consideration external variables as a part of a behavior change model.

Attitude and its Relationship with Behavior

This study focused specifically on one predictor of responsible environmental behavior, attitude, because "attitude is considered one of the most important influences on behavior" (Newhouse, 1990, p. 26).

The definition of attitude varies according to different researchers' understanding. Borden and Schettino (1979) argued that attitude is constructed from a combination of affective, cognitive, and conative components. The affective components are feeling or emotionality, the cognitive components are ideas, thoughts, or knowledge, and the conative components are the tendencies to act.

On the other hand, the majority of researchers regard it as only the affective domain. Hungerford et al. (as cited in Boerschig and De Young, 1993) defined attitude as an intricate mental construct developed by a combination of an individual's belief and value system, so attitude differs from the cognitive domain and deals with the affective domain only. Likewise, Newhouse (1990) defined it as only the affective domain, remarking that attitude is "an enduring positive or negative feeling about some person, object, or issue affective domain" (p.26).

Given these different notions about attitude, this study treated attitude as a combination of the affective and the conative domains. The cognitive domain was excluded from attitude elements of this study, because it is strongly related to knowledge that is a separate predictor of responsible environmental behavior.

To assess such attitude, Leeming, Dwyer, and Bracken (1995) developed an assessment instrument named "Children's Environmental Attitude and Knowledge Scale" (CHEAKS). This assesses ecological attitude and knowledge of students in the first to seventh grades, and obtained satisfactory levels of reliabilities. To assess students' environmental attitudes in particular, the researchers included verbal and actual commitment, and affect scales into their instrument. Verbal commitment denotes an individual's willingness to make commitments to responsible environmental

behavior and actual commitment signifies self-perceived commitment to such behavior, which should be distinguished from actual behavior. These commitments can assess an individual's conative domain. Affect implies feeling and value toward such behavior and the environment per se. Therefore, it can assess an individual's affective domain. These three imperative constructs of environmental attitude were also utilized in early studies by Maloney and Ward (1973) and Borden and Schettino (1979).

Even though attitude is regarded as a major predictor of behavior, the relationship between attitude and behavior should be measured with proper research approaches. Newhouse (1990) revealed the high degree of association between them, and she explained that the potential causes of low association that other studies had found were inappropriate research designs and confounding factors, such as social norms. Therefore, it was presumed that there is an association between attitude and behavior that many studies did not identify because of inappropriate research designs and unmeasured variables.

Findings from Previous Studies on Environmental Education

This section of the literature review identifies appropriate methodologies for evaluative research on environmental education, and for investigating findings from previous evaluative studies of environmental education. This section consists of three parts: (1) evaluation of environmental education and its methodological issues, (2) differences in environmental attitude explained by other variables, and (3) relationships among attitude indicators (verbal commitment, actual commitment, and feeling and value).

Evaluation of environmental education and methodological issues.

Leeming et al. (1993) analyzed 34 environmental education studies that attempted to measure learners' changes in environmental knowledge, attitude, or behavior. Of the 34 studies, 17 were in-class programs and 17 were out-of-class programs, primarily targeting school children. The main purpose of this review was to suggest the most effective evaluative research approaches toward environmental education. Three studies reviewed by Leeming et al. included in-class and long-term programs, and these program settings are most comparable to Nepalese school environmental education.

Asch and Schore (1975) measured behavior change comparing 12 fifth-graders who had obtained environmental education for two years with 12 randomly selected fifth-graders. The researchers utilized the unique measurement technique of direct observation of subjects' behavior. The direct observation was conducted during a fourday visit to a nature center, focusing on four tasks: building a small shelter, making changes to a creek, fishing in a small pond, and making a vegetable garden. The results indicated the experimental subjects showed significantly more positive behavior in all four tasks than the control subjects.

Ramsey, Hungerford, and Tomera (1981) conducted a comparison among an action-trained group, an awareness-trained group, and a control group to assess changes in learners' environmental action knowledge levels and self-reported environmental behavior after seven months of environmental education. All the subjects were in eighth grade. The results indicated the action-trained group scored higher in environmental action knowledge than the other two groups, though the difference was

not statistically significant. Furthermore, the action-trained group showed significantly higher results in self-reported environmental behavior than the other two groups.

A noteworthy aspect of this study was its successive follow-up studies to assess the persistence of students' knowledge and behavior changes, which few other studies conducted. The researchers administered surveys with students' parents during the educational instruction and subsequent two months. In these surveys, the action-trained group also scored higher in environmental behavior than the other two groups. Another follow-up study was conducted three years after the instruction by interviewing the same students. The results suggested that the action-trained group was still involved in more environmentally appropriate behaviors than the other two groups, though the original behavior had been eroded over time.

Ramsey and Hungerford (1989) evaluated 18 weeks of an environmental education program that emphasized issue investigation and action training by comparing experimental groups provided with such educational instruction to control groups. The groups showed no difference in pre-test. However, the results of post-tests showed the experimental groups scored significantly higher than the control groups in environmental behavior, self-perceived knowledge, action skills, locus of control and solutions to environmental problems. Nonetheless, it should be pointed out that the researchers did not conduct a follow-up study to ascertain the persistence of the effects.

As a result of the review of 34 studies, Leeming et al. (1993) included a list of methodological issues and implications for future research:

 Only two of 17 in-class studies conducted follow-up studies to determine whether observed effects persist over time.

- 2. None of the studies compared different types of education programs or teaching strategies and styles. Borden and Schettino (1979) and Bolscho, Rode, and Dempsey (1998) in other studies also pointed out the importance of focusing on such differences, indicating they should have some influence on changes in students' behavior, attitude, and knowledge.
- 3. When using different classes, differences in teachers, different interactions among students in one classroom, and different school characteristics may influence the effectiveness of environmental education. Thus, in such cases, the unit of analysis should be a school classroom. However, only three of 17 in-class studies used a classroom as the unit of analysis, and only one of them found a significant difference in students' behavior change. The improper unit of analysis increases the probability of a Type I error, and therefore, the reviewers were skeptical of positive results in the other studies.
- 4. Most studies did not address instrument reliability and validity issues adequately. For efficiency, continuity, comparability, and quality, the reviewers suggested utilizing and refining existing instruments that had assured reliability and validity.
- 5. The reviewers pointed out experimenters' expectancy effects, which denote that an experimenter may bias subjects to perform in the measurement instrument in favor of her or his expectations in various ways. This is particularly true when measurement is conducted immediately after instructions are given or by the same person who has provided the instructions.
- Most studies reported only how environmental education programs affect attitude, knowledge, or both, and very few assessed effects on actual behavior.
Differences in attitude explained by other variables.

A review of previous evaluative studies on environmental education was also useful to identify salient variables that would influence the effectiveness of various educational programs on students' attitude and behavior change.

Several studies have investigated differences in environmental attitude and other predictors of behavior by sex. Consistently, they found that female students tended to have more positive attitudes. Hausbeck, Milbrath, and Enright (1992) surveyed approximately 3,200 students in the eleventh grade in New York State to assess levels of environmental knowledge, environmental awareness, and environmental concern. Even though the researchers did not show the evidence, they concluded that male students were slightly more knowledgeable and female students were slightly more aware and concerned.

Williamson (1996) evaluated a particular educational program the "Great Lakes Education Program (GLEP)." The focus of the study was to measure the impacts of the program on changing in students' Great Lakes knowledge, attitude toward the Great Lakes, and responsible behavioral intentions. The researcher surveyed a total of 945 students in the fourth grade. The results showed a significant increase in female students' positive attitudes toward the Great Lakes as a result of the GLEP experience. In addition, even though the GLEP experience did not increase responsible behavioral intentions, female students tended to have significantly more positive behavioral intentions than do male students.

Kellert (1985) indicated differences by sex in more specific aspects of attitudes. The researcher conducted a study with 267 children in the second, fifth, eighth, and

eleventh grades to examine their knowledge and attitudes toward animals and behavioral contact with animals. Female students tended to show their empathetic feelings to subordination and dominance of animals and to have a greater emotional affection for large, attractive, primarily domestic pet animals. Although the researcher did not describe it as attitude, affection belongs to the affective domain and so it can be concluded that female students tended to have more positive attitudes toward wildlife than do male students. However, it is noteworthy that no studies indicated why female students tended to have more positive environmental attitudes than do male students.

Other studies investigated differences in environmental attitude or behavior by age. These studies found that younger children seemed to have more positive environmental attitudes. Leeming et al. (1995) developed an environmental knowledge and attitude scale and conducted a comparison of the scores between younger children (grades 1-3) and older children (grades 4-7). Using Analysis of Variance (ANOVA), the researchers found that younger children obtained significantly higher scores in the attitude scale than older children in the both first and second administrations of the survey.

Another study examining age differences was conducted by Leeming, Porter, Dwyer, Cobern, and Oliver (1997). The researchers evaluated a specific environmental education program, named The Caretaker Classroom Program. This program was to encourage elementary school classes to engage in pro-environmental activities, and the participating classes engaged in a minimum of eight activities during an academic year. After participation in the program, the researchers conducted a comparison in the attitude scale between younger children (grades 1-3) and older children (grades 4-7).

Using ANOVA, the researchers found that younger children showed more positive attitudes than older children, whose scores declined after participation in this program.

In evaluating educational programs in a formal class setting, it was also essential to consider the ratio between teachers and students. However, few studies have been conducted to investigate the direct relationship between class size and students' environmental attitude. Therefore, this study reviewed research on the relationship between class size and effectiveness of educational programs. It was assumed that the effectiveness of educational programs was strongly related to students' environmental attitude and behavior change.

Smith and Glass (1980) conducted a meta-analysis of 59 studies to examine the relationship between class size and students' and teachers' attitudes toward classes as well as quality of education. In these 59 studies, class size varied from 5 to 70. The researchers concluded smaller class size had valuable effects on the general quality of the educational environment. More specifically, smaller classes were positively associated with students' attitudes (self-perception, interest in school, participation) and teachers' attitudes (workload, morale, attitudes toward students) due to greater attempts to individualize instruction and better classroom climate.

The State of Tennessee conducted the Student/Teacher Achievement Ratio (STAR) Project to assess the relationship between class size and students' achievement measured by the Stanford Achievement Test and Tennessee's Basic Skills First test. For a comparison of class size, three types of classrooms were created: (1) small, with one teacher for 13 to 17 students, (2) regular, with one teacher for 22 to 25 students, and (3) regular-with-aide, with one teacher for 22 to 25 students along with a full-time

teacher aide. After four years of the project, the result showed that in all grade levels, smaller classes performed better than the other two groups. The follow-up study also indicated that the positive benefits for students who had been in small classes still remained even one year after this four-year project (Nye, Boyd-Zaharias, Fulton, and Wallenhorst, 1992).

Even though a number of researchers assessed the effectiveness of smaller class size, it would be essential to take into consideration appropriate measurement methods and different classroom circumstances. Holliday (1992) indicated that if the measurement was on students' achievement, it was likely to dismiss the effects of smaller class size, because tests used for measurement would be incentives for students to work hard. In addition, unqualified teachers, ineffective methods, or inappropriate teaching strategies for smaller class size would have an impact on the effects. Therefore, to assess the effectiveness of smaller class size properly, Holliday suggested focusing on teaching and learning rather than achievement. He explained that smaller classes make it easier for teachers to conduct problem solving, attempt to enhance students' understanding and improve classroom atmosphere. Thus, smaller class size appeared to be more effective for activity-oriented instruction rather than lectureoriented instruction.

Relationships among attitude indicators.

A few studies have investigated the relationships among the three factors of environmental attitude: verbal commitment, actual commitment, and feeling and value. Borden and Schettino (1979) conducted a study to investigate the relationship among knowledge, affect (feeling and value), verbal commitment and actual commitment to environmentally responsible action. They found that affect (feeling and value) had a significant influence on verbal and actual commitments. However, because they examined such relationships by comparing a high affect subject group to a low affect subject group in their verbal and actual commitments, the researchers could not assess how strongly affect (feeling and value) was related to verbal and actual commitments. Moreover, they did not assess the relationship between verbal and actual commitments, either.

On the other hand, Maloney and Ward (1973) examined the degree of the relationships as well as the relationship between verbal and actual commitments and affect (feeling and value) with three different subject groups. The results showed affect (feeling and value) was moderately correlated with verbal commitment, and the correlation coefficients in the three subject groups were .59, .75, and .72. Moreover, affect (feeling and value) was moderately or highly correlated with actual commitment and the coefficients were .40, .39, and .83. Lastly, verbal commitment was moderately correlated with actual commitment, and the coefficients were .39, .40, and .45.

Therefore, the three scales to measure environmental attitude have been proven to have relationships with each other, and these findings from previous studies provided the foundation to develop the conceptual framework of this study described below.

Theoretical/Conceptual Framework of the Study

As a result of the literature review, the theoretical and conceptual frameworks were prepared to direct the entire dimension of this study. The theoretical framework in Figure 2 describes the process of how environmental education could have an impact on reduction of environmental pollution.



Figure 2. Theoretical framework: Model for predictors of responsible environmental behavior

Personal behavioral change is the most essential factor, which could solve the pollution problems caused by improper waste management in Pokhara. Gigliotti (1992) advocated that pollution is a reflection of human beings' attitude and behavior toward the environment, and therefore, amelioration of environmental issues necessitates shaping more responsible attitudes and behavior. In this sense, solving the pollution problem in Pokhara requires the development of citizens' environmentally responsible behavior.

Such responsible environmental behavior can be determined by multiple predictors and their intricate combination. According to Newhouse (1990), Hungerford and Volk (1990), and Boerschig and De Young (1993) responsible environmental behavior can be influenced by: (1) awareness and sensitivity, (2) attitude, (3) knowledge of issues and action, (4) action skills, (5) locus of control, (6) sense of responsibility, (7) active participation in solutions, and (8) social norm. The complex interaction and combinations among these predictors determines individuals' responsible environmental behavior.

When considering ways to change one's behavior, Boerschig and De Young, (1993) suggest education is one avenue to changing behavior. This statement can be supported by the ultimate goal of education, that is, modification of human behavior (Hungerford and Volk, 1990). Likewise, environmental education has also been recognized as an effective tool to develop responsible environmental behavior by stimulating the above eight predictors of such behavior.

However, environmental education does not seem to simply result in behavioral change. It should be noted that there are an infinite number of situational factors influencing responsible environmental behavior and predictors, such as the lack of facilities, economic conditions, inadequate accessibility to dependable information, political reasons, and opportunities to choose different actions (Hines et al., 1987; Mezirow, 1992). Intricate and multi-dimensional interactions of all the factors create one's personal environmental behavior.

Given all the variables described in the theoretical framework, the conceptual framework of this study was developed as in Figure 3 in order to clarify the presumed relationships among the variables this study investigated. It explained that perception of environmental education was assumed to reflect the effectiveness of environmental education. Further, because an individual was likely to have feelings about and intentions for environmental behavior prior to actually being committed to it, this study presumed that the perception of environmental education would influence verbal commitment and feeling and value first. In addition, as Maloney and Ward (1973) advocated, verbal commitment and feeling and value would influence the actual commitment to environmental behavior. Finally, it was hoped the actual commitment could predict the actual behavior and would have an association with environmental pollution in the long run.

Therefore, the main focus of this study was on investigating the primary variables, such as perception of environmental education, verbal commitment, actual commitment, and feeling and value toward proper waste management, and also, the relationships among these variables.



Figure 3. Conceptual framework: Relationship between perceptions of environmental education and attitudes towards responsible environmental behavior

CHAPTER 3: METHODOLOGY

Research Design

This study was an evaluative study to assess students' and teachers' perceptions about school environmental education and their attitudes toward waste management. The research instruments included t a combination of quantitative and qualitative methods: (1) the group-administered survey and (2) the personal interview. The groupadministered survey was conducted with students in the eighth grade. This method was useful, because by administering the survey with a group of students at one time, the researcher was able to reach a wide range of informants within the short time span of two months. In addition, the personal interview was administered with both students in eighth grade and environmental education teachers. This method was useful for achieving more in-depth understandings of information from the survey.

Population and Sampling Procedure

The target area of this study was in the Pokhara valley. Pokhara is one of the largest cities in Nepal and famous for tourism. In the central downtown area and the tourism area, population density and degree of environmental pollution are especially high. On the other hand, around the edge of the Pokhara valley, population density and environmental pollution are comparatively moderate. Therefore, to eliminate as many extraneous variables caused by the location variances as possible, the targeted study area was limited to the more populated central area of the Pokhara valley based on a consultation with the director of the local private school association.

The targeted population of this study was students in the eighth grade and environmental education teachers. Eighth graders were selected because they had already obtained two years of school environmental education (in the sixth and the seventh grades) and were in the last year of this three-year curriculum. Thus, by targeting them, it was possible to assess the perceptions of environmental education and attitudes toward waste management of students who had already received more environmental education than students in other grades. In addition to students in the eighth grade, it was imperative to include environmental education teachers in this evaluative study, because the teachers' perceptions and attitudes might potentially affect the students' perceptions and attitudes. Furthermore, it was essential to identify teachers' needs for improvement of this curriculum, because there had not been any workshops where teachers could assemble and discuss ways to improve their curriculum.

For sampling, first of all, the researcher garnered the public school list from the Regional Office of Ministry of Education and the private school list from PABSON. From these lists, 21 public schools and 31 private schools were identified for sampling with the criteria that the schools included the eighth grade and were located in the populated central area of Pokhara as mentioned above. Second, to make comparisons between public and private schools, stratified sampling was performed (Ary, Jacobs, and Razavieh, 1996). The researcher randomly sampled 10 schools from each stratum, public and private schools by using a random table (Ary et al, 1996). However, in visiting the sample schools, it was found that public schools were likely to have more sections in one grade and more students in one classroom than private schools. Thus, to

balance the student numbers in both school types, two additional private schools were selected by the same sampling procedure. As a result, 10 public schools with 15 classrooms and 12 private schools with 13 classrooms were selected. In these schools, the survey was administered to a total of 1,152 students (796 public and 356 private school students).

For the personal interview, three public and three private schools (a total of six) were randomly selected from the 10 public and 10 private schools that had been chosen in the first step of sampling as described above. Then, the personal interview was conducted with one student and one teacher in each of these six schools. To select a student for the interview, in the visit to each school, the researcher picked one student number randomly and selected a student. As for teachers, most schools had only one environmental education teacher, so there was no need to do a random selection. However, in some schools with more than two environmental education teachers, the researcher selected the teacher who was more available at the time of the visit. As a result, the personal interview was conducted with a total of six students (three public and three private school students) and a total of six teachers (three public and three private school teachers).

Instrument Development

Original instrument.

The survey was composed of two parts: (1) perceptions of environmental education and (2) attitudes toward waste management. The first part asked students about how interested they were in environmental education and how effective it was on attitude changes.

The second part of this survey was developed primarily on the basis of the "Children's Environmental Attitude and Knowledge Scale (CHEAKS)" made by Leeming et al. (1995), as introduced in Chapter 2. By taking advantage of the previous measurement instruments, it was possible to ascertain more acceptable levels of reliability and validity (Leeming et al. 1995). CHEAKS assessed ecological attitude and knowledge of students in the first to the seventh grades and included items to explore major attitudinal components, such as verbal and actual commitments, behavior and feeling and value (affect). This instrument has indicated satisfactory levels of reliability. Thus, following the structure of CHEAKS, the researcher developed three sub-sections under the attitude part of this survey: (1) verbal commitment to, (2) actual commitment to, and (3) feeling and value toward waste management.

The first part, perceptions of environmental education, included five statements, and the second part, attitudes toward waste management, included a total of 29 statements (10 statements in each of verbal and actual commitment scales and 9 within the feeling and value scale). All 34 statements were asked with Likert-type five-point response scales ranging from 100% true to 0% true, with the "I don't know" response treated as a missing value. The English version of the survey is attached in Appendix A.

The personal interview with students consisted of the same two major parts as in the survey. Specific question items were almost identical to statements in the survey. During the interview, the interviewer asked the questions in an open-ended format and repeatedly asked why, how, and what to the interviewees' responses in order to achieve more in-depth understanding of the topics. In regards to the interview with teachers, the

whole structure was the same as the student interview, including the two major parts with most of the same question items. However, the part about perception about environmental education explored more about curriculum quality, such as strengths and weaknesses of the current curriculum, quality of teacher training and teaching materials, and needs for improvement. The interview questions for both students and teachers are attached separately in Appendix B and C.

<u>Pilot study.</u>

The group-administered survey and the personal interview instruments were pilot tested to assure reliability and validity. The survey instrument written in English was translated into Nepali, the local language, by a Nepalese professor who taught English at a local university. With this translated survey, the researcher consulted individually with one student in the eighth grade and another student in the ninth grade at separate times prior to administering it in a real classroom setting. These two students pointed out some ambiguous words or sentences for students in the eighth grade. Given their comments, the researcher made changes and reformed the survey.

The sample schools for the pilot study were selected by convenience sampling after sample schools for the real study were chosen. As a result, two private schools were selected for the pilot test. The survey was administered with three classrooms and the interview was conducted with two students and one environmental education teacher. With the feedback from the pilot study, a few changes in wording structures were made and the translation into Nepali was finalized.

Final instrument reliabilities.

It is essential to assure acceptable levels of instrument reliabilities (Leeming et al., 1993). Therefore, the researcher computed Cronbach alpha coefficients to ascertain

the instrument reliability with data from the real study. The reliabilities for all the subscales measured by Cronbach alpha coefficients are shown in Table 1. In order to examine as detailed information about the reliabilities as possible, the researcher also calculated the scale reliabilities by two different age groups as well as with all students, because Leeming et al. (1995) found older children evidenced higher reliabilities in the attitude scale than did younger children. To create age groups, the age median of 15 years was obtained first and students were divided into two groups: 14 years & younger and 16 years & older (Table 1) in order to have a distinct difference between these two groups. Then, scale reliabilities were calculated for each age group.

T 11		n 1		
Table	1.	Scale	relia	bilities.

Age groups	Perception of EE	Verbal commitment	Actual commitment	Feeling and value
14 years & younger	.534 (429)	.667 (368)	.722 (368)	.648 (359)
16 years & older	.595 (213)	.660 (186)	.713 (176)	.624 (179)
All	.516 (1015)	.664 (864)	.726 (847)	.630 (847)

() = number of respondents

Table 1 indicates, with all students, the verbal commitment scale, the actual commitment scale, and the feeling and value scale held acceptable levels of reliabilities, which is higher than .60. However, the perception scale had a relatively low level of reliability (.516). In this perception scale, older students also had a relatively low reliability, .595, which was below .60. Therefore, this low reliability of the perception scale was not caused by the age factor alone. It should also be noted that this low reliability could have been partly due to the small number of items (five) in the perception scale.

Data Collection.

The data collection started on January 22, 1999 and ended on February 18, 1999 by visiting the 22 schools. The researcher made appointments with most schools over the phone prior to the visits, but he visited a few schools without initial appointments. In most schools, the researcher conducted the data collection without special hindrance, thanks to collaboration from the schools.

Since the researcher was not fluent enough in Nepali, the local language, to conduct the personal interview and to translate the open-ended comments of the survey into English, he hired a female Nepalese assistant. She was a local college student and was able to translate written Nepali into English without difficulties.

Data collection for the group-administered survey.

The survey was administered in regular classroom settings during the normal school class periods. In all cases, the researcher administered the survey with one or two teachers present.

The researcher followed the same process for data collection in all cases to avoid generating extraneous variables caused by variances in data collection settings. He began with introducing himself and the study he was conducting. Then, he explained the following points:

- 1. The survey would not affect their school grades and the respondents' confidentiality would be maintained.
- 2. The procedure to fill out the survey. Before students started the core part of the survey, the researcher asked students to work on the two sample questions at the top of the survey and ascertained whether any students were confused with the procedure.
- 3. The researcher wanted students' honest comments. He also mentioned there were no right or wrong answers in this survey.

Since all private schools were English schools where students and teachers were compelled to speak English within schools, the researcher explained the procedure to fill out the survey in English. However, in public schools where students and even some teachers had trouble understanding English, he provided the instruction in Nepali with some help from teachers.

Even though private school students did understand written English without difficulty, the survey was written in Nepali for all the sample schools. This was because of the concern that slightly distorted nuances of translation might cause extraneous effects on the students' performance in the survey. Including all the instruction by the researcher, it took students approximately 25-40 minutes to complete the survey.

Data collection for the personal interview.

The student who had been selected for the interview was interviewed before s/he started filling out the survey to eliminate the risk that s/he might obtain some information from the survey and this information might affect her or his comments in the interviews. The interview was conducted in a separate room to avoid other students' and teachers' distraction.

The interviewer began by introducing her/himself and explaining of the study.

Then, before starting the interview, s/he explained the following points:

- 1. The interview would not affect her/his school grade and confirmed the respondents' confidentiality.
- 2. The interviewer would like to obtain honest comments from the interviewee.
- 3. The interview was totally voluntary. If the interviewee felt uncomfortable answering some questions during the interview, s/he would be welcome to refuse to answer.
- 4. The interview would be audio-recorded. If the interviewee felt uncomfortable to be taped during the interview, the interviewer would stop recording at any point.

An interview with a student took about 20-30 minutes and one with a teacher took about

30-45 minutes.

Since two of the three teachers agreed to be interviewed in English, the researcher conducted the interview with these two teachers in English. The assistant conducted the interview with the remaining four teachers and all of the six students in Nepali. All the results from the interview were transcribed. The 10 interviews conducted in Nepali were first transcribed in Nepali, and then translated into English by the assistant, with help from the English professor.

Data Analysis

The data from the survey were entered into an SPSS 8.0 spreadsheet. Then, the SPSS software computed the final instrument reliabilities. For the eight objectives of this study, descriptive and inferential statistics were performed by the SPSS 8.0 software and the path analysis was performed by the Hunter Path Analysis program. For the interview data, qualitative data analyses were conducted on the interview transcriptions.

For objective 1, to describe students' and teachers' perceptions of environmental education, the researcher performed descriptive statistics for the survey data and qualitative data analysis for the interview data. To describe students' and teachers' attitudes toward waste management for objective 2, he also performed descriptive statistics for the survey data and qualitative data analysis for the interview data. For objective 3 to identify differences in the students' perceptions and attitudes by sex, he performed t-tests. For objective 4 to explore relationships between the students' perceptions and attitudes with age, he conducted bivariate correlation analyses. To identify differences in the students' perceptions and attitudes between public and private schools for objective 5, he performed t-tests. For objective 6 to explore

relationships between students' perceptions and attitudes with class size, he also conducted bivariate correlation analysis. For objective 7, to explore relationships between students' perceptions of environmental education and attitudes toward waste management, he performed the path analysis. Lastly, for objective 8, to describe the present situation of teacher training and their needs for improvement, the researcher conducted qualitative data analyses. For analyses using correlation, strength of association was determined in accordance with Davis' (1971) convention. He articulated that a value of .70 or higher is a very strong association, from .50 to .69 is a substantial association, from .30 to .49 is a moderate association.

Path analysis is a particular technique in causal modeling and not only specifies the simple relationships between independent and dependent variables of interest, but also examines causal relationship among these variables (Asher, 1983). This specific technique is "basically concerned with estimating the magnitude of the linkages between variables and using theses estimates to provide information about the underlying causal processes" (Asher, 1983, p. 30).

The steps of path analysis include: constructing a model based on theory, estimating the path coefficient from the data, and testing the fit of the path model. In the first step, path analysis begins with creating a path diagram that states the hypothesized relationships among variables and the causal processes on the basis of theory. Then, "if the relationships among the variables are all linear, the path diagram can be interpreted in a series of equations called a path model or structural equation model" (Hunter and Gerbing, 1982, p. 282). Thus, a path model represents the

predicted relationships among the variables and is derived from theory. The second step is to estimate the path coefficients. To do this, all the causal arrows (relationships) among the variables in the path model must point in the same direction, a condition typically referred to as recursive. Then, each relationship can be associated with a path coefficient (Hunter and Gerbing, 1982). A path coefficient shows "the relative strength of association between variables, controlling for other variables in the model, and the sign of the influence" (Agresti and Finlay, 1997, p.626). The interpretation of a path coefficient is the same as that of a standardized regression coefficient in multiple regression analysis, if there is more than one variable serving as a predictor. If there is only a single predictor, the path coefficient is the same as a correlation coefficient. The last step is to test the fit of the model. For this step, typically chi-square analysis is employed to test the null-hypothesis that the data are consistent with the predicted model. Finally, if the null-hypothesis is accepted, it can be concluded that the data have supported the good fit of the model.

Lastly, it should be noted that a path model is not equivalent to the theory itself. It represents a set of predicted relationships that are derived from theory. Thus, path analysis should be considered as a data summary technique and not a procedure for specifying a theory. It describes correlations between the variables, hence it should be distinguished from theory which explains the underlying causal processes (Hunter and Gerbing, 1982).

As explained before, all the statements in the survey were asked with a fivepoint response scale format. In the analyses, five had the most positive value and one had the least positive value. The "I don't know" response was treated as a missing

value. To create the mean of each scale (perception of environmental education, verbal commitment, actual commitment, and feeling and value), all the item values of one respondent were added and divided by the number of items s/he answered. Lastly, there were two negative statements and their values were reverse coded before the scale mean was calculated.

CHAPTER 4: FINDINGS

Characteristics of Respondents

The sample included 22 schools (10 public and 12 private) with 28 classrooms (15 public and 13 private school). The group-administered survey was conducted with a total of 1,152 eighth graders (796 public and 356 private school). Of the students, 52.6 percent were male (n = 601) and 47.4 percent were female (n = 542). The mean age of students was 14.7 years old with a standard deviation of 1.1 years, a maximum age of 19 and minimum of 10. Class size ranged from 16 to 82, with a mean of 51.4 students, and a standard deviation of 21.0.

Regarding the personal interview, the researcher and the assistant interviewed six students in the eighth grade (four males and two females) and six teachers (all males) who taught population and environmental education in the sixth, seventh, and eighth grades.

<u>Objective 1: Describe students' and teachers' perceptions of environmental</u> <u>education</u>

Students' perceptions of environmental education.

Table 2 indicates the survey result, from the section regarding students' perceptions of environmental education. This section included the five statements described in Table 2. The mean of the perception scale was 4.17 with a standard deviation of 0.65.

	Students' response						Item	
Statements	100% true	75% true	50% true	25% true	0% true	Don't know	Mean	SD
It is interesting to learn about environment. (n = 1147)	69.9% (805)	18.5% (213)	8.5% (98)	2.3% (26)	0.4% (5)	0.3% (4)	4.56	0.78
Environmental education class is useful to be aware of environmental issues in Nepal. (n = 1135)	58.0% (658)	16.6% (188)	13.6% (154)	5.4% (61)	3.0% (34)	3.5% (40)	4.26	1.09
Environmental education class is useful to be aware of environmental issues in Pokhara. $(n = 1132)$	51.7% (585)	19.9% (225)	12.9% (146)	6.6% (75)	5.2% (59)	3.7% (42)	4.10	1.19
Environmental education class has made me more aware of how people dispose of trash around my city. $(n = 1142)$	44.5% (508)	21.6% (247)	17.1% (195)	9.0% (103)	4.6% (53)	3.2% (36)	3.95	1.20
As a result of environmental education, I have changed how to dispose of trash. $(n = 1145)$	44.8% (513)	23.8% (273)	17.0% (195)	8.8% (101)	3.5% (40)	2.0% (23)	4.00	1.15
Perceptions of environmental education scale (1,152)							4.17	0.65

Table 2. Students' perceptions of environmental education

() = number of respondents

Interests in environmental education

Students were asked whether they were interested in learning about

environment. The results showed students' high level of interest in environmental

education. Table 2 indicates the majority of students (69.9%) answered that for them,

this statement was 100% true, and the mean was 4.56. Similarly, in the interviews, all

students showed interest in environmental education. Three answered that they were interested in it because it provided information about how to make the city clean. Two stated more specifically that environmental education provided information about how to dispose of trash. One of them said:

"Environmental education gives much useful information. We are able to understand about environment and how to dispose of garbage properly."

Usefulness for environmental issues in entire Nepal

Students were asked whether they perceived that environmental education was useful in order to become aware of environmental issues throughout Nepal. Table 2 indicates approximately three-quarters of the students (74.6%) answered either 100% or 75% true for this statement. In the interviews, all students answered that it was useful to become aware of environmental issues throughout Nepal. However, only one of them further commented that knowledge from environmental education would promote awareness of the environmental issues of the entire country.

Even though all agreed on its usefulness, half of the respondents needed practical activities and knowledge to improve environmental quality in their real life. One female student commented:

"Yes, it is useful, but it does not teach us what kinds of activities and practices are useful for solving environmental issues."

Usefulness for environmental issues in Pokhara

Students were also asked whether they perceived that environmental education was useful in order to become aware of local environmental issues in Pokhara. This statement was included to investigate how much environmental education covered the local environmental issues in comparison to issues affecting all of Nepal. Although the

majority of students (51.7%) answered 100% true, the percentage was lower than 58% in the previous statement regarding environmental issues throughout Nepal (Table 2). The mean, 4.26, was also slightly lower in the statement about the entire nation's issues than 4.10 in the statement about the local issues. In the interviews, even though most students admitted its usefulness to become aware of local environmental issues, half of them referred to the lack of practical activities and knowledge in class. One student said:

"Yes, it is useful. But it does not make us aware of a particular issue. It covers very general topics. So it should provide more practical activities."

It is noteworthy that four students mentioned "Education should be provided to all uneducated people." One said:

"All uneducated and ignorant people must be taught about the environmental pollution mainly through practical work. This is not only for themselves but also for future generations."

Such a statement is an indication of the students' belief that education could improve environmental quality.

Increase in awareness of waste management

There was a statement in the survey remarking "Environmental education class has made me more aware of how people dispose of trash around my city." Table 2 indicates less than half of students (44.5%) answered 100% true, and the mean was 3.95. In comparison to the prior two statements, students obtained lower scores on this statement, which asked about awareness of waste management in particular. In the interviews, even though five students reported having become aware of waste management in Pokhara as a result of environmental education, none of them could specify what they were aware of regarding waste management. The remaining student mentioned environmental education had not made her aware of waste management in Pokhara.

Behavior change in waste management

Students were further asked whether they had changed how they dispose of trash as a result of environmental education. It should be noted the finding here indicates self-perceived behavior change, instead of actual behavior change. Less than half (44.8%) answered 100% true, and the mean was 4.00 (Table 2). In the interviews, all mentioned that they had changed their waste management practices as a result of environmental education, and five of them reported that they had started to put trash into trash cans. Nonetheless, no one could identify how they would ultimately treat the trash that had been collected in trash cans. There was one student who clarified specific ways to treat trash, instead of just putting it into trash cans. He mentioned that he used to burn plastic materials, but now he had stopped doing so. He also stated that glass should not be mixed with other trash. However, he did not mention how he would deal with plastics and glass currently after he had changed his previous practices.

<u>Teachers' perceptions of environmental education.</u>

To grasp teachers' perceptions of environmental education, the interviewer asked three questions introduced below.

Usefulness for environmental issues in entire Nepal

Teachers were asked whether they perceived that environmental education was useful to make students aware of environmental issues affecting all of Nepal. All teachers answered that it was useful, while only two teachers further explained its

usefulness, saying knowledge would lead to awareness. Interestingly, two teachers admitted that environmental education could be useful to generate other people's awareness through their interactions with students. One teacher stated:

"It (environmental education) makes students aware. And also other people can learn from students about various environmental issues by talking with them. So, it helps not only students but also other people to be aware of such issues."

Usefulness for environmental issues in Pokhara

They were also asked whether they perceived environmental education was useful to make students aware of local environmental issues in Pokhara. No teachers had clear ideas about how environmental education could contribute to students' awareness development in the local context. Two indicated that environmental education had not been providing adequate information about local environmental issues. One of them stated that since the textbook did not cover the local issues in Pokhara, he occasionally cited some local examples that might be applicable to the topics of the text.

"Actually, the text is designed in the context of Nepal and has not focused on Pokhara at all. So when I am teaching, I use many examples of Pokhara. We have talked about Pokhara many times during my classes."

In terms of topics relating to waste management, one teacher mentioned that

environmental education covered very limited information. He remarked:

"We teach 'garbage is to be managed this way and that way.' But this is not the topic of the text. So whatever I can think of, I have taught them."

Students' behavior change in waste management

Teachers were also asked whether students had changed how they dispose of trash as a result of environmental education. All agreed that students had changed their waste management practices in school, such as keeping classrooms clean and putting trash into trash cans. However, two teachers were skeptical of their behavior change at home. One of them mentioned that students would not follow the proper waste management practices at home due to their families' habitual practices. He remarked:

"Because of the family practices, I don't think they have done (practices they had learn from environmental education) at home. Whatever practices going on at home, they are also doing the same practices."

Objective 2: Describe students' and teachers' attitudes toward waste management

Students' verbal and actual commitments to proper waste management.

Tables 3 and 4 show the results from the survey sections about students' verbal and actual commitments to proper waste management in the survey, respectively. Each section included the 10 statements on the same topics. The results from both sections are presented together in order to achieve a comparison between the degree of verbal commitment and that of actual commitment. The mean of the verbal commitment scale was 3.94, with a standard deviation of 0.61 (Table 3). The mean of the actual commitment scale was 3.62, with a standard deviation of 0.72 (Table 4).

As far as interview questions are concerned, verbal and actual commitments were asked in one question during the interviews. As the interview questions show in Appendices B and C, interviewees were asked about actual commitment on each topic first, and if the interviewee did not have such commitment, they were further asked about their willingness to make the commitment as verbal commitment.

	Students response						Ite	m
Questions	100% true	75% true	50% true	25% true	0% true	Don't know	Mean	SD
I would be willing to talk with my family or friends about trash spread all over the city. (n = 1145)	54.4% (623)	22.7% (260)	13.8% (158)	7.3% (84)	1.6% (18)	0.2% (2)	4.21	1.04
I would be willing to dispose of different types of trash separately. (n = 1141)	50.0% (571)	16.7% (190)	13.6% (155)	8.7% (99)	8.9% (101)	2.2% (25)	3.92	1.35
I would be willing to bring my own bag for shopping instead of getting a plastic bag at a store. (n = 1140)	52.4% (597)	18.2% (208)	15.5% (177)	7.7% (88)	5.4% (62)	0.7% (8)	4.05	1.22
I would be willing to reuse a plastic bag which I get from a store. (n = 1127)	30.3% (342)	14.2% (160)	17.4% (196)	13.9% (157)	21.3% (240)	2.8% (32)	3.19	1.54
When I buy a beverage, I would be willing to buy a glass bottle instead of a plastic bottle. $(n = 1133)$	25.9% (294)	17.4% (197)	18.4% (208)	13.0% (147)	17.0% (193)	8.3% (94)	3.24	1.47
I would be willing to keep and reuse a plastic water bottle. (n = 1103)	33.8% (373)	16.7% (184)	16.2% (179)	15.2% (168)	15.0% (165)	3.1% (34)	3.40	1.48
When I study, I would be willing to save paper or notebooks. (n = 1112)	48.9% (544)	16.8% (187)	12.1% (135)	7.7% (86)	11.2% (125)	3.1% (35)	3.87	1.41
If I have an opportunity, I would be willing to join a clean-up activity in my city. (n = 1135)	59.2% (672)	18.0% (204)	13.1% (149)	6.5% (74)	1.1% (13)	2.0% (23)	4.30	1.01
When I eat a snack outside, I would be willing to find a trash can to throw away the wrapper of the snack instead of tossing it onto the ground. (n = 1140)	72.8% (830)	16.0% (182)	6.7% (76)	3.1% (35)	1.3% (15)	0.2% (2)	4.56	0.85
I would be willing to go to a public bathroom rather than urinating and defecating outside. (n = 1149)	77.6% (892)	11.7% (134)	5.7% (66)	2.2% (25)	2.2% (25)	0.6% (7)	4.61	0.86
Verbal commitment to proper waste management scale (1,150)						3.94	0.61	

Table 3. Students' verbal commitment to proper waste management

() = number of respondents

	Students' response					Item		
Questions	100% true	75% true	50% true	25% true	0% true	Don't know	Mean	SD
I have talked with my family or friends about trash spread out all over the city (n = 1150)	28.4% (327)	27.4% (315)	22.3% (257)	12.6% (145)	7.2% (83)	2.0% (23)	3.58	1.23
I dispose of trash separately depending on the type. (n = 1148)	36.3% (417)	17.7% (203)	18.2% (209)	12.9% (148)	12.8% (147)	2.1% (24)	3.53	1.43
I bring my own bag for shopping instead of getting a plastic bag from the store. (n = 1135)	40.2% (456)	19.6% (223)	18.2% (207)	12.2% (139)	8.8% (100)	0.9% (10)	3.71	1.34
I reuse a plastic bag which I get from a store. (n = 1116)	23.7% (264)	16.1% (180)	18.1% (202)	16.6% (185)	22.0% (246)	3.5% (39)	3.03	1.49
When I buy a beverage, I prefer to buy a glass bottle instead of a plastic bottle. (n = 1129)	21.5% (243)	15.4% (174)	20.9% (236)	16.1% (182)	19.5% (220)	6.6% (74)	3.04	1.45
I keep and reuse a plastic water bottle. (n = 1114)	31.2% (348)	17.6% (196)	16.1% (179)	15.4% (171)	15.6% (174)	4.1% (46)	3.35	1.48
When I study, I save paper or notebooks. $(n = 1114)$	44.5% (496)	19.8% (221)	14.5% (161)	8.4% (94)	9.7% (108)	3.1% (34)	3.84	1.35
I have participated in a clean- up activity in my city before. (n = 1128)	30.6% (345)	16.3% (184)	16.0% (180)	14.6% (165)	19.0% (214)	3.5% (40)	3.26	1.52
When I eat a snack outside, I try to find a trash can to throw away wrapper of the snack instead of tossing it onto the ground. $(n = 1130)$	61.8% (698)	18.0% (203)	10.9% (123)	5.9% (67)	3.1% (35)	0.4% (4)	4.30	1.08
I got to a public bathroom instead of urinating and defecating outside. (n = 1144)	72.6% (831)	14.3% (164)	7.3% (83)	2.5% (29)	2.1% (24)	1.1% (13)	4.55	0.90
Actual commitment to proper waste management scale (1,152)							3.62	0.72

Table 4. Students' actual commitment to proper waste management

() = number of respondents

Conversation with families or friends about waste management

Students were asked about their verbal and actual commitments to having conversations with families or friends about waste management issues. Tables 3 and 4 indicate the mean score of the verbal commitment was 4.21, whereas that of the actual commitment part was 3.58. The percentage of students who answered 100% in the verbal commitment was 54.4%, whereas the percentage in the actual commitment part was only 28.4%. Thus, students were much less actually committed to having conversation with families or friends about waste management issues than verbally committed.

In the interviews, all students answered that they had talked with families or friends about waste management issues, specifically about how to keep the city clean or how to clean houses. Three students mentioned that they sometimes talked about these issues, because they knew environmental pollution would affect human health and they were worried about their own health. Two students had suggested to parents or friends not to throw garbage anywhere.

On the other hand, one student stated that he could not suggest to his parents such things because of their low educational level. In addition, he also expressed the lack of internal locus of control (Hungerford and Volk, 1990) that denotes the belief in his own ability to make a change.

"I have talked with my friends about such things but not with my parents. They are not educated and will not understand about garbage issues. It is true that Pokhara is polluted and I am worried about it but I cannot do anything because I am small and this is the time for me to study."

Disposing of different types of trash separately

Students were asked about their commitment to disposing of different types of trash separately. Table 3 indicates that exactly half of the students answered 100% true in the verbal commitment section, and the mean was 3.92. On the other hand, Table 4 indicates only 36.3% answered 100% true in the actual commitment section, and the mean was 3.53. Moreover, the percentage of students who answered either 25% or 0% true was as high as 25.7%. Considering the students' tendency to give more socially desirable answers, this percentage in the 25% and 0% true range should be noteworthy.

In the interviews, four students mentioned that they collected most trash in one place and burned it. Two indicated that their families put trash into containers and made fertilizer. In addition, it should be noted that two students remarked that their families sold glass bottles for reusing. One student remarked:

"Sometimes we keep glasses into ditch but most of the time we sell them. I am doing this practice, because I want to clean environment."

Overall, all students did not comment on detailed waste management practices.

Bringing own bags for shopping instead of getting plastic bags at stores

There was a statement regarding students' commitment to bringing their own bags for shopping. Table 3 indicates 52.4% of students answered 100% true in the verbal commitment section, and the mean was 4.05. Table 4 indicates 40.2% answered 100% true in the actual commitment section, and the mean was 3.71. If the percentage of 75% true responses were added to 100% true, approximately 60% of students were actually committed to bringing their own bags for shopping (Table 4). However, most students in the interviews tended to get plastic bags from stores. Two of them further indicated that they would bring their own bags only if they had known the quantity of

things they would buy in advance. One female student said:

"First, I decide what I want and how much I buy, and then I bring my own bag from home. Otherwise, I tend to take plastic bags from stores, because it is very easy and convenient."

There was only one student who mentioned he had stopped getting plastic bags from

stores, because he was told by his teacher that it was not a good practice.

"I used to use plastic bags from stores, but now I bring own bag, because my teacher told us not to use plastic too much. He said 75% of garbage is plastic in Pokhara. And I love Pokhara and so I do this practice. I believe if other students could do the same practice, Pokhara will be cleaner."

Reusing plastic bags from stores

There was also a statement regarding students' commitment to reusing plastic bags. Table 3 indicates only 30.3% of students answered 100% true in the verbal commitment section and as much as 35.2% of students answered either 25% or 0 % true. Among the verbal commitment items, this item had the highest percentage of 0% true responses (21.3%). The mean was 3.19, which was the lowest among all the verbal commitment items. Table 4 indicates only 23.7% of students answered 100% true in the actual commitment section and approximately 40% answered either 25% or 0% true. Among the actual commitment items, this item also had the highest percentage of 0% true responses (22.0%). The mean was 3.03, which was the lowest among all the actual commitment items.

Contrary to the results from survey, four students stated that they tended to reuse plastic bags from stores. One student mentioned:

"Although I want to use paper bags, shopkeepers give plastic bags. So I keep them carefully and reuse them, because I think plastic causes pollution when I burn them."

The remaining two students indicated they would reuse them as long as these bags were useful, otherwise they tended to burn them. However, it should be noted that no one clarified how they would reuse the plastic bags or for what purpose they would reuse them.

Preferring to buy glass bottles instead of plastic bottles

Students were asked about their commitment to preferring glass bottles to plastic bottles. Table 3 indicates only 25.9% of students answered 100% true in the verbal commitment section, which was the lowest in the verbal commitment items. Thirty percent of students answered either 25% or 0% true, and the mean was 3.24. Table 4 indicates only 21.5% of students answered 100% true, which was also the lowest in the actual commitment items. Approximately 35% answered either 25% or 0% true, and the mean was 3.04, which was the second lowest among the actual commitment items. It should be also noted that the percentage of "I don't know" responses was the highest in both the verbal (8.3%) and the actual commitment (6.6%).

In the interviews, all students preferred to buy glass bottles. Four explained that this was because glass bottles were reusable. One student explained that glass bottles were easy to drink from and plastic bottles were more expensive than glass bottles.

"I prefer glass bottles because they are reusable. I can return them to collectors for reuse. Also, since plastic bottles are expensive, I don't buy them. Plastic bottles are mainly for tourists."

Reusing plastic bottles

Students were further asked about their commitment to reusing plastic bottles. Table 3 indicates 33.8% of students answered 100% true ,and 30.2% answered either 25% or 0% in the verbal commitment part, with a mean of 3.40. Table 4 indicates 31.2% of students answered 100% true, and 31.0% answered either 25% or 0% true in the actual commitment part, with a mean of 3.35. In the interviews, four students mentioned that they tended to throw away plastic bottles after they had finished drinking. One of them explained that these bottles were useless and untidy to reuse. She mentioned:

"After I finish drinking water, I throw them (plastic bottles) at a proper place because I don't want to bring them with me. It is uneasy for me to reuse them and they are useless also."

Saving paper and notebooks

Students were asked about their commitment to saving paper and notebooks when they studied. Table 3 indicates approximately half of the students answered 100% true in the verbal commitment part, and the mean was 3.87. Table 4 indicates 44.5% answered that 100% true in the actual commitment part, and the mean was 3.84. In the interviews, three students answered they sometimes tended to waste paper unconsciously. On the other hand, the remaining indicated they would never waste paper and one student explained that the reason for this was that she wanted to save extra expense for stationery supplies. However, none of them specified how they saved paper and notebooks.

Participating in a clean-up activity

Students were also asked about their commitment to participating in a clean-up activity. Table 3 indicates 59.2% of the students answered 100% true in the verbal commitment section, and the mean was 4.30. Table 4 indicates 30.6% answered 100% true, and the mean was 3.26. It is imperative to note that the degree of decrease from the verbal to the actual commitment was the highest in 100% true responses (the difference = 28.6%) and also in the mean (the difference = 1.04) among all other items. This enormous decrease denotes students were highly motivated to participate in such activities, while in practice many students had not participated in them.

In the interviews, four students answered that they had participated in school clean-up activities. The remaining two had not participated in such activities, because they had not had any opportunities to do so. However, they indicated high willingness to participate in such activities, if they had any opportunities. One student expressed his willingness and also explained his experience in a school clean-up activity:

"I have not participated in such activities yet. This is because I have not had any opportunities before. But I will participate in any of these activities if I have a chance. I remember, on the last environmental day, I participated in a school program and collected all plastics and bury them under the ground. Ever since then, I always suggest other people to use cloth bags instead of plastic bags."

Disposing of trash into trash cans when eating snacks outside

Students were also asked about their commitment to disposing of trash into trash cans when they had snacks outside. Table 3 indicates approximately three-quarters of students (72.8%) answered 100% true in the verbal commitment part, and the mean was 4.56. Table 4 indicates 61.8% answered 100% true in the actual commitment part, and
the mean was 4.30. However, in the interview, four students said that they would throw trash anywhere, because there were no trash cans available. One student mentioned:

"I tend to throw wrappers or bags of snacks anywhere I want, because it is easy and also there is no trashcan available in the city."

Use of public bathrooms

The last statement in the verbal and actual commitment sections was about use of public bathrooms instead of urinating and defecating outside. Table 3 indicates 77.6% of students answered 100% true in the verbal commitment section, and the mean was 4.61. Table 4 indicates 72.6% answered 100% true in the actual commitment section, and the mean was 4.55. Both the score of 100% true responses and the mean were the highest in both the verbal and actual commitment sections. In the interviews, two students indicated that they would first ask stores for a bathroom, and if they could not gain permission, they would go to a corner and relieve themselves. One of them pointed out the lack of public bathrooms. On the other hand, four answered they would not relieve themselves outside because they would be embarrassed. One male student explained:

"There are not enough public toilets in Pokhara. When I feel like going to a bathroom in the city, first I ask some stores. If they do not allow me to use their bathrooms, I go back to home. When I was smaller, I used to do toilet anywhere, but now I feel embarrassed to do so."

Students' feelings and values about proper waste management.

Table 5 shows the result from the section about students' feelings and values toward proper waste management. This section included nine statements described in Table 4. The mean of the feeling and value scale was 4.12, with a standard deviation of 0.56 (Table 5).

	Students' response					Item		
Questions	100% true	75% true	50% true	25% true	0% true	Don't know	Mean	SD
It is a problem that people throw away trash anywhere in the city, like into rivers. (n = 1139)	78.3% (892)	9.4% (107)	4.2% (48)	3.6% (41)	2.6% (30)	1.8% (21)	4.60	0.93
I get angry when people throw away trash into rivers or onto the ground all over the city. (n = 1144)	57.9% (662)	25.9% (296)	10.3% (118)	3.7% (42)	1.7% (19)	0.6% (7)	4.35	0.93
It makes me happy when people recycle used bottles, cans, and paper. $(n = 1140)$	65.6% (748)	17.2% (196)	8.2% (93)	2.8% (32)	4.0% (46)	2.2% (25)	4.41	1.04
I worry about the trash thrown away all over the city by people. $(n = 1136)$	49.4% (561)	27.3% (310)	14.8% (168)	6.2% (70)	1.4% (16)	1.0% (11)	4.18	1.00
The way I think and treat trash has a large impact on the environment. $(n = 1128)$	26.2% (296)	23.6% (266)	22.8% (257)	11.6% (131)	8.8% (99)	7.0% (79)	3.50	1.28
*I feel that there is nothing I can do to clean up the city. (n = 1125)	8.4% (95)	8.4% (95)	15.2% (171)	14.4% (162)	45 .3% (510)	8.2% (92)	3.87	1.36
I am worried about the effects of waste related pollution on my family and friends. (n = 1134)	54.1% (613)	21.8% (247)	15.8% (179)	6.6% (75)	0.7% (8)	1.1% (12)	4.23	0.99
I am interested in how recycling works in Nepal. (n = 1128)	32.6% (368)	21.8% (246)	22.2% (250)	11.2% (126)	5.6% (63)	6.6% (75)	3.69	1.23
*I do not care that people urinate and defecate anywhere around the city. (n = 1136)	7.2% (82)	6.1% (69)	7.0% (79)	8.3% (94)	62.0% (704)	9.5% (108)	4.23	1.30
Feeling and value about proper waste management scale (1,145)					4.12	0.56		

Table 5. Students' feelings and values about proper waste management

() = number of respondents
* the mean scores were recorded to be consistent with other items.

Feeling and value about waste management

In the survey, there were three statements regarding students' feelings and values about proper waste management: (1) "it is a problem that people throw away thrash anywhere in the city, like into rivers", (2) "I get angry when people throw away trash into rivers or onto the ground all over the city", and (3) "I worry about the trash thrown away all over the city by people." In the interview, these three statements were asked as one question: "How do you feel when people throw away trash anywhere in the city, such as into rivers or around your neighbors?" (Appendix B).

Table 5 indicates for the statement (1), 78.3% of students answered 100% true, and its mean was 4.60. For the statement (2), approximately 60% of students answered 100% true, and its mean was 4.35. For the statement (3), almost half of the students answered 100% true, and its mean was 4.18. Results from these three statements indicate students had consistently positive feelings and values about proper waste management.

In the interviews, all students worried about improper waste management practices. They explained that these practices would cause water pollution and the contaminated water that people drank would affect human health. One student said:

"I feel very worried about the improper practices, because they are the main causes of pollution like water pollution in rivers. At the same time, such pollution is causing diseases and affecting human health."

Feeling and value about recycling

In the survey, there were two statements about recycling: (1) "It makes me happy when people recycle used bottles, cans, and paper" and (2) "I am interested in how recycling works in Nepal." Table 5 indicates for the statement (1), 65.6% of

students answered 100% true, and its mean was 4.41. For the statement (2), 32.6% of students answered 100% true, and its mean was 3.69. Students showed much more positive feelings and values about recycling in the first question than the second question. The differences were 33.0% in 100% true response and 0.72 in the mean.

In the interviews, all students mentioned that recycling had positive effects on the environment. However, three students could not explain how recycling had positive effects. The remaining three students explained that reduction of garbage would mitigate environmental pollution in general. One student explained:

"Recycling helps to reduce the amount of trash in Pokhara. And so it will help to control environmental pollution and clean the city."

No one could provide any further explanation of how recycling could influence the environment positively. In a similar manner, all students in the interviews were interested in how recycling worked in Nepal, while no one could explain their interests.

Impact of attitude and behavior on the environment

Students were asked whether they believed their values and behavior toward waste management would affect the environment. Table 5 indicates the responses of 100%, 75%, and 50% true were relatively even; 26.2%, 23.6%, and 22.8%, respectively. The mean was 3.50, which was the lowest in the feeling and value section.

In the interviews, three students answered that their behavior toward waste management might have impacts on the environment, because how they dispose of trash might pollute the environment. However, no one could explain this process. One stated:

"I think they (how I think and I treat trash) would affect the environment. But I cannot explain how they affect the environment."

In addition, no one specified how their values about waste management had impacts on the environment.

Belief in solving waste related pollution by their own action

Students were asked whether they felt there was nothing they could do to clean up the city. Table 5 indicates approximately 60% of students answered either 25% or 0% true, and the mean was 3.87. These results denote that the majority of students believed there was something they could do to clean up the city.

In the interview, two students believed there was something they could do. They suggested participating in clean-up activities, cleaning their own houses, and encouraging other people to keep the city clean. In contrast, three students felt that currently, there was nothing they could do. One student mentioned:

"I think I cannot do anything to clean up the city at this point, because I am too small and nobody will listen to me. This is the time to study for me. The only thing I can do is to clean up my house and the neighbors."

Concerns for the effects of waste-related pollution

Students were also asked whether they were worried about the effects of waste related pollution on their families. Table 5 indicates 54.1% of students answered 100% true, and the mean was 4.23. In the interviews, five students indicated they were worried, and four of them explained that they were worried because their parents were uneducated and were not aware of environmental pollution and its effects on them. One mentioned:

"I am worried about my family, because my parents are not educated and they are very careless about environmental pollution. They do not understand about it. They throw trash anywhere due to their ignorance." The other student explained that he was not worried, because his family knew better about environmental pollution and waste management.

"I am not worried about my family because my family understands about environment and waste management. In my opinion, if one member of a family understands about environmental pollution, all the other family members can learn about it."

As a consequence, the results indicated family members' education levels appeared to be associated with the degree of students' concerns for their families.

Concerns for people urinating and defecating outside

The last statement in the survey was "I do not care that people relieve themselves anywhere around the city." Table 5 indicates 62% of students answered 0% true, and the mean was 4.23. This result denotes that the majority of students did care about people relieving themselves outside. However, it should be also noted that this item included the highest percentage of students who answered "I don't know" among the feeling and value items. In the interview, all students expressed their concerns and uncomfortable feelings about this practice. Three alluded to the effects on human health.

"I feel worried about this problem. It looks very bad and this practice pollutes the city. It also causes diseases and is bad for our health. I just feel it makes the city dirty and I do not feel easy to walk around the city."

One student mentioned there was nothing he could do about this issue in spite of his profound concern.

Teachers' verbal and actual commitments to proper waste management

Conversation with families or friends about waste management

Teachers were asked about their commitment to having conversations with their families or friends about waste management issues. All teachers had talked with family members or friends about such issues. They had talked about how to treat different types of trash and how to reduce the amount of trash. Four explained they had talked about these issues, because they knew such pollution would affect human lives and health. However, no one explained the detailed process of how improper waste management affected human lives and health. One teacher talked with his family and friends about such issues, because he felt sad to see his home city dirty. In the meantime, he expressed the pessimism that such conversation with other people would not solve the problems:

"When I talk with them (family and friends), everyone feels sad. But for these things (environmental issues) we cannot do anything. We don't have time also. So that's why we just talk and share how sad we feel. Just sharing sadness."

Disposing of different types of trash separately

One purpose of the interview was to determine how teachers would dispose of trash at home. The results revealed they either burnt or buried all trash, including plastics. Although two of them indicated that they knew the negative effects of burning plastics, they told that there were no other alternatives. One teacher stated:

"Although I know the negative consequences of burning plastics as it produces bad smell and affects the soil, I keep doing so, because I do not have alternatives and because plastics spread everywhere make the environment dirty and do harm to cultivation."

Two teachers tended to throw glass into rivers or places where people could not see.

"Sometimes we just sell glasses. But usually we just put them at a corner. And I don't know. One day we just find a place and throw them. Places nearby, like a bush or a river. It depends on the time and the situation."

Bringing own bags for shopping instead of getting plastic bags at stores

Teachers were asked about their commitment to bringing their own bags for

shopping. Five teachers indicated that they tended to get plastic bags from stores due to

the convenience. Nonetheless, three of them admitted it was not a good practice,

because there were no proper management methods for plastics. One teacher remarked:

"I don't prefer plastic bags, but this is the general practice, because we go to a market and buy some goods. And people at a store put them into plastic bags. It is easy to carry too, so we take these plastic bags. This is not good but we are doing this practice for our easiness. It is not difficult to bring your own bag, but generally people will not do it."

The same teacher continued and explained his preference for paper bags over plastic

bags:

"What I found was that even if you put fire on plastic bags, it is not properly burnt. It still causes some problems in the soil structure. So it is better to make paper bags, because they can be easily burnt. And it is easily decomposed in the soil after one or two years."

The remaining two teachers argued to ban plastic bags.

Reusing plastic bags from stores

How do teachers deal with the plastic bags they have got from stores? Five of

six teachers indicated they burned plastic bags from stores, instead of reusing them.

One said:

"Depending on the quality of the plastic bags. But usually we just burn them. We get a plastic bag from store and in the next morning we burn it."

Preferring to buy glass bottles instead of plastic bottles

Teachers were also asked whether they preferred glass bottles to plastic bottles.

Three teachers did not show any preference and tended to buy whatever was available.

Two teachers indicated a preference for glass bottles, because they were more available

in Nepal than plastic bottles or cans.

"We buy either glass bottles or cans. I have not seen plastic bottles too much... yes, I have seen plastic water bottles. But we don't have to buy bottled water, because we can boil it at home. Only when we go for a trip, we sometimes buy water bottles."

Reusing plastic bottles

How do teachers deal with plastic bottles after they finish drinking the contents?

All teachers tended to throw away plastic bottles after they had finished drinking.

However, two of them mentioned that they would not usually buy plastic bottles, except

when they were travelling.

"I don't have that much problem, because a few times a year I buy plastic water bottles. And I don't know where I dispose of them. It is not that much problem to us."

Saving paper and notebooks

One purpose of the interview was to assess teachers' commitment to saving paper when they work. Five teachers indicated that they saved paper or notebooks when they were working. Three of them specified how they saved paper, such as by using both sides of paper, using small pieces of paper, and writing small letters. One of them also tended to collect used paper or magazines and sell them for recycling. Only one explained that this practice would save the extra expenditure on stationary supplies.

"This is related to the money expenditure. I don't know how far it is related to environment. If we use a big size of paper and write a few lines, this paper could be used to write a very good quantity. And doing this practice, it has to be checked unnecessary expenses for stationary items."

Thus, the financial factor was the only reason to save paper that students also indicated.

Participating in a clean-up campaign

Teachers were asked whether they were committed to participating in any cleanup activities. All teachers indicated that they had participated in such clean-up activities a few times a year. Half of them mentioned these activities were useful to educate other neighboring residents, because they would see other people or their children cleaning up the city. However, some teachers indicated their empathetic opinions about these activities and explained that participation in these activities would not represent people's positive attitudes toward the environment. One teacher, who participated in a clean-up activity held by a local non-governmental organization (NGO), said:

"People attended to this program because of their friendship with the people in the NGO. Because of the friendship, I also joined the activity. So I don't mean that people were aware of the issue because of their participation in the activity."

Another teacher who held some school clean-up activities with students mentioned:

"Students were not so much sincere. It might be under our (teachers') pressure. I have seen half of the students walking around and enjoying with other students during the activities. They are not very sincere, because they become dirty and feel so bad to be dirty."

He was also skeptical of the effects on neighbor residents:

"I don't know what they (neighbors) think. They just see it and that's all. They don't perceive any ideas or relations to those activities, because it is just once a year and they don't pay any special attention to the activities."

Disposing of trash into trash cans when eating snacks outside

When they eat snacks outside, how do teachers deal with wastes, such as wrappers or bags of the snacks? Four teachers indicated that they would throw away such trash anywhere because of its convenience and the lack of trash cans. On the other hand, one teacher indicated that he would not throw trash away. For instance, at a picnic he would collect all the trash in the site before he left and would burn everything. He mentioned this is a part of educating other people:

"We want to give the message to the people living in the society. 'Look, this is the system.' We came here, we enjoyed here, and now we are leaving, but your place is tidy and clean. It is a part of education"

Use of public bathrooms

Teachers were further asked about their commitment to using public bathrooms instead of relieving themselves outside. Three teachers indicated they would not do this and would go to stores, hotels, or friends' houses. Two other teachers indicated first they would ask stores or hotels, and if they could not gain permission, they would relieve themselves outside at corners. Another teacher explained that usually stores or hotels would not allow people to use bathrooms without making a purchase. He insisted on the lack of public bathrooms as the reason that people tended to relieve themselves outside. He explained:

"The strong cause for this is the lack of public bathrooms. There must be proper management of public bathrooms. People do not hesitate to pay one or two rupees to go to public bathrooms. Even I have been to Kathmandu (the capital city of Nepal) and did the same practice."

Additionally, one teacher indicated that public bathrooms should be kept clean, otherwise people would not feel like utilizing them.

Teachers' feelings and values about proper waste management.

Feeling and value about waste management

Regarding the question of how teachers feel about the waste management in Pokhara, all teachers were worried about improper waste management practices, because they would cause water pollution and this contaminated water that people would utilize as drinking water would affect human health. In addition, two teachers mentioned water of rivers should be kept clean for religious reasons. In Hindu culture, a river is a sacred place to cleanse people's bodies. One teacher remarked:

"We think that rivers are very holy. Many people go to riverbanks and wash themselves. But now they use this holy river as a drain. You see houses by the river directly supplying their toilet water into the river."

Feeling and value about recycling

Regarding the question of how teachers feel about recycling, five teachers indicated their positive opinions of recycling. However, no one could provide a detailed explanation of the process of how recycling could affect the environment positively. The only explanation of this process was that reduction of the waste volume would mitigate environmental pollution. Two teachers conspicuously misunderstood recycling as reusing.

Although most teachers were interested in recycling in Nepal, two teachers were skeptical about its feasibility in Nepal due to the financial constraint. One said:

"I am interested in recycling. But I don't know how far it is practical and possible. There is only one recycling factory in Kathmandu."

Impact of attitude and behavior on the environment

Teachers were also asked whether they believed their values and behavior toward waste management would affect the environment. Five teachers believed that their behavior would affect the environment, especially by improper waste management practices. One of them stated that if he articulated his opinions about environmental pollution, others would listen to him because of his high education. This comment might denote his belief that his value about waste management would influence other people's values and behavior, and then, would have an impact on the environment.

Belief in solving waste related pollution by their own action

One purpose of the interview was also to determine teachers' belief in solving waste-related pollution problems by their own action. Five teachers indicated that they believed there was something they could do. Three of them suggested they could educate other people to conduct proper waste management, while they did not explain how they could educate other people and how educated people would contribute to solving waste-related pollution. In addition, two teachers alluded to the Municipality Office or the Pokhara Sub-Metropolitan Office. They pointed out that the governmental offices should take some responsibility for waste management issues. One of them expressed his disappointment with these offices:

"All the big people can do something. But they are not interested in. If we go to their offices, they will just listen and say yes, but will not do anything. They fear the voters. So many times I talked with the mayor that at least we can clean the city or we can remove the animals walking around the city and either sell them or take them into the jungle. Why cannot we do this? But still they are afraid that voters might get annoyed and they will lose the support. It is a political game and political benefit."

Furthermore, he expressed his dispassionate feeling toward environmental issues.

"I don't have too much interest (in cleaning up the city), because sometimes I think this is not my job."

Concerns for effects of waste related pollution

Teachers were also asked whether they were worried about effects of waste related pollution on their families. Four teachers indicated they were not worried. Two of them explained they were not worried because their families conducted proper waste management practices. One explained that his family members were educated and were aware of proper waste management. Conversely, two teachers were worried about their families, because their families were not educated. One teacher said:

"To some extent, yes (I am worried about the effects on my family), because it affects everyone... but my wife may not be educated like me. My daughter and son might not be educated like me. They will not be so much conscious of environmental pollution like me."

Concerns for people urinating and defecating outside

How do teachers feel when they see people urinating and defecating outside?

All teachers expressed discomfort toward such practice. All agreed this practice would

affect human health. One teacher repeated the term "bad" several times in his

comment:

"That's too bad. It is very, very bad. It is bad, because it make s the whole surrounding bad. The whole environment becomes bad. So doing toilet outside is not only our sign of uncivilization, but also it is just again the human culture and it makes everything bad. It makes people feel bad and it doesn't look nice. So from every point of view it is very bad."

Surprisingly, one teacher indicated approximately 80% of the population in Pokhara tended to relieving themselves outside.

Objective 3: Identify differences in the student's perceptions and attitudes by sex

To examine the differences of students' perceptions of environmental education and attitudes toward waste management by sex, t-tests were performed. The results are shown in Table 6.

		Purchan				
Scale	Group	Number	Mean	SD	t-value	P-value
Perceptions about	Male	601	4.12	0.65	2.08	.003*
environmental education	Female	542	4.23	0.65	-2.98	
Verbal commitment to	Male	600	3.82	0.63	-7.27	.000*
waste management	Female	541	4.08	0.57		
Actual commitment to	Male	601	3.49	0.74	6.65	000*
waste management	Female	542	3.77	0.66	-0.03	.000+
Feeling and value about	Male	600	4.06	0.57	4.09	000*
waste management	Female	538	4.20	0.54		.000+

Table 6. Differences in students' perceptions and attitudes by sex

* denotes significance at $\alpha = .05$

Table 6 indicates that the difference in students' perceptions of environmental education was statistically significant, and female students (mean = 4.23) had more positive perceptions than male students (mean = 4.12). However, the mean difference of 0.11 was very small, hence male and female students had systematically similar perceptions of environmental education.

Table 6 also shows that the difference in the verbal commitment to proper waste management by sex was statistically significant, and female students (mean = 4.08) had more positive verbal commitment than male students (mean = 3.82). The mean difference of 0.26 and the t-value of -7.27 were relatively large. Therefore, female students had systematically more positive verbal commitment than male students.

Likewise, the difference in the actual commitment by sex was also statistically significant (Table 6), and female students (mean = 3.77) had more positive actual commitment than male students (mean = 3.49). The mean difference of 0.28 and the t-

value of -6.65 were relatively large. Thus, female students had systematically more positive actual commitment than male students.

Lastly, Table 6 also shows that the difference in feeling and value about proper waste management by sex was statistically significant, and in a consistent manner, female students (mean = 4.20) had more positive feelings and values than male students (mean = 4.06). However, the mean difference of 0.14 was fairly small, hence male and female students had systematically similar feelings and values toward waste management.

Objective 4: Explore relationships between the students' perceptions and attitudes with age

To examine relationships between the students' perceptions of environmental education and attitudes toward waste management with age, bivariate correlation analyses were performed and Pearson correlation coefficients were computed. The results are shown in Table 7.

Scale	Number	Pearson correlation	P-value
Perceptions of environmental education	1136	054	.069
Verbal commitment to waste management	1134	083	.005*
Actual commitment to waste management	1136	019	.524
Feeling and value about waste management	1130	064	.032*

Table 7 Relationships between students' perceptions and attitudes with age

* denotes significance at $\alpha = .05$

Table 7 indicates the relationship between students' verbal commitment to proper waste management and age was statistically significant. The obtained Pearson correlation coefficient of -.083 denotes the relationship between verbal commitment and age was negative. However, the coefficient was extremely small, hence the result asserted there was systematically no relationship between students' verbal commitment and age.

The relationship between students' feelings and values about proper waste management and age was also statistically significant (Table 7). The Pearson correlation coefficient of -.064 denotes this relationship was negative. However, the degree of correlation was extremely small, hence, there was systematically no relationship between students' feelings and values and age.

For the other two scales, the analyses did not find statistically significant relationships. Regarding the perception scale, the p-value of .069 was relatively close to .05 (Table7), while the correlation coefficient was trivial. Thus, this result also indicates that there were no relationships of the students' perceptions and attitudes with age.

Objective 5: Identify differences in the students' perceptions and attitudes between public and private schools

To examine the differences of the students' perceptions of environmental education and attitudes toward waste management between public and private schools,

t-tests were performed. The results are shown in Table 8.

Table 8. Difference in students' perceptions and attitudes between public and private schools

Scale	Group	Number	Mean	SD	t-value	P-value
Perceptions about	Public	796	4.14	0.69	2.59	010*
environmental education	Private	356	4.24	0.58	-2.38	.010*
Verbal commitment to	Public	795	3.97	0.60	2.45	.014*
waste management	Private	355	3.88	0.63		
Actual commitment to	Public	796	3.71	0.71	6.20	.000*
waste management	Private	356	3.43	0.70		
Feeling and value about	Public	789	4.11	0.56	1 70	080
waste management	Private	356	4.17	0.55	-1.70	.089

* denotes significance at $\alpha = .05$

Table 8 indicates that the difference in the students' perceptions between public and private schools was statistically significant. However, the mean difference between public (mean = 4.14) and private schools (mean = 4.24) was very trivial (0.1). Thus, both public and private school students had systematically similar perceptions of environmental education.

In Table 8, the difference in the verbal commitment to proper waste management was also statistically significant, and public school students (mean = 3.97) had more positive verbal commitment than private school students (mean = 3.88). However, the mean difference of 0.09 was also very small. Therefore, public and private school students had systematically similar verbal commitment.

Table 5 also indicates that the difference in the actual commitment was statistically significant, and pubic school students (mean = 3.71) had more positive actual commitment to proper waste management than private school students (mean = 3.43). The mean difference of 0.28 and the t-value of 6.20 were large, hence, public school students had systematically more positive actual commitment than private school students than private school students.

Objective 6: Explore the relationship between the students' perceptions and attitudes with class size

To examine relationship between the students' perceptions of environmental education and attitudes toward waste management with class size, bivariate correlation analyses were performed, and Pearson correlation coefficients were computed. The results were shown in Table 9.

Scale	Number	Pearson correlation	P-value
Perceptions of environmental education	1152	041	.167
Verbal commitment to waste management	1150	.092	.002*
Actual commitment to waste management	1152	.144	.000*
Feeling and value about waste management	1145	.000	.990

Table 9. Relationship between the students' perceptions and attitudes with class size

* denotes significance at $\alpha = .05$

Table 9 indicates the relationship between students' verbal commitment to proper waste management and class size was statistically significant. The Pearson correlation coefficient of .092 indicates this relationship was positive, while the degree of correlation was extremely small. Therefore, the result asserted there was systematically no relationship between students' verbal commitment and class size.

Table 9 also indicates the relationship between students' actual commitment and class size was statistically significant. The Pearson correlation coefficient of .144 indicates the relationship was positive, while the degree of correlation was small. Thus, the result asserted that there was systematically no relationship between students' actual commitment and class size.

For the perceptions of environmental education and feeling and value about proper waste management scales, the analyses did not find statistically significant relationships.

Objective 7: Explore the relationships between students' perceptions of environmental education and attitudes toward waste management

This study explored the relationship among students' perceptions of environmental education, verbal and actual commitments to, and feeling and value about proper waste management by predicting and testing a path model of these

variables. First of all, Pearson correlation coefficients among these four scales were computed (Table 10) in order to predict the path model based on the conceptual framework introduced in Chapter 2 (Figure 3.).

	Perceptions	Verbal commitment	Actual commitment	Feeling & Value
Perceptions of environmental education				
Verbal commitment to waste management	.441*			
Actual commitment to waste management	.376*	,633*		
Feeling and value about waste management	.400*	.440*	.419*	

Table 10. Pearson correlation coefficients among perception and attitude scales

* denotes significance at $\alpha = .05$.

In addition, partial correlation coefficients among two of the four scales were computed, controlling for the other two scales. For instance, the partial coefficient between the perception and the verbal commitment scales was computed by controlling for the actual commitment and the feeling and value scales. The partial correlation coefficient between the verbal and the actual commitment scales was computed by controlling for the perception and the feeling and value scales. These partial correlation coefficients are introduced in Table 11.

Table 11. Partial correlation coefficients among perception and attitude scales

	Perceptions	Verbal commitment	Actual commitment	Feeling & Value
Perceptions of environmental education				
Verbal commitment to waste management	.229*			
Actual commitment to waste management	.094*	.510*		
Feeling and value about waste management	.234*	.182*	.174*	

* denotes significance at $\alpha = .05$.

Table 10 indicates the correlation coefficients ranged from .376 to .633 and all were statistically significant. Thus, according to Davis (1971), all four variables were

moderately to substantially correlated with each other. As shown in Table 11, the partial correlation between the perception and the verbal commitment was low (partial correlation = .229) and that between the perception and the feeling and value scales was also low (partial correlation = .234). However, compared to these two correlations, the partial correlation between the perception and the actual commitment scale was negligible (partial correlation = .094). Thus, these findings support the relationship of the perception scale with the other three scales described in the conceptual framework. It assumes that the perception scale has direct relationships with the verbal commitment and the feeling and value scale and has indirect relationship with the actual commitment by way of these two scales (see Figure 4 below).

The verbal commitment scale was substantially correlated with the actual commitment scale even after controlling for the other two scales. The correlation coefficient was .633 (Table 10) and the partial correlation coefficient was .510 (Table 11). Therefore, this finding provide support for the direct relationship between the verbal and the actual commitment scales as assumed in the conceptual framework.

However, there was a need for a minor correction in the conceptual framework regarding the relationship between the feeling and value and the actual commitment scales. Even though the correlation coefficient between them, .419, indicated the moderate relationship (Table 10), the partial correlation coefficient between them, .174, was weak (Table 11). Thus, it can be assumed that if the effect from the verbal commitment were included, the relationship between the feeling and value and the actual commitment scales would increase. Since feeling and value about proper waste management is assumed to precede the willingness to have commitments to it (verbal

commitment), this study presumed that the feeling and value scale influences the verbal commitment scale first and influences the actual commitment scale indirectly by way of the verbal commitment scale.

Table 11 indicates the relationship between the feeling and value and the verbal commitment scales was also weak (partial correlation = .182). However, the correlation coefficient between them, .440, (Table 10) was relatively high, and Maloney and Ward (1973) also observed the substantial relationship. Hence, it can be assumed that if the influence from the perception scale was included, the feeling and value scale had a relatively strong influence on the verbal commitment scale.

As a result of these correlation analyses, the path model among perception of environmental education, verbal and actual commitments to, and feeling and value about proper waste management was developed and tested as shown in Figure 4. This model hypothesized that students' perceptions of environmental education impacted their feelings and values about and verbal commitments to proper waste management directly. Their feelings and values also had a hypothesized direct impact on their verbal commitment. Lastly, students' verbal commitment had hypothesized influence on their actual commitment to proper waste management.

Figure 4. Path model of perceptions of environmental education and attitudes toward waste management (numbers represent path coefficients)



In order to test the fit of the model, the path coefficients were examined, and these coefficients ranged from .31 to .91 (Figure 4). Considering the large size of respondents in the survey (1,152), these coefficients were substantial. Additionally, the divergence between the predicted and obtained coefficients was examined. All obtained errors were insignificant and the test of the fit of the model indicated the data from this study were consistent with the model ($\chi^2 = 1.36$, P-value > .05).

Objective 8: Describe the present situation of teacher training for environmental education and teachers' needs for improvement

In the interview, teachers were asked how they perceived environmental education, what training they had been provided, and what needs they had.

Strengths and weaknesses of environmental education

Teachers were asked about the strengths and weaknesses of environmental education in Pokhara they had perceived. Regarding strengths, most teachers indicated that environmental education could raise students' awareness level and influence their behavior toward the environment. In turn, improved awareness and behavior would reduce the waste related pollution.

As for weaknesses, most teachers referred to the lack of activity-oriented instruction and knowledge of action skills that environmental education provided, such as solutions to environmental issues in practice and what students could do to achieve solutions. One teacher mentioned:

"Environmental education is limited only within the classroom and in the form of exam and grades. Even if students get 90 points out of 100-point exams, they throw trash anywhere. So this education is limited only within the classroom and exams. So it is not related to their behavior."

Teachers also indicated that environmental education did not cover local environmental topics, such as waste management issues in Pokhara.

Teacher training for environmental education

One purpose of the interview was to determine how much and what types of training for environmental education teachers had obtained in the past. No teachers had any form of teacher training for environmental education in this area previously. It was found that these environmental teachers in the interview were from other subject areas, such as social studies, Nepali language, and mathematics. One teacher said:

"Sorry, I do not have any training in the past. Basically, I am a math teacher. And I have done my Master's degree in economics."

The interview further asked about the current situation of teacher training. Most teachers were not certain about any teacher training being available. One teacher alluded to some Non-governmental organizations that had been providing such training. However, these types of training seemed to be limited only to public school teachers,

and even if they were accessible to private school teachers, it would not be suitable for

teachers' situations.

"There are some agencies that provide teacher training for environmental education. But this sort of training is only limited to public school teachers. And private school teachers are hardly invited to such training. Sometimes, they even call us to the training. But the training period would be long like three to five months and so we cannot send our teachers. Because of these factors, we do not have any sort of training."

Another teacher described the present situation and his future perspective.

"Till now, we have only population and environmental studies in university, but there is no provision of environmental education. So, most teachers have not got any environmental education or training to become environmental education teachers. So, at least there must be a short course, maybe four or five weeks for environmental education teachers."

Teaching curriculum and materials

Teachers were asked what types of teaching curriculum and materials being

accessible to them. All teachers indicated that there was nothing accessible except for

the textbook. One teacher said:

"Well, the book is the major instrument. And the nature I see outside is the teaching material. We do not have any other teaching materials. No audio visual, no other listening cassettes."

The majority of teachers mentioned they had been teaching on the basis of their

personal experiences with natural resources. One teacher mentioned he would collect

magazines and booklets and utilize them for his class.

Needs for improvement

Teachers were also asked what was needed to improve environmental education.

The majority of teachers indicated that it should be taught in an activity-oriented way,

instead of the present knowledge- and theory- oriented way, and should provide

knowledge of action skills, such as how to solve environmental issues and what students could do. One teacher said:

"Environmental education must be a practical class. If I teach about water pollution, I should be able to take students to somewhere water is polluted. And I should be able to ask them 'what do you think about throwing trash in the water?' To perform such class, I need to take them to real places. In this way, students can directly feel the environmental pollution."

In addition, other teachers indicated environmental education should be given more emphasis in the entire school curriculum. Currently, environmental education has been given 50 marks instead of the 100 marks that other main subjects have been given. Schools in Nepal offer to sixth to eighth grades a total of nine to ten subjects with 700 to 800 marks. Population and environmental education with the 50 marks is taught two class periods (one period is approximately 50 minutes) a week, and a subject with the 100 marks is taught four class periods a week. One teacher explained the need for expanding the scope of environmental education.

"It should be given as a 100-mark subject. Now it is given as a small subject and it has been taught two periods in a week. It must be given six periods in a week."

Needs for teacher training

Lastly, teachers were asked what they needed for their own training to teach environmental education. Some teachers mentioned they needed fundamental information about the environment and its issues for themselves. One teacher said:

"I need basic knowledge about environmental pollution, such as what it is, how it is created, what consequences it has on human beings, and how it can be solved. Then, I will be able to provide quality education."

Other teachers expressed their needs for different teaching materials and techniques.

"I need to know different types of teaching techniques and materials regarding environmental pollution and its solutions. More than anything else, teachers have to be prepared to teach."

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Chapter 5: Summary, Discussion, Conclusions and Recommendations

The primary purpose of this study was to evaluate environmental education in Pokhara Nepal by assessing students' and teachers' attitudes toward waste management and perceptions of environmental education. Data were collected using a groupadministered survey with 1,152 eighth graders and personal interviews with six eighth graders and six environmental education teachers in 22 schools in Pokhara.

Summary and Discussion

Perceptions of environmental education.

Overall, both students and teachers had highly positive perceptions of environmental education. The perception scale mean was 4.17 (Table 2) in the survey. Additionally, in the interview, both students and teachers agreed that it was useful to become aware and make students aware of environmental issues, including waste management practices, and that it was also useful to influence students' behavior toward such practices. However, their notions of the process of how environmental education could solve environmental issues appeared to be over-simplified. They believed that providing knowledge about the general environment, not specifically waste management issues, would enhance awareness of and attitudes toward waste management and result in students' behavior change. As a result, their modified environmental behavior would solve the environmental issues. Nonetheless, the association between knowledge and attitude or behavior has been proven trivial by many studies (Borden and Schettino, 1979). Newhouse (1990) remarked that knowledge is a prerequisite to appropriate behavior, while it does not lead directly to

behavior change. An individual should know and be able to use practical actions to solve issues.

In the interview, students reported to have changed their behavior toward waste management as a result of environmental education. They reported to have started putting trash into trash cans, instead of throwing it anywhere. However, no one could explain how various types of trash should be treated ultimately after being collected in trash cans. This implies that students' understanding of proper waste management stops at the rudimentary notion that people should not spread trash all over, while they did not comprehend the more critical notions about how to deal with trash properly.

Both students and teachers mentioned that environmental education in Pokhara was more knowledge- and theory-oriented, instead of activity-oriented. Environmental education provided environmental knowledge within the scope of the textbook used, but not knowledge of action skills to solve environmental issues in practice. Thus, most students and teachers in the interviews indicated the needs for knowledge of action skills and learning experiences through practical activities. This theory- and knowledge-oriented environmental education may not be improving students' understanding of proper waste management to that described above.

Teachers revealed that environmental education did not cover local environmental issues or specific waste management topics. Supporting these teachers' comments, there was a lower percentage of students in the survey who answered that environmental education was useful for local issues in Pokhara compared to those who answered that it was useful for issues throughout Nepal. Teachers further reported this was because the textbook did not cover local problems or waste management topics.

Conspicuously, the lack of these topics had been hindering students' ability to relate knowledge from the class to their daily lives in order to take action.

The lack of activity-oriented instruction and the lack of local and waste management topics was partly due to the lack of access to teaching materials and teacher training. The study disclosed that teachers did not have access to any teaching curriculum or materials, except for the textbook. In addition, teachers interviewed had no previous training to teach environmental education. Furthermore, there was no regular and affordable in-service teacher training currently. Thus, the lack of teaching materials and previous teacher training may have been restraining teachers' ability to teach knowledge of action skills and local issues and waste management topics through practical activities.

Teachers further needed to put more emphasis on environmental education within the entire scope of the school curriculum. As explained before, schools in Nepal teach nine to ten subjects with a total of 700 to 800 marks in the sixth to eighth grades and major subjects like Nepali language, math, and science, are given 100 marks each. Currently, environmental education is provided 50 marks; hence, some teachers suggested providing the full 100 marks to this subject. This will give environmental education more class periods in a week and may allow teachers to implement more activity-oriented instruction.

Attitudes toward waste management.

Overall, both students and teachers had highly positive attitudes toward waste management. In the survey, the means of the verbal and actual commitment and feeling and value scales were 3.94, 3.62, and 4.12, respectively. In the interviews, most

informants mentioned that they were aware of negative effects of improper waste management. However, they also indicated that they were liable to perform such improper practices as burning plastics, throwing glass bottles into rivers, and throwing trash on the ground when they ate snacks outside. In a similar way, even though teachers condemned people urinating and defecating outdoors in the city and were aware of its harmful effects, they, themselves, tended to do so at times. This discrepancy between awareness of issues and actual behavior indicates that they had certain characteristics within the category of "Entry-level variables" in Hungerford and Volk's (1990) behavior flow chart (Figure 1). They had awareness and knowledge of the issues, while they were not taking the issues personally, as do individuals who possess strong characteristics classified as "Ownership variables", such as personal investment in issues and the environment.

This may be partly due to the situational external variables, that is, the lack of facilities such as dumping sites, trash cans, and public bathrooms. Another influential variable hindering behavior change could be the social norms which Vining and Ebreo (1992) regard as prominent in environmental behavior change. In the past, when Nepal did not have plastic materials, people used to burn or bury all types of trash. Moreover, they used to relieve themselves outside, such as in bushes or forests. Thus, innovation of technologies has started generating inorganic wastes and has changed lifestyles, while the transition of social norms about waste management might have not taken place yet.

In addition, this discrepancy between students' awareness and their behavior might have been caused by the lack of knowledge of action skills and the lack of an

internal locus of control. The interview revealed that students did not know what they could do in practice to solve waste related issues, which represented their lack of knowledge of action skills. Moreover, the survey found that students and teachers were uncertain about how their attitudes and behavior toward waste management would influence the environment. This finding represented their lack of internal locus of control, that is, the belief that they can make changes (Hungerford and Volk, 1990). Since, as this study found, knowledge-oriented environmental education tended to provide only general knowledge of environmental issues, it might not promote students' knowledge of action skills and internal locus of control currently.

In comparison with students, teachers had stronger beliefs that there was something they could do to remedy the waste related issues. Most teachers believed educating other people could contribute to the improvement of environmental quality. However, no teacher alluded to school environmental education. Thus, there remains a skepticism in teachers' beliefs that this environmental education could have impacts on the environment by way of students and their behavior change. They might believe that environmental education was only to provide knowledge and prepare for students' academic examinations.

Students indicated highly positive verbal commitment to having conversations with their families and friends about waste management, and the mean of this item was 4.21 (Table 3). Although students had less positive actual commitment (mean = 3.58, in Table 4), this finding indicates the favorable potentiality that school environmental education would have positive effects on other citizens through students as agents of change (Boerschig and Young, 1993). In addition, students have potential to

disseminate educational messages to other citizens through city clean-up activities, as one teacher mentioned. However, during the personal interviews, students reported that in spite of students' strong willingness, they did not have adequate opportunities to participate in such activities.

Lastly, the concept of recycling seemed to be unknown to students and teachers. In spite of the high means of two items regarding recycling ("It makes me happy when people recycle" = 4.41 and "I am interested in how recycling works in Nepal" = 3.69, in Table 5), they could not describe how recycling would affect the environment. Their understanding of recycling were simplified to the belief that recycling would reduce the amount of trash generated and result in improvement in environmental quality. In addition, some teachers obviously misunderstood recycling as only reusing. Their limited understanding of recycling would suggest that concepts of recycling, reusing, and reducing were unfamiliar to the citizens of Pokhara. In fact, there is no recycling facility in Pokhara.

Differences in the students' perceptions and attitudes by sex.

The survey revealed that female students tended to have more positive attitudes, specifically verbal and actual commitments, toward proper waste management. The differences in the verbal and the actual commitment scales by sex were statistically significant, and the means of female students on the verbal commitment scale and on the actual commitment scale were higher than those of male students (see Table 6). This finding was consistent with previous study findings by Kellert (1985) and Williamson (1996) that female students tended to have more positive attitudes toward animals and natural resources. In the context of Nepalese culture, females are generally

expected to be involved in household chores, such as cleaning up houses and neighborhoods or coping with household trash in a proper manner. Such socialization perspectives for females might have inspired female students' more positive attitudes toward proper waste management than male students.

Relationship between students' perceptions, attitudes and age

There was no observed relationship between the students' perceptions of environmental education, their attitudes toward waste management and age. This finding did not correspond with the findings by Leeming et al. (1995) and Leeming et al. (1997) that younger students tended to have more positive environmental attitudes. This might be due to the different methods for comparison. This study conducted the comparison among differently aged student within a single grade, whereas the studies of both Leeming et al. (1995) and Leeming et al. (1997) conducted the comparisons between lower grade students (grades 1-3) and upper elementary students (grades 4-7). Therefore, the differences in students' environmental attitudes within Leemings' studies might have occurred due to different educational levels (grades) instead of biological age.

Difference in students' perceptions and attitudes between public and private schools.

The study indicated public school students had more positive actual commitments to proper waste management than private school students. The difference in the actual commitment scale between public and private schools was statistically significant, and the mean of public schools was higher than that of private schools (Table 8). This might be explained by the difference in students' financial resources. Students with less financial resources tend to go to public schools, and those with more

financial resources tend to go to private schools. Therefore, for example, private school students with more resources can afford to buy plastic water bottles, drink the water and throw away the bottles, whereas public school students with less resources would reuse the plastic bottles even after drinking the water. Consistently, there was no difference in the verbal commitments between these two groups. This suggests that there was not a difference in their willingness or intention, but only in their actual practices caused by their financial situations.

In addition, this difference in actual commitment to proper waste management might have been caused by the difference in the number of female students. Public schools had more female students (52.7%) than male students (47.3%), whereas private schools had more male students (64.4%) than female students (35.6%). As mentioned previously, one finding of this study was that female students tended to have more positive attitudes, specifically actual commitment, than male students.

Relationship between students' perceptions, attitudes and class size.

There were no relationships between the students' perceptions of environmental education or their attitudes toward waste management with class size. This finding did not correspond with findings by Smith and Glass (1980), Nye et al. (1992), and Holliday (1992) that smaller class size would have a more positive impact on students. In the case of Nepalese environmental education, the knowledge- and lecture-oriented instruction would have hampered the effectiveness of smaller class sizes. Teachers could fully take advantage of smaller class sizes in activity-oriented instruction that would require them to have more frequent interactions with students than knowledgeand lecture-oriented instruction. Thus, because environmental education in Nepal
tended to include more knowledge- and lecture-oriented instruction, smaller class size did not tend to have special effects on promoting the students' positive perceptions and attitudes.

<u>Relationships between students' perception of environmental education and</u> their attitudes toward waste management.

This study supported the idea that students' perceptions of environmental education would influence their feelings and values about proper waste management strongly (path coefficient = .70) and their verbal commitments to proper waste management substantially (path coefficient = .54). Students' feelings and values should also have moderate impacts (path coefficient = .31) on their verbal commitment. Finally, students' verbal commitment should influence strongly (path coefficient = .91) their actual commitment to proper waste management.

Conclusions

The study suggests the tremendous potential of environmental education and its effectiveness on students' attitudes toward waste management in the future. Students and teachers had highly positive perceptions of this school subject and strong interests in learning and teaching about the environment. Their positive perceptions, representing their willingness to learn, will contribute to the effectiveness of environmental education. In addition, students and teachers had highly positive attitudes toward waste management, such as high willingness to make commitments to and feelings and values about proper waste management. Their positive attitudes toward waste management will be readily promoted by environmental education, and then improved attitudes will result in their actual behavior change toward waste

management. Overall, it should be stated that in spite of its short history, environmental education in Pokhara has made remarkable progress.

Environmental education has the potential to enhance students' actual behavior by promoting their willingness to conduct proper waste management practices and their feelings and values about such practices that also enhance their willingness. Finally, enhanced willingness should lead to individuals' actual commitment to proper waste management practices and should result in their actual behavior. Environmental education can enhance students' responsible environmental behavior by implementing lessons to inspire students' willingness to conduct proper waste management practices, as well as their feelings and values about them.

Furthermore, environmental education is a potential means for disseminating environmental knowledge and awareness to other citizens through students' conversations and through clean-up activities that also deliver environmental messages. Students' high willingness to have conversations with their families and friends and to participate in clean-up activities indicated the potential of environmental education as a way to disseminate such knowledge and awareness to other citizens by encouraging students' conversations with them and providing clean-up activities.

In spite of such positive perspectives of environmental education, there were also several shortcomings to be considered. Environmental education was knowledgeand theory-oriented, instead of activity-oriented, and did not cover local environmental issues or waste management issues in Pokhara. Although environmental education would promote students' knowledge and awareness of general environmental issues, it would not enhance their responsible environmental behavior toward the local issues.

For example, students and teachers appeared to have positive attitudes toward waste management and fundamental knowledge and awareness of waste management issues, while they tended to conduct improper waste management practices.

This discrepancy between their knowledge and awareness of the issues and their actual behavior could be partly due to their lack of knowledge of action skills and internal locus of control. If a goal of environmental education in Nepal is to develop students' responsible environmental behavior, it should put more emphasis on promoting students' knowledge of action skills. As Hungerford and Peyton (1980) indicated, students who have knowledge of how to affect decision-making are most likely to become involved in environmental issues. Moreover, such knowledge promotes a positive internal locus of control. Finally, enhanced knowledge of action skills and internal locus control will lead to responsible environmental behavior.

To promote students' knowledge of action skills and internal locus of control, environmental education teachers need teacher training which would provide fundamental environmental knowledge, teaching materials, and teaching strategies to teach knowledge of action skills and local topics through practical activities. Teachers with such training will be able to provide more effective instruction for students' behavior change. As a result, their students will be able to relate knowledge from environmental education to their real life and utilize it in practice. However, financial and resource constraints may hinder PABSON and the Ministry of Education from holding such training periodically.

Even though this study did not include higher grades, one of the challenges will be to conduct such activity-oriented environmental education in these grades. In the

1999/2000 school year, some schools will start implementing population and environmental education in the ninth and tenth grades. In these higher grades, schools tend to emphasize preparation for the national standardized examination at the end of the 10th grade, which requires more knowledge-oriented instruction in other school subjects. In addition, this examination does not include environmental education. As some teachers suggested, if schools will expand the scope of environmental education to have more class periods in a week, it would be more difficult for schools to keep the balance between preparation for the examination and activity-oriented environmental education. Since private schools put more emphasis on the examination than do public schools, as students' parents expect, private schools would have more constraints to implementing activity-oriented instruction.

A critical hurdle for public schools in implementing activity-oriented instruction will be large class size. Public schools' class sizes tend to be much larger (approximately 60) than that of private schools (approximately 30). As mentioned before, activity-oriented instruction requires teachers to have more frequent interactions with students than the current lecture-oriented instruction. Therefore, large class size may limit the ability of public schools to implement activity-oriented environmental education.

As Guagnano et al (1995) and Mezirow (1992) indicated, development of students' responsible environmental behavior would necessitate the provision of waste management facilities, such as dumping sites, trash cans, and public bathrooms. These external variables regarding development of such behavior could nullify students' internal locus of control, and therefore inhibit behavioral action. It should be also noted

that the provision of such facilities requires financial resources and the financial constraint will be an obstacle for the Pokhara Sub-Metropolitan Office.

Lastly, given the current situation of insufficient waste management facilities, reduction of material use and waste volume generated will be the most appropriate strategy to remedy current waste pollution. This should be considered by both schools and policy makers regarding waste management and is addressed more in the recommendation section below.

Recommendations

This study suggests recommendations for the following: (1) the school system, including teachers, administrators, and educational policy makers, (2) Pokhara Submetropolitan mayor's office, and (3) for conducting further evaluative research on environmental education in Pokhara, Nepal.

<u>Recommendations to the school system, including teachers, administrators,</u> and educational policy makers.

Environmental education needs to provide knowledge of action skills through practical activities, and include local environmental issues, especially waste management issues. To fulfill these needs, PABSON and the Ministry of Education should provide teacher training periodically. These types of teacher training should provide teachers with: (1) fundamental knowledge of the environment and its issues, (2) teaching materials, especially those introducing various practical activities, and (3) teaching strategies to teach knowledge of action skills and local environmental issues through practical activities.

According to Hungerford and Peyton (1980), action skills and environmental action may be classified in five major categories. These are persuasion, consumerism,

political action, legal action, and ecomanagement. Of these, persuasion, consumerism, and ecomanagement could be applied to Nepalese environmental education targeting sixth, seventh, and eighth graders. Political action and legal action will not be appropriate for students in these grades, because they are not eligible to vote yet, and it will be extremely difficult for them to understand the political structure and take their own initiatives in such actions.

According to Hungerford and Peyton (1980), persuasion means an effort to verbally motivate human beings to take positive environmental action. Consumerism includes economic behavior or behavioral modification in business or industry regarding goods and services. Ecomanagement denotes physical action aimed at improving the existing ecosystems. Practical activities that could be implemented in environmental education classes are:

Persuasion:

- Discussion of waste pollution in Pokhara, its consequences, and action students could take to improve the situation.
- Students making speeches about waste management issues that they have discussed or learned in environmental education to other citizens or to students' parents.
- Students writing letters to policy makers and to the mayor to petition for provision of waste management facilities.

Consumerism:

- Encouraging students to make verbal commitments to make conservative use of plastic products, such as bringing their own bags for shopping instead of getting plastic bags from stores, and reducing the waste volume they generate. Then, students could present their commitment in class or to their parents.
- Students writing letters to snack producers to encourage less use of plastic wrappers, and letters to beverage producers to encourage more utilization of glass containers than plastic packs and bottles.

Ecomanagement:

- Periodical clean-up activities, even if only within or around schools.
- Installing trash cans within schools, around the city, or picnic sites and monitoring such trash cans.

• Longer-term "adoption" of local parks for frequent clean-up and other stewardship projects.

Teacher training should provide detailed directions to implement the activities above. Furthermore, the duration of teacher training should be short - three to five days - so that teachers could participate in them without leaving their schools for a long period. Moreover, such training should be affordable and accessible to teachers in terms of teachers' and schools' time schedules, locations of training sessions, and cost.

Teachers are also advised to implement some of these activities to promote students' feelings and values and verbal commitment to proper waste management practices. For example, a field trip to the trash-free area of an old part of Pokhara where citizens are determined to clean up the area, and discussions of their observations during the trip would promote students' positive feelings and values toward the cleanliness of the city. Activities to encourage students to make verbal commitments to proper waste management practices and reduction of material consumption even if only within schools would promote students' verbal commitment. Improved student feelings and values and verbal commitment toward proper waste management should lead to actual commitment and result in actual behavior.

It will be also useful to provide assignments to promote students to interact and discuss with their families, neighbors, and friends about waste management and reduction of material consumption. In addition, schools should provide students with more opportunities for clean-up activities. These assignments and activities could inspire other citizens' environmental knowledge and awareness through students as agents.

It is further recommended that both regional and district offices of the Ministry of Education expand the scope of environmental education within the entire school curriculum. By providing more class periods devoted to this subject, teachers will be able to conduct more sequential activity-oriented instruction, such as field trips, research projects, and giving outcome presentations to other students or parents. However, it would likely be controversial to include environmental education in the national standardized examination, because the examination is based on facts to be memorized and requires knowledge-oriented instruction. Including environmental education in the national examination would make it difficult for teachers to conduct activity-oriented instruction.

Recommendations to Pokhara Sub-Metropolitan Mayor's office.

It is recommended that the Pokhara Sub-Metropolitan Mayor's office complete the construction of a landfill site that is to be completed by 2001. In addition to the landfill site, the office is advised to create an organized waste collection system. Without a convenient system, citizens will lose their motivation to collect waste and utilize the landfill site that will be located about 13 kilometers away from the city center. Vining and Ebreo (1992) indicated that fostering proper waste management practices requires personal convenience for people to conduct such practices.

Furthermore, the office is advised to consider banning the use of plastic bags in stores and substituting paper bags, as one district of Nepal has begun to do. Another alternative would be to implement a system in which citizens could gain benefits if they bring their own bags for shopping instead of getting plastic bags from stores. Lastly, it

should be also recommended to encourage reduction of citizens' material consumption and waste volume through a public information campaign.

<u>Recommendations for further evaluative research on environmental</u> education in Pokhara, Nepal.

Leeming et al. (1993) indicated the importance of assessing actual environmental behavior, instead of predictors of such behavior. This study also investigated attitudes toward waste management, which is one of the predictors, and subjects' self-reported perceptions of environmental education. Further research should investigate students' actual behavior regarding proper waste management and its relationship with their actual commitment. To assess actual behavior, it would be advisable to conduct direct observations of students' behavior. One example is Asch and Schore's (1975, as cited in Leeming et al, 1993) study, in which they conducted direct observation on students' environmental behavior during a four-day visit to a nature center.

It is also important to focus on differences between types of educational programs and teaching strategies by participant observations, and to conduct comparisons of their effectiveness on students' environmental behavior (Leeming et al, 1993, Borden and Schettino, 1979, and Bolscho, Rode, and Dempsey, 1998). These comparisons will identify the most effective educational programs and teaching strategies.

Lastly, in order to fully grasp the effectiveness of environmental education on students' environmental behavior change, it is highly recommended that comparisons be made between students without environmental education and those with such instruction in the same grade level. However, it might be difficult to find schools that

do not teach environmental education in the sixth to eighth grades, because it is a compulsory subject throughout Nepal.

APPENDICES

APPENDIX A

The Group-Administered Survey Instrument

This questionnaire is to know your honest opinions. And this is not a test. So, there are no right or wrong answers. Please do not write down your name, so I cannot find out who answers what. Again, this is not related to your class activities or grades.

Please read the following questions. Check one box for each question. Before you begin with question 1, please try the two sample questions.

Sample 1: I like to eat biscuits more than rice. Sample 2: I finish my homework before I have dinner.

PERCEPTIONS ABOUT ENVIRONMENTAL EDUCATION

	17.00% Th	0 ^{0/0} 10	2 ^{5%} 25	2 ^{0/0} 0	10 True don't know
A-1. It is interesting to learn about environment.					í n
A-2. Environmental education class is useful to be aware of environmental issues in Nepal					
A-3. Environmental education class is useful to be aware of environmental issues in Pokhara.			D		
A-4. Environmental education class has made me more aware of how people dispose of trash around my city.					
A-5. As a result of environmental education, I have changed how to dispose of trash					

ATTITUDE TOWARD WASTE MANAGEMENT

VERBAL COMMITMENT

	×.	20% Th	1017 NB	2 [%]	2 (N)	the True don't know
P.1. I would be willing to talk with my family	ſ	ſ	ſ	· ۲		
or friends about trash spread all over the city.						
B-2. I would be willing to dispose of different types of trash separately						
B-3. I would be willing to bring my own bag for shopping instead of getting a plastic bag at a store.					D	
B-4. I would be willing to reuse a plastic bag which I get from a store again and again						
B-5. When I buy a beverage, I would be willing to buy a glass bottle instead of a plastic bottle.						G
B-6. I would be willing to keep and reuse a plastic water bottle again and again.	Q	Ċ				
B-7. When I study, I would be willing to save paper or notebooks.						
B-8. If I have an opportunity, I would be willing to join a clean-up activitiy in my city.					ú	
B-9. When I eat a snack outside, I would be willing to find a trash can to throw away the wrapper of the snack instead of tossing it onto the ground.						
B-10. I would be willing to go to a public bathroom rather than urinating and defecating outside.						

ACTUAL COMMITMENT

	ç	10% r	e The	olo re	olo Lo	The on thom
C-1. I have talked with my family or friends about trash spread out all over the city			ې (م			
C-2. I dispose of trash separately depending on the type.						
C-3. I bring my own bag for shopping instead of getting a plastic bag from the store						
C-4. I reuse plastic bags which I get from stores again and again.						
C-5. When I buy a beverage, I prefer to buy a glass bottle instead of a plastic bottle.						
C-6. I keep and reuse a plastic water bottle again and again.						
C-7. When I study, I save paper or notebooks.						
C-8. I have participated in a clean-up activity in my city before.						
C-9. When I eat a snack outside, I try to find a trash can to throw away the wrapper of the snack instead of tossing it onto the gound		D				
C-10. I go to a public bathroom instead of urinating and defecating outside.						

<u>AFFECT</u>

	.(10% Th	00/0 (N	2°/0 00	solo of	True don't know
D-1. It is a problem that people throw away trash anywhere in the city, like into rivers			``) [
D-2. I get angry when people throw away trash into rivers or onto the ground all over the city.						
D-3. It makes me happy when people recycle used bottles, cans, and paper.						
D-4. I worry about the trash thrown away by people all over the city.						
D-5. The way I think and treat the trash has a large impact on the environment						
D-6. I feel that there is nothing I can do to clean up the city.						
D-7. I am worried about the effects of waste related pollution on my family and friends						
D-8. I am interested in how recycling works in Nepal.						
D-9. I do not care that people urinate and defecate anywhere around the city						
How old are you?						

G Female G Male

THANK YOU FOR ANSWERING THE QUESTIONS!!!

APPENDIX B

The Personal-Interview Instrument for Students

Perceptions of Environmental Education

- 1. How interesting is it to learn about environment?
- 2. How useful is environmental education to be aware of the various environmental issues in Nepal?
- 3. How useful is environmental education to be aware of the various environmental issues in Pokhara?
- 4. As a result of environmental education, how have you become more aware of the way people dispose of trash around your city?
- 5. As a result of environmental education, how have you changed your behaviors about how to dispose of trash?

Verbal and Actual Commitments to Proper waste management

- 1. Have you ever talked with your family or friends about trash spread all over the city?
- 2. How do you dispose of different types of trash?
- 3. When you go shopping, do you usually get plastic bags or bring your own bag to carry staff you buy?
- 4. How do you deal with plastic bags that you get from stores after you come home from shopping?
- 5. When you buy a beverage, do you prefer to buy plastic bottles or glass bottles?
- 6. How do you deal with plastic water bottles after you finish drinking water?
- 7. When you study, do you try not to waste paper or notebooks?
- 8. Have you ever participated in a clean-up activity at all?
- 9. When you eat snacks outside, where do you throw away the trash, like bags of the snacks?

10. When you feel like urinating and defecating outside, what do you do?

Feeling and value about Proper Waste Management

- 1. How do you feel when people throw away trash anywhere in the city, such as into rivers or around your neighbors?
- 2. How do you feel when people recycle used bottles, cans and paper?
- 3. Do you think the way you think of and treat trash has a large impact on the environment?
- 4. Do you think there is nothing you can do to clean up the city?
- 5. How worried are you about the effects of pollution caused by waste management on your family?
- 6. How interested are you in recycling in Nepal?
- 7. How do you feel when you see people urinating and defecating outside?

APPENDIX C

Personal Interview Instrument for Teachers

Perceptions of environmental education

1. How useful is environmental education to make students aware of the various environmental issues in entire Nepal?

- 2. How useful is environmental education to make students aware of the various environmental issues in Pokhara?
- 3. As a result of environmental education, how have students changed their behaviors toward waste management?
- 4. What are the strengths of the current environmental education curriculum?
- 5. What are the weaknesses of the current environmental education curriculum?
- 6. What kind of teacher training for environmental education do you have in the past?
- 7. Could you describe the current teacher training for environmental education?
- 8. Could you describe teaching guidelines and materials for environmental education provided to teachers?
- 9. What do you think are needed to improve environmental education?
- 10. What do you need for your own training for environmental education?

Verbal and Actual Commitments to Proper waste management

- 1. Have you ever talked with your family or friends about trash spread all over the city?
- 2. How do you dispose of different types of trash?
- 3. When you go shopping, do you usually get plastic bags or bring your own bag to carry staff you buy?
- 4. How do you deal with plastic bags that you get from stores after you come home from shopping?
- 5. When you buy a beverage, do you prefer to buy plastic bottles or glass bottles?

- 6. How do you deal with plastic water bottles after you finish drinking water?
- 7. When you study, do you try not to waste paper or notebooks?
- 8. Have you ever participated in a clean-up activity at all?
- 9. When you eat snacks outside, where do you throw away the trash, like bags of the snacks?
- 10. When you feel like urinating and defecating outside, what do you do?

Feeling and value about Proper Waste Management

- 1. How do you feel when people throw away trash anywhere in the city, such as into rivers or around your neighbors?
- 2. How do you feel when people recycle used bottles, cans and paper?
- 3. Do you think the way you think of and treat trash has a large impact on the environment?
- 4. Do you think there is nothing you can do to clean up the city?
- 5. How worried are you about the effects of pollution caused by waste management on your family?
- 6. How interested are you in recycling in Nepal?
- 7. How do you feel when you see people urinating and defecating outside?

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